UNITED STATES OF AMERICA

ENVIRONMENTAL PROTECTION AGENCY

NINTH CONFERENCE ON AIR QUALITY MODELING

EPA Auditorium
109 TW Alexander Drive

Research Triangle Park, NC

October 9, 2008

V O L U M E 1 OF 2

P A G E S 1 - 450

The above entitled meeting was called to order by Tyler J. Fox

PRESIDING OFFICER:

TYLER J. FOX
Group Leader
Air Quality Modeling Group (C439-01)
Office of Air Quality Planning and Standards
EPA
Research Triangle Park, NC 27711

A P P E A R A N C E S

Presiding: Tyler Fox, Leader, Air Quality Modeling Group, EPA

TABLE OF CONTENTS

Topic	Presenter	Page No.
Introduction and Opening Remarks	Tyler Fox Richard “Chet” Wayland	6
Clarification Memoranda	Roger Brode	39
National Air Toxics Assessment - 2002	Ted Palma	59
AERMOD Experiences Birmingham Area Particle Study	Leigh Bacon	79
Photochemical Grid Models for NEPA	Ralph Norris	96
Use of Gridded Met Data	Bret Anderson	108
MM5 to AERMOD Tool Implementation	Roger Brode	110
Mesoscale Model Data Reformatted Program	Herman Wong	123
Questions	Audience	132
Lunch Recess		142
AERMOD Implementation Work Group	Randy Robinson	143
AERMOD Update	Roger Brode	187
AERSCREEN Update	James Thurman	192
AERMIC Update	Roger Brode	204
Questions	Audience	218
CALPUFF Status/Update EPA’s Perspective	Tyler Fox	238

TABLE OF CONTENTS

(Continued)

Topic	Presenter	Page No.
Overview CALPUFF VISTAS Version	Roger Brode	253
CALPUFF Chemistry Improvements	Prakash Karamchandani	274
CALPUFF Development, Maintenance & Evaluation	Joe Scire	288

The following NINTH CONFERENCEE ON AIR QUALITY MODELING, was held at the United States Environmental Protection Agency, Building C, Auditorium C-111, Research Triangle Park, North Carolina, and was transcribed by, Judy D Hall, Transcriptionist, Quality Staffing, Cary, NC on Thursday, October 9, 2008, commencing at 8:00 a.m.

Tyler Fox: All right, I think we're ready to start. Imagine that -- on time! I want to welcome everybody to our nice and lovely EPA facility here in RTP, North Carolina. We've got quite a bit in two days in store for you. We appreciate the attendance and hope your trip here was not very eventful and hope your time here is eventful. We do have a lot in store and let's start with introductory remarks from Chet Wayland, our Division Director.

Chet Wayland: Thank you Tyler and I would like to echo Tyler's welcome to everybody here. I will tell you and Tyler may go into more detail. There may be a fire alarm sometime today. We're not sure. It's Fire Prevention Week and there's a vicious rumor there will be a fire alarm. If there is, it's not a big deal. Everything can stay in the room so far as your laptop as it's a secure building. We all will just go out to the Visitor's Parking lot and they'll call us back in. But we'll keep our fingers crossed that they will do it tomorrow and not today. There is a vicious rumor going around the office that it may come today. Anyway, a lot of you may have heard there's been a lot of change in EPA in the past three years. We had reorganization and a lot has happened since the last modeling conference. I believe the last conference was Tyler's first as a group leader for the modeling group. For me, this is my first modeling conference as the division director of Air Quality Assessment Division. It's not a new area for me, however; I started in EPA back in 1991 in the Air Quality Modeling Group under Joe Tikvart and I think everybody in the modeling group has ties to Joe. I learned a lot under Joe and a lot of what I'm trying to do with the group today with the modeling in particular goes back to those days. Some people may groan at that and some people may cheer depending on what your opinion was of Joe, but I learned a lot under Joe and I appreciate the guidance he gave me as a young staff person. But one of the things -- it's one of our first conferences where we have AERMOD, the new regulatory model. Not only AERMOD, but we have CALPUFF as well. One of the things I learned back in my early days was that it's most important when we're talking about air quality modeling is the integrity of the model. These models are used for a variety of purposes and scientific integrity is something that is very important in how we use these models and we can't do that necessarily alone with just EPA. I think the modeling group right now is one of the best groups of people we've had in years, except when I was in there, of course. It really is a great group of individuals and it's a lot of young talents who are striving to make sure we have the best models that we have for folks to use. Modeling is not something that's done just for EPA. It's a modeling community. One of the things I appreciate about the 9th Modeling Conference and the modeling conferences in the past is that it's an opportunity for people to get together and share their ideas and talk about how we can make things work. In the old days when we were gearing up for ISC, we were a beginning process and people were working together collaboratively to see how we can make this model work and how do we use this, how do we make it better. We developed a Modeling Clearinghouse which is a great vehicle for sharing information. What happened over time, however, is that we all got comfortable with that process. We all said we've been running ISC for years and we know how to do this and not communicating how to use this application. I don't think I need to tell anybody how I'm doing this. I think we have been creating some problems. To be quite honest with you, over time we've had not rogue models out there running around but we've had rogue applications where they may be perfectly legitimate but nobody else knew what was going on because the Clearinghouse was not being used. We were not communicating like we were. When we started developing AERMOD, we had a lot of communication initially on the development and production, but now we need to continue that aspect. One of the things I want to stress at this workshop as well as stress to Tyler's folks in my division is that we cannot do this alone. We have to have open communication with the modeling community and with the regulatory community about how these models are used. Not only are we battling with one model now that we have AERMOD, we have CALPUFF as well and we can't have models out there kind of being used haphazardly because what that does is it creates problems for the regulatory side as the scientific side. So one of the things I want to institute as a new division director in this division is getting back with the integrity that we once had with these models. And that doesn't mean that EPA sits up here and says okay we know the answer and this is how you do this and everybody else just has to follow along. That's absolutely the wrong way to do it. It's a collaborative effort and we have to sit here together as a community be it private, public, research, academia, or whatever and talk about what is the best method to move science forward in these models and what's the best way to use the applications of these models and we need input. It has to be a collaborative process and if someone does discover issues with the models that it is sent back to the Clearinghouse. If someone wants to use the model in a way that is different that has been approved, that goes through the Clearinghouse so that everybody is aware of it, so that when that instance comes up again, it's not something new -- it's something that has been documented and vetted through the community. And I really want to strive to push us back into that mode. It's not a burdensome mode; it's a positive mode. Yeah, it takes a little more effort to run something through the Clearinghouse, but it saves us months and months and even years of work down the road when it has been vetted through the community. So I'm really excited about where we're going with the Clearing house. We're re-energizing it and getting back into using it. I'm excited about where we are with the two models. One of the things we've seen from the regulatory perspective is that AERMOD Model is much more complicated than ISC and as a result we're running into all kinds of issues on how it's being used. Some of it is issues that people just don't understand it yet. They haven't had the familiarity with AERMOD that they've had with ISC and so they're making a mistake as to how they are applying it or they may not understand the input properly. Those things will be worked out in time, but we need to work as a community to share those things with those things within the state and local agencies and make sure they understand how to use this model. It's an extremely powerful tool and it has numerous applications, but we need to make sure we're following the guidelines that we've laid out as to how these models should be used. And as people make changes to these models they need to go through the full vetting process so that everybody is aware of what is going on and how they can be used. I think it's an exciting time to be in the air quality modeling field. When I was here in the early nineties with this group, we were just starting the photochemical regulatory aspects and it was really exciting to be there on the cutting edge and say let's look at how we can use these new models. We are on the cutting edge again and we've got brand new models out there and we have old models that we have revamped and are trying to use and I think what we're seeing is a revitalization as far as the new modeling goes. We all became somewhat lax over the years because it was turn the crank and do the modeling. We're now seeing now that we have better tools and we're also seeing new applications from people asking if they can use AERMOD for this or that and we have to say we're not sure. We need to look at it and evaluate it and test it to see if it applies in that particular situation. We've got forces that we didn't have to deal with in the past and we had ozone exceedances in Wyoming which is something that we never had to deal with back in the nineties. So we've got cases where we are looking for new environmental issues and I think we have the tools but we need to make sure those tools are applied properly. It was funny last night as I was sitting on the runway in Philadelphia trying to get home and they pulled us away from the gate and said the wind has shifted and they're now going to send us off on the other runway in the opposite direction and there will be about a forty- five minute delay. Then in about a minute and thirty seconds they came on and said the wind shifted again and we're going off on another runway and there will be another delay. This went on for about an hour and a half, and I thought what a great omen for the modeling conference if the wind can change that fast and they shift thirty or forty airplanes around like that. But I do think change is something we all have to deal with, and as I was sitting on the plane talking to folks about it with folks about it everybody was gripping about this and that. One guy sitting behind me said wind changes and things change and you just have to deal with it and in the modeling world we have to do the same thing. Five years, ten years from now we may be dealing with different models or dealing with revised versions of the current models. We may be dealing with new problems but the key to all of this is working together. When I came into this job two years ago, my fundamental goal was to be a collaborative organization and not to work in silence and not to work in a vacuum. We cannot solve all the problems by ourselves in this division in this modeling group. We need your expertise. We need your input and we value that input and we need to be sure we have this process. One of the reasons this modeling conference was set up was to bring these folks together every two years or so to talk about these issues. But it can't just be when we're here. It has to be throughout the year so I encourage you to get involved and use the Clearinghouse when you have that opportunity or you have that need to do so. Get involved with work groups in passing information back to Tyler and his folks. That's the only way we're going to solve problems and move modeling forward. It's a complex issue as you all know and it's not something EPA can do all by itself. I really appreciate you being here and taking the time to come and I hope this won't be a one time deal where you come and relay your information here. This needs to be an ongoing process and I would also ask for some patience since you guys know when you work for the government you have certain rules and requirements we have to deal with. We have the regulatory process we have to go through. It may be burdensome and it may take time but it is what it is and we have to deal with that and I respect that process. I don't always agree with everything we have to do, but I respect that process. Therefore, we may not get to something as fast as you would like and it can't be changed overnight. But it's not for lack of trying to make things better. It's just that we have to deal with the processes as they are and sometimes that process is bureaucratic in nature, but that shouldn't discourage us from bringing new ideas forward and trying to work together as a community. I've looked over the agenda and it looks to be a very packed agenda with a lot of information. I think you guys are going to have a great conference and I think it's going to be a busy meeting in seeing everything you have to do. Unfortunately, I can't be here this morning, but I would trade places with any of you because I have to go to the dentist right after this. If anyone would like to swap with me and do that instead that would be great. But I do plan to get back here this afternoon and tomorrow as well. Again, I thank you for coming for what you bring to the modeling community and to the modeling program is invaluable. Your expertise, your years of knowledge, your insight into looking at things from a different perspective are all critical to the process. I'm very pleased with the staff that I have in this division to work on modeling and I think they are exceptional people. They are open to suggestions and they are open to getting feedback and I encourage folks to provide that information and use this opportunity to talk about these ideas. It is up to all of us to communicate. We will communicate with you but we would also expect and hope that you will also communicate back to us and provide insight. And so with that I hope you have a wonderful meeting. I'm looking forward to working with all of you for the next several years in my new position. I think it's going to be a great partnership and I think this conference is going to be a good start to a new personal relationship for me that we can continue for years to come. Thank you very much and have a great conference.

Tyler Fox: Thank you Chet for your remarks and also for providing us with a very good contact that we will have over in the next two days and beyond. As you can see Chet's not only familiar with our program but we benefit greatly from his support within the division and it's very good to have Chet leading us into the future. Now, I get the job of going through some of the logistics but before I get into that I had an opportunity to talk with Joe Tikvart a few weeks back and I was mentioning all the things that are going on and as Chet was talking about all the changes. Joe looked at me and smiled and mentioned that he was thankful that it was my job now rather than his. But he said the more things change the more things stay the same. And even though in some cases the names and faces will change the issues we confront, as Chet was pointing out, the way we had done things in the past and the issues that we confronted then are really the same situation we face today. And I think we need to look to the past and as you can see we are trying to reinstitute new things such as Chet mentioned the Model Clearing House that we will get into shortly in trying to bring back some of the ways we did things in the past. For one reason or another we kind of lost our way on that. We need to clarify what our roles and responsibilities and the ability to use that as a template or blueprint to work on those things now. As Chet said, it's only going to get more challenging which will make it more interesting for all of us in terms of these models, modeling science, and these challenges I think are opportunities that our air quality program brings us into the future. Let's turn to some of the logistics and formalities before we start. First I would like for all of us to thank and recognize Peter Eckhoff for doing all the logistics and administrative stuff. If we could just give him a hand. Applause. We greatly benefit from the accommodations and all the set up and the like. I have asked Peter to walk through the surroundings and the like. As Chet said, knock on wood that we don't have a fire drill. If we do, we would go upstairs and out to the visitor's lot. In your public comment you can say never ever again hold the conference in RTP.

Peter Eckhoff: Why they want to hold a fire drill when there's a chance of rain I'm not sure...especially with the conference here and with a bunch of ninth graders coming in too. Are they joining us? No they're not. In case the fire alarm goes off, they will announce it and say there's been an emergency. We will file out the exits here and go upstairs and out the main doors you all came in and into the visitor's parking lot on the other side of the flag pole. Let's see what else. We have some amenities here. For those of you who may want internet access. There are five terminals up in the library at the top of the stairs and to your right. As a matter of fact we have an excellent library. Outside the doors here is a Cafe, and they are open from 6:30 am to 10:00 am and from 11:00 am to 2:00 pm. They have grilled sandwiches, hot food, and its good food. The restrooms are on the other side of the stairs. Just go down past the phones and there will be a narrow hall off to the left and the men and ladies restrooms are on the left. If you go past the elevators you will be stopped by a guard so just turn around and go back and take a right. We're in the age of electronics and this is my electronic lease. If you need to get hold of me my number is 672-6533. The emergency telephone number here is 541-2900 and Edna is our group secretary and her number is 541-5561. Around noon time we'll break for an hour. We have a nice trail and it takes about an hour to walk around. It's out these back doors but you will probably need somebody with you who has an EPA or Federal badge in order to get back inside or you will have to walk all the way around. If you want us to recommend a few area restaurants just let us know. Judy Hall is going to be our conference recorder. Judy raise your hand. If you are like me spelling last names and sometimes first names is a challenge. I've forgiven a lot of people because I know how they have spelled my name. Apparently there are about three or four dozen ways to spell it. Up the stairs and behind the guard's desk there's a gift shop with cards, sodas, coffee and some local newspapers. Anyway I think that's about it. Oh yeah, we have three wireless mikes in the aisle here and they feed into our speakers here and Judy has a recording device on her table picking up our conference. So if you go to ask a question the person nearest the mike just bring it over to the person with the question. There is a button on the front of it and I think they all say on. The other thing is the lighting. This is fairly dim. Is this good for you? It that better? We'll go with this one. Okay.

Tyler Fox: Thanks Pete. And the store upstairs is open until 3:00 and you can find a variety of things such as snacks and the like. Like Pete said your movements will be restricted by guards around the facility but don't hesitate to ask one of us if you have any questions. I have a couple of things I would like to take care of before we move into the first session. One is we have a number of the regional office folks here and if you could all stand up and introduce yourself and let everybody know who you are that would be great. Randy Robinson, Region 5. (inaudible) Thank you guys and as Chet was saying we cannot do it all ourselves and that goes for the program offices as well. If not for the modeling offices in the region and their expertise we wouldn't be successful here. We continue to rely on them and you should as well. We also have folks in my group here and to be fair if you could stand up. We don't have everyone obviously, but go ahead and introduce yourself . Roger Brode, James Thurman, Pete Eckhoff. Later on you will probably see Karen Wesson who has worked a lot on AERMOD and Kirk Baker who is doing a lot on the photo chemical models will be joining us as well. Now, let me go through some of the ground rules and then we can go ahead and start and I'll walk through the agenda. Everybody should have gotten a final agenda out there as we made a few changes today. We'll be starting with the Appendix W Refresher and you'll see presentations in the time and minutes allotted. What we would like to do is have the presenters present in the session and then we'll open the questions and answers afterwards. That way we can try and keep our time here to about fifteen to twenty minutes after each session. If you can't resist the temptation and you really have to ask a question feel free to write it down, pass it up, and we'll keep it on the front and we'll make sure that question gets asked. Also recognize that we won't be able to address everything here and now but the docket is open and you're able to provide public comment for another month following this conference. If you don't think of something and don't ask the question, you can always make comments through that process and we will take it into account as we move forward. In some of the sessions, we will have introductions by either by me or other folks. Hopefully that will provide an appropriate context for you as you will see that what we're talking about here as it relates to the discussions we had in the 8th Modeling Conference and hopefully you will see both the progress and the issues we are facing and that we need your input on your ideas and thoughts as well. Let me make sure we have got everything. The only other thing is that if anybody was not able to get to Pete or myself about a public presentation for tomorrow afternoon please catch us in the break or sometime before tomorrow at noon. We'll get you on the agenda and get you all set up. The public session is from 2:00 on tomorrow afternoon. We've already got about two hours or so scheduled from the public in terms of those presentations. We try and limit everybody to about ten minutes. You can go over and request more time if necessary but in order to fit everybody in we are trying to limit it to that. There is some availability for someone if there's a need or desire to do so. Obviously after the conference maybe early next week we'll get all the presentations up and available to the public. Recognizing that this is a public meeting we are having it recorded and having a transcript submitted to the docket and made available as well. Please be aware that it will be made available to the public so anything that you don't want to reveal to the public you probably shouldn't say it here or submit it in your comments as this is all an open process. With that, we'll go ahead and start. I'll hand the beginning session off to myself. I was hoping I could hand it off to somebody else. Enjoy the dentist.

The first session and the objectives here following what Chet said let's remind us of the processes and structure we have in place and make sure we are effectively using it and are letting you know of the efforts the EPA has taken on and the efforts you have made here. It takes a community and obviously we want to and encourage you to participate in this and hopefully you'll have a better idea of the processes in place and your role and hopefully we can have some discussions afterwards. In case you didn't know. Of course those of you at the 8th Modeling Conference may remember that I ask you to go on a fancy ride with me because at the time AERMOD was not promulgated and I just ask all of you to pretend as if it would and it was. I promised you that it would and it was as of November, 2005 and was published in the Federal Registry on December 9, 2005 we had the one year grandfather period where you could in the transition use the ISC or AERMOD. But as of December 9, 2006, AERMOD was promulgated and replaced the ISC3. There is a new Appendix W available as I said and is published and there's a copy on SCRAM and for more information about the modeling system and the code itself and the documentation. Again it's available on SCRAM. We've taken a lot of effort to update SCRAM and hope to make it more successful. We hope you will take your time to go there and utilize the information that we're trying to make available to you all. Back to the here and now I'm going to reflect back on what we said that our vision was and the elements we expect from the 8th Modeling Conference. I'll walk through the things that we have been doing so that you are aware of them and put them in the context of response here. And as I said hand it off to Roger to talk about clarification memos something that we're trying to start a more broader guidance and information to all. And then I'll come back and stress the importance of some of the processes as we move forward. For those of you here who were at the 8th Modeling Conference remember what I said about being new and what we wanted to do is kind of challenge the status quo and question the status quo and what we're doing. I think we would all agree we were in a situation where the system was leading us rather than us leading the system. So with the help of a number of folks in the group what we wanted to do is restate what our mission was and obviously to lead and promote collaborative efforts in this field to improve source culpabilities as you will see later on in a number of discussions especially with the non-guideline discussions. We've gone beyond that. Of course Chet mentioned these models are relevant and appropriate for use outside of permitting and supervision and we're looking into that and there will be some presentations on that as well.

As part of that you've got to have some focal points and there are four elements that we stress. I'll mention two that I think are particularly relevant here as we talk about process and look at the things we've been doing

The first element is to foster a collaborative environment aimed at strengthening our expertise and working relationships not just within EPA, but across the Federal agencies, and scientific community to reestablish the leadership role that we have and to promote best science and evaluation methods. Chet mentioned integrity and that's really what this is all about. That spans just not in the application models that's in the Appendix W but broadly speaking as folks in my group and our division support air quality programs broadly.

The fourth element that relates here is to promote a community approach to model development and acceptance that promotes the best use of science continued improvement in modeling science and data but make it timely in terms of use in regulatory arena. I hope you'll see some of the things that we've done to promote that as well.

Soon after the 8th Modeling Conference there was a lot of discussion and the regional office presented two recommendations to our the Air Division Directors: One related to the need for OAQPS to enhance its expertise regarding this new generation and the next generation of near-field models. The other related to accelerating the reinstatement of an active and effective model clearinghouse to bring that expertise the permitting and SIP applications. We have responded since then and in fact are working on a number of things prior to that responded well to these things.

Let me walk you through a couple of those to illustrate and hopefully to inform you of where we are. I'll start where we are with the AERMOD modeling systems. Obviously a new model we're going to have implementation issues. You'll know that back in the 8th Modeling Conference (inaudible) Al Cimorelli did a presentation on the AERMOD Implementation Workgroup. We are relying on this workgroup to effectively guide OAQPS through the implementation issues so that we can effectively identify and resolve them for the betterment of the model and for your benefit. That part of the process will engage collaboratively with the regional, state and local folks and bring those issues to light and make sure we are coordinating and prioritizing the things that we do in terms of improving that model to meet the needs that you have. On the other side we've got AERMIC and some of you will recall that AERMIC was the committee that brought us AERMOD thankfully. They originally formed in 1991 and charged to develop replacement for ISCST at the time. Their efforts resulted in the promulgation of AERMOD.

What we're looking to do with AERMIC is to address the scientific aspects of the model and make sure they work in partnership with us and the AERMOD implementation work group to identify scientific aspects and other items within the model that really need to be addressed separately and perHAPS take more time. Maybe even be seen more in a research mode and then do that work and feed it into the process throughout the AERMOD implementation work group so that we balance both the implantation issues and the scientific issues related to the model and have both those entities working in tandem and in support of the model and in support of you and across the modeling community.

Just to highlight the fact and we'll hear more in the

AERMOD session but this new committee met in RTP during March and in July as well. So there have been two separate meetings and they have been very effective. What we've got is a new membership that really consists of the members from before that are in the public or EPA arena. Co-chaired by Roger Brode and Jeff Weil. Then we have Akula Venkatram, UC-Riverside, Al Cimorelli, Region 3, Bret Anderson, Region 7 and Vlad Isakov, who works in our research and development. Right now we've got the basis for a more community style not totally but at least bringing the community together to work on these scientific issues. We'll hear more about the work group later in the AERMOD session from Randy. So that relates to AERMOD and the way we are trying to be proactive in managing and working through these issues.

We also have CALPUFF and we have an update process there and it's our responsibility to perform an independent assessment of CALPUFF when updating to new versions and responding to new issues and any other types of changes in the model that need to be brought into the EPA approved version. Obviously the complexity of CALPUFF requires a pretty extensive assessment and understanding of changes to interpret these changes and to provide you and you in the public arena the confidence in that model as it is applied under Appendix W. And consistently with UARG these approvals are made by EPA.

What we did is we developed a CALPUFF update tool and protocol that was introduced by (inaudible) Desmond Bailey and Roger Brode at the 8th Modeling Conference. We have actually applied that tool. What it does and again you'll hear a little more about this in the CALPUFF session. It basically compares two versions of the model 1 proposed a new version (beta) and the current regulatory version (base.) It looks at the differences across 10 preset scenarios. Those scenarios were defined preciously and touched upon but certainly available through a number of presentations and include a variety of different domains and situations to be able to test the model. Again to the best of our ability given those available (inaudible) scenarios. It provides a consistent and standardized approach or methodology for assessing the and then being able to interpret those so that when we update the model in that very clear and transparent process and provide that documentation through SCRAM to you and the public. You can have the understanding that we did and the confidence in those applications.

We have successfully applied this tool as part of two updates: One was from the original Version 5.7 to 5.711a back in Dec 2005. Then more recently we engaged quite a bit with the model developer and folks at Vistas who were very thankful to, given some of the issues that were brought up in the (inaudible) process in the application of CALPUFF there. We looked at updating the Version from 5.711a to 5.8 on June 2007 and you'll hear quite a bit more about this in the afternoon session about CALPUFF.

The other thing I would like to remind folks about is that we have annual regional, state and local workshops. In fact Appendix W refers to these and they are critically important in terms of providing the type of interactions and gaining the input and providing information to regional, state and local agencies. So it allows us to provide clarification on the models and ensure consistency throughout to clarify the intent of the guidance. Again showing consistency. You can see throughout here it is really meant to make sure we have a proper and communication flow and an avenue by which we can discuss these things. It's extremely important and has been very valuable over the past three years or four years or so as we have been engaging in these new models. Giving a little history here we had our 2008 workshop back in June in Denver. Just an FYI it was our 30th workshop. We've been at this for a long time since 1978 ... we skipped one year. The attendance there is limited to EPA, OAQPS folks or broadly EPA and regional office folks. That was really the focus at the beginning. Now we also include state and local agencies. They are a critical part if not the most critical part of these workshops in terms of getting information out and getting information in to us. In Denver we had about 90 total folks. As you can see we had representation from 10 EPA Regional Offices, 29 States, 5 local agencies, and as well as FLMs Since 2005 we've made all the presentations available on SCRAM so you can go to the appropriate place in SCRAM and find the modeling conferences and find each individual workshop and access the agenda from each and those presentations are available in PDF form. It's another way in which you all can benefit from the information that's communicated here, it is all publically available. There's nothing presented here for the most part that is not been made available to the public. Again it is critical. In past discussion and I think we brought this up in the workshop. I think Joe Tikvart once said if you are not checking SCRAM on a daily basis or weekly basis you are not in the know. That's definitely back in vogue here because we're using it and trying to use it effectively to get information out. That's another processing and way in which we ensure communication and coordination and ultimately collaboration is through these workshops.

Now you heard Chet mention the Clearing House quite a bit and the Regional Offices mentioned that we needed to have an active and effective Clearing House. For one reason or another because we got comfortable with the situation that we were dealing with we stopped using the Clearing House. We didn't maintain it and we had some loss in key staff and the like. We forgot how valuable this mechanism is. And it is an effective mechanism by which the Regional Offices can get our program offices current on implementation issues related to modeling under the modeling guidelines. And it is actually referred to under Appendix W here appropriate venue and avenue by which that can be accomplished. It is a formal part of the language we used to work and a formal part obviously how we work now and in the future. The goals are clearly to promote national consistency and make sure that we can engage in a timely way to advise folks in terms of the interpretation of guidance. Again as issues arise, the clearing house is really focused on individual (inaudible) specific situations. We don't necessarily handle generic or broad issue necessarily. Although they are taken into consideration and flow into the process and actually Roger will touch on the clarification memo to get at the more general broad issues. It will definitely minimize the bad precedents that may get set. It allows us to engaged early in the process on these issues and the memoranda provides critical support to the regional, state and local agencies and you all in terms of the interpretation and can in fact be used in some legal proceedings and the like to provide the necessary justification and cover for the modeling that we've done in support of particular actions. It does put both a buffer around certain things so that it is clearly understood why that approach was taken in that circumstance. On the other side of the coin if you have a situation similar to that you can apply and look to these things as a way to more easily and more quickly do what you need to do because you've got a good precedent in that case of being able to follow. Now in the end it allows to inform the development guidance ultimately through the process of consensus building.

Now in terms of the operation of the clearing house, technical issues are the focus so modeling issues are the focus of the clearing house. Obviously there have been policy issues and other things and sometimes it's hard to distinguish technical and policy issues but we are really trying to focus on the technical model issues to be handled by our group OAQPS and other technical experts and provide review by the policy staff as part of that process. If Policy issues come through or if policy issues come up in discussion, those would be submitted to the clearing house but hopefully will have had communication so that they will be referred to our new source review group headed by Roger (inaudible) and that is in our Air Quality Policy Division so you could and should expect a response in that case from Bill Harnett and his division. The new source review group would be the group responsible and Roge (inaudible) is the group leader. And we would provide technical support and input as appropriate. As has as come up recently and requested by our policy division and unlike past process, we can have situations where our response or memo will be reviewed by OGC. Given some of the situations going on in court and other types of things and for our own protection as well. In terms of interpreting Appendix W and the likes having that type of review, we hope to have that review handled in a timely manner.

Now the process so that you know. Its specific actions the state will contact the region. It's a formal process and the region writes a memo to us with a clear statement of the issue, their recommended approach and a justification of that approach. That would again be submitted formally to the Clearing House. We will facilitate the solutions and write a formal response. And again we would be providing that response memo format back and then we'll summarize and archive these decisions in a searchable database MCHISRS which I'll talk about through SCRAM and there are some important updates there for you to know about. And we would present a summary of actions and the like and discuss those at our workshop and have an annual report as well consistent with past practices to get back to the way we did things before. And out of that we would obviously we would be able to develop guidance as appropriate being aware of these issues and aware of the solutions and other types of things that people are working through and those could take the form of a policy memo for a report or rule making if necessary.

So let me touch on MCHISRS quickly

Our old system you may be familiar with or you may not be familiar with because it was only accessible to epa.gov folks. Formal memos and MICHISRS records were separate on SCRAM. The new system as of May, 2007, allows full public access as to the database. So you can search and find this material. We've linked the records with both the requesting memo from the regional office and our response. So they are paired so you can see what we are responding to. To the extent possible, we will make available supporting documentation if that was available. Once again it is searchable by topic. I'll show you a slide in a minute and show you some of the fields and I urge you to go and check it out. We are still in the process of cleaning things up and making sure we've got all the records there and they include some informal records. Previously we had formal and informal records and what we're doing is going about the process of cleaning out some of the informal records that really aren't as useful as one might think and focus on the formal records. If we don't have the type of documentation we need in electronic form that we need in going back and make that available. Transparency and full disclosure, availability of information supporting the type of communication we need on these issues.

Here's a screen shot of SCRAM with the Modeling Clearing House. You can access the Clearing House through here. Also the clarification memo section that Roger will be talking about in a moment is also accessible through here. Then it's a very easy online search here. The system is a nice compliment to the system I believe that region 7 or 8 has on the policy side here. We actually have a link and I don't think you can see it. Actually you do. Its region 7 and a guidance database there at the bottom. That really is the storage place for a lot of the policy type memos and the like.

At this point I'm going to hand this off to Roger and allow him to go through the process and define for you what the clarification memos are. Again it's pretty important from a general perspective how the Clearing House will handle specific items. But in order to engage in this area of new models and the like. A lot of the issues that require us to not reinterpret Appendix W but to clarify Appendix W for all of you so that we're working consistently

Roger Brode: Thank you Tyler. I'll try to clarify what clarification memoranda is all about? First let's talk about what the role of these memoranda is from our perspective and talk about the process that we set up to go through and generate these memoranda as needed. Then maybe review some of the references in Appendix W that Tyler has already shown you in terms of regional workshop as far as need to clarify guidance or the intent of guidance and consistency in application of guidance. Then remind you or mention the two who have mentioned already and make you aware of some pending issues or particular issues that we are looking at that may result in clarification memos sometime in the future.

So the role of these memos is basically trying to address issues that arise and have broad implications.

They're not coming up in the context of specific permit application which would go through the Model Clearing House process that Tyler has just presented. They are intended to serve as reminders or clarification in response to new issues that might arise. We have a new model out there and new issues have come up and we need to clarify what the intent of guidance is in relation to that issue or concerns that Appendix We might not be followed in some cases. Again the intent is to foster consistency in the application of Appendix W guidance. So these issues that are addressed through these clarification memos may be things that come up through our ongoing OAQPS assessments or through regular interaction we have with regional office modeling contacts. We have monthly calls with regional offices. In terms of process, we have an internal review process so before a clarification memo goes out it certainly goes through internal review from our group and our division. Chet Wayland being the director spoke to you at the beginning of the day. And as needed go through Air Quality Policy Division Office of General Council (OGC) depending on the nature of the memo and the potential impact that it may have. We also have so far gone through review by Regional Office modeling contacts as we have identified issues and drafts of these memoranda so they are involved in that process as well. So they are typically issued as a memo to Regional Offices either through modeling contacts directly or in some case to the Air Division Directors in each region depending on the magnitude of the issue or the scope of the impact and also distributed on SCRAM. So if a new memo is released you will see it on the recent additions under SCRAM website and also archived on the SCRAM web page. As you can see under the permit modeling guidance down at the bottom under the Appendix W guidance there's a link for clarification memos and that's the memo clarification page which shows includes the two that have already been issued. I won't go into too much detail. Tyler showed you some of this in the presentation showing the Clearing House as far as process. There are several places in Appendix W that discusses the need to clarify guidance in some cases and the importance of consistency in the application of guidance. So I won't go through these in too much detail as all of you all are familiar with Appendix W... I'm sure. Here are the two that have already been issued. The first once that came out was addressed in the regulatory status of proprietary versions of AERMOD and was issued in December of 2007. That was motivated in response to frequent questions regarding the status of parallelized versions of AERMOD. AIRMET did a great job in designing the technical aspects of AERMOD model but one of the issues we have gotten feedback on is that AERMOD is too slow. Our response to that is that a number of third party vendors have developed a faster version of it. But given that they are proprietary products the question came up what is their status. Appendix W clearly addresses that in many places and we issued a memo to clarify that a preferred model cannot be proprietary. We laid out what requirements would need to be met in order for these proprietary products to be used in a permanent application.

The second one that came up more recently addresses the regulatory status of CALPUFF modeling system for a near field application. That was motivated by concerns that Appendix W guidance might not being followed in all cases and also some technical issues and concerns that have started to come up.

I'll just say something briefly about the clarification memo for CALPUFF. We'll be talking about that this afternoon in the CALPUFF session. One main point EPA preferred model for near-field regulatory applications is AERMOD as 2006 the guideline does refer to CALPUFF as an option that may be considered on a case-by-case basis as an alternative model for near-field applications involving complex winds. So if (inaudible) characteristics in the wind fields are crucial to determine the wind values, that might be a situation where AERMOD may not be appropriate and CALPUFF may be appropriate since it's a (inaudible) puff model. This is subject to approval by reviewing authority and subject to requirements in paragraph 3.2.2(e) of Appendix W, when there is no preferred model or where another model is considered more appropriate. So those are the main points and some supporting information has been issued in a staff memorandum regarding technical issues related to CALPUFF near-field applications posted on SCRAM on September 26, 2008.

Also I want to take this opportunity to let you know about a couple of issues that are sort of pending. Potential issues we are currently looking at are addressed in some ways through this clarification memo. One has to do with the use of ASOS vs. observer-based National Weather Service data with AERMOD and treatment of missing airport data in AERMOD.

The implementation of EPA formula for Good Engineering Practice (GEP) stack height in AERMOD which includes prime downwash. It's an issue triggered by the fact that implementation relates to the prime downwash output. I'll say a little bit about each of these. The one about the airport data and AERMOD. Here is some background information related to that. One is that the AERMOD requirements for data completeness differ from ISCST3, which required 100% completeness under regulatory default option. AERMOD doesn't impose that requirement in its design and that wasn't an oversight. That was intentional.

Also over ten years ago there was a sensitivity study done the sensitivity of the ISCST3 model to ASOS vs. observer-based data from airports. There were some concerns at the time. We knew that the automated surface observing systems being put in airports had limitations in terms of the cloud cover. It only went up to 12,000 feet so if it was overcast at 16,000 it would show up as clear below 12,000 feet. Quite a difference between clear and overcast in terms of (inaudible) stability so we need to understand what impact might that have on our modeling programs. Sensitivity analysis was conducted with ISC and there were certainly some sensitivities that were found at the time. For ISC generally if there was a significant difference, the difference was that using ASOS data produced higher concentrations than using observant based data. That might be okay for us but not as good for you. At least it wasn't something that required us to say no you can't use it. So it was kind of left a little vague case by case. I acknowledge there may be cases where ASOS data might not be appropriate but we're not going to say no. The question has come up and been out there for a while. Well, how is AERMOD going to respond in that same situation? Partly through the activities of the AERMOD implementation workgroup and some assistance from contractors, we (inaudible) conducted that analysis with AERMOD and actually found that AERMOD due to some formulations in AERMOD that it is less sensitive especially to that cloud cover issue. So that's good news. We're better off with AERMOD than

ISC in regard to that. So it would be good to get that information out there and clarify that. And we'll hear more about that this afternoon. Another important issue that's arisen is with the advent of ASOS is with the Missing NWS data more extensive with advent of ASOS these automotive surface observing systems and also the adoption of the METAR standard for reporting airport data. We've seen a lot more missing data than we did in the early 90's or earlier than that. So that's a new issue that's come up within the modeling community. Missing airport data was pretty rare when ISC required 100% data capture so it wasn't that big of a deal but today missing data is not that rare with ASOS and METAR. Basically METAR introduced a new variable wind code which means when the wind direction is variable we don't know what is missing but the wind speed is not missing and not calm. We need to address how this is being handled. We're finding out this is being addressed differently in different agencies and so on. We need to try and clarify that but also introduces an option that we are looking at which is to potentially use another data archive (inaudible) set because the one minute ASOS wind data. It turns out right now we're using a single 2-minute average reported sometime before the hour. That's our standard weather observation for the model if that single 2-minute average is calm the hour is treated as calm and so on. But there's actually archive that are publically available that has 2-minute averages reported every minute. So we actually have 60 overlapping values and we're looking at utilizing that as an additional resource to supplement the standard observations that could drastically reduce the calm and missing winds in the airport records.

The second one I'll give you some background on. I probably should have gone to the gift shop and gotten a bottle of water. But anyway it has to do with the implementation of GEP formula height in AERMOD and this is actually where AERMOD turns currently turns off building downwash effects if stack height is greater than or equal to EPA formula for GEP formula height. The formula is Hgep. Hgep = Hb + 1.5L, where Hb = building height above stack base and L = lesser of building height and projected width. I'm sure most of you are familiar with this.

AERMOD implementation is consistent with all previous versions of AERMOD and all previous versions of ISC including ISC5. What's happened is that we've seen significant discontinuities in AERMOD impacts have been noted for stacks that straddle that formula height so the stack just above gets no downwash effect much lower concentration on the stack just below. We're talking millimeters difference. Could have a much higher concentration in orders of magnitude in some cases. That's a little bit unsettling. Turns out this issue was actually presented as a comment at the 7th Modeling Conference and it was the (inaudible) committee that recommended the EPA consider changing ISC-PRIME. To eliminate discontinuity the EPA response to that initial comment was that current implementation is a requirement imposed by GEP Stack Height Regulations. End of story I guess. However, seeing the magnitude of discontinuities again orders of magnitudes, one case was eight orders of magnitude different based on a hair difference in stack height. That's not very comforting so we decided to re-examine this position. And our current assessment is that AERMOD should be modified to remove this criterion for turning off downwash effects. So before doing that we want to make sure we got all the bases covered and intention is this is something that could be addressed through a clarification memo as to what the issue is and why we need to make this change. Ultimately it would result in a change in the model perHAPS. This is a summary of the line of reasoning behind that current assessment. If you go to GEP Stack Height regulations define GEP stack height as the greater of:

- 65 meters (de minimis GEP height);
- EPA formula height; or
- Height determined by field study or fluid modeling demonstration.

So based on the definition, EPA formula height does not apply below 65 meters. The discontinuities we have seen are primarily a concern for shorter stacks, usually with squat buildings. So stacks that are about 65 meters were not aware of an issue with that formula for those types of sources.

Pre-PRIME downwash algorithms defined vertical extent of wake influence generally consistent with EPA formula height, resulting in little, if any, discontinuity. So it really wasn't an issue in that case. It's just been carried forward through the years.

The vertical extent of wake influence in PRIME formulation can extend well above the EPA formula height and that's what's gotten us into these wind field studies.

Wind tunnel studies clearly support wake influences above EPA formula height for some stack/building geometries.

So that's what's motivating that and not sure how soon it will get resolved but just wanted to inform the community. I think Tyler is going to take over again with some processes. Any questions? Thank you.

Tyler Fox: Thank you Roger. I'm not doing a very good job of keeping us on time but will try and get some time back. Let me continue with the importance of process here. Obviously the importance of the Clearing House process has been stressed as of late. Particularly in regard to the recent promulgation of CALPUFF and AERMOD and it really emphasizes the formal process. I can't stress that enough. Just so you know and we've talked about this with the regional office. Informal contacts with OAPQS staff does not constitute consulting with the Clearing House. If somebody talks to you and says don't worry everything is fine and I've talked to the Clearing House or whatever that thing might be. That's not the case if you don't have a memo in your hand or a process like these two. These are the only ones we've had over the past couple of years. Another issue we've been discussing at the workshops with the regional, state and local folks is if you're not being consulted with or by the Clearing House and if you feel as if you need to then you need to stress that with the folks you are dealing with. I just want to make that clear'crystal clear hopefully. There has been quite a bit of confusion. I know with emails and all it's really tempting. But it's really what the Clearing House says. So unless you get that formal memo, the Clearing House hasn't really said anything.

The other thing is getting back to the importance of modeling protocol in order to get review and input early in the process both by EPA and FLM's. I don't believe we have any federal land representatives here over the next couple of days. But they are an important element of this process as well. Getting those protocols in and defining clearly the models or the options you are pursing in the course of doing your modeling, it is critically important. It's not something I think is formerly required by Appendix W, but it's a very useful instrument to communicate and understand on these things and provide the essential background if you are going through the clearing house or if you are going to consult with the program office on interpretation and the regional offices as well. I would stress getting back into practice of providing those early in the process. I just want to stress this is not dictatorial or mandatory control. This is really respecting the roles and responsibilities of the various stakeholders. From applicant to reviewing authority to us and to the public, these processes are in place to provide the type of structure and, as we said before, the confidence and integrity of the model as applied.

We need to get back to understanding what our roles and responsibilities are. And when we have people interpreting the guidance or interpreting Appendix W or providing recommendations and not seeking guidance or input from regional offices, and not seeking guidance from us or not putting it through the Clearing House, it puts us all in potentially harms way. We certainly don't want to see anything come up in legal review or overturning of an action and so it's critically important we follow this process and we respect the process and we respect each other's roles as part of that process. As I said Appendix W recognized this from the very start and we have to have this national consistency. With that national consistency we can have the security of mind that we're supplying these models in the appropriate way. And to the extent we need to provide ways in which to meet the needs for a specific application, we have the flexibility under Appendix W to do so. That's the Clearing House process that provides that.

I'll close and lead into the next session with there is a distinction between the regulatory model applications and those who follow Appendix W and those that don't. Obviously we focus on (inaudible) revisions of existing and new sources and NSR and including PSD. It's applicable to criteria air pollutants. Obviously we use these models and when AERMOD is used it doesn't mean it's automatically under Appendix W situation. AERMOD is being used and as you will see in the next session and discussion in the conference we are actively using the model for other avenues. I think that Appendix W and the guidelines provide best practices and good guidance for a starting point for the types of discussions we need to have. In fact, the way we used it in the (inaudible) where it didn't fall under Appendix W but we should be consistent and respect Appendix W to the full extent that there is overlays and overlaps in gray areas and there were. And we have had to deal with those as they have come up. But I just want to make it clear as you start seeing these models used there are situations when Appendix W applies and when it doesn't. But in all cases, we need to be following the process making sure the best practices and other types of appropriate communications we're using the model in the right way. After all the types of applications will affect the integrity of the model and both types of application offer us an opportunity to learn from that experience and to engage in a process that will hopefully improve that model as we move forward.

If there are no questions, we can move on to the next session.

In this session we'll talk about non-guideline applications and it's appropriate that we have these should we get into some situations where we see these things coming up.

We'll have Ted Palma of OAQPS group here to give us an update on the 2002 National Air Toxics Assessment (NATA)

Then we'll have Leigh Bacon from Alabama DEM discussing AERMOD experiences w/Birmingham PM2.5 study.

Then we'll have Ralph Morris to talk about the use of photochemical models for NEPA and addressing new issues out west with new oil and gas wells. A situation where we will look at photochemical models and their applicability here in a context that is outside of Appendix W but may be very relevant for consideration and use currently and in the future for Appendix W.

For toxic risk assessment in Appendix W, as revised when we promulgated AERMOD we identified there are separate guidelines related to the modeling for facility-specific and community-scale air toxics risk assessments. They are available through the Air Toxics Risk Assessment Reference Library and the link is provided there. We wanted to make sure and were successful in the language to the surprise of some but we were pretty persistent that we wanted to make sure that in this promulgation that we set the stage for folks evolving and moving toward the issue of AERMOD and not ISC. There's a lot of ISC based and older generation models basis built into a lot of the models used for toxic risk assessment and broadly other risk assessments as well. And we wanted to and were successful in getting this language here where we committed the agency or committed ourselves making sure that we eventually that we would reflect the improved formulations of the AERMOD or basically the modeling itself as we move forward and incorporate them as expeditiously as practicable. I'm pleased to say that Ted's presentation should give you an indication of the success there. (inaudible) group and Ted and Mark Morris who is with us as well. They've worked effectively with us and will continually work effectively with us in moving those types of assessments to embrace AERMOD and other types of models as we move on. We are also working very effectively with the (inaudible) standard group. We'll hear a little more about that tomorrow in the evaluation session about the application of AERMOD for the standards and process at least for this process for the NO2 primary (inaudible) standard, We are seeing the use of AERMOD and other dispersion models in the types of exposure assessment that are called for given the current focus on local scale issues such as near roadway and as we look at some we look at some of these (inaudible) with primary components or primary missions as being a large component that's a critical thing to do.

With that said, Leigh Bacon will provide us with an example in Birmingham where consistent with our guidance that we provide separately. Brian (inaudible) Timin is the lead in the group and we've revised the ozone PM and regional haze modeling guidance. We actually have a single guidance now instead of a separate guidance for ozone and PM and regional haze. We've updated it from January, 2001. We had a draft final that went through a thorough review back in September, 2006 and we released the final version in April, 2007. And again you can find it on SCRAM like everything else and it's available in PDF form. Again, our lead in our group is Brian (inaudible). Timin. And within that guidance we bring up what we call local analysis and we've got situations and our understanding of the PM 2.5 problem across the country with the monitoring network and the like has made us realize that there are local influences of primary PM on these monitors. In order to demonstrate attainment, it's necessary to address these at that local scale. That may not be sufficient to the types of broader grid based chemical modeling that has been used up to now in that context. This local analysis and new guidance replaces what was called the hot spot analysis back in 2001 which specified dispersion modeling in unmonitored areas with high primary PM2.5 emissions. In the local analysis as defined in the guidance we have now looks for the potential use of both dispersion models or fine grid Eulerian models. What we're focusing on here is what you will realize it's a valuable thing to do is when you are looking at the contributions in nonattainment and the impacts of controls there you're using 12 km or 36 km grid or whatever photo chemical model you're going to be smoothing those things out and you may not be taking into account the true effectiveness of these controls. Let alone the base line conditions that are affecting that monitor that are important to account for. So we need to consider high resolution grid models 1km or finer and follow a standard guidance as those would apply. We're doing things there to look at that and there are efforts going on in St. Louis and other places that will be very interesting to learn from. And we've got dispersion modeling that would be and could be appropriately applied in these areas but you need to combine those results in some way with the photo chemical modeling that's also being done and the guidance provides a framework not a prescripted but a framework to follow. We went through this process just so you know we held and sponsored back in October, 2007, a local analysis where we brought together in Chicago a number of states who were interested in this and going through the process of trying to apply dispersion models or fine grid models to address the types of local primary impacts on their monitors as part of their demonstration efforts. You can see here a list of the areas that participated in that and the workshop itself is available on SCRAM with the presentations and the like so you can go back and we're thankful that we have Leigh here to provide the details in Birmingham. With that said let me hand this over to Ted Palma. He will walk us through the 2002 NATA.

Ted Palma: Thank you Tyler. I think you set that up real nice. I think the next three talks, as he said; with the non guideline models. I guess that makes us a bunch of mavericks. My group, SBAG, handles most of the of the risk characterizations that come through the agency. Right now this is one of the many projects national air toxic assessments. We're also working on residual risk assessments and everyone of those residual risk assessments come through our office. As Tyler said, we're trying to work as closely as we can with his group to try to make sure, even though it doesn't say in Appendix W; we have to do under the guidelines. We're trying to mimic that as closely as possible and some of the progress we've made in the last couple of years will show you that. So I'm going to talk about NATA. I'd like to refer to NATA as the single largest modeling application done and I'll show you some of the numbers in a second. I have to give a lot of that credit to Steve Fudge who's sitting over here, as a contractor with ECR, did perHAPS 99% of the modeling. Some of the numbers are daunting as you'll see in a couple of seconds. What is NATA? NATA is characterization of air toxics across the nation. Keep in mind toxics are 187 of them, air toxics, now across the nationwide. At a census tract resolution if you look at 187 about 177 actually are in our inventory and I'll show you in a moment. We're at the mercy of the inventory folks. Now if we have lousy inventories and lousy stack characterizations all of the models we come up with are pretty useless if the inventory is not accurate. If you look at our national inventory it's a 177 HAPS. We also include a very important pollutant that's not considered, diesel PM, and that's in there as well. We start out with the inventory we model ambient concentration as many of you are familiar with and then calculate inhalation exposure concentration. Now this is not the type of assessment if you're worried about Mercury ingestion from fish. This is not the type of assessment to give you that. So we don't have deposition if you are looking at multipathway assessments. We are only looking at the inhalation for somebody. We are only looking at sources of outdoor origin. So if you're worried about off gassing from your formaldehyde gases from your carpet, it's not going to cover that as well. We look at both cancer and noncancerous risks and the number will be 133 HAPS. For every one of those 187 HAPS, or 177 HAPS, we don't have at risk or reference concentration and we don't have health risks for all these. We'll continue to develop this and we have a lot of this on our air toxic website which is also on the TTN where you can get all sorts of good information on OAQPS guidelines, unit risk estimates and reference concentrations all that we would suggest you use in your risk characteristics. Different states have different one that they use as well. So we did the cancer and noncancer for 133 different HAPS.

What is NATA? NATA is a tool for most of our states, locals and internal to use to kind of gauge themselves in the air toxic program. It's pretty daunting when you have 187 HAPS and so many HAPS so where do you start. We all have limited resources and budgets. So NATA points you in the right direction as where you start to look at.

Then a little bit of history and I won't spend too much time because I know we're behind. But this is actually our third application of NATA. One of the things that jumps right at you is why am I doing an application that is almost seven years old. Six plus years old. Well, it takes 2-3 years to develop an inventory and as you see it takes several years to do this risk characterization and then a couple of years to get it through the political system. But we're hoping when is comes out, I'll show you a schedule in early 2009 for the public, state, and regional folks, it should be available much sooner than that. We are also planning on some future NATA's but I won't talk about that. We're actually working on renaming it to NAPA and it has nothing to do with grapes and wines. Maybe it will be and we'll have our conference in NAPA Valley. But we're hoping to integrate at that point criteria air toxics into one cohesive modeling. That's still on the drawing board and maybe in future talks we can talk about that. That's one of the things'we want to improve the timing on that. I had mentioned who uses NATA. We have actually used it some regulatory settings but it's not the only. Actually NATA went in front of a science advisory board about four or five years ago. They said they didn't want NATA to be just a regulatory application standing on its own. We have used NATA for our mobile air toxic rule a few years ago but we used it in context with other things to gauge how some of these other things are doing. With monitoring, other assessments, local assessments along with NATA you can use it in a regulatory setting.

We've also used it and some of you might be familiar with our air toxic monitoring network that we've set up on air national toxic trend sites. We use it to place trend sites so we're placing them in the areas of the country where we think we need the most monitoring. We're also using it to support some other toxic programs. As I said, many states and communities are using NATA on a regular basis.

I have to show at least one flow diagram since I have a lot of scientist in the room. These are the five steps to developing NATA. Like I said we're at the mercy of the inventory. I'll go over each one of these in a little more detail. Many of the folks in this room will be familiar with number 2 where we actually do the dispersion modeling. One of the steps is that many folks seem to miss is the results of the dispersion modeling analysis is generally not what people breathe. When we're doing a risk characterization, and I'm looking at people's long term chronic health effects, people don't live at the fence line of the facility. People don't live at a census tract centroid or wherever you want to place your receptors. People like us spend 90% of their time in an indoor locations like we're doing right now. So how does that concentration outside relate to the concentration in this room or wherever you spend your time. In your house or your car and how do we relate that to the concentration from the dispersion models.

We run what we call exposure models to do that and we take into account the human activity pattern to come up with an exposure concentration or a breathing level concentration that someone might breathe. Then we do a risk characterization with that. We also did a model model comparison and I'll show you some of the results of that just to see how well it does.

I'll just spend a few minutes on the inventory itself.

Like I said we are at the mercy of the inventory folks and EFIG here at EPA put together a really good inventory every three years on toxics. The 2005 inventory is just about ready. In fact I've talked with folks who have gotten it in the last two days or so. The 2005 NEI is about to be released any day now to the public. You should be looking for that. The 2002 NEI was based on a later version of the 2002 NEI on April, 2007. And those of you who are familiar with the NEI knows it is broken up into two point sources or sources where we know the location of that facility, And non point sources where we get the inventory for a large area such as a dry cleaning for instance. I'll get an inventory for Wake County which

I live in has X thousand pounds or X tons of perc from dry cleaners. But we don't know exactly where these dry cleaners are. It's an area source inventory. We also have a similar type of inventory ran through Mobile 6.2 for folks up in Ann Arbor Michigan put together for our mobile sources both on road and off road sources. On road would be cars and off road would construction vehicles and recreation vehicles and what not. So we get those types of inventory as well. But we don't know exactly where the locations are. So how I treat those in my modeling scenario comes into play. One of the things you have to be careful with is you have limited resources and time is where do I want to put my biggest bag for my buck. I don't want to over analyze data and spend all sorts of time on my non point source inventory and try to characterize those down to the nearest meter when I don't really know where these things are located. So I did spend more time on the point source inventory rather than the non point inventory. I have the point source inventory results and we'll talk about that in few seconds. I also have the area source broken down into subsets so if I want to look into NATA and see what's coming from the dry cleaning sub category and what's coming from the POTW I can get the results and look at them that way.

The same thing with on road as I can look at the different on road vehicles and see what's coming out of ports and see where my risks are coming from.

Now getting to the modeling component, how did I model the point source category? This is what Tyler was talking on a few minutes ago. HEM stands for Human Exposure Model and this is also available on our FERA website which is a sister website next to SCRAM. You can get access to HEM3. HEM up until about two years was ran with the ISC model. When Tyler and I sat down, one of the biggest things that kept us from updating it was the meteorology data. Everyone who has done some modeling in the past with ISC can go to SCRAM and get all sorts of meteorology data and download it and with all the five year data sets that are out there. Well, Tyler, Roger and myself sat down and we actually developed meteorology data to run a national application like this for the whole nations. We developed over 200 meteorology stations nation wide and we can talk about that in a little while.

Essentially we have the closest Met station nationwide approximately 50 km from any given source nationwide with this data set we have. And it's also been supplemented by many states data. Wisconsin sent me seventeen process stations they have in their state. So you are within twelve miles of any point sources in Wisconsin and other states have been sending me data all along.

So we're building a nice archive of meteorology data to run for these non regulatory applications through the HEM model for the NATA application as well. Just looking at the numbers here this is what comes out of the NEI about sixty thousand facilities. That's why I think it's probably one of the biggest applications of the Gaussian model ever. Out of those sixty thousand facilities there are 131,000 sources there so we really got to applaud Steve for getting through this. Two hundred ninety one different pollutants. If you look at the one hundred seventy seven, there are many different compounds for several of these things so there are actually more than the one hundred eighty eight HPAS HAPS in the Clean Air Act. We modeled the point sources at a census block resolution. A census block is about forty people. Census tract is about four thousand people. There are about 8.2 million census blocks nationwide. So just start doing the math on these numbers here. One hundred thirty one thousand sources at 8.2 census blocks. Guess how long it took for this to run. I don't want anyone to complain about their model taking an overnight run. So it was a big time running on many, many PC's and Steve had it clustered all over the place and got most of it ran in a relatively short period of time. Let's go over a couple of model options we did. One of the big things we did to save some time was ran it through air toxic option which does the sampling time period through the model. It kind of expedites the model and we only ran annual impacts. We did not do short term impacts which can also slow it down. We did include terrain. I didn't write it on here but we did not include things like building downwash and surface features. We're trying to calculate our risk at the census block (inaudible) and the census tract. Generally our thought process on that is even if we had the data for building downwash would add a lot of time to the assessment. This is not a regulatory fence line application. It's an application that someone is living a kilometer or several thousand meters from the facility where they spend the majority of their time. I'm trying to come up with chronic type impact not fence line impact for somebody's permit application where a downwash application might be important. As I mentioned we had the meteorology set nationwide and one of the things that AERMOD obviously has the strength to look at the land surrounding the facility. Obviously I couldn't do that for sixty thousand facilities and do a terrain feature run through sixty thousand facilities so we used airport surface data around these airports to come up with and use that in our assessment. That's another simplification that we use but when you look at the assessment as a whole, we think the results are pretty good.

For the non point I mentioned we don't know where many of these are located. We felt like rather than model another sixty thousand sources and take another couple of months to run. Let's run these through the old ASPEN model. This model is still on SCRAM and I saw it the other day. The model EMSHAP is an emission process so it takes our inventory at the county type level and distributes it geographically. You don't have very thing plucked down in the middle of the county. It uses the different surrogates such as population, vehicle miles travel to spread those emissions out over your county and model it at a different locations so that you don't get hot clusters where you shouldn't really have them. So we modeled these using the ASPEN model which is based on an even older ISCLT2 model. We modeled these, rather than model these at the census block; we felt we would over analysis them so we modeled them at the census tract. It's more reasonable than the 8.2 million and it's only 66 thousand census tracts and I talk about the bins that we broke up the data a few seconds ago. We also did one other thing. The inventories aren't perfect. What we tried to do is add a background concentration. What a background concentration represents is of several things. These Gaussian models are limited to 50 km. We also have non inventory sources that are not included so the inventory doesn't get a lot of the smaller sources. So we developed background concentrations and I won't spend a lot of time on it. We have a report on this that will be on the website that outlines how we did this but we have 33 HAPS where we have what we call a background concentration. We looked at things like different clean wind sectors using monitoring data. We looked at emission inventories to develop background estimates when we didn't have adequate monitoring data.

Finally we did a model to monitor comparison where we looked at the results from NATA compared to the air toxic monitors out there. These are the pollutants that we do have a background concentration and the different colors just represent the background concentrations as we've gone through time from the different NATA assessments we've done.

We have model to monitor comparisons that may be of interest to some folks in this room. The rectangles that you see on the 25th and 75th percentile of all the monitors as compared to the NATA data. The value of one would be equal comparison with our NATA results. They were perfect if you get a nice one. Those two gray lines is the famous Joe Touma factor of 2 if your results are within a factor of 2, you're good. You can see most of the gas pollutants are within a factor of 2. A couple of outliners out there that we're looking into might be inventory issues. Remember the inventory is coming from some states and different states characterize that inventory differently. Some do a better job than others. Some inventories we have to build them up from things like TRI. There were several states who didn't supply inventories in 2002. This is some of the non gases some of the metals particulate that we looked at and the monitoring data that is out there is broken up into two data sets. We have TSP monitors that are measuring these particulates and you have PM 2.5 monitors that are measuring these fine particulates. When you compare the NATA results to the PM 2.5 it actually did pretty well. Compared to most HAPS, Mercury and Selenium didn't do as well. But for most of HAPS and Arsenic and those of you who are familiar with toxicity, Chromium is one of our most toxic metals out there. We did a pretty decent job in the 2002 NATA compared to the fine particulate we did a pretty decent job I think.

I mentioned earlier about exposure characterizations and once you have this ambient concentration at a census tract or census block we try to follow people around. I won't spend a lot of time on this. We have a model called HAPEM that we run and develop these exposure ratios. That is the ratio between what's predicted at that census tract and what people breathe. It essentially takes into account that people spend 90% of their time in indoor locations.

People don't generally spend a lot of time outside. So we take into account people driving to school and commuting and what not. And this HAPEM model that we have account for this in our characterization. Then take that breathing level concentration and apply the unit risk estimations and the reference concentrations to come up with the cancer and noncancer values. These will be on our website. Those of you familiar with our previous NATA characterization we had a series of maps on the website. Those maps were costing me about $30,000 a year to actually post these maps on the website. It's internal EPA funny money but it gets all clogged up so I'd rather spend my money on modeling and risk characterization. One of the things we're looking at is actually exporting the NATA data into what's called a KML format. You click on it and bring it up and Google Earth. Right now it will be in Excel and Access format and I'll give you a timeline on that in a second and it will be available at the census tract. For the state and regional folks in here who want some of the finer resolution data, I can work on that when that data comes available. We'll work on that in a year or so. When will it be released? I get this question all the time. We are just about to start a formal preview with our local and state partners. We're already given it out to many states already where we thought there were some issues with the data and inventory. The states look at the data for about two or three months. They'll give us their feedback on any modifications and we're hoping to release this to the public in early 2009.

I know we're short of time but here's what some of the results look like from the national air toxic. We break the results into Major Sources, Area Sources. When you define Area Sources from a regulatory point of view it's the 10/25 tons not the area source as a model. On and off road and the background, you can see the two bars that represent the 1999 and the 2000 NATA. Essentially we think the clean act Clean Air Act is doing a good job if you look at it real quick. That darker purple line is shorter than the other line. A lot of it is attributed to... we did revise our background concentration. So that might not be something real that's more of a technique. If you look at the other four categories there, everyone is shorter in the 2002 than it was in the 1999. That tells us that our regulations and a lot of our reduction programs are working over time. So we should see this as we go forward the assessment will get shorter and shorter and you'll see better risk characterizations.

Which HAPS are driving our risks. Above and beyond all is Benzene. I don't think that's any shock to anyone in here who has done any risk characterization. I think Benzene should be a criteria pollutant. Over 30% of risk comes from Benzene. The carbon tetrachloride that you're seeing is actually coming from that background numbers. It's coming from the international transport. There's not a lot of carbon tetrachloride emitted in this country. There's a little bit coming from the pulp and paper industry. But most is coming from long range transport. You can read the other ones on there. There are about 13 HAPS that make up about 92% of the national air toxic risk. This is at the national level so if you're looking at any censes tract block, you'd get different results. This gives you an idea. This is the source category that it's coming from. We've pretty much completed our MACT program which is the biggest reductions. The major source is about 6% of the risk where as area sources which we are just starting up and coming out with regulations are a bigger chunk of that risk that's left out of there. At nearly 20%, the MSAT rule that came out last year which will help reduce that chunk of the pie. If we had an air toxic satellite to put up there, this is what it would look like. This is the NATA results at the county level. This is obviously the county level. For those of you who saw my presentation in 1999, there were quite a few orange and red spots up there and a lot of those are shrinking which is good news. Like I said the air toxic program is kicking in and it's doing its job. If you look at some of those lighter blues and yellows are where you would expect in a large metropolitan areas. We have a lot of mobile sources to follow the I-95 corridor up and down the East coast. Southern California and what not where most of the traffic is. The big orange one that jumps out at you is Oregon. It's actually from forest fires and 2002 was a very tough year for forest fires out in the northwest. They had fires burning most of the summer and wood burning sends up a lot of PAH and will show up as a high risk in that area.

One of the things that moving toward the NAPA approach is how do these toxics overlay with criteria pollutants. We develop this color wheel to give you that idea and that might be real busy for you to see on the wheel. You'll have the slides to go back and look at it. But essentially it tells us what we have done here as plotted out the different areas of non attainment nation wide for the ozone and PM. We have compared to where the higher toxic areas. Black means all three of those are high. Many of the areas overlap so this tells us when we development programs we should be looking at both the criteria and air toxic programs. We need to develop controls that take care of everything coming out of the facility more unison in a way. We may be smarter developing our controls in looking at overlapping these controls over both criteria and air toxic.

Tyler Fox: Thank you Ted. Nicely presented both during the presentation and especially at the end there. There are obviously benefits of working together from a modeling standpoint as we move forward identifying multi pollutants solutions to environmental problems. Chet mentioned that OAQPS is reorganized we have a division that once was an emission standard division responsible for (inaudible) and area source rules and the risk and technology reviews are now going to be looking into sector based approaches that help identify or look at those type of areas where you have multi pollutant issues and look at the sectors contributing that and focus programs to get both criteria and air toxics. Obviously with climate on the horizon as well green house gases will also be important to get to.

Next we have Leigh Bacon from Alabama DEM. And although she has 49 slides she has assured me that she...

Leigh Bacon: Don't know if it's a good thing to go after Ted or not. I was pretty impressed with the number of sources we're doing until we saw what he was doing. We just sat back there and thought everything he is saying is pretty much what we're saying. EI is the key as the component to the BAP studies. I'm a fast talker even though I'm a southern girl. So I think we can get through this pretty quickly. Thank you to Tyler and his group for having us talk. This has been an interesting year and a half almost two years process that we originally slated 6 months for. We're hopeful that it will end soon. As you know EPA designated areas for the annual PM.2.5 standard a few years back and EPA designated part of the Birmingham area, part of Jefferson, all of Jefferson, Shelby, and a small portion of Walker counties as nonattainment for the annual standard. Current PM2.5 Design Values - 2005-2007: North Bham - 18.9 ug/m3 (18.7), Wylam - 17.7 ug/m3 (17.5). However there was an influence of fires on these so the numbers in parentheses reflect the design values associated with removal of exceptional days. Obviously the NAAQS is still at 15 and we are over. Obviously we had to develop had an attainment demonstration to provide EPA with the plan for coming into attainment. Well, prior to that the Jefferson County Department of Health contracted with a firm to identify what are the problems at those inner monitors. They are clearly higher than other monitors in the county. We have very good distribution of monitors in that area. Based on those conclusions, what we've been focusing on is the reduction of direct inner (inaudible) PM fine in the area immediately surrounding these monitors. It obviously relies on reductions from National programs such as CAIR which we're planning as if it still exists. We're in denial.

And so we began to develop the 2002 baseline modeling using VISTAS which is our (inaudible) regional planning organization in the southeast and then we did some 2009 modeling and now we're looking into 2012 as well. And we are using, as Tyler mentioned earlier, we are using an integrated approach to show attainment.

These are our monitors in the Birmingham area and actually these are not all. I don't know what happens on Power Point. In the far eastern part of the county, we also have a monitor and we have another monitor just south of the Hoover monitor. The two monitors directly in the middle of the map are the monitors that show higher concentration than those in the (inaudible) rest of the NAA. These are designed back in 2000. You can see that North Birmingham and Wylam have shown values greater than the standard. We do have some good news. We've done QAQC on the first two quarters of this year and we have had amazing lower concentrations. We don't know why but we're very glad to take it.

This is the (inaudible) bar chart speciating the local PM.2.5 design value for the 2005 to 2007 period. You can see clearly there is an increment above the other monitors in the areas. Providence is our far western monitor. We kind of call it background. Technically it's background. You can see that the ENVAIR study will showed you that there is a regional component, an urban component and local area component to the problem in Birmingham. The numbers in the middle are the design values themselves.

We started doing all this process with VISTAS back in 2000 when we started doing haze. We did some modeling some 2009 and 2018 modeling for haze. We also looked at the CAIR modeling that was done. What it basically told us was that we would get better (inaudible) than from our nonattainment ozone plans. We'd get about a microgram per cubic meter reduction. But it's not enough. We knew it would help, but it wouldn't bring us into attainment by 2010. And so the first question we asked ourselves'are there any other reductions in local PM possible. Where is it coming from and who's emitting it and how it is being emitted? Again the original component, the

ENVAIR study decided that the regional component was approximately 12-14 mg/m3, general urban - ~2 mg/m3, local - ~3-4 mg/m3 that has been revised by (inaudible) the BAPS workgroup through the process. There are multiple lines of evidence that do link to excess to several geographical source complexes. These monitors are literally on top of some of our industry. One of our industry is 300 meters from our north Birmingham monitor.

So the ENVAIR study dated a number of the now (inaudible) ways to try and determine what are the causes and who are the causes and what makes up the excess. Again we decided that it couldn't just take regional PM reductions, it had to take local reductions. We decided to focus our attention on those first complexes. The problem with this and it really gets back to what Ted was saying is that emissions inventory is the key. And many of these sources are very intermittent in terms of emissions to semi-continuous. We have transportation; we have a large corridor there with three or four major highways. We also have trucking and rail yards in the area. So what do we do? We'll just model and see what happens.

This is just some of the pictures of the monitor of pollution. This is pollution roses and you can see the... that's the monitor. It's not actually there it's actually attached farther to your left in the boundaries. That's the whole facility that's just the middle I guess where the (inaudible). Not only that there are homes that are in the immediate area of many of these facilities.

This is the North Birmingham monitor. You'll see a rail yard in the upper middle of the slide and you'll see two other facilities. This is just a sample and we're not just picking on these. We have a lot of these facilities but the pollution rows obviously indicate this is a predominate wind direction. So we took the findings from the monitoring study and (ENVAIR study) and contracted with ENVIRON/Alpine Geophysics to conduct a whole new attainment demonstration. We awarded the contract in December, 2006 using the CMAQ platform with MM5/SMOKE integration and using the AERMOD model to evaluate local source impacts.

We have George (inaudible) Schewe is here and he did all of the AERMOD modeling so all the questions I will direct to George. He has already volunteered to everything. Thanks George.

Honestly, what doesn't kill you will make you stronger. I don't know how many revision on this contract we made. I think we are up to five extensions, revisions additional modeling. We have so many different stakeholders so we made an effort to make our process transparent. It's almost too transparent. Everybody got involved. Believe me it was very involved. And so you know we took the stance we'd rather the involvement early instead of being litigated. When we turn in our SIP we will probably still be litigated. That's okay, as Tyler said; this is new territory the integration of photo chemical and (inaudible) dispersion models. Joe Sims and Tim Martin are colleagues of mine. Ten or eleven (inaudible) revisions have been made of this inventory. There's uncertainty in marrying two models that are intended for different purposes and highly variable emissions. Many sources which have never been involved in a modeling study like this. We developed our inventories. Our emission factors for many of the factors are poorly defined even if available. We many times had to weigh a perfect inventory against time and resources. We did fix as many errors as we can but as of this morning George told me we have a few more issue that we have to work with. Many small sources may have an impact and sources you may never have considered before when we looked at the magnitude that would have an impact. So we are willing to admit that we make some mistakes. They made more'no they didn't make more that's just a joke. We did ask for active involvement but if we had known how difficult it would be we have considered we might have contracted for the inventory development. Many of these sources have never been characterized. We did run SMOKE outputs were run through CAMx to produce consistent hourly emissions profiles to be input into AERMOD. Our studies showed a clear "local sources" signature, especially for primary PM2.5, CMAQ, even with 4 km grid spacing, was not considered adequate to resolve impacts due to local emission controls. The guidance chose AERMOD. Which local sources should be modeled? We decided to cast our net very wide.

If you lived within Any source within 5 km of either monitor with PM2.5 emissions greater than 1 tpy (~1/4 lb/hr) was included. Between 5 - 10 km of either monitor, any source with PM2.5 emissions greater than 4 tpy (~1 lb/hr) was included. We also did some Q/d and Q/d2 analyses which supported the above criteria fairly well. We did a pretty good job. We identified a total of 46 facilities identified; roughly 1200 individual emitting sources. Included point, area, volume and buoyant lines. Initial discussions with EPA and among the study participants led to a 1 km X 1 km AERMOD receptor grid with 100 meter spacing. We had a lot of property issues. We ended up with a 200 m X 200 m Cartesian grid with 100 meter spacing. For the attainment demonstration, concentrations will be averaged across all receptors. For culpability and RACT, concentrations at the monitor were used. We used 2002 met data - same as base case emission data year. This is where Roger and James Thurman and others at OAQPS provided us with invaluable assistance.

We have some pretty good met data in the area. Birmingham is in a large wide valley with a series of bridges that run northeast to southwest. The valleys are pretty shallow but are very broad. So we had an ASOS station at our airport which is probably four miles from the nearest monitor. We also had a SEARCH site which is run by a Southern Company which is co-located at the NBHM monitor which we thought would be fantastic. But we had some issues with some missing data sometimes. We had the one minute data that Roger had talked about earlier. So we decided to use the one minute data that was augmented by ASOS data were necessary. We really like the SEARCH data but we had too many issues with quality control.

I hope you can this busy map. The black line is the PM 2.5 Birmingham monitor. The one minute data is the green and the SEARCH data is the blue. So the SEARCH data was valuable but it was unfortunate that we couldn't use it in this application. But the green line represents the data that we did use. This is the first quarter of 2002. So we ran AERMOD for our facilities and we assessed significance as they pulled it out of the hat. And we decided that we would use a (inaudible) significance level of 0.2 microgram per (inaudible) cubic meter. The facilities whose facility wide AERMOD concentration was 0.2 micrograms per cubic meter or higher we flagged it and then within each facility any process that was greater than 0.2microgram per cubic meter was asked to do a RACT analysis. When we looked at primary PM and when we did model performance we looked at the monitors. So we expected AERMOD to predict lower concentrations than daily FRM since the monitor doesn't know the difference between local sources and regional sources. After having some discussion with some of our stakeholders, we revised what our local component was about ~3 ug/m3 at NBHM and 2 at WYLM. And I know that Roger would disagree with this statement but we typically think of AERMOD as a conservative model. Taking all this into account I want to show you some of our AERMOD results. Let me also say this is an older version of our inventory. We've had multiply revision of our inventory since then. So we think model performance is a little better. As you can see we expected a 3mg contribution from our local sources and we got roughly 33mg contribution in 2002 and 20mg in 2009. Wylam did much better. Wylam was expected at about 2 ug/m3 and we got 6 ug/m3 and 5 ug/m3. Obviously some of our concerns were focused on our N Birmingham monitor. Again that's the monitor with the industry literally 300 meters away.

So this is some of our model performance statistics. I just chose some quarters. I chose 2002. Sequences are modeled values and the observation are in black. The Wylam monitor looks pretty good. The first quarter of 2002 and second quarter (inaudible). The monitor doesn't know the difference in local, urban or regional. This is just ranked so you can see pretty good agreement. We're very happy with Wylam's results.

This is another quarter. The is the wind frequency distribution and you can see AERMOD did have some issues at the lower level. Again the model performance is pretty good.

So we agreed with the expected patterns in general as they are always lower than the monitors. Again we expected the local industries about 2 ug/m3 and the (inaudible) modeled values were approximately 6. ug/m3. And AERMOD was rarely greater than 10 times the local component. We had a few other issues. Again red is the model and black is the observed. We saw consistently higher concentrations using AERMOD at the North Birmingham monitor from the local sources. That was second quarter, third quarter we had some spikes as high as a 110 and 115 ug/m3 when the monitors [ed. were]reading about 25 ug/m3.

(inaudible) As you can see the model values are always higher than the observed values. Then again that was third and fourth quarters. So this is pretty consistent across all quarters and again consistent issues with our winds especially greater than 50 mg per cubic meter. This is calm winds sorry I should have said that.

We had dramatic over predictions it was almost always higher than our FRM. The annual mean is low greater than 5 times what we expected. Almost half the year greater than 10 times, two thirds of the year greater than five times and heavy in that top range, greater than 30 ug/m3.

These model performance plots show you they're pretty good for Birmingham. There is a marked difference in the performance between North Birmingham and Wylam. The facilities at North Birmingham are much closer to the monitor than at Wylam. I guess this isn't a relevant statement because there are several industries at Wylam that are within two or three kilometers. But we had much much closer.

Should we expect AERMOD to perform poorly for certain source characterizations or are we asking the model to do too much? What are our expectations for AERMOD? We have made many revisions to our emissions rate our first characterizations. How will these changes affect AERMOD? We don't and don't know if we want to know. We want to show compliance to CMAQ. If we can show compliance to CMAQ I'll show you why in a minute. I don't know if we will go to AERMOD for our attainment demonstration. We do think that future modeling and exercises modeling exercises like this should focus on refining photochemical models to handle at very small grid scales. It's not that we have problems with AERMOD we just don't know if this is the best way to precede. We ran AERMOD for local sources and we ran CMAQ, all sources, and we took out the local sources. Then we married the two to see what the differences would be. The results to obtain our future projections. We followed EPA model guidance again we can't stress how thankful we are to EPA Region 4 for all their involvement, not just modeling but a lot of policy discussions and questions. But it's still difficult to determine if this is an appropriate model for this situation. CMAQ 'all-source' runs used the 1x1 and 3x3 grid cell averaging around NBHM and WYLM models and then I'll show you the CMAQ and AERMOD runs.

Our 2002. North Birmingham is the first two and Wylam is the next two 2002 and 2009. so you're seeing a reduction in the model of about a microgram and a half at North Birmingham and about the same at Wylam. This is everybody running CMAQ at about 4km. And it's just using those cells.

This is AERMOD so we went from 16.7 in 2009 to 15.7 ug/m3. We went from 15.5 at Wylam in 2009 to 15.0 ug/m3. One would think this is good news and we've spent a lot of time how comfortable we are with the results. We believe the answer is between the two.

This is just the same thing in a table format. All sources we saw about a microgram and a half. VISTAS recognized that Atlanta and Birmingham were having some issues in 2009 so they ran some 2012 modeling for us for our boundary conditions. That was done in July and August timeframe. Everybody provided their up to date emissions inventory. This was the first time we put the BAPS inventory into that modeling. And so this helped us get an idea going into 2012 what would the magnitude of our reductions be.

They look promising and it's important not to look too closely at the number per se, but rather the signal. We were very happy. This is too good to be true and it was. It's okay because we think the results show that controls in GA and AL will help bring the area into attainment in 2012.

This is Alabama and it's very busy. And I apologize. The two biggest bars are the Jefferson county, North Birmingham and Wylam. The third bar the one that's really low is the ASIP of our 2012 with the BAPS inventory in it and it showed about 13.9 at North Birmingham and I was speechless which is rare. Again, it really provides us with a lot of confidence that we might be able to get there in 2012. We're going to propose an attainment date as expeditiously as practical based on the implementation of federal, state and local measures. We do believe 2012 is the best year for us. However, we are going to model both 2009 and 2012. We're going to account for CAIR at this point our modeling is running we are going to account for CAIR and any mobile source controls, We got a lot of RACT controls and we are really happy with our RACT. We had ten sources that had to go through RACT. They offered a lot of things they didn't have to offer and we were very pleased with that.

Again, we will continue to do this until we have an attainment plan that shows attainment standard and then those will be modified as JCDH permits. That's all I have today.

Tyler Fox: Thanks a lot. Obviously a lot of good work going on there and another indication of when we engage and work collaboratively and talk about these things because there aren't any real clear issues. We are really venturing into new ground. Also as you saw there, we are looking at pairing AERMOD results in time and space. We've been doing some recent work, as I mentioned, with Karen Martin's group and Mrs. (inaudible) group and CMAQ. Roger will be talking about that tomorrow. Obviously we learn quite a bit when we look at those types of performance. It's a different way of holding our models to a more rigor in those types of applications which is appropriate when you're looking at exposure and risk type of assessment or attainment demonstration given the nature of those problems versus the nature of the problems when we're evaluating permitting.

The final presentation here is Ralph Morris. Ralph will take us into our break. I apologize that we are running about 15 minutes over but we'll get that back somehow. Then we'll have a break and come back. I did want to introduce this as we're moving away from the (inaudible) tables. (inaudible) couldn't be here today. He has removed all (inaudible) with respect to those tables. So we have to find ways in which we can address ozone and other types of issues and photochemical models are one area we need to pursue. Ralph is here to give us some information as to how that was used in oil and gas flow.

Ralph Morris: Thanks Tyler. Before I start I would like to give some two examples of my history with Appendix W. I started air quality as a consultant 29 years ago and when I say 29 ago I mean 29 because that was October, 1979. Looking at this crowd that makes me a young buck. So early on in the early 80's it was in the RAM model which was the guideline model at that time. I found a bug in a very large application I was running. I called the person on it and they said it can't be because it's the EPA guideline model there are no bugs. I said well it's a bug and I can see it there and I know how to modify and fix it. There was silence. You're going to modify (inaudible) model so I decided to work around it and then I had to clear my sources so it didn't go through the spot with the bug. Later in my career in the late 80's I worked hard to get the (inaudible) model listed as model, the photochemical grid model. In 1990 I succeeded it was the guideline model for ozone modeling. Then we came up with new (inaudible) chemistry for (inaudible). And all the two years of testing we had to do we had to do it all over again. And so I spent the next few years trying to get (inaudible). You're locked in there and the kind of tests you have to do so that they have integrity like Chet said is a critical part of it.

So I'm going to talk not about NATA and not NAPA. I'm going to talk about NETA which is the National Environmental Policy Act and I'm sure you all have heard about EISs that people have to do. You have to expose the impacts not just the air quality impacts, all the environmental impacts even some non environmental impacts. I'll try to go through this pretty quickly. If you're like me, you're ready for the break.

This is not guided by Appendix W on the air quality, but the part I'm going to talk about is by using the best science available. That's kind of the mantra in doing it.

In particular I'm talking about potential oil and gas developments in the western states. On public lands and then the federal agencies whoever is in charge. Could be Bureau of Land Management, could be the forest services or tribal agencies. They have to do environmental impact statements to disclose to the public and to the other federal agencies of what the air quality impacts plus all the impacts. I'm going to talk about a particular application in and a history of Wyoming. As you may have heard rumors there is an efforts in increasing domestic. I think it's drill baby drill. I think I got that right.

As you can see the projections in 2008. I don't have a full year there yet but it's growing. There are efforts to make it grow even more so it's something you have to deal with. The development of an oil and gas production project on federal land usually involves the preparation of an EIS or EA under NEPA that discloses the potential environment effects of the project. One of the things you have to do is includes air quality modeling to show project impacts on criteria pollutant concentrations, visibility, and deposition.

I found some history of (inaudible) in south west Wyoming. Before 1996 it was qualitative. I'll describe what this means Moxa Arch that set many precedents. Jonah and Pinedale EIS in and around 1997 was the first big CALPUFF applications. Pinedale EIS actually bought a low NOx burner at local power plant to mitigate their impact. There was a large study in 1997 and 1999 that SWWYTAF develop a comprehensive CALPUFF Database and that was used for many years. Moving on to 2000 we had the flag guidance. More recently the Jonah Infill EIS project was done. In 2005 they made a mistake and put ozone monitors in out there. At the same time that happened, the Pinedale Supplemental EIS was going on and they had to do ozone modeling to address ozone so they had to do a photochemical grid model. (inaudible) In the Four Corners area they started running photochemical grid models. In 2008 and 2009 there's a Continental Divide-Creston EIS use PGM for air quality, visibility and deposition (No CALPUFF) So here's the measurements in 2005 which is the first year they measured high exceedance in the Jonah (inaudible) Project area in southwest Wyoming. Up to this point there running AERMOD for near-field impacts and CALPUFF for far-field AQ and AQRV impacts but they don't feed ozone so they had to bring a photochemical grid model.

This is the oil and gas development. Where's the pointer. Anyway up there in the top right the highest and to the right is the Pinedale (inaudible) Project areas and right next to that is (inaudible) CDC Project areas and we'll talk a little about Moxa Arch the long purple one on the left. The continental divide is way over on the right. But the high ozone is right to the left of Wyoming being Pinedale, Jonah and (inaudible) CDC.

Kind of history 2006 Moxa Arch and Hiawatha (MA&H) O&G Infill Projects were going on. They're using AERMOD for near sources and CALPUFF for far field. Pretty much a standard practice. We had the ozone (inaudible) in 2005 and 2006. In 2007 we went off to field studies and measured the ozone exceedance and they didn't show up. But in 2008 they came back with a vengeance and they were maxing out over 122 PPD which is higher than Denver and much higher than most non attainment areas.

So these gas and oil developments had to have more grid modeling to do their assessments to look at the ozone issues in about 2007. And we're doing this because of the work by the Western Regional air partnership developing background databases. We did that and did some ozone analysis including the Pinedale stuff that was issued. We needed to go back because we were not looking at ozone in the past. You'll see inventories that are not exactly up to snuff. We had to go back and redo all the modeling for Hiawatha and Moxa Arch. At that point we are kind of wondering why we're running CALPUFF to get sulphur and nitrate impact when we're running a perfectly good model to get the sulphur and nitrate impacts using a more complete chemistry. So at that point we are dropping CALPUFF and doing everything with the photochemical grid modeling.

But I do want to talk about continental divide which started off with the stakeholder process proposing to just use AERMOD and a photochemical grid model for all the air quality and AQR/AQRV impacts. This a fairly large projects about 9,000 new wells. There will be 15,000 after the way things are going. This is the first EIS to propose to use photochemical grid model to perform both ozone and AQ/AQRV analysis at the far field.

It is also the first EIS to do a comprehensive emission inventory for oil and gas production sources and it was done by Doug Blewitt and (inaudible) in this room. So this is an example of the location of the drill rigs for the five counties in SW Wyoming and there are a bunch more not shone. Locations of the producing wells and you can see the (inaudible) areas are right there in the (inaudible) Patrick and up to the northeast of Pinedale/Jonah area and then south of Colorado you can see mountain circles. So a lot of (inaudible) the same area. But to support these photochemical grid modeling for these oil and gas things we had to do an environmental (inaudible) modeling. This is the 36/12 km environmental modeling where we picked the 12 actually it's for other gas and oils in the area and the Four Corners areas.

Just to show you MM5 evaluations. As for the Jonah model which is further south and next to the Wind River range which has a kind of northwest or southeast. Early on with the CALMET modeling in 2002 which is on the left. You can see it didn't see the Wind River Range. Excuse me with 12km MM5 and the observed data which is a different year is (inaudible) you can see north, northwest, southeast orientation of the Wind River Range that channels the flow. And then we run MM5 to get the surface data and we see we can get that at 4km. So we you can see using MM5 high resolution you will pick up flows that has a history of channeling and (audible) that you don't see if we take 12km MM5 data and put it through CALPUFF or CALMET. I think we've talked about that.

This is the photochemical grid model domain where we have a 36 domain from the (audible) carrying all the continental US domain. We have more than 60,000 sources. Then we run that to get (inaudible) for our 12/4km domain where we do our impact which is shown here. You see the continental divide (inaudible) area there with the monitoring sites and we still use AERMOD for the near source impact. But we'll (inaudible) for the 12/4km grid with the project and without the project you get the potential impacts as well as with cumulative impacts. Going back to the NEPA mantra we are trying to use the best science available is which is what we feel we have right now in these applications.

So this is some of our PGO photochemical models and configuration we are using and think this is the best and latest science. We do have an issue as to how to simulate the winter high ozone events in SWWY. We have some ideas on what's causing it. Will the model pick it up is another story. These are very non traditional ozone events. I've been doing ozone modeling for about 28 years. This is not a typical one but we do have some ideas.

There are some challenges in this. One is monitoring network not as dense as is typical for urban areas. One is how to use EPA-guidance projection approach using relative modeling results? How to perform model evaluation without a detail monitoring (inaudible) that we used to have when we had to do urban (inaudible) and with CALPUFF we don't have to worry about that because you don't have to compare model results to measurements. These photochemical grid model applications we always (inaudible) the model back to what was observed to give us a sense if the model is performing correctly.

How do you use photochemical grid models to obtain project-specific and cumulative impacts? How do you use ozone and PM source apportionment to obtain incremental contributions? Use ozone and PM source apportionment to obtain incremental contributions. That also allows us to figure out how much our projects are contributing to the ozone in the high ozone areas.

The final challenge when we are already violating the new standard. How do you ask for more sources and not violate the standards. We can't it's hard to show. It's up to the (inaudible) to figure out how they are going to reduce emissions to show compliance. (inaudible). So this is not the only application that we are doing photochemical models and NEPA related studies. We are also using CMAQ model for southwest Wyoming and the Four Corners region. And also EPA Community Multiscale Air Quality (CMAQ) model for Uinta Basin Air Quality Study in northeast Utah.

My conclusions here are we do have some recent advances allows for the more routine use of PGMs for NEPA EIS/EA air quality assessments. We talked about this two years ago, but with the two-way grid nesting and flexi-nesting (inaudible). I'll talk about tomorrow about the plume in grid model for near source chemistry and plume dispersion. The ozone and PM source apportionment is the way to get individual source impacts. The other is the advances in database availability and expertise RPO process over the last six years has developed advanced photochemical grid model databases across the US and also trained a lot of people to use.

Of course computing speed and doubling computing speed every 18 months or so. Then we have a PGM software MM5/WRF meteorological; SMOKE/CONCEPT emissions; post-processing tools. So the current round of NEPA related studies demonstrate utility of PGMs for this kind of application is not guideline application. I mentioned BLM Moxa Arch and Hiawatha EISs in SWWY and the Uinta Basin Air Quality Study (UBAQS). The Utah Four Corners Air Quality Task Force NM/CO. Finally the BLM/WDEQ Continental Divide Creston EIS SWWY. The extra effort kept these databases in use.

This process is an ongoing process and there are a lot of agencies involved. It's not the Model Clearing House but model guideline applications. They're the ones involved and some of the people in this room like Kevin (inaudible) Golden, Region 8 and there a lot of states involved as well as the operators. Of course BLM is right there and some of the other consultants. So I'll turn it over to you.

Tyler Fox: Thank you Ralph. I appreciate that. As we saw with Ted, Leigh and now Ralph there's quite a bit going on. It's actually pretty exciting to see the photochemical model is being used here and trying to advance us there. We'll hear more about that in the next session with respect to gridded met and tomorrow with respect to the use of photochemical grid models and techniques within those models like plume in grid and source apportionment in trying to address the types of problems we have.

We're running 15 minutes behind so we'll take a 15 minute break and be back here about 11:10. We'll have an hour for the next session and we'll get back on time in terms of breaking for lunch at 12:15. See you back in 15 minutes.

Tyler Fox: Welcome back and hopefully everybody took advantage of that break. We'll go for about the next hour or so. As Pete mentioned there is a cafeteria right over here. In the meantime, we'll look for a pointer. Obviously that would have come in handy earlier.

The next session is on the Use of Gridded MET. We have Bret Anderson from EPA Region 7 here to basically chair this section. Then we'll have Roger and Herman Wong go through Development Efforts in terms of building tools to deliver these gridded data directly to AERMOD and to CALPUFF respectively. Bret.

Bret Anderson:

I think it's necessary to step back a moment in time like Tyler did in his introduction to talk about where we were at the 8th Modeling Conference. Tyler highlighted four critical or essential elements for the 8th Modeling Conference. This was the second essential element. It was to promote and facilitate the use of gridded meteorological data including state-of-practice "National Weather Service (NWS) meteorological analyses to improve modeling science and performance for near-field, permits, toxics and direct PM)." That was one of the underlying themes for the 8th Modeling Conference and there was a panel discussion on how can gridded meteorological model data be used. There was a presentation by Noah on the Philadelphia case study where MM5 data had been extracted and been used in the first study nationally that had been done to use AERMOD data and MM5 directly into AERMOD. So what's happened since the 8th Modeling Conference? After the 8th Modeling Conference, OAQPS formed a gridded meteorological workgroup in 2005 to discuss sources and various uses of gridded meteorology in dispersion modeling. In addition to this, EPA development of MM5-to-AERMOD tool in 2006.

In 2007 EPA published MM5-AERMOD Philadelphia Study which was in the Journal of Waste Management. At CMAQ this week we see the UNC development of MCIP-to-AERMOD prototype in 2007-2008. Most recently in 2008 EPA development of MM5-to-CALPUFF prototype.

Now that we have that we ask where do we go from here as there are some inconsistencies coming up as a result of this. First we need tools in order to do that. You'll see two separate presentations on tools that EPA has undertook to develop. We have to complete the development of this software and documentation for the gridded meteorological data conversion tools.

The next thing is both important for AERMOD and CALPUFF is to develop testing protocols for the gridded met products. Yes you get a file that is compatible either with AERMOD or CALPUFF. But that doesn't mean that the product is any better. There has to be some rigorous testing protocols that go into this so that we understand are the data files getting better and how the model responds. Ultimately this would lead to development of guidance on the application of gridded meteorological products in dispersion modeling applications. That's something that you'll see there are generic guidances already exist in the form of PM ozone regional haze guidance that have fairly lengthy section on performance evaluations for meteorological that are used for photochemical modeling things along this line. This takes on an entirely new flavor because now we are getting into issues especially for AERMOD where we're using the gridded meteorological products. And we're getting into the issues of site representativeness'does this satisfy or is this any better than National Weather Service data going to the nearest National Weather Service site.

This is a whole new paradigm that we're in that even in the gridded meteorological modeling community that we're going to have to address that we've not looked at before. I just kind of tee that up from where we were to where we're at. Right now I'll turn this over to Roger. He'll be talking about the MM5 to AERMOD tool that he has been working on.

Roger Brode:

Thanks Bret for the background on that. I'll be talking the MM5 to AERMOD tool and I apologize to those who have seen this presentation before as it's not a whole lot different. Hopefully many people haven't.

To give you an idea as to where we are with this: Present the problem statement. What's making us think about pursuing this and what's the objective and describe the tool as it stands right now. It's sort of a preliminary tool that has been developed. And look at one example test case where we have applied the tool for the Detroit area. And then discuss the next steps and that's something we want to get to as quickly as possible as this is a good forum to get some feedback on regarding that.

So the problem statement is of course meteorological data are key inputs to air quality models such as AERMOD. Everybody knows that.

NWS data currently used in most cases; however but met sites may not be representative of source locations due to proximity or other issues with AERMOD the representativeness of surface characteristics have now come to the forefront as far as issue in implementing the model and applying the model so that's a new dimension in the problem. Upper air data sparsely located, especially in mountainous areas in the west.

We are also finding a newer issue that's emerged with airport data that we have significant gaps in NWS data due to calms and variable winds; frequency of gaps has increased with the advent of ASOS began in the 1990's and pretty much completed by late 1990's and then the METAR standard in July, 1996 which they introduced a variable wind code. Variable winds means one direction is missing and we don't know where the wind is going but we have a wind speed for you. Well, that's not very helpful for this dispersion model where we need to say where the plume is going. Onsite meteorological data collection is an option but is also an expensive and time consuming.

Potential solution that could alleviate some of the issues by using outputs from prognostic gridded meteorological models to drive the dispersion models. As Bret said, this is something that has been talked about for a while. These are now being routinely used and datasets have been generated pretty routinely and these could be beneficial for use in dispersion models like AERMOD.

They are being used in other regulatory modeling context with CALMET/CALPUFF for long range transport applications. The initial effort was to develop a tool that provides spatially consistent AERMOD inputs.

So you select the Grid cell based on application/source location so that overcomes the sparsity of observed data. I don't have to look for the nearest airport for something I can just pick the grid cell where my source resides. And you can get surface and upper-air data located in same grid cell. And hourly values available for every grid cell.

So the tool allows AERMOD to use parameters calculated by MM5's advanced atmospheric physics options including the heat flux, friction velocity, PBL height. What's not provided by MM5 data that AERMOD needs we are able to calculate it from the date it's available. So this just shows the two different approaches. On the left is the traditional approach in using AERMET. You feed it airport or other input data input data plus surface characteristics and AERMET processes it (inaudible) files (inaudible) for AERMOD.

On the right is the MM5 AERMOD tool currently designed to take gridded MET data from MM5 in this case.

Beyond that we certainly would consider more (inaudible) models. Feed it through the tool and then it outputs data again formatted for AERMOD. So the test case we've done so far is to apply it to the Detroit area. The Detroit area is an area currently being studied for multi pollutant SIPS demonstration platform. We are going to be studying it a lot. We have extracted 2002 MM5 data for the grid cell containing the Detroit metropolitan airport. And we extracted 30x30 grid cell sub-domain from the larger 12 kilometer MM5 domain to be a little bit more manageable in terms of file size to feed through MM5 AERMOD. So we applied the tool and the traditional airport data to AERMED approach and compared the results.

This just shows the domain. The larger red box on the right is the 12 kilometer eastern domain and the smaller red box is not an MM5 domain. That is the 30x30 grid cell sub-domain of the data we extracted to feed with the tool. That shows the grid cell that was selected. The sort of orange dot is where we think the airport tower is located. That's the metropolitan airport right there. We're right on the edge of the city sort of the southwest side of Detroit city.

There's windroses for 2002 airport on the left and the gridded data on the right for the lowest level. They look pretty similar not too bad as it's pretty flat up there. The wind speeds at this point have not been adjusted. On the left the anemometer at the airport resumes 10 meters and on the right is the first-half sigma level from MM5 for about 19 meters. So that is one difference, but overall they look pretty similar. We did a very simple sensitivity analysis. We picked nine sources, point sources ranging in release height buoyancy some with downwash and some without. From a ground level non buoyant source up to a 100 meter buoyant source with no building.

These are comparisons of the 24 hour averages for rural dispersion. On the left you have is the H1H, On the right H2H point per hour average. Then you have AERMET traditional airport results and the MM5 results and the ratio between the two. So the AERMOD prediction based on MM5 inputs divided by the AERMOD prediction based on airport input. Generally it doesn't look too bad between ratio of 1 to 2 including all most all sources except for the non buoyant ground level source where you see MM5 results much higher. That wasn't too surprising based on the earlier study that Bret mentioned that is documents in the paper for Philadelphia. That was an earlier pre-prototype if this idea, but a factor of 10 higher.

So just decided to look at what's happening. The MM5 data for that H1H 24-hour average again this is a ground level non buoyant source that not surprisingly shows light wind speed. Don't know if we have a pointer yet, but you can sort of see the wind speed column there. Those are meters per second. There's quite a few wind speeds below 1 meter per second, but they're not all ridiculous .01 or something. Can AERMOD impose a minimum wind speed for dilution of about .28 or 0.3 meters per second. We'll talk about that in a second.

Let's see what's going on at the airport for the same day and it's very consistent. Eighteen hours of calm okay so again it's a similar picture consistent between the two except when you feed the airport data through AERMET we're going to be not calculating for eighteen of those hours and to get your twenty four hour average with the calm policy you add up the six non calm plus twelve zeros and divide by eighteen. Suddenly that day goes from H1H down to your much lower.

So you go back to that again. The first time we did this we didn't have air surface. Is this working at all? So we didn't have air surface and we just used the same roughness length (inaudible) that came out of the MM5 model for that grid cell which was about 0.3 meters and that seemed reasonable. So that was the first comparison.

Later air surface was developed. Went back and re-ran it with the roughness estimated at the airport from air surface which was quite a bit lower. This was kind of approximate but a little bit less than a tenth of meters so about a factor of five differences. We re-ran AERMET with that surface characteristics and the ratio went down by almost a factor. So that's interesting.

Then I'll mention the 1-minute ASOS data so that's a lot of calm. There's not anything we can do about that. We know that the ground level non buoyant source that's going to be the worst case meteorological conditions that we're throwing out. That kind of raises some concern all by itself. But we looked at the 1-minute ASOS data so we went back and supplemented the airport with the 1-minute ASOS winds to calculate hourly average when reducing draft to the number of calms and variable. We ran that supplemented airport data through air surface through AERMET with air surface inputs and the ratio dropped quite a bit. For the H2H, we went from initially a factor of 7 higher with the MM5 data to a factor ratio of 1.2 roughly. That's an interesting result. It doesn't say either one is great but it's an interesting result. So that's kind of. I was hoping we have more test cases to show you but I guess I was afraid they wouldn't look as good as that or something. Actually we didn't have a lot of time. I think that's interesting.

Our plans just to summarize we have developed this tool it's in draft form. We've done some miniature comparisons. Preliminary results are pretty encouraging especially when we supplement the airport with 1-minute winds. We think the basic approach is promising, but we still feel considerable work that remains to be done before we feel we can endorse this for regulatory modeling. It's something that we have to pursue. It's a technology that we expect will get better on its own without EPA having to fund it. So we want to be able to position ourselves to take advantage of it.

As far as next steps, that's probably the more important thing. It's a busy slide but we want to do more detail comparisons with results from the MM5

AERMOD tool versus the airport data both looking at the meteorology more closely as well as dispersion results.

Do additional sensitivity analyses using the MET input from each approach, including: wider range of source types; different options for interpolation of MM5 grid. When I get into details a little later but I'll talk about that. I didn't get to details here.

Basically you've got the MM5 as a staggered grid so you have winds at dot points, temperature at cross points and the initial one is to interpolate the scale of perimeters to the nearest dot point of the wind and use the nearest dot point to your location. But we can do (inaudible) interpolation each independently.

There are different approaches we can use. We know how sensitive how it is and does one work better than the other or not. Those are the questions we have to ask and answer and then look.

The way we initially did it here is we've used the full profile winds and temperature derived from MM5 for that grid cell and fed that into AERMOD through the profile files. As if I had a tower that went up 5,000 meters we could do some sensitivity analysis if we had partial sub-sets of the MM5 data. We don't how sensitive the results are to that. Then looking at the grid to grid variability, we picked Detroit metropolitan airport because it's the major airport for the city but it's right on the edge of the city. Now the (inaudible) I will mention later. In terms of air surface there is some uncertainty when you run air surface you feed it to location of your MET tower. We found out those locations aren't always documented very accurately. In fact the published location of that tower would have put it in the next grid cell which would have been all rural. How sensitivity is it to that. You can read that.

We also want to extend it to other areas. One to Birmingham, AL, sort of building on the work that has already been done. The BAP studies that we've heard of this morning. And Atlanta, GA, we did some work recently. I'll talk more about it tomorrow. Looking at AERMOD for the NO2 (inaudible) NAAQS review. So looking at some other areas.

We plan to coordinate in a collaborative way with UNC for example what they're doing with CIP2AERMOD and they're doing some other work with FAA. So we want to kind of work jointly with that. My feeling is that EPA we're probably not getting where we want to be in terms of the use of gridded MET data just based on EPA resources and (inaudible). We're going to need to collaborate and benefit from the broader community and other researches that are interested in that. We hope to do that in a coordinated way as much as possible so that we're not duplicating efforts and wasting resources. That'll be difficult but that's kind of our goal. Beyond that since I have been doing modeling over the domain of Detroit city I could have grid cells over the whole city. Why not use grid cells for each source. May not be a perfect solution but maybe be better than using one for the whole domain like we do now for the airport data. There are ideas, different way to utilize this (inaudible) resource that we need to talk about.

Ultimately I think the key is we are going to have to validate the use of MM5 AERMOD data against some field studies data. We have a lot of field studies that have been used in evaluating AERMOD and that's in our plans. I don't know how soon we're going to get there but ultimately that will sort of be the proof.

You'll hear more about MM5 CALPUFF in a minute. But it's a similar but somewhat different approach to taking MM5 data directly into CALPUFF model. Should we couple those two efforts? We have one tool that does that. Or build on the MCIP-to-AERMOD. MCIP is the met process for the CMAQ model. And what UNC has done is MCIP to AERMOD so then they can send feed MCIP with either MM5 or more data. They don't need to change the tool. That was the original proposed design for this tool was that two (inaudible) process that resource didn't permit developing that complete of a system. But that makes a lot of sense. As near prognostic models come into being and talk about hosting an invited workshop on use of gridded meteorological for dispersed model and guide to the best use of this science. Putting the prognostic meteorological modeling community experts together with dispersion model experts and figure what the issues are and best ways to work through them.

So as the range of options for developing met inputs to models expands, we have airport data we have onsite, we have 1-minute ASOS on site, gridded met data whatever. Other (inaudible) that are either here or maybe emerging or in the future. Ultimately we need to look at developing criteria for acceptance of whatever meteorological data you have for whatever model you have for that application. That's kind of an issue that hopefully we need to get a better handle on.

Finally I don't know how soon but we need to have questions how to disseminate this technology to user community. Do we give a tool, you get your own MM5 data, have fun or do we actually does EPA develop an archive of MM5 data and you just go online and download the data. I'm all set to go. Put all the consultants out of business maybe.

That's kind of where we are with that. I think Herman is going to talk next about the MM5 CALPUFF tool.

Tyler Fox: We'll be holding questions until after the next session.

Herman Wong: I'll be talking about the Mesoscale Model Data Reformatted Program that we have been working on for the past couple of years here. Region 10 has interested in using this scale model to guide EPA programs. In fact about nine or ten years ago, we had asked to provide contract money to state of Alaska. We had Joe Scire do some evaluations using the Mesoscale model up in Alaska specifically using the output from, excuse me, output from CALMET to drive ISC3 AERMOD and CALPUFF. The purpose of that particular study was on terrain and the results that came back from that state was in fact good. So we (inaudible) in using Mesoscale data being either from WRF or MM5 to drive (inaudible) models. Particularly right now we're interested in using this data to drive CALPUFF and the (inaudible) version that Joe Scire recently placed on his website. For the past couple of years, Faye Anderson, at Region 7, Tim Allan and (inaudible) and myself have been working on a (inaudible) scope program to use particular meteorology data from MM5 and WRF and CALPUFF.

This program that we're working on is an alternative to CALMET not necessarily a replacement. CALMET has its own niche here. But we thought for what we were looking to do with that model (inaudible) we didn't need all those options in it. We thought it would be (inaudible) in using CAMx and CMAQ and reformat meteorological data used using CALPUFF.

Recently Bret created an initial code to convert the MM5 data and it could be read directly into CALPUFF. We also wrote in options in there where MM5 doesn't have those needed meteorology parameters that the program would calculate those parameters. At the same time we also wrote a work scope to test the program to make it bullet proof, as

Tim Allan likes to call it, and for a contractor to do it for us. We do have limited resources and cannot always spend our time doing these types of fun projects. We do have to do government work. I think I just talked about that. Moving right along.

Some of the calculated parameters that we'll be calculating will be convective velocity scale, surface friction velocity, Monin-Obukhov length, air density, and surface relative humidity. I'm sorry I have been sick for the past few days.

We did provide this work scope to Tyler Fox and he thought it was a good idea. And Tyler Fox graciously provided money to us for a contractor to review the code and make sure it has all the bells and whistles. However, the work scope we wrote it wasn't enough budget to cover it all. So we couldn't get any freebies from the contractor whatsoever. A joke there.

We're paring down on the work scope, but I'm not sure what part we're paring down. In talking to the contractor we expect that phase of work scope to be completed in 2-4 months by contractor from the date of the agreement in regards to cost.

Any work that is not completed by the contractor we will be completed internally. Probably Region 7. We will also do some independent evaluations tests on the program after we get it back.

Some of the highlights of the work scope I thought it would be nice for you to know.

Review Region 7 code that Bret had put together including the reading and reformatting of meteorology and geophysical parameters. (inaudible) Review parameters that will have to be diagnosis/calculated. The contractor may have other options that they want us to consider. We also want the program to run on different platforms. (inaudible) What I like about this program is the (inaudible) capability output statistical comparisons observed to measure from the program. A lot of times we get applications or studies from contractors to just use the MM5 and it goes into CALPUFF without providing statistics to us. What we're intending to do with the contractor is to put some option in it that offers statistics to measure data for stuff like wind direction. We also have an option to generate some visual graphs to compare wind roses. We also incorporate output hourly predicted meteorology so we can compare to the measured data. Another aspect of this is to develop documentation that describes all parameters, algorithms, and methods that are being used so that the users can understand just how it does it. Another feature we want is to lay out code structure. The last time I have seen any code structure to identify any (inaudible). I don't remember which one. (inaudible) One of the final items we are including is to identify some switches that users can use in this particular program.

While all that is going on, work is being done by the contractor. We are also generating some workgroups including EPA, Forest Service, National Park Service and Fish & Wildlife Service to develop statistics, benchmarks, and methods to calculate missing parameter. Outside testers and evaluators of the program and get some outside approval. If all goes well, we will submit to OAQPS for approval to the Model Clearing House.

The reason Region 10 is interested in this program is that we have a lot of exploratory and developing operations in the Outer Continental Shelf of Beaufort Sea and in the open water of the Chukchi Sea.

Back in 2006 MMS submitted to EPA an over water transport called CALPUFF version 6 point. I don't remember numbers. What'd we like to do is because we will need all the bells and whistles to reformat the program to grant meteorology to go into the over water model. In preparing for this, Shell came in 2006 indicating to us that they want to drill and put some pipelines out there to process oil. At that time, 2006, we asked Shell Oil to collect meteorology data a proper distance from their property because it costs a lot of money.

Most recently in March of this year I sent a letter to Shell saying that I strongly urge you that data that would be collected at the outer continental shelf up on the Beaufort Sea. Shell came back late this summer and agreed that they would collect data using buoys out in the OCS. Those buoys would be located anywhere from 5 to 10 miles in the OCS and at 15 to 25 miles of OCS. They have at least four buoys out there collecting surface observation as well sea surface temperatures and wave height.

We expect Shell to collect that data sometime in last summer of 2009. I should add that Shell also agreed to put a profiler on one of the islands so that they will be collecting temperature profile there for us. What I intend to do with the data and I let Shell know that. We will provide that data to University of Alaska. We are working with University of Alaska on the WRF model which they are currently developing an ice model up there. As you know, there's a lot of ice up there unless we have more global warming ice won't matter. We are working with them and we intend to provide that data for them to use to assimilate that data to WRF and to use it to (inaudible) to do the performance evaluation.

They are currently evaluating the polar version of WRF and have also looked at some of the issues that we have with our concerns about us not recommending use of (inaudible) on the Sea Breeze (inaudible) so they are currently looking at the impacts of (inaudible) on those (inaudible) patterns.

In the 2006 version of CALPUFF, MMS requested Joe Scire include the core product elements into CALPUFF. The elements are used to drive the (inaudible) parameters over water. At this point and time, (inaudible) we had to include those core program (inaudible). That's the thing we had to consider and that's partly why we asked Shell to collect (inaudible) shelf data and weight information.

Now EPA Region 10 will work with MMS to evaluate and test CALPUFF Version 6 using tracer gas experiments. Shell will providing tracer gas experiments to us and we will be doing our own independent evaluation using the information data he used. Basically he used it and fed it to CALMET the surface file for OCS and to compare tracer gas experiments results. We'll do the same thing with our independent evaluation as well as other analysis but we were often running MM5 or WRF for those periods. We will see how those results compare where he used CALMET and we used the reformatted program. We expect this will take 2-3 years depending on our availability as well as the pressure on EPA Region 10 to permit of drilling permit in OCS.

Just so you have an idea that you know what we're looking at. This is the Beaufort Sea and these are lease areas that Shell has where they intend to drill. This is the (inaudible) where the located platform once they find oil out there. This area here ranges anywhere from 3 to 28 miles from the coast line. The same area in which I think (inaudible) one billion dollars leases where Shell would like to drill as well as Phillips. Phillips came to our office and talked to us about their proposed activities out there. This area is not outside of OCS but between 60 and 180 miles out in open water.

Oh man...Okay. This is the modeling domain that the University of Alaska is using in testing the WRF with the ice model currently. They'll do some additional testing in Phase 2.. But I just wanted you folks to see that this domain is 10 km (inaudible) and encompasses both Beaufort and Chukchi Sea and over the land areas which we are not looking at.

The advantage of working with the University of Alaska is that they're doing a lot of the testing for us in terms of the WRF model using their new icing program. They're also doing for us besides doing the core evaluation using the (inaudible) buoys and upper air. They will generate five years of high testing for us to use. It is my desire to take that data and use it in CALPUFF or over water so that we won't have to do this again. The oil companies will not have to say that they don't want to do this. Use this WRF data in the reformat program and the CALPUFF over water program. Again the CALPUFF version 6 is intended to replace OCD. It is a newer and better science and if you read the introduction to the users guide CALPUFF version 6 it will indicate that is the purpose is to replace OCD with version 6.

Bret Anderson: Are there any questions for either Roger or Herman. Do we have to go through the process of stating your name? State your name and facilitation for the record.

Gale Hoffnagle: Seemed like what you did is to fix ASOS data until it matched MM5 data. Is that right?

Roger Brode: I filled in gaps in the ASOS data with other ASOS data that were more highly resolved temporally and didn't arbitrarily applied a three knot threshold.

Gale Hoffnagle: What's your conclusion from that process?

Roger Brode: I don't know if we have a firm conclusion, like I said, it doesn't say that either one of them is right. They are both probably wrong but the fact that supplementing the ASOS data with the 1-minute winds brought it in to pretty close agreement with what we're seeing in the MM5 data was an interesting and encouraging result. One thing that it does suggest is using standard ASOS data as is for modeling low level plume. This may be problematic because you're throwing out large chunks of data that you know that it is going to provide us the results in the wrong way from our perspective.

Gale Hoffnagle: Right. And so the normal correction at least for some category sources should be using 1-minute data not necessarily going to MM5.

Roger Brode: Right. I think MM5 is the longer term vision that addresses other issues. The fact that I don't have any airport data is representative what do I do? Put up a tower well I don't want to do that. If I can use prognostic data and we have confidences it's going to give reasonable results. Then that's good for all of us. That's why I mentioned earlier one of the things that we are thinking about addressing through a clarification memo is treatment of airport data in AERMOD. One is ASOS because the sensitivity study I mentioned we have redone it. We need to document that more fully. We plan to do that. We actually went beyond what was done with ISC in terms of AERMOD sensitivity to ASOS verses observant based data. You will see a little more about that with Randy's presentation on AIWG.

Bob Paine from ENSR: I'll see if this microphone is working. Oh? Turn it on. Now it's working. It's working too well. Bob Paine from ENSR. A couple of questions and one is: when will BETA test versions of these programs be released to the public?

Tyler Fox: For the AERMOD tool as Roger indicated was a quite of bit of testing left that we need to do. And obviously we will work with regional offices and the state and local folks to try and understand the nuances there before we release something broadly to the public. Similar to the experiences we've had with air screen and air surface. Long story short there is no firm date. On the CALPUFF side I guess I should commend Herman not only soldiering through his presentation given his throat and the like. But for being proactive in identifying the future need that he is going to have in region 10 and dealing with the situation, working with us and others collaboratively across regional offices and pursuing a solution both in tool development and application that will allow the tool to be developed in a way that will bring the best science to bare for the situation. And using the clearing house probably to allow it to be used in that 2-3 year period. That may the first time in which that tool and the results of which become public in a formal sense. Again it would depend on our resources and the time that we have available to get that out there. But we will go through the same type of testing process again with the regional, state and local folks. PerHAPS there will be ways in which we engage with parts of the community in a selective way and seek your input in terms of how best you might see and others in the room may see a way to play a role there. Again there is no firm date.

Bob Paine: A follow up question is on the MM5 WRF to CALPUFF and then bypassing CALMET. Since CALMET can already take the MM5 data, why do you need to bypass CALMET?

Bret Anderson: It's you know you can look at it from different perspectives. One of the primary things is this is not intended to be a replacement for CALMET but as Herman indicated it's intended to be an alternative to. Part of the running any like okay for the people who are running multiple year simulations. If you're doing three years worth of CALMET you know CALMET/CALPUFF. Logistics file side you're talking multiple gigabytes worth of data. This presents to the user community potential alternative in terms of going straight from MM5 to CALPUFF and then bypassing large (inaudible) data sets and large (inaudible) data sets. It potentially has the alternative of being able to speed up the permit review process. In come cases this is an attractive alternative. As I said, you'll find it is not intended to be a replacement. There is clearly an application where CALMET is the preferred or the more appropriate application. The model that you may find where there might be where there's no more to be gain from running one verses the other like in flat terrain. You know over the mid west for example you might find that might be suitable for that. It really boils down to a philosophical issue just you know in terms of logistics.

Bob Paine: Okay. One more quick question for Roger. If you have gridded met data for AERMOD and you had a lot of sources that extend over more than one grid square, would you consider multiple grid inputs to AERMOD for the same run?

Roger Brode: I think I mentioned that in an earlier presentation as one of the ideas we talked about looking at. Yeah. If you have a domain that covers more than one grid cell why not use each source with its own grid cell. It would be not an over night change but a relatively manageable change to AERMOD just to add multiple met input option and then pre sort just to assign it to which met file you wanted or even if you did coordinates it would pick it based on location. So that's something that could be implemented but we need to study it. But it may not be a perfect solution but if we can demonstrate that it's no worse and hopefully little better than assuming completely uniformed then maybe can make progress to that.

Pete Manousos: I'm from First Energy. I'm a meteorologist. I have a question for Roger. What when you say tool is this a series executables that you are extracting the data from the grid? Is it a grid file that you're extracting the data from. Just elaborate briefly on that.

Roger Brode: Sure. The MM5 AERMOD tool is (inaudible) program that extracts data from MM5.out files. So the raw and then the .out files and the users specifies the location either coordinates, latitude, longitude, (inaudible) or a grid cell if you know which one you want to do. Then extract MM5 data for that grid cell.

Pete Manousos: Is that one year interpolation is that correct?

Roger Brode: Right. Now the initial

implementation picks the closest dot point. The wind location to that location you entered and then interpolates the smaller parameters to that location. And that becomes your grid cell. Again, there are different ways that could be done. I think that is sort of consistent with what the MM5 CALPUFF or CALMET.

Pete Manousos: Okay. Just to follow up with what Bob was saying. If you have as series of points around that line there's an opportunity to perHAPS run AERMOD in an ensemble. That might be something to look at and get like a PDF most likely second high concentration or something like that.

Roger Brode: Again that gets back to non regulatory application model where that type of information could be used might not be as clear how it would be used in the regulatory permitting, But yes that certainly makes sense.

Arney Srackangast: This is in the same topic as far as the MM5 or WRF AERMOD input. Are the surface parameters coming directly from the MM5 such as the convective parameters, etc., or is there some blend with AERSURFACE? Where does AERSURFACE that's completely out of the picture come in as opposed to all these parameters coming directly out of the meteorology model? In addition to that, could this be utilized to eliminate urban versus rural switches in AERMOD so you can something directly from land use.

Roger Brode: There are a couple of questions there. I think the last one is a very good question. I hope I remember to get that. Again, this is just an initial design for this draft tool. It currently uses whatever information is output from MM5 that AERMOD can use. So the (inaudible) it'll use it. The heat flux sits there and actually uses (inaudible). We actually recalculate (inaudible) from each flux and (inaudible) star. Whatever is not there, AERMOD the tool will calculate like the . Again a lot of this depends on what options you select in MM5. Some MM5 options will give you certain output others won't. Right now the tool is not designed to be generic for whatever MM5 options you might select. Looks for what is available. It's designed for this specific data set. Currently it's been tested on 2002 MM5 platform data that's used in all CMAQ photochemical modeling. Again that's just one approach. The initial there's been a lot of discussion about other approaches taking the data through AERMET. That's something we still might revisit. A sort of more interim step might be to just use the profiles to develop (inaudible) upper air data. Then it can go through AERMET with your own surface data. Especially out west if I have site specific surface measurements that I'm confident in using. But there's no upper air data in sight using gridded met to generate (inaudible) upper air data to go through AERMET. Seems like a pretty straight forward approach. That's something we've talked about pursuing as well. That will be a smaller step down that path. Right now we are sort of at the beginning of the path and there's a lot of different paths we can go down which is one reason why we haven't gotten further. Because I don't want to go too far down the wrong path and then realize we wasted a lot of resources. Of course we have a lot of issues to deal with but that's it.

The question about urban is one that has been talked about. I think it was mentioned in that paper Bret referred to in the AWMA May, 2007. And right now ideally we would be able to do that to speed up the urban grid cell from MM5 or WRF and not have to turn on the urban option in AERMOD. Not sure we have a lot of confidence in current grid models photochemical or prognostic models to simulate the urban boundary layer in the way that AERMOD would need to do that. There's been some work that's been done in urbanizing MM5 and or WRF and that's kind of what we would need to urbanize prognostic met model that actually does capture the important aspects of the urban boundary layer for dispersion modeling purposes before we could say yes turn off the urban switch. It's something we will have to study as we go further with this.

Dick Perry: Beeline software. Roger I had a question that was sparked by you saying how attractive having a 5 km tower would be effectively. And yet in AERMET processing the user goes to all the trouble of finding a (inaudible) run and virtually nothing is done with it. Where it's appropriate it's a much taller tower than 5 km. Has there been any looking done at utilizing that data for a little better upper air description.

Roger Brode: Well not really to speak of. I guess in terms of (inaudible) we are lucky if we get two (inaudible) soundings per day (inaudible). So there's sort of a temporal resolution issue there what can we really extract from that full profile from the upper air (inaudible). I know early on in the development of AERMOD/AERMET at one point talked about whether to use the (inaudible) to sort of do a later check on the boundary layer height calculations to see if any adjustments need to be made. That never got implemented. I guess in terms of MM5 AERMOD we basically have that full profile every hour. So I think that's what makes it a more meaningful resource to use because if you feed it into the profile file as profile of winds and temperatures all the way up. Does that make sense?

Tyler Fox: I want to thank all the presenters for this morning session. We will have an hour and ten minutes or so for lunch. Everybody here there may be a crunch, little lines in the cafeteria so we'll see you at 1:15 and we will spend an afternoon on AERMOD and CALPUFF. Thank you.

(Due to technical issues with the recorder, the first part of Tyler's speech was not recorded)

Tyler Fox: James will do Air Screen and Roger will do Air Surface and then we'll have an AERMIC update from Roger. Other than Bret we planned it as such that none of the other members of the AERMIC committee could be available. Not that we purposely did it that way, but they had other conflicts. Unfortunately we don't have Al and other folks here as we have in the past. Then we'll have the Q&A session. Without any further ado I'll just hand this over to Randy. We put yours on here Randy? There it is.

Randy Robinson: Thanks Tyler. As he mentioned my name is Randy Robinson. I work with EPA Region 5 office in Chicago. What I was asked to do today was to provide an overview and update on the AERMOD Implementation Workgroup. This was a work group that was introduced at the last conference. We'll get you up to speed on what's been going on since then. I'm going to talk about providing a little background on AIWG. That's the acronym for our group. Discuss group organization and purpose. Discuss issue identification and how we prioritize those issues. Touch a bit on the accomplishments so far with this group. Then talk about the issues that are currently being worked on and whether there is some activity going on with the sub group which I'll mention in a minute. A little bit of background there was an initial AERMOD implementation work group that was initiated in April 2005. It was co-chaired by Al Cimorelli (R3), and

Warren Peters (OAQPS). The members of that group I believe it was a pretty large group. There may be 25-30 members consisting of states, local agencies and EPA Regional offices. They set up 3 goals for themselves. That was to come up with a recommendation on how we were going to handle AERMOD implementation issues going into the future. Put information into an Implementation Guide that would be useful to help people out there using the model. And also to try and identify all the unresolved issues related to AERMOD that were out there. This was a successful work group. I say it was successful because they had a beginning and they had an end. The end came with the Final Report April 2006 and that final report has proved to be real useful for the current version of the implementation work group which I'm going to talk a little about now.

This full AIWG group is co-chaired by myself and Roger Brode (OAQPS), and the make up is similar to the original only smaller. We've got state representatives local agency representatives, regional offices and headquarters. We had our initial call in January, 2007, so we have been at this a little over a year and a half or so.

The purpose of the current AIWG is to advise OAQPS on implementation issues, provides input for budgeting considerations or planning considerations. Put together action plans that are needed that may require us to work with other groups. Primarily that would be the AERMIC group which is the sort of scientific technical group associated with AERMOD as Roger mentioned earlier and will mention again later. Just in general provide feedback to OAQPS on how the process is working, how's the clearinghouse process working, communication materials and kind of a sounding board for headquarters.

I mentioned the initial AIWG group. One of their goals was to identify all the issues they could associate with AERMOD. They did a good job and came up with a list of 57 issues that were categorized either as bug fixes, mandatory work that needs to be done, model improvements. Those kind of things. In our first couple of calls we looked at that list and we said well that's tough to get your arms around that large a list. So we narrowed it down to 10 through a very democratic voting process. Further narrowed it down to 3 and developed Subgroups and had chairs step up for those sub groups. They're listed here. The three sub groups that we have are:

ASOS/Met Data - Alan Dresser (NJDEP) / Joe Sims (ADEM)

Urban Issues - Margaret Valis (NYDEC)

Surface Characteristics - Doris Jung (CO DPHE)

Having said that we also recognize that all the issues on that list are important. We just needed to narrow it down so we can manage it. We have been able to knock off some of those items over the last year and a half. We put some in a kind of low hanging fruit category. Others are being worked over time and all the issues are important. But these are the three main areas we have been focusing on. I guess I should mention in addition to this an ad hoc group that has been organized and has had a couple of calls that have dealt with specifically GEP kinds of issues. They are formally a part of AIWG but came about as a result of the initial list of issues.

What have we accomplished over the last year and a half or so? A couple of things that I'm highlighting here. One is updating the AERMOD Implementation Guide. That was something that the original AIWG group had listed as a goal. They did put out an original guide in September, 2005. The latest version that we have of the AERMOD Implementation Guide is dated January 9, 2008. Generally the revisions to that document include: We've revised the structure. There are a lot of new sections in the met data in the processing area as well as some new text in the urban applications. I'll talk a little more about that in a minute. Another accomplishment is the development of the AERSURFACE methodology and the release of the AERSURFACE tool. We'll hear more about this later on. But it's a tool that automates the process of generating the surface characteristics that you need to run in AERMOD. And this is one of the significant accomplishments associated with this group.

Specifically the improvements to the new structure we've added the Table of Contents. We've got a "what's new" section. If you have the old version memorized and a new one comes out you can go to that what's new and you'll know what's changed. Added a Background and Purpose section. Added some references. Fundamentally it's designed to be easier for EPA to revise and update and also easier for people to find what relevant information they are looking for. Hopefully it's an easier document to use. In terms of the other updates to the guide that fall under the meteorological data and processing section relating to determining surface characteristics, there's a section with a discussion of representativeness some general recommendations on things to consider when you're looking at representativeness of your surface characteristics. As I mentioned an updated very lengthy discussion on the new method on determining surface characteristics which is tied into the release of the tool that implements that which is the AERSURFACE tool. In addition, there were updates to sections talking about processing upper air data. Just some recommendations on options you should be selecting when you're downloading data from the upper cell web site. Also information on processing sites specific met in urban areas. Some general considerations to take into account if you are in an urban area whether using national weather data or site specific onsite data some recommendations there. Other areas that were updated include Urban Applications. In terms of the urban/rural determination an update to that is a change to the recommendation that moves from source by source determination as to whether it should be urban or rural based on the Auer/Irwin technique to a more general recommendation that you should look at. Look at the modeling domain and the area that is impacting your sources as a whole to see what the heat island impact might be on the group of sources. Other changes include population input we've got some recommendations if you're modeling urban and AERMOD you use population as a surrogate to represent the heat island impact. There are some recommendations in there on determining the appropriate population. I'll talk a little bit more about that in a minute. Also a clarification of the urban roughness length. We felt there was some misunderstanding of what this value was that AERMOD was asking for. We clarify in there it is to be used to characterize the urban heat island impact and it's not a value that should represent the roughness difference between your source site and your met sight. I think there has been some misunderstanding about what that value is to be used for and we've set a default value in the implementation guide that represents the regulatory mode of the model.

Okay I've mentioned we have the 3 sub groups. The ASOS data met data group, the urban issues group and the surface characteristic group. I'm going to briefly talk about each sub group sort of highlight the issues they are dealing with and highlight a couple of actions items that they are currently involved with. In a lot of these slides I've stolen from the sub group chairs so I appreciate that. I think Joe is the only sub group chair here. With respect to the ASOS and met data processing sub group they determined a group of issues they were going to focus on. One was the impact ASOS data versus pre-ASOS data on AERMOD concentrations. Secondly they wanted to look at the guidance and tools for missing data and improving quality assessment and reporting in AERMOD.

Thirdly impact of light winds in AERMOD and then lastly use of hourly average ASOS winds and this is referring to the 2-minute average winds that Roger was talking about earlier this morning. I'm going to talk a little bit more about Bullet 1 and Bullet 4 just to provide some information on what the sub group has been involved with there.

In terms of the ASOS verses the pre-ASOS predictions. Here the activity was to compare AERMOD comparing using pre-ASOS and the ASOS met data. Looking at the same National Weather Service stations during the same times. It is essentially redoing the 1997 ASOS and pre-ASOS study that was conducted for ISCST3. That was done and the results the conclusions that the sub group came up with based on that analysis was that overall the use of ASOS date in AERMOD was generally less of an issue than it was with ISCST3. In particular the lack of complete cloud cover that you get with the ASOS data was much less an issue for AERMOD than for the ISCST3.

Here's some of the information that was generated. You are looking at plot on the left is for AERMOD and the plot on the right is for ISC. The Y Axis is the difference in the two met data sets that were used. In this particular plot it's a comparison of the conventional observation met data in one case. In the other case, we've substituted in ASOS clouds so for the observational data it's observer temperature, winds and clouds. In the other case we substituted in ASOS clouds combined with the observer temperature and winds for the ISC. There's a variety average of times along this. This is for point source. As you can see for AERMOD the inclusion of the ASOS clouds didn't really make too much of a difference. The ISC plot actually this is a plot that is equivalent to one of the plots in the 1997 study. There were more differences in the ISC version in the ISC plot than the AERMOD which isn't necessarily surprising given how ISC stabilities are determined compared with AERMOD's stabilities are determined. This plot is similar except where comparing the full ASOS temperature winds and clouds with the convention observer based temperature winds and clouds for AERMOD and for ISC. The different symbols are for the six met stations. And again here you can see more of a difference with AERMOD than when we just replaced the clouds; more along the lines of what we were seeing with ISCST3. In general we felt the use of ASOS data was with our AERMOD was good or better than it was with ISC. Overall that's less of an issue. The use of ASOS data is overall less of an issue with AERMOD. Another area of work that the met data issues group is looking at is the hourly average winds. You heard a little bit about that this morning. Just a little bit of an explanation. Currently as you're all aware we used 2-minute average winds taken about 10 minutes before the hour. 2-minute winds averages are available every minute for first order stations starting in 2000, other sites starting in 2005. So what we can do is to take those 2-minute averages and compute hourly average winds. The expectation is that this would reduce the number of calms and reduce the number of missing data currently reported. Also what would be the impact on that if you ran it through AERMOD?

We've done the hourly averaging and as you can imagine there are a number of decisions you have to make when doing that in terms of what are your thresholds, how much data do you need to do your average. So we've come up with a methodology, it may not be the methodology, but it's a methodology of averaging the winds and thought of what would be the standard ASOS data compared with the hybrid or the average. Here we've got a five year period of record. On the bottom we have the various wind speed categories starting with calm, missing and variable. And the various wind speed category. The thing to point out is the number of calms is reduced when you do the hourly average. The number missing hours is reduced when you do the annual average and the number variables are reduced. And again variable is if you have an hour between 2 and 6 knots but the wind direction varies by 60 degrees or more it is classified as a variable which would be classified as a missing for our group. The hybrid really speaks to that.

Another example of this is Oklahoma City. Again the hourly average you see the reduction in calms. See the reduction in variable hours. A few more hours below 3 knots. We took that information and we modeled it to see what the results looked like. And again this is for Detroit and for Oklahoma City and the Y Axis is the ratio of the hourly average concentration to the standard ASOS concentration. There is a variety of source categories here arranging from low level non buoyant sources to more higher buoyant sources. Overall we see an increase in prediction when using the hourly met data. It varies from source to source somewhat but I guess it's not surprising for both Oklahoma and Detroit seeing generally slightly higher predictions with the hourly met data.

We'll move on to the urban issues sub group which some of the issues that they decided were a priority were urban/rural determination and guidance on population input for urban option. The urban issues work group has been instrumental in the changes that have already been made in the AERMOD Implementation Guide. They also contributed in the text that clarified the urban roughness length. They were involved with methods for quantifying heat island effect and I'll show some images in a minute.

And then lastly have an issue of enhanced dispersion from large heat sources not related to population.

I'm going to focus a little bit on the population input issue. As you know if you're modeling urban and AERMOD you need population as surrogate to capture the enhanced dispersion you'll see in the nighttime due to the heat island. The magnitude of the population that you use is inversely related to the model concentrations that you'll get. So there is a desire not to overestimate the amount of population that you'll be using in the model to make sure you're being conservative on your concentrations.

The good news is that I don't think AERMOD is extremely sensitive to this parameter. But there is still a desire what population is appropriate. What should we be using? The group has borrowed some of the information that's been used in the Detroit multi-pollutant pilot study. This particular plot on the left is plotted census tract population density people per square per km. If you were looking at that and I think the box is for the AERMOD domain that is being considered. If you look at that it's a little tough to get your arms around it and try to determine what is the urbanized area and what is the population I should be using. One technique that was used in Detroit is to take this information the density gridded on the 6x6 km basis and I think one thing that does it helps to organize the data a little better. It helps you get a handle on what is the urban area that might be contributing to the heat island impact. This was the technique that was used in Detroit and we took that said well it did a good job of sort of simplifying the image for Detroit. How about a more messier area like the northeast? This is a New York City example and Margaret Ballis has done all this work and really done a tremendous job. But on the left is the greater New York City area population density is again plotted there. If you take that information and grid it on a 6x6 km basis you end up with this image. Then what Margaret was able to use was to use the 750 people per square km threshold that is in the guideline and delineated and it's a bit of judgment call but delineated what she thought was the urban population was in that 750 people per square km threshold. The good news is that using on this side the population of the census tract selected is about fourteen and a half million using the gridded approach she came up with a similar population. The question is still out there though as to what is the appropriate population. This doesn't necessarily get at that and that is one thing we are trying to refine as to obviously fourteen million is probable not the right number to model if you've got a source or two located in Manhattan.

So one of the things we are also looking at is combining the population information with other data that may help delineate the urban heat island which is what we are trying to get at.

This is some land cover data that shows impervious land cover. Again you can overlay that on the population density to maybe give you a better feeling of what is the urban core that might be impacting your model area. As I said this is still work in progress and we're trying to refine. The hope is to come up with a methodology that people can implement to generate population data from that application.

This one last area that is also being explored is what we're really interested in trying to get at the heat impact is what is the temperature difference in the urban and rural areas. And we've discovered that NASA has satellite images that might provide that kind of information and these are a couple of examples. So we are looking into what is the potential for using these satellite images that show you the temperature radiance for our urban kinds of modeling and maybe the future is that the temperature differences is directly input into the model or maybe we can use this kind of information to sort of collaborate the population data that we are using. But we are just really starting to interact with the NASA folks on this. We'll see where that goes.

Lastly the surface characteristic subgroup. Their three main issues that they identified was lack of representative met data. What do you do if you don't have any representative met data and I think the future is possibly gridded met data or the MM5 to AERMOD that we heard about earlier or maybe it's the up over down seems like I've hearing about for a long time. But I think that's an issue that is ultimately sort of out of this sub group's hands but we'll see what happens there. This sub group has also been involved in the surface parameter determination and we're quite involved in the testing and development of the AERSURFACE methodology and testing the different radius that are recommended for the surface roughness parameters. I'll talk more about that in a second. Then lastly representativeness process met data you know can we develop something that can give us some criteria or some information on is the met data that I've generated to run in AERMOD is it representative of my source location or is it conservative or what kind of differences should I expect. So that's some of the road that this group is going down.

Real quickly this is some of the modeling work that the sub group has done and it's focused on Baldwin met data and source information and this is a site southeast of St. Louis in Illinois. Baldwin is the site specific met tower Belleville is the National Weather [ed. Service] station located about 20 miles to the northwest or so. The graph here shows the land use area around Baldwin which is site specific and the land used around Belleville which is the nearest National Weather Service station which is what you would grab and use most likely.

Here is wind roses for Baldwin and Belleville I guess you know the directionally they look reasonably similar. One of the things that really jump out is the number of calms you get less than 0% and 24% calms at the National Weather [ed. Service] station. Again that's evident in the bar chart below which shows the wind speed distribution.

This a plot that examined more directly the impact of calculating your surface roughness based on a 1 km radius from your tower verses based on a 3 km radius from your tower. The recent AERSURFACE methodology recommends the 1 km for surface roughness calculation. This is the 1 km circle this is 3 km for the site specific and the numbers in the middle don't know if you can read those or not. But those represent the difference between the 1 km surface roughness and the 3 km. For example this sector right here is 250 % which means that the 1 km surface roughness is 250% higher than the 3 km for that particular sector. That's the only one that's really different. The other ones are 10% to 20% difference. For the National Weather Service site similar map, I think all the 1 km surface roughness value are less that were produced at a 3 km radius and at a bit higher percentage than we saw for site specific. So what does that translate to in terms of model concentrations is one of the things the sub group is looking at. On the Y AXIS is the ratio of the 1 km surface roughness prediction to the 3 km radius concentration prediction for a whole slug of difference sources ranging from area sources to buoyant sources to non buoyant volume sources. Generally not a whole lot of difference for this site specific tower which is this particular plot. A couple of sources show up as being slightly lower using the 1 km but generally it didn't make much difference for the site specific tower. For the National Weather Service tower comparing the 1 km to the 3 km ratio increased differences mostly predicting a little bit higher with the 1 km roughness. Had one source that popped up over two times higher than the original prediction. A little bit more sensitivity with the National Weather Service station. The group is doing more modeling of different sites and trying to get a better understanding of what kind of impact we're seeing. There's also efforts to look at some of the field studies relative to these data basis as well.

If you remember nothing else, these are some kind of

final points. AIWG is I guess I would call it an inclusive process, relying on the states and locals and other folks who have experience and knowledge in using the model to advise EPA on these implementation issues. There's been a tremendous amount of good work that's been done by this group at this point and continues to be done. We realize that communication is critical and it doesn't do us any good to generate some information that may be useful and not really communicate. So we try when we get new implementation guides we put them up on SCRAM and maybe we need to think of different ways to broadcast when we do have new information. But communication is the key, it flows outward and you guys
bring the issues with AERMOD we'd like to hear about it as well.

Then lastly I want to thank again all the members of the AIWG group as they are donating their time and efforts and have done a tremendous job. That's it.

Tyler Fox: Thank you Randy. I just want to echo the appreciation from our standpoint Randy, Roger and the rest of the workgroup members. As you can see it's not only impressive reflection of people but a reflection of work that's moving us forward that if we hadn't been communicating and bringing that collection of people together we wouldn't have been able to get this far. I'll talk while you go ahead and prepare that. Next we have Roger on the status and updates and the specifics of the AERMOD modeling of the system itself. I would like to recognize the efforts of the implementation work and after Roger talks we'll get more specifics on the AERSURFACE tool that Randy mentioned that one of the AERMOD implementation work sub groups was focusing on and I think Bob Paine asking about releasing tools and the like. That's one example where I think by engaging with the state and local folks as well as the regional offices we can get a lot of testing and work through the demos or beta versions of these tool and get them but maybe not necessarily bullet proof as someone mentioned this morning but in a suitable form to get into your hands so that you have got something good and have some confidence in working with it. As I mentioned or tried to indicate this morning as we move forward the gridded met tools for AERMOD and CALPUFF we look to work through the same type of process and engaging with the state, local and regional offices first to go through that testing. But as I indicated to Bob if there's a way in which and there are interested parties here or out there or in the community we would certainly look to provide that to gain your insight and experience as well. It's obviously something as Chet said in the beginning we can't do it ourselves and working through these collaborative processes definitely get us much further along than we otherwise would and we will continue to rely on these types of collaborative processes as we move forward. I'll hand it over to Roger.

Roger Brode: Thank you Tyler. Sorry I wasn't here at the beginning to express my acknowledgment and appreciation for all the assistance that Randy has provided as co-chair of the workgroup. I really appreciate that and have enjoyed that very much. And also to express once again how appreciative and encouraged and impressed I am at the especially the state members how committed they are to this process that has been going on close to two years now. And people hardly miss a call usually with the full group and the sub group that's like two calls a month very consistent level of participation. We're really encouraged by that and we hope to continue that. We've discussed sort of to keep things kind of fresh maybe rotations of membership on the group or could a different sub group for a while that's something we haven't implemented yet. Also with the (inaudible) this year sort of revisiting the AIWG list of priorities and activities in light of AERMIC plans and any adjustments that need to be made there. I want to thank you very much for that.

I'm going to give you a recap of AERMOD status and then talk about some recent developments with the AERMOD modeling system and inform you of some other AERMOD related activities that have been going on within our office. I guess Tyler mentioned so everybody here is aware AERMOD was promulgated as EPA-preferred near-field model in Federal Register notice dated November 9, 2005, with effective date of December 9, 2005, with one-year grandfather period. Since that time there were some significant updates made to all of three main AERMOD components AERMOD dispersion model, AERMET met processor and AERMET (inaudible) processor and briefly summarize those. They've been out there for a while so I'm pretty sure most of you are aware of those. They're listed in the Model Change Bulletin as well as some addenda to the User Guide. Two key areas of focus when I first got there that go into Version 06341 of AERMET and AERMAP but issues related to processing the newer format of surface weather service data. Think we've got a pretty good handle on that. There were a lot of changes with AERMET for handling that.

For AERMAP, a lot of issues to associate with how the horizontal datum conversion reference datum conversion was taking place to get coordinates for your source or whatever from old topographic maps generally those coordinate are going to be referenced to an older datum, North America Datum 27 is basically what model of the earth was use to represent those coordinates. And the newer datum is NAD 83 so a lot of newer elevation data is in that 83 but some elevation data is in that 27. So dealing with the conversion from your source coordinates in one datum to terrain elevation coordinates in another datum that's a complication of AERMAP that we've had to deal with and I think we have addressed a lot of those issues. There are still a few bugs left over and that certainly wasn't bullet proof. But I think we made some significant progress there.

Now more importantly what you're probably more interested in is the recent AERMOD developments and the updates to all three AERMOD components have been completed conversion dated 08280. Had hoped they would be posted before you got here. Depending on how fast you travel they may be posted before you get home. It's very close to trying to make them as bullet proof as we can. For one thing it's a time consuming and I don't want to call it painful but it certainly a demanding process to go through these kinds of updates. And we don't want to do them anymore often than we have to. So this should make you aware that these are going to be released on SCRAM as soon as possible. Another motivation for getting the especially the AERMOD update out is that we want to release a draft version of AERSCREEN. Screening version right now the version of AERMOD out there now will not work with AERSCREEN. So that wouldn't make much sense to get AERSCREEN out first. So that's another thing driving us to reach this milestone. Some of the documentation may come a little bit later but the basic information will be there as new options. Just to give you an overview of what changes have been made: I guess as far as all three components some miscellaneous bug fixes and enhancements have been made and I'll give you more details in the following slides. Some of the improvements have been made to try and make the code more portability across different compilers and platforms. I think we've made some progress on that. In terms of the EPA executables that are going to be released on SCRAM we've updated to Intel Fortran Compiler for Windows for those. Just making that upgrade will speed the model up to I think about 40% generally compared to the Compaq Visual Fortran that are out there now. We might be able to do even better than that. Something we will have to look into. User's Guides are in the process of being updated to incorporate all the Addenda. I think each of those components have a main User Guide and an Addendum so we need to get those blended. We sort of started that process. It's a time consuming process. We're not going to get that done before these are released but hopefully at least you'll have all the information you need to run the model.

Get into a little more detail about AERMOD in particular. Randy mentioned one of the activities of the Implementation Work Group and one of the items in the Implementation Guide Update addressed the use of the urban roughness length parameter it's an optional parameter on the urban option part when you select an urban option for AERMOD and the default value is 1.0. Probably shouldn't have been made an option to the user because as Randy indicated. It came to our attention that people didn't really understand what that value was used for. So a decision was made to as reflected in the Implementation Guide that any value other than 1.0 should be treated as a non default option. So what we've done in this version of AERMOD is make it explicitly a non default option. It doesn't mean you can't use a different value but you will have to turn off the default switch and provide justification for that.

Just some other enhancements for hour to vary emissions by hour-of-day and day-of-week . More recent enhancement was made to the hourly emission file option that allows you to (inaudible) by hour for all source type. Then for point sources you can vary the exit velocity and exit temperature. But we (inaudible) for providing to area source to also vary the release heights and initial dispersion coefficient by hour. And one thing that has motivated that is a lot of focus recently on modeling and how best to model emission from mobile sources in AERMOD. And there's a lot of information out there that those parameters may vary depending on the wind direction relative to the road and so on if your vehicle mix if you want to have an effective (inaudible) for (inaudible) of light and heavy duty vehicles. and maybe that mix varies by rush hour or night time. This will give you the flexibility to change that. So that's a recent addition that's been made.

I want to make you aware of a significant bug with the ozone limiting method option if you use OLM with the OLMGROUP keyword then you have problems. And given the significance of the impact of the bug more details in Addendum to Model Change Bulletin. It's the worst kind of bug that you can have with the model. Its model runs gives you numbers and the numbers are almost always wrong and sometimes significantly (inaudible) in the wrong direction. If it had not been such a busy summer, we probably would have put out a bug alert notice to the community but we're getting the model fixed anyway. You'll read more about that. At least make people aware of that. Fortunately it's a non default option so it's not used all that widely. If you don't use OLM keyword then OLM is okay by itself as far as we know. We had to make the change to AERMOD to be able to read the screen meteorology coming from AERSCREEN so we've done that. Generally improved efficiency of memory allocation especially for AREAPOLY sources. Another recent change was the decision to go ahead and sort of upgrade to use of double precision for nearly all non-integer variables in the model. So there's been some long-standing questions or issues about possible sensitivity to resolution or precision in the computation for UTM coordinates since the UTM northern coordinates is seven digits and borderline for single precision computation. So we have done that explicitly in the code and think its working pretty good. There are some other benefits it improved consistency of results across different compilers and computing platforms. I think as you hear later about some plans that AERMET has for enhancing AERMOD I think it also provides a firmer foundation for some of the enhancements we envision down the road.

I know this is a lot of information to digest but so I'll try to move as quickly as I can. So AERMAP and AERMOD have been the main focus on the more recent changes. Some things just fix AERMAP but AERMAP we've made significant changes first to address some problems with processing Alaska DEM files. As you go far enough north due to the longitude lines getting closer together. As you go further north, there is a non-uniform spacing in terms of the longitude verses latitude horizontal spacing of the nodes and we fixed the problem with that. But we've gone ahead and upgraded AERMAP to support newer elevation data sources which is specifically the National Elevation Dataset (NED), NED is now available for the whole US from USGS Seamless Data Server in GeoTIFF format which AERMAP can process. So you go to that server you download one file for your domain, you have but one datum so you don't have to worry about mixed datum within your domain and basically have one file for your whole domain is possibly one option. I think that's a significant enhancement. We will probably update the AERMOD Implementation Guide to go along with this to recommend migrating to use of NED as soon as practical. I'm not saying you have to and it's something we may entertain later. We need to get more familiar with the data to make sure there aren't other problems but so far we feel that NED is the higher quality data set than DEM. We know a lot of issues with DEM data. One being just the fact that you have different horizontal data in neighboring DEM files so that's an issue. Now the default format for that data from the server is (inaudible) you just have to remember to change that. But that'll be in your user guide. We also gone ahead and enhanced AERMAP to support use of mixed DEM files. When the issues have come up over the past two years if you're using the 7.5-min DEM file or data for your application. If part of your domain for the DEM 7.5 minute quadrangle is completely over water for part of your domain there is no data for that quadrangle and that can create some problems with setting up your receptor grids and so on your domain. So what you can do now is feed it all 7.5 data you have and then if you have a gap like that just feed it one degree file to fill that gap. It'll use the higher resolution data to first get the elevations and then just fill in the gap with the one degree data. Of course with the met data you don't have to worry about that but at least that flexibility is still there. And that kind of motivates somewhat by both the mixed DEM and NED is to make the domain key words optional. So if I go to the seamless data server and download the domain of NED data while I've already defined the domain why do I have to do it again in AERMAP? So you just take the domain now of your inputs to AERMAP the default will be to use all the available data. That basically controls just how much of the elevation file is used to determine the critical (inaudible) height scale. Doesn't affect the elevation just the height scale.

I don't know why this was in there earlier but the included keyword that's in AERMOD to feed in receptor information or source information is now supported in AERMAP. And let's see I'm trying to remember all the changes are it's been a lot but we're getting close.

This was a recent decision you'll hear about AERSURFACE in a minute. AERSURFACE uses the standard convention of West longitude being negative.

Everybody else in the world looks at it that way.

AERMAP looks at it the other way so we've decided to go ahead and switch to the standard convention in AERMAP. The only place it really shows up as an issue is if you define your domain in terms of latitude and longitude. If you don't define a domain doesn't matter at all. If you define a domain in terms of (inaudible) doesn't matter but if you use (inaudible) as domain it will interpret negative as West longitude and positive to the East. But we've also put in codes that will check to see if you forgot to change it. So if it sees a problem processing it with the correct convention it'll say well would it work if they didn't change it so that seems to be working okay so you don't necessarily have to change your old inputs it'll give you a warning that they have been switched. But I think in the long run it will make things easier and simpler because you do your lower left upper right for both and the other you do the switch. And then finally allocatable array storage at runtime as in AERMOD. Should probably have questions after each one.

AERMET is a bit shorter list. There's been lots going on but it's a cosmetic bug in terms of the station elevation. The last update added the option for using the specified station elevation on the location card. The fact is it was only used in one case and there was with (inaudible) if it was missing in the data file. A lot of people didn't realize it was only used there. Over time we have expanded that to use station elevation for all surface formats. And some formats have the elevation in the data file which we were not using so it's using that. So we are basically updating it and making it more robust in terms of defining the station elevation using what's available. Basically that is used in finding station pressure if it's missing any data rather than using the default sea level pressures. There are a couple of problems that have shown up. One was processing the sub-hourly inputs for site-specific data that came up recently. I won't go into any detail but we corrected some problems there. Then there was a problem that hasn't shown up too often in terms of time zone adjustments if we had site specific data in one time zone and wanted to use with surface data from the next time zone there were some problems there and we fixed that. We've also had a minor enhancement but the currently AERMET looks for the 12Z sounding to use for calculating the convective mixing heights and it gives you plus or minus more in hours. So it's 11, 12 or 13Z will be accepted. We've added a user option to define that window differently. Part of it is motivated by if we do go down the road (inaudible) air data derived from MM5 data then we don't want to be limited to the 12Z (inaudible) data because we're have hourly sounding. In fact 12Z is not the ideal sounding for the East coast in the middle of the summer because the sun has already come up so the sounding probably reflects some reflective boundary layer and we don't adjust for that. Finally we fixed the problem with the FIXISHD. There were some ISHD files that AERMET crashed on. We released a utility as an interim solution to fix the data. You don't have to do that anymore. So that's an overview of where we are at with AERMET.

Our AERMOD system updates are very close to being released. Hopefully you will see them very soon. Check SCRAM regularly. I hope they're bullet proof but they probably maybe not if you run a spit ball through. I hope they're last two weeks. But we're be glad to hear about any of the problems you have and we'll try and fix them as quickly as we can.

So other activities we in fact we have gotten some resources to update the APTI course 423 on Dispersion of Air Pollution, Theory and Model Application, to reflect AERMOD model. Sort of gotten through the first phase of that and it'll take a while. We hope to continue that this fiscal year. As Tyler mentioned there a lot of in house applications of AERMOD that we have been involved in, I don't want to go into a lot of detail here but I'm going to talk about it a couple of these tomorrow in terms of evaluating AERMOD for non regulatory applications. One of them was mentioned already this morning the ADEM BAPS study in Birmingham. More recently we got involved in applying AERMOD for use in an exposure assessment for land area to support the current NO2 NAAQS review. Talk about that a little more. But some common themes that have come up in all of these is that AERMOD has a problem with light winds and over predicts or not. And then the representativeness of the meteorological data and source characterization issues was mentioned this morning, uncertain in emissions, and then again, we're applying the model in a different context here that was illustrated this morning. We had one PM temperature at 2.5 or actually 2. Two monitors evaluating how the model performs at this specific location paired in space certainly even paired in time to some degree and that goes beyond expectations that has been placed on the model for routine regulatory applications. Again I'll talk about that more tomorrow morning.

Also kind of develop infrastructure to support more efficient updates to the modeling system. I wish we had gotten further down this road but I think we've learned a lot in the last two years. With the full assessment of the impact of model changes for example going to double precision we want to document what that impact is. It's not very much, but one of the things that motivated though was the recent case that came up that showed greater sensitivity not related to the (inaudible) coordinates but just the way the source emissions spread of source emissions and how they are grouped it turns out that group call consistently predicted about 3% lower impact than if you summed the impact from all the sub groups. And that was all to do with precision because you had a wide range of impacts from sources. Some of them got truncated in the group (inaudible) but as they were grouped there was there wasn't as wide a range and they didn't get truncated. So that was one of the motivations in doing that at this time. But through more developing more effective procedures to challenge model changes prior to release, including going through different compilers and different platforms and so on. Automating the process of assessing impacts of changes through the consequence analysis and also we want to do the same with the model evaluation databases to make sure there is any changes in model performance that might be expected if some significant bug comes up. Then procedures for notifying community of significant bugs like I mentioned with the Illinois (inaudible) Kincaid Power Plant(?) bug. That was pretty significant. I think we would like to have sort of a bug alert system. An alert would go up on SCRAM here's about you really need to know about and then a bug tracking page identifying the bug. Sort work around if there is a way through or not and then kind of keep you updated on the stats. It's been predicted to be released in the next update or whatever. That's something we'd like to have just to make sure that you get the information you need to apply the model appropriately. Then clearer procedures and mechanism for reporting problems to EPA but haven't figured out exactly what that is but we do hear about things and if we do we will try and address them as fast as we can. Some other activities to associate to AERMOD course coordinating with the work group and with AERMET some of the issues that have come up in those context is modeling impacts from haul roads has come up a lot in the last couple of years. And there has been some coordination with Car Refinery Association and some other state coverts assessing potential updates to the emissions factors. So they do recognize that emissions is an important part and the model is not going to be any good if you give it the wrong emission rate. Obviously. Or if it is good it's for the wrong reasons. Also we're looking at assessing source characterization options or issues to develop best practices to recommend use for modeling haul roads emissions. Part of it is the consistency and some groups say you should (inaudible) [model] a haul road with the zero release and zero dispersion and others say you should use the height of the truck or something. So we hope to be able to provide that but hopefully it is based on some sound principles as well. And then the met data representative issue we did conduct a more detail sensitivity analysis of AERMOD to (inaudible) characteristics and we presented a conference paper at this past AWMA Annual Conference in June in Portland and we plan to expand conference paper to more complete EPA report documenting that sensitivity report. Again as Randy mentioned working through AIWG and AERMIC to try to come up with some better ways to improve the guidance on surface characteristics and met data representativeness even sort of evaluate or validate your AERSURFACE based on some of the work Randy mentioned looking at the evaluation data sets to understand what's going on. I actually did some tests recently just to see for Kincaid would it make any difference. If by using the actual source and the actual field study data; if the AERSURFACE was 1 km or the AERSURFACE is 3 km, does it impact model performance? In face it didn't much. What was noticeable if I used AERSURFACE inputs with a 10 meter on site data. It appeared to improve model performance compared to the surface characteristics that we came up with earlier to sound meteorological judgment whatever in the initial study before AERSURFACE was released. So that's it on AERMOD model system updates. I guess I should take the question slides out.

I'll give you a little bit more details about the AERSURFACE tool. You've heard a little bit about it already. So again assess the current tool and the implementation issues with AERSURFACE that maybe you are aware of or not. And share some plans for enhancing AERSURFACE. I'll try to be fast but you want to hear about AERSCREEN. Basically AERMOD has met data needs as summarized it was designed to accept the same met input as ISC basically in NWS surface and upper air data. It's also designed to accept more robust met input and however the advanced boundary layer algorithms require the search surface characteristics: albedo, Bowen ratio, surface roughness. So that sensitivity to surface characteristics is one of the main implementation issues with AERMOD. I think we knew it was going to be and it may have exceeded our expectations as far as the magnitude of an issue. But I still think it is manageable and I think it's better than ignoring it. AERSURFACE what is it? It is a tool designed to assist with determining surface characteristics for use in AERMET and/or AERSCREEN. Initial version of AERSURFACE was released on SCRAM on January 11, 2008. Just as sort of an acknowledgement and clarification, there was a program called AERSURFACE that was developed earlier. I guess primarily to the auspices of the State of West Virginia. It is basically the same concept but uses different land covered data and different processing method. So don't get them confused this is a different program. Anyway it is not currently considered part of the AERMOD regulatory modeling system but as a tool to assist in that process. And basically as Randy mentioned it is noted in the January updates to the Implementation Guide the recommended methods to determine surface characteristics were changed. Those change methods were implemented in AERSURFACE and they are listed here. The original recommendation I guess in the AERMET User Guide was use an area weighted average within 3 km of the source of the met tower. Plain and simple, but once we got into it, we realized there were some problems with that. So we decided to incorporate inverse-distance weighting on the calculation for surface roughness as the sector gets wider. Basically, you end up if you just do straight area weight is you weight surface characteristics further from the met tower more than closer indirectly. So we had to adjust for that. Since sensitivity of the model to roughness or (inaudible) is based on the (inaudible) knot we feel it more appropriately to use a geometric mean which is basically in (inaudible) averages a log. For a Bowen ratio, we feel a geometric is more appropriate as well because it is a ratio. And then as the domain a default domain recommend 1 km radius for surface roughness and for Bowen ratio albedo the implementation guide already acknowledged distinction between surface roughness which clearly needs to be representative of the met tower we feel. Bowen ratio and albedo affect the convective boundaries (inaudible) layers in the model which is going to be more of an issue with taller stacks which are going to be influenced over a much larger domain. There's sort of a separation there and what we've done in this recommendation is as well I (inaudible) design is to separate them so for Bowen ratio and albedo. The default is no sector or distance dependency average or 10x20 km domain. There's a number of options available. Current version supports 1992 data and NLCD data this is 30 meter horizontal resolution and it's in a (inaudible) Geo-tiff format and there are 21 categories.

I guess one of the main issues we dealt with is the land cover data is not designed for the purpose of estimating roughness at airports. If you notice one of the categories is commercial industrial transportation. So at an airport, it's the airport runway and the open parking lot and the terminal building and any other commercial or industrial buildings nearby are all going to be in the same category. We're covering the full range of surface roughness influences all in one category without being to distinguish one from the other. That's not very helpful. So that's why one of the things we did was (inaudible) at an airport or not and if I am then I assume a different mix of that category if I'm not. That's reflected in this table so for surface roughness you'd have category 23. Here's the assumed roughness for an airport and there it is if you're not at an airport. That's the best we can do for now and I don't think it's perfect, but that's what 1993 NLCD data for North Carolina. That's Raleigh/Durham areas and the airport is down there and the orange is the urban recreational grass category which we have a pretty good handle on. The dark red is the developed category and the runway, the terminal and any commercial building and anything concrete is basically in that same color.

Another issue we ran into is that we discovered that one of the key input is the location of the met tower because you're going to get the land cover around the 1 km radius of the met tower. But the standard file that we anticipated we're referring people to get that information for that location has turned out to be very unreliable. For Raleigh/Durham for example it was up by over 2 km so that's not very good. So use of erroneous station location especially if I'm off by 2 km I'm looking at a 1 km radius that kind of comprises the validity of the results. We discovered this partly through this ASOS cyclone wind study there are some links on the NCDC site for two hundred states along the Gulf and East Coast stations that could be subject to influences of tropical cyclones. They sent somebody out to the met tower and they determined the anemometer height and actually estimated surface roughness, a compass points at each of those locations. That information is available on the NCDC web site. They also had GPS and coordinates and that's how we discovered they were different and this one generally seemed to be more accurate but not always. That's the problem. This kind of slices two sets together and what's the difference? The immediate difference seems to be about 500 meters. But the number of cases are over 1 km. I think JFK is almost 4 km difference. So that's a problem. We've highlighted in the user's guide. At this point, I don't know what else we can do.

At some point we might kind of provide some suggestions on here's what you might go through to verify it one way or another. I'm hoping that state agencies might be in the best position to compile that information and share it with modelers.

We actually have some plans to enhance AERSURFACE in significant ways not necessarily to deal with that station location problem. We want to support the 2001 NCLD data for one thing is more representative temporally for a lot of applications. It is also expanded to include Alaska and we actually have a graph beta test version that does support both types. Should be released on SCRAM soon but currently in review with the workgroup. We also have GeoTIFF Reader to deal with some problems that came to our attention. If you want to supplement NLCD data with other information we think we can actually provide some additional files to give an average height of obstacles or at least some estimate that might allow it to distinguish between the runway and a building. The other problem is the 2001 categories are different than the 1992 and they are not any better as far as surface roughness at airports. All of the developed categories are now in these four categories 21, 22, 23, and 24. The only difference between them is the percent of pervious land cover. Unfortunately the urban recreational grass category we had before for the grassy areas around the runway, that shows up as developed open space. So basically at an airport you can go from developed open space and developed high intensity just by going from the grass to the runway. Depending on how much of the grid cell is on the runway or on the grass.

In some ways it's even worse than before. We've had to come up with a way to adapt to that through this draft version that addresses 92 there's the two for Raleigh/Durham. 1992 and 2001 so you see that orange recreational grass is now this light pink which has developed open space but it could be part of the runway could be developed open space if it's barely runway. What we're looking at is there is two elevation data sets and NED I mentioned for AERMET is being upgraded to handle the NED data. There's also SRTM data. We think we can use both these data sets at roughly same resolution as the land cover data to estimate the average height of obstacles. That data represents ground elevations just as the SRTM represents elevations of obstacles whatever reflected the signal to the Shuttle. The elevation data are with respect to the reflective surface, which may be vegetation, man-made features or bare earth. So we think by coupling these two to get an average height of obstacles within the land covered data we can distinguish: "Am I at a runway, building or what?". And so we decided to check and see if it would really work. That's the NED data on the left for Raleigh/Durham airport and that's SRTM. We brought them into AERMET and (inaudible) greater receptor, calculated elevation and that's the plotted the difference in elevation. The difference is there is some wide open space with very little difference and that's projected the light is higher elevation, dark is low. That's the overlay on the land cover data so you can see the difference in elevation picks up the trees very clearly and even some of the terminal buildings. There's another plot.

We decided to go downtown Durham. There's the Durham ball park famous for the Bull Durham movie. Just see how it would work in the city. That's the SRTM data on the left, that's the Durham freeway, that's the satellite view so this is all reference at that point.

We did the same thing to apply the difference in elevation. Then you see some pretty peaks showing up where the taller buildings are in Durham. That's encouraging. Decided to go to DC for a conference same sort of thing. There is land cover data, Washington Monument and it actually picked that up pretty good. That's the projected map version, the dot is the monument and that's overlay. That's encouraging that that actually has value. It's not without problems.

This is Chicago. That's NED data pretty flat. That's kind of a busier SRM data and that area looks kind of weird and that's a data gap. We see elevations of over 100 meters so we are picking up very tall buildings obviously. For our purposes we don't care if it's a 100 meter or 200 meter. If its 1 meter or 10 that's important.

Apparently in the very downtown urban core there's some gaps and that kind of makes sense. If you have a 30 meter grid cell and this is supposed to be the height of the reflecting surface and the reflecting surface changes from 0 to 300 like very quickly and then the same thing shows up at (inaudible). So basically there are some issues but I think we have some options to improve it and we are going to pursue them. I guess it's sort of that in the past we should have been data limited in terms of these dispersion models. We've got airport data what else are you going to use. We've got land covered data what else are you going to use. But I think we are being more data driven now so we got land covered data plus these elevation files to give us some useful information. We've got gridded prognostic met data. We've got remote sensoring of all kinds of things. So I think it's an exciting time as Chet mentioned this morning to be in this field. I'll now hand it over to my distinguished and highly valued colleague James Thurman for AERSCREENING.

James Thurman: I'm just going to give you an update on AERSCREEN and on the status and update of AERMET Just as a brief overview, I'll go over who's in the workgroup, description and features of AERSCREEN. This will be brief more brief than if you were at the regional model workshop. Some initial test results, brief description MAKEMET which is meteorology for AERSCREEN, a brief summary of the stages in AERSCREEN and questions at the end of the whole section. The workgroup consists of Jim Haywood, Chair, Michigan, Karen Wesson, EPA, Roger Brode, EPA, James Thurman, EPA, Bob Paine, ENSR, Lloyd Schulman, TRC and I want to acknowledge Herman Wong, EPA Region 10 who helped with MAKEMET.

AERSCREEN is a DOS tool that runs AERMOD in a screening mode for a single source. Right now it can't do multiple sources at once so you have to do each source one at a time. It calls MAKEMET, BPIPPRM and AERMAP to generate necessary AERMOD inputs and in the Spring of 2008, incorporates output from AERSURFACE but does not currently call AERSURFACE itself so you have to run AERSURFACE.

The SCREEN option was added to AERMOD in 1995 and forces the model to calculate centerline concentration for each source/receptor/meteorology combination. It does

1-hour averages and NOCHKD selected option to eliminate date sequence checking in the met file because it's not real dates like you would normally see in an AERMOD run.

The features of AERSCREEN were initially developed by Jim Haywood. You can enter the data via prompts or by input file and I'll show you an example of an input file. Source types currently support a point, volume, rectangular area, circular area, and flare sources. You can't do area polygon sources. You can do flat or complex terrain and when you are into complex terrain AERSCREEN calls AERMAP to generate terrain height. We don't use terrain for rectangular area sources; kind of messy for that. You can also use the PRIME building downwash. You would need to give stack location and direction relative to building center, building dimensions, the direction of long building dimension from north and we don't use it for either area source or volume sources and AERSCREEN calls BPIPPRM at the prompt to generate the necessary input for AERMOD. AERSCREEN does not include deposition and the meteorology comes from the MAKEMET program. The User would specify min and max temperatures for the location, minimum wind speed, anemometer height and surface characteristics and other variables come from internal matrices in MAKEMET.

Some more features: User can specify probe distance for terrain processing. I think at the 8th Modeling Conference this may have been internally calculated but now you can specify that. Right now we decided to make the default of 5 km for flat terrain with or without building downwash or rectangular area sources.

The only time you use anything other than 5 is for terrain processing. You can include flagpole receptors and the elevation of source location for PROFBASE keyword in AERMOD even for flat terrain. That's for potential temperature profile calculation. You can do rural or urban source and urban population. You can specify ambient air distance or fence line distance to calculate concentrations. You can specify source location in geographic or UTM coordinates when you're doing terrain processing. Regardless of how you put it in it converts it to UTM coordinates. We just added this last week actually just to have AERSCREEN give AERMAP something consistent. And it includes a search routine to find worst case impact using the RANKFILE output in AERMOD and it will find the concentration, date, direction, distance, and meteorological conditions associated with that max concentration. We also added a feature to find the maximum concentration for automatic receptor distances and AERSCREEN has specified distances of receptors. When you're doing terrain or buildings modeling, you do a ring of different directions of receptors so it finds the max concentration of distance regardless of direction. You can re-use previous AERSCREEN run files. When you run AERSCREEN it generates an input file and then you can use that input file changing some of the options so you don't have to do it from the prompts every time. AERSCREEN does errors checks on AERMOD and AERMAP output and writes to a log file. It includes factors for 3-hour, 8-hour, 24-hour and annual averages - based on upper bound of SCREEN3 factors right now. Early on Roger decided to go with.

- 3-hour: 1.0 (0.90 +/- 0.10)
- 8-hour: 0.9 (0.70 +/- 0.20)
- 24-hour: 0.6 (0.40 +/- 0.20)
- Annual: 0.1 (0.08 +/- 0.02)

Some work done I think by Jim Haywood or Herman for several AERMOD and AERSCREEN runs and pretty much the factors picked seemed to do pretty well. And initially AERSCREEN tests have shown good results across wide a range of applications and 'good' to find a reasonable conservatism compared to AERMOD.

Here are some studies done by Jim Haywood, Karen Wesson, Roger and Bob Paine. You can see from the maximum median results are pretty good. So far so good.

MAKEMET is the program to generate the meteorology used in AERSCREEN and loops through several parameters: Wind speed (stable and convective), cloud cover (stable and convective), max/min ambient temp (stable and convective), solar elevation angle (stable and convective), convective velocity scale (w*) (convective only), and mechanical mixing heights scales. Then it uses AERMET subroutines to calculate u* and L, and also calculates convective mixing heights. In MAKEMET, if you run stand alone you can specify multiple wind directions. For AERSCREEN, uses wind direction of 270 from the West is easier. So you will generate surface and profile files for running AERMOD so you'll generate the dot .SFC and .PFL files that you would use in AERMOD.

So what's changed recently in the past this year was input surface characteristics. There are three methods of inputting surface characteristics into AERSCREEN. User defined one number for albedo, one number for Bowen ration and one number for surface roughness. It doesn't vary through the year or spatially.

Seasonal tables from AERMET User's Guide (Tables 4-1, 4-2, 4-3)

User specifies dominant land use type and moisture conditions for the source location. Listed are the 8 land use types: Water, deciduous forest, coniferous forest, swamp, cultivated land, grassland, urban, desert shrub land.

AERSURFACE output: User enters AERSURFACE output filename or AERMET stage 3 input filename. When you run AERMET you have to put surface characteristics in. That can be annual, seasonal, or monthly or 1 to 12 surface roughness sectors. AERSURFACE is run for the source location so you don't have to worry about that representative problem when you use airport data. It may not be temporal representative because you use 1992 NLCD but you don't have to worry about the spatial part of it.

MAKEMET is run for each temporal, sector combination and met files generated for each combination. So when you use user define you will generate one file for surface and one for upper air. Seasonal you will generate four one for each season and AERSURFACE depending on temporal resolution and your spacial resolution it can be anywhere from 1 to 144 if you did your one annual sector or monthly 12 sector. It's not too bad they're not that big.

How does AERSCREEN work? Basically as the user you would input and validate the data. Then the program will take over and generate meteorological files and run BPIPPRM and AERMAP for the source if necessary. You can get source elevation from AERMAP if you're not sure what it is. Then the program says - Is there a source-receptor

direction dependency?? If not, that means you are running flat terrain with no downwash and you're not running a rectangular area source, than execute PROBE. If there is a dependency that means you are running a terrain with or without downwash or rectangular area source, execute FLOWSECTOR. In the 8th Modeling Conference it executed PROBE and FLOWSECTOR now we split them. Regardless of the PROBE and FLOWSECTOR output from one of those goes to REFINE routine which finds the worst case impact. It refines the receptors and reruns AERMOD and you'll get your final output. This is an example of an input file and basically this is the whole file itself is an AERMOD input file but AERSCREEN reads its header information and the asterisk reads as comments for AERMOD. Your source date is here, this is a point source, building data. This Y means you have a building here with dimensions and other inputs. Here's your met data and under surf you'll see the nine that means use AERSURFACE. Then terrain data flags and the coordinates and then the other flags and inputs that are going to AERSCREEN such as are they metric or English. You'll get inputs from the prompts your data can be English but from the input file they are metric. And R/U, Population, Ambient Distance, Flag Pole and Flag Pole Height.

It's a pretty good way of inputting the data this file has actually grown since I started last August.

This is the validation page so when you put your inputs in from the prompt or the input file, AERSCREEN will list all your inputs and then you have the options down at the bottom of changing any of the source data, building data, terrain data or met data. If you want it to yes or no. When it says change source data you cannot change source type. You can change parameters. If you are happy with everything hit enter and AERSCREEN starts the run.

When you run terrain data it will ask you if you want to use a previous AERMAP output and that's all in the user documentation. That's the only time you have to interact with the program.

The summary of stages are: PROBE is for flat terrain no downwash. 5 km default probe distance (25 m spacing) in one direction. They are positive in the X direction so that's 200 receptors and you have your fence line direction. AERMOD is executed for each temporal/spatial sector of Surface Characteristic (SC) so if you are doing annual 2 sectors that's two AERMOD runs. The other stage is FLOWSECTOR. For rectangular area sources, 5 km probe distance (25 m spacing) for 5 degree diagonals, AERMOD run for each SC temporal/spatial sector for each diagonal. If you had seven diagonals at monthly 12 sectors, for surface roughness that's a lot of runs and we decided to invoke the TOXICS option to speed up the model. Other sources in FLOWSWCTOR such as point volume and circular areas that means you're using terrain or building downwash. Receptors every 10 degrees out to PROBE distance so you have a network of receptors and each degree radial run separately. Direction specific terrain and projected building dimensions are used for whatever direction you're going. And AERMOD is run for each SC temporal sector, annual, seasonal or monthly, but for the upwind spatial sector of the direction being processed and I'll show you an example. The final sub routine is REFINE. It finds the overall maximum concentration from PROBE or

FLOWSECTOR. REFINE is to use meteorology and SC associated with maximum concentration as well as terrain and/or downwash, use terrain heights and projected building dimensions of direction of maximum concentration and then refine receptor spacing to 1, 2, or 5 m increments around that distance that will refine the maximum concentration as close to the max as you can.

These are the receptor networks for PROBE and FLOWSECTOR. So for PROBE, you go out 5 km and you're going to run each of the surface characteristics resolutions you have. Then for rectangular area sources, AERSCREEN will calculate the mathematical diagonal of the rectangle using opposite and adjacent sides in the angle. Starting at 0 degrees it goes up every 5 degrees and then one diagonal past the mathematical value. So you're going to run each one of these through AERMOD for each spatial and temporal sector. So if you had monthly AERSURFACE output with 12 sectors you will run each one of these diagonals for that. This is a lot of runs and used to take hours but now with the TOXICS option only a few minutes.

Then for other sources in FLOWSECTOR these are the 10 degree radials. For example, the 10 degree radial, I'm going to find the upwind direction which is 190 degrees and whatever surface roughness sector that is the surface characteristics you will use. So you're using the upwind sector. So you don't have to loop through all the spatial sectors for point volume or circular area sources and in FLOWSECTOR.

This is an example of output see the concentration is really high so these are hypothetical sources. This is the maximum 1-hour concentration calculated by AERMOD and these are the scaled concentrations that AERSCREEN will calculate from that maximum 1-hour. Then AERSCREEN will give you the distance from the source and what direction. If you are using terrain it will give you the receptor relative height to the source elevation. In this case our receptor was 5 meters below our source in terms of terrain differences. Under that the ambient boundary this is the max concentration for all directions calculated the ambient distance. From the regional workshop it used to be in the same direction but two weeks ago we changed it so these two are not the same direction. It used to be the same direction but no longer the case. So if you see this case at the ambient boundary at 30 meters which I think is the ambient distance it's actually in a different direction 110 degrees verses 180.

What's the future of AERSCREEN? We'll have the draft release package out right after AERMOD, AERSCREEN at the same time. It'll have AERSCREEN and MAKEMET executables. I don't know about BPIPPRM but you can download BPIPPRM, AERMOD, AERMAP and AERSURFACE from SCRAM website. There will be some user documentation and example case. We've written a limited user guide and it should help it's kind of a technical support/user guide. It tells you more about AERSCREEN than you probably want to know. Guess I'll hand it off to Tyler.

Tyler Fox: We're making great time. Now we'll do AERMIC Update with Roger and then have questions and we'll have our afternoon break.

Roger Brode: As Randy mentioned earlier, I guess at the AERMIC Implementation Work Group and the three sub groups who were formed to focus three main areas. I guess two regional workshops ago; the point came up what about BPIP downwash issues. Why is that not in the top three so basically presented to the group so maybe we could form an ad hoc group anybody want to volunteer. We actually got four states that volunteered for this sort of ad hoc BPIP prime work group. We've had some calls not a lot but I think we have made a little progress in scoping out defining what the issues are and you can only manage so many groups at a time. But I think we're going to get back together.

Just want to briefly share what the group came up with as far as some of the issues. Again it emerged from the 2007 regional model work shop and like I said it's not formally part of AIWG but certainly some similar interests. Some of the issues we came up with and this is something that was discussed at a few workshops ago. It came to our attention based on the criteria in BPIP. If you have two structures with the same GEP height which one does it use? It uses the one with the smallest projected width. In AERMOD with prime that is not always going to give you the worst answer.

Probably wasn't as much an issue before prime. That's an issue that needs to be addressed. If you have a building and you got a difference of 2 millimeter probably best not to do it as 2 separate tiers, not very realistic. But on the other hand we could modify

BPIP just to change that to use one with the larger width that will give you the most conservative result with prime. On the other hand, another issue with BPIP we are aware of is with very long narrow buildings, BPIP has the protected building length with AERMOD so the projected width and projected building length. So for this case if you have a narrow long building then the wind is at an angle. Projected building length could be much larger and longer than the actual long building. And the wake cavity structure is defined in relation to that projected building. So what that can do is displace the cavity in space quite a bit from where it is physical in relation to the building. So that can create a problems and it may be that splitting the building may be a way to address that issue. So we don't want to fix one problem and then hamper ourselves in addressing another. So we're at least again defining some of the issues. Again probably the biggest issue might be is the original criteria in BPIP for selecting the dominate tier for the downwash algorithms might not always be applicable for prime and that was the basically the single tier that had the highest GEP height within the region of influence.

Well with the old algorithms ISC3 didn't really know where the stack was in relation to the building so it didn't matter. But with Prime it does take into account the stack building geometry so if you have a basically a structure that is a 100 meters high right next to the stack that's going to have a lot more influence on the stack in terms of down wash than a 102 meter structure. So somehow that needs to be taken into account and right now it's not. There are some issues perHAPS with the use of wind power to drive equivalent building dimensions partly in relation to the same issue. You know in ISC3 the model didn't know where the building was in relation to the stack so it didn't really matter if you put the EPD next to the stack and the actual building was displaced. The model didn't care but with prime it does. You might want to think about revisiting some of the criteria for guidance to develop EPD for older ISC3 in relation to prime downwash algorithms. We have implemented some Beta test options to deal with capped/horizontal stacks. At least part of that is listed in the AERMOD Implementation Guide is that the Model Clearing House procedures for simulating a capped or horizontal stack which was to set the exit velocity very low and put in an effective stack diameter to maintain the flow rate. Therefore maintaining the buoyancy. That's not going to work with Prime because Prime uses a stack diameter input into the model to define the initial radius of the plume. That can mess up the plume calculation quite a bit. So you shouldn't use that procedure for downwash sources and prime algorithms. So we haven't gotten a lot of feedback from the community on this. This is an issue that is kind of sitting out there. But what we need is some test data to do some kind of validation that this sort of simple approach. Basically, to adapt the same principles that were in that Model Clearing House procedure for non-downwash stacks. Sort of adapt those to be used within prime downwash algorithms. If there is some wind tunnel data out there or something that could inform that whether that is working or not that would be helpful. Did I mention the discontinuity for stacks that straddle the EPA formula height earlier? The horizontal meander algorithm currently not incorporated in PRIME part. There was not a lot of time to do it and there was some complications. The goal initially was putting Prime into AERMOD was to keep Prime as intact as possible. That was just a decision that was made. It might not be an important issue but on the other hand Prime doesn't account for up wind dispersion for plume released within the cavity due to the cavity recirculation. So if your stack is downwind from the building and you have a receptor closer to the building you're getting no impact when in fact you could be getting very high impacts. That is showing up in some wind tunnel studies and not sure how to fix that.

PRIME was designed to include partial plume entrainment into the cavity, but the wake effects switch is all-or-nothing either its downwash or not. One thought might be could we incorporate partial entrainment approach there. These are minor adjustments and don't know how quickly or if we are going to pursue these. They are motivated by some concerns that there might be some discontinuities in the model especially for convective conditions where you have a lot of near wake, up draft and down draft influences on the plume maybe that all or nothing may be an important issues in terms of whether the building downwash is going to apply or not. The light wind speed issue comes up a lot with AERMOD. AERMOD is designed to accept wind speed below 1 meter per second. The affected lower limit for speed used in AERMOD is about 0.3 meter per second but what's the minimum wind speed needed to generate a wake from the building? I don't know if we have a clear answer to that. Just a quick background on the BPIP Prime work group because this was an issue that came up with AERMIC.

I have until 3:30 with questions...with questions? AERMIC update just to give you a quick history of AERMIC, reconstituted AERMIC, summary of AERMIC Activities, and future plans for AERMOD - Overview.

As Tyler mentioned this morning AMS/EPA Regulatory Model Improvement Committee (AERMIC) initially formed in 1991; charged to develop replacement for ISCST based on state-of-the-science. It only took 15 years but AERMOD promulgated Dec. 2006. The committee and you can see the new committee members.

- Roger Brode, OAQPS, Co-chair
- Jeff Weil, CIRES-NCAR, Co-chair
- Akula Venkatram, UC-Riverside
- Al Cimorelli, EPA Region 3
- Bret Anderson, EPA Region 7
- Vlad Isakov, EPA/ORD/AMD

New AERMIC committee has held two meetings in RTP (March and July 2008), with third meeting tentatively planned for mid-November. First meeting AERMIC reviewed status of AERMOD modeling system and activities of AIWG at initial meeting. Looking at the activities of the Implementation Work Group sort of assessing the issues and some of the studies that have been done. Going into the key priority of AERMIC has been the urban formulation in AERMOD. I think that was an issue in AERMIC mind even before AERMOD was promulgated there were some issues there. Sensitivity of the population how do you know what population to input. I won't go into all the details. But in the early discussions with the committed it was quickly recognized there were significant overlap among many issues, including Urban, Surface Characteristics and Met Data. Urban issues and surface characteristics and a lot of the urban issues have to do with surface characteristics in addition to the psuedo-convective urban heat island effect and also have higher roughness in the urban area than you typically do at the airport site where the met data is being corrected and so on.

Prior to the first meeting we had gone through the development of AERSURFACE and looked at the idea of supplementing AERSURFACE, the land (inaudible) and AERSURFACE with the elevation files. So it was very interesting process to be a part of the AERMIC came up with an idea to utilize more of this data in the model and might be able to address these issues.

Also discussed the building downwash in issues so that's why I gave you an overview of the BPIP Prime AD Hoc work group first. One of the recommended incorporating building processing function within AERMOD to take it out of BPIP Prime so you don't have to have a separate BPIPPRM processor. Another thing to facilitates assessment of additional options for processing building information for PRIME. One of the big issues is that by simple criterion of the structure with the GEP height regardless of where it is in relation to the stack that's a problem. By feeding all the data into AERMOD to give us an opportunity to study some different approaches to refine that criteria in a way it would make sense. Why not just loop all the structures but don't think we want to do that as a default option but at least it would be a way to do tests on that just to document the degree of sensitivity to this issue perHAPS.

Might even offer the opportunity to combine influences from multiple structures. Prime does offer benefit that it defines the three dimensional structure and location of the wake for a building. So maybe there is some way to combine influences from nearby structures and wake.

Another activity that AERMIC has pursued in fact to develop an alternative AERMIC has developed an alternative implementation for horizontal meander algorithm. As I mentioned earlier one of the big complaints we still get along with all the other issues even though a lot of people have issues with surface characteristics sensitivity or source characterization problems their biggest complaint is that AERMOD is too slow. The horizontal meander algorithm is one factor in making it slower because that algorithm incorporates up wind dispersion and AERMOD is required to do calculations for every source, every receptor every hour. Where ISC only looked at center line plus or minus 50 degrees for each source so that by itself slows the model down by a factor or 3 or so on average by doing all the factors instead of 100 degrees out 360.

So we're looking at an approach that would preserve the centerline value from current implementation but eliminates upwind dispersion component that could be appropriate for short term averages. It would be sort of a regulatory option that could be used. The standard operation would not change and you could say I don't want up wind dispersion I am only doing short term averages so it would speed the model up with hardly any difference in results at all. May require additional guidance on when and how often it can be used especially if you have long term averages because we know the bias for long term averages would be for lower concentrations.

So we're considering implementing this in AERMOD and we're not quite there yet. And we still need to do some more assessment of it but it could be something to speed up the mode. And also our goal is to eliminate the inconsistency between volume and area sources in AERMOD because right now the horizontal meander algorithm (inaudible) and volume sources in the model but not area sources. So the reason that's important is if I'm doing a modeling of mobile source emissions say a roadway the two approaches is you can use the AERMOD one is a string of volume sources in case meander would be applied. The other would be the longative (?) area sources in that case meander wouldn't be if we could eliminate that inconsistency that would be a nice goal to achieve.

So AERMIC has discussed the use of gridded prognostic meteorological data with the model and we will provide science support for the development and evaluation of options related to this effort. They recommend implementing and testing approach of processing gridded met data as pseudo-observations through AERMET. That was an option considered early on. And we're not sure how or when we're going to do that. Also suggested to invite experts in gridded meteorological modeling community to next (or future) AERMIC meeting to discuss some of the science issues involved there. Beyond that looking at other options to incorporate some non-steady-state characteristics in AERMOD modeling system by using multiple grids and we talked about that this morning. As for gridded met data why not pick the grid cell for each source location and what else can we do from there.

Future plans for AERMOD that AERMIC has come up with again this is not a detail yet sort of a vision. Building on plans to enhance AERSURFACE by combining land cover and elevation data, AERMIC is working on an approach to address a wide range of issues by utilizing this data directly in the model. As I mentioned earlier, the recommendation is to incorporate the BPIP Prime functions into AERMOD and the land cover and elevation data (SRTM-NED) will be fed directly to AERMOD as well. So this will eliminate preprocessing functions. Then AERMOD would have the ability and information available to maybe do might not be up or down approach to adjust meteorology but maybe over the river and through the woods approach but I don't know.

It sure has sketched out a preliminary technique to do that and we plan to implement it and start testing it but haven't gotten very far. The idea is to provide that information to the model gives us a lot of opportunity that wouldn't exist keeping it in separate preprocesses.

Those meteorology adjustments will account for effect of urban canopy on wind profiles. So the roughness affect of the urban area on meteorology would not really accounting for directly right now in the AERMOD formulation. This would be a way to deal with that. So if this works, it could eliminate many implementation issues, especially related to urban applications. There would no longer be a distinction between "rural" and "urban" sources. That would determine on source by source basis based on the information available for the model. That would mean there would be no requirement to estimate "effective" population as surrogate for urban influences. It would allow for dealing with spatial and temporal variability of urban heat island influence which we don't do now. Right now if it's urban it's urban even though we know it's not a uniform urban influence. The representativeness of met data will always be an issue, but influence of surface characteristic variability should be mitigated if an approach like this can work. It's not going to be perfect, but again I'm looking at it from the perspective that if we can do it and demonstrate value at it in doing that. And when I mean value it I mean the model performance field data actually improves. Then that seems like a good thing even though that may not be perfect. That's a lot of work that needs to be done. Again incorporating all that information into the model can eliminate the preprocessors but having access to the data might allow some other enhancements to be considered. For example an option that has been mentioned for training purposes is to have direction-specific hill height scales sort of like building down wash. Terrain influences is not identical but there's some similarity to training influences and building down wash influences. And having all the information there in the model would make it much easier to implement that than it would be right now. So you wouldn't have to loop through you know feed all that direction specific height scale to the model first and let it figure it out. So that's one example. This new structure for AERMOD we think would also better accommodate future enhancements as new data sources emerge. As we mentioned we've had some interaction with folks from NASA and in fact one of the members said he might come to the conference but I don't know if he is here. Using remote sensing information in terms of surface temperature gradiants to inform the urban heat island aspect of the model. The downside is that it will not make AERMOD faster, but hopefully at that time we'll have faster computers. I guess that's it. Questions? No questions? All right.

Patrick McKean: With ENSR. I have a couple of questions. Is there going to be any interim guidance issued in the cases of 1992 and 2001 and old data may not be representative of that year? This is a case in the West even when you've upgraded to 2001 if there is rapid growth in the area will that be accounted for.

Roger: That is something we have discussed I don't think we have interim guidance really clearly in mind yet. One of the things we have talked about is making AERSURFACE more robust in being able to process land cover data in the SIP format maybe from an alternative data source so if you have land cover data in (inaudible) and can make some modifications to the land cover through that kind of mechanism and then export it to the (inaudible) format that AERSURFACE can read. I know it's also come up you know we'd had a lot of interaction with OTAQ in terms of mobile sources emissions and conformity plans where you plan a new highway project you are going to be changing land cover quite a bit as part of the project and how do you account for those influences so it's an issue that we're aware of.

One of the ideas in AERSURFACE is it produces the inputs to go to AERMET in stage 3 also produces text files that is a data dump of the gridded land cover for each of the domain for the surface roughness and the ratio of the (inaudible) in a form if you have the right tools you could be able to import that and do some adjustments there perHAPS. That might be one way to do it. I think the question is what is the (inaudible) if you do have to do it. We don't have a clear answer on that. Hopefully the sensitivity isn't great enough to be a deciding factor and it's a legitimate question.

Patrick McKean: Yes it's come up several times in some the applications we've done.

Roger Brode: The other again AERSURFACE is not a regulatory required tool I mean it's a tool to assist in doing that so you can run AERSURFACE. We hope that people will when they look at AERSURFACE outputs review them and see if they make sense and see if they are reasonable. We have seen some problems with the land cover data where there has been recreational grass areas around the runway instead of showing up as urban recreational grass shows up as low density residential even though there's a photo that doesn't show any houses there . I mean if there are a lot of data problems that's been in other things like in ASOS there's data problems, land cover there's data problem, we don't know where the met tower is thought we did but don't. That presents a lot of challenges and we hope people will take some time and QA the data going in and coming out. You might be able to make a well informed meteorological sound judgment kind of adjustment as long as you can defend that appropriately to the appropriate agency.

Patrick McKean: This might go to Jeff. Did you guys ever try to recreate the inverse waiting type of approach with more like (inaudible) instead of using a GeoTiff?

Participant: Yes we did. (inaudible)

Patrick McKean: Okay.

Roger Brode: A couple of members of the workgroup have been working on that maybe they already had state systems with their own state land cover data set up through EROS and have been trying to replicate the methodology. We may learn more from their activities along these lines.

Patrick McKean: Okay. One more question. When will the beta option to turn stack to downwash for individual sources become guidelines. Isn't there an option or a beta version where you can turn stack to downwash for individual sources?

Roger Brode: I don't think so. There's the capped and horizontal release beta option.

Patrick McKean: That might be it. Yeah. Thank you. It has to do with stack to downwash as to whether or not you can turn it on or off for individual sources that are capped or horizontal if you have a mixture of source types.

Roger Brode: Right. The Model Clearing House procedures for modeling capped stacks could send you to the issue of stack to downwash that you could set the (inaudible) very low, trying to affect the diameter and turn stack downwash off. That's kind of. The fact is if it's (inaudible) downwash it didn't apply downwash so you wouldn't need to do it there. Right now the main point is that procedure should not be used for stacks that are subject to building downwash. My guess is that most capped stacks are subject to building downwash.

Patrick McKean: Well we had an application where we had some capped stacks that were heaters at a gas processing facility that were sitting out in the middle of nowhere and if it was influenced by all the buildings.

Roger Brode: Maybe what we need to be clear on is that if your stack is not subject to building downwash then the capped stack option in AERMOD applies to the clearing house procedure. You don't have to do anything; just input the normal stack parameters, stack height, velocity, actual diameter. It does the rest and takes care of it so it will not apply downwash for that so I think there's no reason why you couldn't use capped stacks for non-downwash source in AERMOD. It's just more of a matter has it been verified that it fully influences the clearing house procedure. Maybe we need to be clearer about that. Does that make sense?

Patrick McKean: Yeah.

Peter Manousos: Pete again. Sort of a consensual question about running this as a DOS application. Have you guys had any discussion about migrating away from providing a DOS application? I guess rumor has it that Windows will not be allowing that interaction on the command [ed. line] through the command prompt anymore in the near future.

Roger Brode: That rumor has been around for at least 20 years.

Peter Manousos: Yeah I know. But you can see it as you get into upgrades of Windows.

Roger Brode: I think right now by hard wiring the input file name if you have everything in the right folder you just double click on AERMOD exc. And it will run. I think that shouldn't be an issue as it's been a rumor for a long time and it just makes it more difficult to use it properly. But I guess there are issues with VISTAS that we haven't fully resolved. I have heard that AERSURFACE might not work under VISTAS for operating system. I don't know, but if anybody has any clear information about that please share it with us. We haven't been able to investigate that.

Arney Srackangast: I was curious for AIWG and AERMIC how the public provides input on setting priorities in the model. It doesn't seem as though there is any other representatives other than agencies in those organizations.

Tyler Fox: Yeah. I think that's a good question. I think that the presumption that we're working under is from the both regional offices and state/local agencies perspective they are bringing out these issues that they are dealing with on an application basis on and bringing those things to the forefront of OAQPS. So we're working on the assumption that they are an effective means by which those issues come to us and we both identify and prioritize them. When

AERMIC was first established we had representatives from AMS and the name reflects that in terms of the collaboration between AMS and EPA. Some individuals representing the private sector were part of that through that association. When the AERMOD was not a regulatory model and in the development phase that was appropriate. But once the model is in the regulatory arena, it becomes difficult and becomes a little more dicey in terms of managing this whole system and making sure that you've got considerations across the board. Other than having a huge assortment or consortium of ways by which we formally do that which would again take time and resources away from actually doing the things we need to do given the constrained resources and budget we are operating under. We determine that the more effective means to move forward was as we presented it. There is still as Roger indicated a need for us to have through SCRAM, or other means, a way in which input can be received on a timely basis; big or small bugs and beyond. We are continuing to work and strive towards that and that would be another mechanism by which people can provide that information.

Roger Brode: I'll just add this meeting is really the formal ideal format for that to submit comments to in the context of the modeling conference itself. Of course it's every 2 years or so.

Tyler Fox: As I said earlier, recognize you have a month from the date of tomorrow to submit things into the docket for formal consideration by the agency. Then again we will continue to work on other means by which people can provide information. There are a number of situations and applications that come up for these issues and we are very much aware of. Unless there are situations that people feel they are not being represented and can inform us about that. I'm hoping that the way in which we have organized ourselves to move forward will respect and reflect those kinds of things.

Arney Srackangast: As a follow up to that, I did not see any itemized priorities in either of these in terms of what is the priority of these and I would phrase that in terms of where is the speed of AERMOD in the priorities of these types of things? Thank you.

Tyler Fox: Well as you presented just the compilers speeds us up by 40%. In fact in terms of interaction that we have the timeframe and the time it takes to run AERMOD is always something that is mentioned and we're trying to deal with that issue through every upgrade and update that we put forward. Hopefully the complier when you get home and Roger has everything up and we put on SCRAM you will realize that up to 40% increase in run time.

Roger Brode: I think that's one of the motivations for the alternative meander option that could be used to speed up many applications. I think it's certainly on the list of priorities. I think if we didn't have such a wide range of compelling technical issues and the validity and integrity of how the model is applied then the speed would be a higher priority. I always find out there are more efficient ways to apply the model in many cases.

Bob Paine: From ENSR with a couple of AERSCREEN questions. One is users have been asked to demonstrate that a meteorological site is representative of an application site. I would suggest that when you have AERSURFACE input available to AERSCREEN you would run AERSURFACE both for the met side and application site, feed it into AERSCREEN, and see if the actual modeled peak concentration peak are significant. If they are not you can probably

conclude that the met site is adequately represented
of the application site.

Roger Brode: I think that's a worthwhile suggestion
to pursue. I think if they do show a little
difference that is certainly comforting and if they
don't I'm not sure what that means. I think we need
to study this a little better to understand how to
interpret the results. But I think it's worth looking
at to see what we can learn from that.

Bob Paine: Because right now there is no real
quantitative way to say how to compare the met site to
the application site from surface characteristics.
The other question I had is I would recommend that
MAKEMET output could be used in lieu of onsite
meteorology as input for full AERMOD application as a
way to show compliance. That is to say to completely
replace if you don't have onsite data or
representative meteorological data. Could you use
MAKEMET input and deem it conservative enough to
replace the need for representative meteorological
data?

Roger Brode: I think the mechanism to do that will be
there and it is a topic that has been discussed within
the AERSCREEN workgroup. But we're at a point that we

haven't really tested it and don't know how comfortable we will be with that or not. It is something again it is worthwhile investigating that option basically a multi source screening technique but I don't think we are prepared to say thumbs up or thumbs down at this point.

Dick Perry: Beeline Software. Before I had a couple of questions but before I started some of the discussions before I got up to the microphone. I just want to make a statement that I can directly attest to the fact that is different from previous years that when problems are brought to the attention specifically Roger they do get addressed in a timely manner. It's not that blank wall that existed a few years back when something was brought to their attention. So that's been very gratifying to see.

Roger Brode I appreciate that comment but I know this past summer has been quite unusual and if other have a different experience than that I apologize.

Dick Perry: Okay. First Randy just a quick question. When you did the 1 to 3 km test did you do any change of the airport setting between the two?

Randy Robinson: No I don't think there was any change in the airport setting it was simply a difference in the radius you were looking at when you were generating this.

Dick Perry: It was an airport setting for both distances.

Randy Robinson: Right.

Dick Perry: Given the interest in PM 2.5 Roger, has there been a movement that were evaluation progress in that Method 2 (two) that was also added not too long ago to the AERMOD?

Roger Brode: Method 2 is one of the options in AERMOD for deposition particle deposition fairly small particles. I guess I would just say no, but deposition in general is an issue that is working its way [ed. up] the priority list. It's getting more and more attention and I think it's going to bubble up to where we are going to be able to address some of those but so far I'm not aware of much additional work that's been done yet.

Dick Perry: Last one is just a nip in AERMAP did you add the open PIP source.

Roger Brode: Yes all source types are supported in AERMAP now.

George Schewe: From Hiperism Consultants. My questions revolve around AERMOD equivalence in acceptability. As you know, there are some of us out there who have versions of AERMOD that are even faster than [ed. the EPA version] (inaudible) and we don't believe compilers are the answer. On reading Appendix W, I do understand and you explained to us that the determination of the acceptability of the model is the regional office responsibility. I think that's clear. The use of alternative models does require an equivalence demonstration according to Appeneix W. Specifically to show that it may be "treated for practical purposes as the preferred model." This leads to the issue of the availability of the model evaluation data base. Now we checked on your web site yesterday and the one is out of date. We couldn't use it with 07026 and we've often wondered what the does the EPA do in evaluating its model before release. So this is the focus of my three questions.

Is the creation and maintenance of this data base an OAQPS or a regional responsibility? That's questions 1. Question number 2. Is there a model evaluation data base that is agreed upon by both OAQPS and the Regional Offices? Question number 3. If it exists is it suitable for use in an equivalence demonstration to which both OAQPS and the regional office would be in agreement with. We cannot proceed on an equivalent demonstration until we have clear guidance on this.

Roger Brode: Well I think the clarification memorandum we issued on this referred to the test cases developed with AERMOD as a reasonable starting point.

George Schewe: Insufficient.

Roger Brode: We agree they are insufficient and that's why I indicated that some applications specific tests should also be done. The next update to AERMOD will include a wider range of test cases that will be more robust. By doing that we are not saying this is sufficient it will just be a more complete set of tests that can be used. As far as the evaluation data bases the data is out there and I think the only obstacle in using those is changing the version date for the AERMET and the header of the met file and that's not a difficult exercise to complete. I don't know that this outweighs evaluation data sets by themselves add all that much more value in terms of equivalency demonstration in this context or not. As I mentioned earlier, one of the infrastructure development activities that I wish we were further along with was to get the evaluation data bases updated to the point we can use them routinely in almost automatic fashion to compare AERMOD performance against field studies. Version A versus B similar to what you heard a little bit about in terms of the CALPUFF modeling system that test data set. For now, I guess it's still up to the appropriate reviewing [ed. authority] (inaudible) to make a decision or determination on what the appropriate equivalency demonstration is for that given application.

Bruce Egan Egan Environmental Inc. I think (inaudible) Roger Brode said something to the effect as to wondering of requesting comments about what the minimum speed is to create wake effects behind buildings. And that's sort of a fluid mechanics question. It strictly depends upon the size of the (inaudible) Reynolds Number in atmospheric size flows. (inaudible) Reynolds Numbers are always greater than 2,000 to 2,500, the criteria distinguishing between laminar flow and turbulent flow around structures, (inaudible) turbulence so you almost always have a turbulent wake behind a building that will be very similar in characteristics. The wakes will always look alike over a wide range of wind speeds. even if you're in triple quadruplet (inaudible). I think the other way to phrase the question as to where you want to go is to think about what is the minimum speed that would have an organized flow and I think you could probably look at that in the context of something much less than a meter per second for example. As long as you have an organized flow then you would have turbulence that would stay behind the building. If it's just sort of in a sense that if the local flow is not organized because (inaudible) upwind and trees are disturbing the larger flow then probably you don't have a good flow that you could find a wake behind a conventional looking building.

Roger Brode: Thank you for those useful comments.

Bruce Egan: Sure.

George Schewe: Trinity Consultants. What is your recommendation for using the new ASOS data sets 23505 where we're getting calls to the tune of 20 to 25 to 30%. I asked you this question last week Roger. So right now you're talking about going to the 1 minute or 2 minute [ed. averaged] (inaudible) data to kind of replace that. Right now in the interim we get that many calms and start calculating 24 hour values and the more calms we get the lower our numbers go so the question is any thoughts what we can do with that right now?

Roger Brode: I think that's why we're considering this idea putting out a clarification memorandum on use of ASOS data with AERMOD and dealing with missing airport data with AERMOD. I don't think we have an answer but I think which you pointed out if there's a real question that arises as to the representiveness of that data set especially for applications involving lower level releases where part of the data that you're throwing out or ignoring is clearly the part that is worse case meteorology for that kind of source. So I think it would be up to right now would interaction between applicant and reviewing authority as to whether the met data being used for the application is appropriate and representative and adequate and so on. That's a legitimate question that would be brought up in that context. Right now we haven't made a direct firm statement one way or the other. Other than to inform the community that it's an issue we feel we need to try an address.

In terms of the ASOS data, one of the big obstacles we have in moving forward quickly with that is that the data files themselves are not in a clean consistent format. They define the format for the files but the data files themselves don't always conform to that format. So there's a lot of practical obstacles in processing the 1 minute data cleanly. So we've done it on a case by case basis for a number of applications and non-regulatory applications. It has given us an opportunity to learn more about that data to see if we like it or if it's useful or not. That's a big obstacle that we're not sure how soon we will be able to work around that and there may always be a bad file that we may run across and haven't accounted for. Right now the tentative plan would be to possibly modify AERMET to read in that as an optional data resource to supplement the other types of data available.

Tom Robertson: Environmental Quality Management. You mentioned a couple of times haul roads and mining type issues. Are you guys ready to make recommendations to the states and the staff as to whether it's a long, skinny road, short road, wide road, a box or a line? Because you get a different answer either way you model it so now you're shopping geometry. There's a function of what the correct answer is and you get a different opinion from every permit writer.

Roger Brode: I think we're still on a road to come up with that kind of information. We wanted it to be based as soundly as it can be on what is actually happening with those emissions. One other point I would mention there in some cases there may be influences that are affecting plumes from haul roads that we're not accounting for. That would be if there was a building very near to the roadway then building downwash may be affecting the emissions from the roadway that currently unaccounted for. Downwash is only applied for point sources currently. That's something we have discussed. Again given the capability of the downwash algorithm the fact that we know where the wake is in space maybe we can apply building downwash effects on blind sources or even part of area sources. We have already started doing some very preliminary testing to see what impact that would have. If it is important then maybe another option would be instead of using a string of volume sources to use a bigger array a denser array of point sources to define the roadway. If there is a building nearby then the building downwash would likely apply. We need to look at that more closely to get a more comfortable feeling that what the downwash algorithm is doing in those cases makes sense. That's something we have considered as a possible option that would be for down the road, sorry for the pun, as an enhancement that might help.

Tyler Fox: thank you. Now you have earned your afternoon break just after 3:45 and we'll finish the afternoon off with CALPUFF.

Tyler Fox: We're in the home stretch if we can all gather back. It's been a long day and it's not even 4:00 and we're scheduled to go until 6:00. Hopefully we can get through this somewhat quickly but not too quickly. As you can see in the agenda there is quite a bit of road to cover here so we'll have a total of five presentations. They vary from 15 to 30 minutes each. I'm hopefully going to get through pretty quickly. I'll be 15 minutes or less, Roger has 20 minutes or so and so does Prakash and then Bret and Joe have 30 minutes a piece. I think that adds up. So that's the set up for this session.

I'm charged with giving a status and update and what you'll see is it's really kind of a chronology of events that have happened over the past three years or so in respect to CALPUFF. Just to make sure we have the context in which EPA has been working under with the community, model and the like and where we stand.

Then I'll hand it off to get into more detail to Roger and from the EPA side Bret's evaluation as well. I'll start with some of the history here. Obviously the modeling system was promulgated in April, 2003, and includes CALMET and CALPUFF. It was promulgated as EPA's preferred model for long-range transport (LRT) applications, beyond 50 km, primarily for Class I increments analysis. At the time the model developer arranged to maintain control of code development and distribution and copyrighted code. Since then we obviously have established an agreement through both memo from Peter Tsirigotis and letter from myself to assure that an agreement with [ed. Earth Tech] (inaudible) that EPA as I mentioned earlier maintains the approprobilability of regulatory version of CALPUFF. It's also identified in Appendix W for near-field applications involving "complex winds" on a case-by-case basis. Roger touched upon the clarification memo earlier and will get into more details later on in this session. It's also used for Class I AQRV [ed. Air Quality Related Values] analyses, not under Appendix W purview. But obviously we coordinate closely with the Federal Land Managers in that process.

So taking a step back and kind of understanding the score card of the various versions that we've been working with and the dates they were originally made available. We started with the promulgated version 5.7. There was an update although it was a number of years after the availability of it 5.711a. That was the first time we used the update tool and were able to update the regulatory version to address bug fixes that were obviously important to us to clear out of the way for regulatory use of this model. There were two versions of the VISTAS model and I'll talk about that a little bit. Then there was a subsequent release in June, 2007, that corresponded to the coordination with the model developer to get an updated version of this model. Version 5.8 and that's where we currently stand as of today. There is as Herman Wong mentioned today and those of you who are familiar with modeling system are aware in April, 2006, MMS developed a version 6.112 that has over water capabilities and other types of changes to the model that they contracted directly with the model developer on.

So let me walk through the chronology here and give you feedback or give you information I should say about the discussions especially within the federal purview and reminder that these are slides and information that we first put out to the public back when we had our 2007 Regional, State and Local Modelers Work Shop. Those presentations are publically available on SCRAM. We walked through a similar set as this to update people about the status because of the situation going on during the analysis for BART. So we've also got similar slides from this year's workshop that also provides information along these lines. These are things that may not be commonly understood or knowledge from your stand point so that's why we're taking the time to go through these to set the table.

In Spring of 2006, we had some meetings across the federal agencies in particle EPA, FLM, MMS for those of us who have a critical interest and have been using this model system. The reason is Earth Tech sells CALPUFF rights to TRC in April 2006 and that kind of alerted us to a situation that we hadn't really thought about. And also we were engaging through our update tools to update to the VISTAS experienced difficulties in being able to successful use that update tool to update the regulatory version from what we had done which was causing frustration in the community, frustration in the VISTAS process, frustrations for us and frustration for everybody. We needed to step back and talk with the federal agencies. Some of the issues we discussed included the lack of adequate documentation, the responsiveness to issues by developer and the need for funding to address any issues from Federal community, despite regulatory status. Given those issues we felt it was important to get the insight and opinions from other federal agencies. In response to that, we contacted TRC and reminded them as the new proprietors or owners of the model that there is a requirement that it meets Appendix W requirements for regulatory models. You can see them here and to basically reaffirm that the type of agreement we had with you on. It was critical that we understood that the model would be maintained and continued to be made available as it had before. In fact I met with Joe [ed. Scire] in Denver during a conference and we had a number of discussions about this situation. I definitely used my concern about the status of CALPUFF and we had general agreement on where we needed to go with respect to these things as well as to the need from the version of standpoint as

I indicated here to really get to a point as I described with the update tool. You had a regulatory version and the Beta version and we're operating in that duel universe and we could reduce the level of frustration and confusion that will result from having multiple versions. NOTE: CALPUFF model/code cannot be proprietary.

In response we got basically the Use Agreement indicating the continued copy write of the model as changes are made and modifications those would have to be delivered to TRC with documentation and instructions for use. And also a reminder that the User Agreements also stated that it's really the user's responsibility to determine the appropriateness for any particular application and that liability was assumed by the users in that context.

So I mentioned the update tool. Here's the diagram and Roger will get into more details. The Base and BETA comparisons using a pre-established set of sources of meteorology and terrain should provide for consequence analysis to understand those differences. Interpret and resolve them to the extent necessary and then document that fully. We did that after having these discussions we wanted to move forward from

Version 5.7 to Version 5.711a. We got the Model Change Bulletin, looked at the application of the update tool and the results there could clearly identify the differences to bug fixes and move forward and improving in that same timeframe. A lot of the discussions we were having as we were internally engaging in this update was whether or not we needed to move from Version 5.7 to 5.711a or just bypass that and directly go to the VISTAS version which was more commonly being used by the community. It became apparent in that conversation that our best scenario was to make this initial change to rid ourselves of the bug fixes and went through the process as we had outlined in the 8th Modeling Conference to do that and it was a successful application and update. Of course it still left unresolved the issue between then that new updated version of CALPUFF and the VISTAS version that folks had been using. So at that time we began in earnest the process of updating to 5.754 and then engage in some discussions to understand some of the differences. We received indication from Joe and TRC that there was going to be a new VISTAS version referring back to the score card. So rather than getting caught again one step behind, we needed to make a decision whether or not we focused on that previous version or the newer version that was going to be made available. It was fully expected that the states and others would be using in the BART process and the like. So we decided to refocus our update efforts on that new version to make sure we could attempt to take care of our bug fixes but also to take advantage of the newer features and latest corrections for the benefits of you all and that in fact included MMS updates for over water that Herman mentioned.

So as we began applying that update tool we found some fairly large unresolved issues but I won't go through these that I have listed here. Roger will provide more details. It was problematic in terms of interpreting what we are seeing because we didn't know whether or not we had full documentation of the changes. We couldn't attribute these types of observed differences to our understanding of the differences between the Base and the BETA version in this case for the regulatory version and the new version we were looking at. And so we were kind of stuck in a situation it was impossible basically for us to proceed without further information from the model developer and others in the community. While we are engaging this and waiting for information to flow about the newer version to see whether or not, there were key pieces of documentation or information we were missing.

The BART applications by the states were moving forward in "good faith." What we talked about this morning is there are certain applications that come under Appendix W and some that don't. We had made a determination in working with Air Quality Policy Division Todd Halls. I don't know if he's with us but he worked with us closely in terms of the language that went into BART and we're pretty clear there was a separate set of requirements or understanding of how and what models could be used under BART. Certainly CALPUFF fit the bill in terms of being able to address these single source questions. But it wasn't the only model that could but a number of states used CALPUFF. And they wanted to use the best available model version and they wanted to take advantage of the best science. So what we had talked about within the regional office modeling community from the EPA standpoint is that what we wanted to do was to attempt to be "consistent" with App W and "wall off" any potential bad precedents. Very good intentions but very difficult to deal with in a situation where as you develop meteorological data sets which take quite a bit of time to develop. As you use and the states use this model and the modeling system in one context either they or perhaps their higher managers ask the obvious question why can't we use it for permitting? So the problem became one where most were eusuing the VISTAS which was not currently approved under Appendix W which provides the rules of the game for NSR/PSD permit modeling. And through the provision of the meteorological data sets through CALMET there are also some potential concerns of the update tool addresses both CALMET and CALPUFF. Some of the differences we saw that we were unable to interpret could have been coming from that tool as part of the regulatory modeling system. So again EPA was faced with the difficult situation in dealing with the regulatory application in BART and managing that but trying to ensure the consistency and the integrity of the models as they are applied under Appendix W. Not a very good situation to deal with in clearing the air on CALPUFF here. Given the frustrations that were existing in the community and kind of at that time the communications that were not really coordinated and

EPA has quite a role in that. We had to make a clear statement to the community and to the regional office modelers and that occurred in January, 2007. That statement was specifically the answer was no that you could not use the VISTAS version unless you wanted to go through the process of demonstrating it applicability and appropriateness as an alternative model. No you could not use the CALMET meteorological data set because they were not based on a regulatory approved part of the CALPUFF modeling system. We had to make that distinction because we can't put into danger the permit actions and the reliance on the modeling and have anything overturned or you in the community using something that in the end causing a problem in that permit process. So the safest and the most appropriate means to move forward at that time was to stick to the version that we had approved. Now at that time, Region 4 communicated that VISTAS and I spoke with Pat Brewer and what she had a great interest in and we very much appreciated it was to try and facilitate discussions so that we can move forward in a way for their sakes leading the way for everybody across the nation that we could engage in a process to get the information that OAQPS needed. Allow time for the review that was needed through the update tool process or the protocol process so we got the request for the information and we proceeded to get that information through communications with Joe and others at TRC. That obviously helped us tremendously in moving forward. They became more aware of the update tool and the process and the protocol itself which was very helpful I think for the community. We became much more aware of the code and got critical pieces of documentation.

Now speeding up to more recent times because Roger and Bret will cover the issues that we found in that process and then where we are now and where we are going in the future. Suffice to say in our interaction the problems were much more than bug fixes and we'll get into that more later in the session. Long story short is that we were able to get to the point of successful applying the update tool with sufficient documentation and understanding of the model, to update the regulatory version 5.8 in June, 2007, establishing the CALPUFF modeling system from a regulatory standpoint is CALMET, CALPUFF and CALPOST. And so we feel pretty good about the current state of the world in dealing both with the modeling developer and our federal agency partners and you all in the public, regional offices states and local folks. Unfortunately as you saw in Roger's presentation on AERMOD, we've got quite a bit going on and on our plate with respect the development and maintenance in that model. around that time our office director, Steve Page, made a decision not to renew our inter agency agreement with NOAA. As some of you may know, my group had a branch of NOAA meteorologist that were available through NOAA to EPA and they provided quite a bit of support both from meterology standpoint and dispersion model standpoint. And despite the fact that we had lost key staff like John Irwin and others over time, they were part of the group in providing valuable support in that effort.

At this time we learned that, that was support that we were not going to be able to count on in the future. So as you may know folks like Joe Touma, Brian Orndorff and Dennis Atkinson have assumed careers with NOAA or other accommodations. We're in a situation where we are dealing with quite a bit of reduction in resources here. Thankfully we were able to get Bret Anderson on a detail Region 7 tour here at least for 6 months and really start looking at this situation and what we found caused us some concern from a science and implementation standpoint and really reminded us of what we needed to do was to go back what we had planned when we had originally talked to the Federal partners some years prior that we needed to update the IWAQM process. IWAQM goes through performance evaluations because the recommendations that were in our IWAQM were irrelevant. The model had passed us by and we needed to go ahead and update that. Again we unfortunately were not able to engage in that process as effectively and as timely as I would have liked. And we would have benefited from but that little promulgation of AERMOD got in the way of that. Unfortunately I should say it was fortunate for all of us that we got through that process. So we really needed to go back and make sure that we went ahead and did what we said we were going to do and commit to the resources. I appreciate management in Region 7 allowing Bret to come and do that because we wouldn't have been able to move forward in a way that we have if it weren't for his efforts and others at OAQPS and the regional offices supporting us throughout. We provided these concerns at our workshop with the regional, state and local folks to let them know we have gone through a process and it hasn't been as timely as we would have liked. Right now we are pending any assessment of versions after 5.8 for the version 6 updates until we can resolve the issues we see. What we want to do is complete these performance evaluations and understand what we are dealing with so that we can have a firm handle on the science and its implementation within the model. So that we can then provide the community with the confidence they need in any update. We certainly planned to get further along than we did so that we could present more detailed performance evaluation information and the like.

Before now, we certainly would have liked to be able to spend more time engaging with the model developer on these issues so that we can then have a more effective engagement here at the 9th Modeling Conference. Unfortunately that has not necessarily all come about but here we are and here we are able to at least provide what information we have and a clear understanding of what we see and have concerns about. Then hopefully get your input as well as input from others about that situation and help perhaps to move forward.

So I'll hand it off to Roger now and then we'll go through the session. I'll come back at the end to summarize where we are from regulatory standpoint.

Roger Brode: Thank you Tyler. I'll see if I can manage the time effectively and get the most important information out there. Here's an outline and a long outline for 20 minutes but just give some overview assessment of the VISTAS version that Tyler referred to. And share some of the information regarding some unresolved technical issues that we have with some of the enhancement in version 5.8. Touch on the near field clarification memo on a little more detail. Discuss in more detail some examples of complex wind situations where use of CALPUFF in the air field might be suggested or considered. But also discuss some technical issues and concerns related to that type of application. And then for other issues. This is stuff Tyler mentioned about EPA role as far as approving and determining when the version (inaudible) CALPUFF is approved for regulatory use and the tool is you saw that diagram before as well. This is just a quick slide showing the results of the initial assessment that came back by applying that tool at that point v5.756. We also took longer than we would have liked but we recently posted the complete documentation in a report on SCRAM as referred referenced down below. Again we saw quite a range of differences from -46% difference, to +83% difference much different than what we had seen the first time this update tool had been applied where we saw differences as insignificant there was only one difference higher than 1% and that was a 5% difference. But everything was clearly identifiable as due to a single bug fixture maybe two I forget which. So we struggled a little bit with this but as Tyler mentioned once we got some additional implementation working with TRC and what I think it was especially helpful was they provided some interim versions of the modeling system to facilitate isolating impact to different types of model changes. One being bug fixes and two other types of changes so that's what is listed there. I won't go into a lot of details here as it's in that document. But we conducted a number of tests and again it was to isolate the effects of bug fixes verses the category called non optional technical enhancements. These were changes made to the formulation that could affect results. But the user didn't really have any control over it. Then finally optional technical enhancements that the user could control.

So what we found the significant differences could be attributed to each of these three known factors. I think sort of a suggestion from the signal we were getting was that it was mostly bug fixes that needed to be taken care of and the sooner the better. We were certainly interested in responding in a timely matter, but we felt we had to go through this process. Surprisingly, a little bit of time one of those factors, the new default parameters for optional technical enhancements (kind of a lengthy title), that actually contributed to the largest differences.

This is another table from that report that shows percent differences to bug fixes. Someone take there it is. The column on the left is due to bug fixes, column 6 is non optional technical enhancements and the new default parameters and the final column is where we ended up in terms of version 5.8. So the new default parameters -- well this is a little more detail by source. So you can see there is differences for every source and every scenario ranging quite a range, but one thing to point out. This is by comparison in the precious assessment done as Tyler pointed out these are the percent differences we saw.

Again .002%, .003% and the one that stood out was about 5% difference for one source and one scenario and that was all traceable to a specific bug fix which we could easily verify that was the cause. That was a little easier to manage. This update tool goes through a range of scenarios domain sizes, meteorological inputs, other options and different source configuration source types. The results I just showed you are the differences in high range values sort of the design value differences. One of the things we realize when we got into this deeper is that those differences could be a tip of the iceberg. They might be skewed to impacts more near field even though long term transport is the prime regulatory nitch for the model. So we started looking at what the percent difference is across the domain and we saw some spots like this where you can ask is that the same model you might ask. That added to the concerns and this was the plot similar contour plot that was done a percent difference across the domain. This was called test 4 which at that time test 4 was suppose to be any troublesome comparisons. So all the changes that were made to the previous version should make it equivalent to the VISTAS version. So all the known causes of the differences have been eliminated and we still have differences of that magnitude. Again close in there's not a lot of difference, but you know within a 100 km if your class 1 area is there you will see a difference 5,000% difference. So just want to clarify this as tables are significant in their own right but just a tip of the iceberg. So we go to the point that we approved version 5.8 but we still have some unresolved technical concerns regarding how the optional technical enhancements for mixing height algorithms. You mentioned the MMS enhancement that MMS funded some enhancements to the CALPUFF modeling system for use over water. One of the issues they addressed in that was the CALMET didn't count for the convective mixing height over water. So it's just mechanical mixing height you could underestimate the depth boundary layer like the Gulf of Mexico. So they made some convective mixing height changes to CALMET for mixing over water. But in doing that for the Gulf of Mexico it could stay convective for day and night on end for a long period of time. So this convective boundary layer could sort of grow without bounds so that was an issue. So some new default parameters were incorporated. The threshold buoyancy energy flux over land and over water. So these are new parameters that were part of the new found enhancements of MMS for over water dispersion. But the way they were implemented they were applied as well over land. So the THRESHS is over land and the THRESHW is over water and the user might not initially be aware they are using these new parameters. The defaults for these parameters are different than the previous models would behave that didn't have those parameters. So that was something that we uncovered in sorting out what is the difference between these two versions of the model. So the way it's designed is the threshold buoyancy flux required to sustain convective mixing height growth; however, in looking at the code its suggested as it has been implemented as soon as the sensible heat flux falls below the threshold, the convective mixing height is immediately assigned the value of 0m for that hour which eliminates any convective turbulence for that grid cell. But a new convective boundary layer may form for subsequent hours. In the default mode in applying CALMET that behavior is masked somewhat by other defaults within CALMET, including the default minimum mixing height of 50m, and the mixing height that goes to CALPUFF is the higher of the mechanical and convective mixing heights.

Also there's an average of as the overall mixing height, and the default option for upwind a of the grid cells. That would mask this effect to some degree. The convective velocity scale which is path to CALPUFF as a parameter that determines how much convective turbulence is in the atmosphere. That is also set to 0 for convective mixing height. That effect is still going to be path to the modeling system. So these are some figures that sort of illustrate one of the scenarios in test the data set. These are three successive hours on one of the days in Scenario 4. This is the scenario with the Shenandoah Valley, Shenandoah National Park sort of up to here. This is a plot of convection boundary layer height with the default threshold is 0.05 W/m2/m. So it happens as the boundary layer gets higher you need more boundary energy flux to sustain it. So you see the red is pretty up as boundary layer height. It's hard to read those but they are 1,000 feet to 1,500 meters perhaps. In the next hour parts of the domain dropped to 0 because of the threshold. In the next hour those parts start to rebound and these other parts dropped to 0. This is the kind of behavior we found in these tests and this is a time series plot of convective mixing height where one of the grid cells within that domain showing convective mixing height so about five or six days there the first day the normal convective mixing height increases then drops throughout the day. Here's one that gets pretty high then it drops and then a little bit of boundary layer. This one is probably most illustrative where convection mixing height goes up and drops at noon to 0 and then goes back up cause it's a (inaudible) break or something. But anyway.

This is just to illustrate that these are options from the modeling system and this is an issue that we are concerned about that really hasn't been resolved. We don't feel that is realistic behavior. What we ended up agreeing to in order to approve version 5.8 was that the non optional technical enhancement first of all those were problematic because the user can't control and it's affecting the result. They were sort of folded under the optional technical enhancements so they were sort of removed as a potential cause of differences so that simplified things. That was helpful.

Then a new regulatory default switch was added to CALMET. Prior to that there was no regulatory default switch in CALMET. There was one in CALPUFF that would allow technical enhancements to be in the model code but again this (inaudible) partitioned them off in terms of not being used for regulatory applications until a fuller assessment could be made. There was another change an optional technical enhancement another threshold parameter in CALPUFF that also had some limited defects.

Once we got all that done this is the final assessment results. Test 8 is you know supposedly these are only differences to bug fixes. And it's very similar to test 5 not exactly because in the process some additional bugs were found and some minor differences were attributed. At least we go to the point where we understood here's the difference. As long as you don't use the new threshold options and don't use the optional technical enhancements it's all about bug fixes and we understand what the differences are. That's important and at least we go to the point where we had that level of confidence. But there are some still issues. The new MREG option for example just as a way of caution it's not that well documented yet. Maybe it's more so in the CALMET data and (inaudible) file that's provided with the modeling system. We have come to realize there is no default value for that parameter and assigned to the value of 0 which is to not enforce the regulatory defaults and we've actually encountered a few people using the model that ran it without realizing they need to change it to 1 to turn on the regulatory default. Just to make you aware of that.

But just in terms of technical details there is still a lot that should be better documented. I made the point the magnitude of differences that we've seen between version 5.8 even with all these optional technical enhancements sort of partitioned off and the previous version of CALPUFF sort of raises some questions of the validity of the original modeling evaluations that were done to support CALPUFF promulgation. As Tyler mentioned fortunately we got Bret to come on detail and he's been doing some work along those lines. We actually we could extend it to a year which means we would have a lot more information to share now but at least we have made some significant progress down that path.

One other issue that has come up quite a bit is PG verses turbulence dispersion option in CALPUFF. Currently the regulatory option is to use the PG as preferred option. Question came through clearinghouse addressed in March 2006 have indicated that it is not an automatic switch. Just because AERMOD has been promulgated and using turbulence as dispersion doesn't mean we switch to that option as a preferred option in CALPUFF. It doesn't say that we don't agree turbulence is better than PG as far as the basic science but that a separate assessment should be made of that before making that switch. That assessment is underway, but again we don't have as many details here as we would like to share. But there is some PG-class dependencies in the modeling system even with turbulence option. That's something we need to get a better understanding of and figure out how to work through that.

Tyler already mentioned enhancements. Another issue is the near-field Clarification Memo. Thought I'd give you a little more detail it's been on SCRAM for a while. The main is that the EPA-preferred model for near-field is AERMOD. CALPUFF is not the EPA-preferred model for near-field applications, but may be considered as an alternative model on a case-by-case basis for near-field applications involving "complex winds," subject to approval by the reviewing authority approval. The reference in the Appendix W that link it to the alternative model section are for cases when there is no preferred model. So a complex wind situation where non steady state effects are so overwhelming that I know a Gaussian straight line plume model cannot give me a reliable answer. So when there's no preferred model then that's a situation that CALPUFF can be considered. But still needs to meet some requirements that are referenced in the guidelines. One issue is as far as I know no such applications have come through the Model Clearing House. So we haven't really developed a knowledge base of experience on when it works, how it works best or how to apply it.

This was just a statement from the Preamble to the Federal Registry Notice promulgating CALPUFF. "We will require approval to be obtained prior to accepting CALPUFF for complex wind situations, as this will ensure and so on. As experience is gained in using CALPUFF for complex wind situations, acceptance will become clear and those cases that are problematic will be better identified."

But unfortunately we haven't had the opportunity to do that because nothing has come through the process. That goes to the main point that how I mentioned earlier in terms of the process. You know my applicant has a deadline and they want to get a permit and I don't have time to go to the clearing house so you didn't. So now we're in a situation where if we had used that process maybe we would be in a better situation now in terms of understanding CALPUFF and how best to apply it in these situations than we are at this time. It's sort of the Model Clearing House needs to be looked at as a long term investment. It's not necessarily going to pay off tomorrow but over time as we gain experience and this is basically what happened with ISC. Things started to become more routine and clear and precedence had been worked out. It's going to pay off over time and hopefully over time it will be utilized more than it has. These are some of the requirements that are listed in Section 3.2.2e of Appendix W to meet for use of an alternative model in cases where there is no preferred model or this model is better than the preferred model.

The basic steps are a determination that treatment of complex winds is critical to estimating design concentrations; if it isn't then AERMOD is the preferred model. You can always submit CALPUFF as an alternative model but you have to meet the requirements for that. Then a determination [ed. is needed] that the preferred model is not appropriate or less appropriate than CALPUFF; that's where you get into that. Once you've done that and it says AERMOD is not appropriate or CALPUFF is more appropriate, then you need to meet those five criteria. Each of these involve a specific consideration become complex winds by their nature are very often unique.

It's a lot of slides. That's sort of the clarification of guidance aspect of it but I guess we're now also going to get into more technical issues. How much time do I have? Not much.

Let's talk about what complex winds are. There are examples of complex winds not deeply technical because I'm not technically deep enough to do that. Down-slope/down-valley flows under light wind stable conditions. That's one example. Cross-valley circulations due to differential heating under convective conditions so one side of the valley is under sun light and the other side is under shade. So that's going to create differential heating which could produce a cross valley circulation habit. Valley channeling may be driven by different conditions. So there's a list of different types. Grid resolution and availability of representative met data may be significant issues for a near-field. Do you have adequate data resolution to resolve the important terrain features and other factors to inform the model to get the wind speeds correctly? One thing to point out is that in these situations very often you are going to have significant horizontal and vertical discontinuities in wind, temperature, etc. So those are critical to understand in order to properly simulate non study state dispersion. Here are some graphics to illustrate that kind of illustrate slope flows, night time, radiative cooling occurs, cool airs drain down the slope and then pulls in the valley. Then in the daytime if this side is getting heated you get upslope flows in the daytime. Then with the thermal structure so there are some important thermal structure that exist in these valley situations. Especially if there are light wind night time stable conditions where you have the drainage that is the dominant flow pattern -- that might be important.

Another category is coastal influences like sea breeze circulations that occur by difference in heating between the land and water. One of the features that is important in coastal situations or may be important is the thermal internal boundary layer near the coast during the daytime (inaudible). We have a stable flow in the daytime, the on shore flow, the sea breeze or Lake Breeze that encounters the land and you get a convective boundary layer that develops thermal internal boundary layer. So grid that resolution and representative of met data may be significant issues there. The importance of the TIBL may vary from source type specifically more important for elevated releases if you have a tall stack or a apartment right on the coast the plume is going to be released in that on shore stable flow and not disperse very much and it intersects the top of the TIBL then you get fumigations. But low level sources might be less important. First you have to understand what the complex wind influences are that are important in that situation. And how are those influences going to be right to your source. If I have a buoyant source I'm going to be more concerned about the thermal structure or as concerned about thermal structure in the valley perhaps. If you don't get the thermal structure right for buoyant source you could have perfectly resolved ideal wind fields but if the plume is in the wrong grid layer it could be going in a different direction. So there's a lot of complexity involved there and we're trying to make the community aware of that. These are general issues so the influence will vary considerably based on the source characteristics and where the source is in the domain. Trying to look for the main points because I don't have much time.

The availability of representative met input to inform the system so that's an issue that needs to be addressed. Do you have the proper inputs for the modeling system to resolve the important features of the complex winds toward that application?

Will the modeling system be able to utilize that site specific information? These are important considerations and then model performance and uncertainty. Just want to point out another document recent Staff Memorandum, dated September 26, 2008, provides additional details regarding these issues and tries to talk through the different situations you may have and where it might make sense or might not. Some of the considerations at least you need to look at when applying CALPUFF in a near-field situation. The modeling evaluation is certainly one of those.

CALPUFF modeling system performance for near-field complex wind applications is not well-documented yet and that was an issue that we have discussed ten years ago when they were looking at in promulgating CALPUFF and what role will CALPUFF have for near field situations. The IWAQM Phase 2 report includes some CALPUFF evaluation results for Kincaid (flat terrain) and Lovett (complex terrain) and Lovett evaluation is the one that has been sighted in an earlier communication and those results look pretty good. This is a figure from the IWAQM phase showing CALPUFF performance which is the solid dots verses CTMDPLUS the open dots and it does very well. That's the one to one line this is the Q-Q plot and that's the two to one line so CTMDPLUS we know from its evaluation it was about a factor or two over prediction but CALPUFF actually does better. However, CALPUFF was applied with CTDMPLUS met inputs, bypassing CALMET. So it didn't rely on non space state meteorology inputs. This is not consistent with motivation for CALPUFF near-field applications under paragraph 7.2.8 of Appendix W, which is to "fully treat the time and space variations of meteorology effects on transport and dispersion." Therefore, these evaluation results are not relevant to near-field applications under that paragraph. So there are various methods for evaluating models. I'll just jump ahead and show this is one thing that Bret had worked on was to actually redo the near-field complex wind evaluation with Lovett using CALMET. Looked at a range of options in CALPUFF and actually tried to utilize the onsite data from the Lovett site.

Here's fractional bias calculated from Robust Highest Concentration so for three hours Robust Highest concentrations. This is AERMOD for reference it did very well. That was one of the data bases AERMOD was developed on. In CALPUFF there was quite a range though. In terms of the options we had PG dispersion with half height adjustment, AERMOD turbulence, with half height, PG dispersion with the strain based adjustment in CALPUFF, AERMOD turbulence with the and the strain based and sort of like we did with IWAQM report on page 2 put AERMOD profile date in half height adjustment. Those weres the different scenarios we looked at.

The easiest to look at Q-Q plots there are a lot of figures and symbols there. The purple one there is AERMOD that has been documented. You see quite a range in terms of performance result based on running CALPUFF modeling system with CALMET generated wind fields for this application. Most of them tend to over predict and the one that gives the largest over prediction is AERMOD turbulence with the strain based terrain adjustment which one could argue is the most scientific option available. This is for the 24-hour with similar patterns there. CALPUFF with AERMOD inputs does quite well. That's the blue the upside triangle, but where we are right now is that we see some significant sensitivity to the dispersion and terrain options in this type of evaluation. The more advanced option turbulence based dispersion strain based terrain adjustments exhibited the poorest performance in this case. CALPUFF with AERMOD profiles did the best in terms of the CALPUFF configuration similar to what we did before using CTDMPLUS profile.

One caveat is these evaluation results are very preliminary and will be updated based on additional insights into treatment of tower data in CALMET. So that's one of the issues is if I have one of the representatives on sight, met data documenting the wind or temperature profile, how can I inform the modeling system with that information. How can I utilize that and is discussed in more detail in that document.

So that's kind of where we're at right now and we have some concerns that I don't think it can just be applied with the assumption if I have complex winds then it's going to work. We need to have some more demonstration that it is working and how best to apply it for it to work appropriately and that's sort of our goal over time. For now, we are sort of saying let's pause and get a better handle on it.

Tyler Fox: Thank you Roger. I know there is a lot to digest here. Just imagine if we had gotten everything done we wanted. What we have next is at the time EPA was working on things the American Petroleum Institute had put out an RFP to address some of the chemistry in CALPUFF and they contracted with AER. Prakash Karamchandani is here with us thankfully from CAMx workshop and will be here for two days. And so, we're going to get the perspective from more of the scientific standpoint in terms of the secondary formation in chemistry that we haven't been looking at. At least until now.

Prakash Karamchandani: Thank you Tyler. I'm going to be talking about some of the improvements we've made to the CALPUFF chemistry. This work was sponsored by API as Tyler mentioned. The motivation was concern that the treatment of chemistry in CALPUFF was outdated and overly simplified. What we've done in this study is to address some of these issues that could be done with the resources that were available for the study. I'll talk briefly in the end about handling those aspects of the chemistry that were not included in our current scope of work.

Before I begin I would like to provide some perspective I would like to compare CALPUFF with SCICHEM. Some of you might not have heard of SCICHEM it is a reactive puff model which is a chemistry version of SCIPUFF. SCIPUFF is an alternative dispersion model in the EPA guidelines and SCIPUFF was developed by ARAP. SCICHEM includes chemistry which I will talk about it in a minute. So like CALPUFF SCICHEM is a non-study state puff model which allows splitting of puffs like CALPUFF. It uses 2nd order closure diffusion. The key difference between CALPUFF and SCICHEM is that SCICHEM allows the full treatment of photochemistry similar to what you'll see in grid models like CMAQ and CAMx. That also makes it more expensive than CALPUFF, which can restrict its use for routine kinds of applications.

So the issues we were dealing with the gas phase chemistry, the PM chemistry and the aqueous-phase chemistry, The gas-phase chemistry is highly simplified but difficult to replace with comprehensive chemistry - it requires a fair amount of recoding within the current framework of CALPUFF. It also increases the complexity of model and as you just heard we talked about SCICHEM which has the complex chemistry and it would be like reinventing the wheel to spend a significant amount of effort to include full chemistry in CALPUFF, which would make it more expensive and complex and kind of hinder its use for regulatory applications. We do have ideas on how it can be improved or at least how the treatment of chemistry can be improved by using techniques similar to what we heard about this morning to couple AERMOD and CALMET and we're going to extend the same concept by using photochemical grid model results to provide the background concentrations to CALPUFF.

So the approach we took focused on improving the treatments for PM formation and cloud chemistry to bring them more in line in what you see in CMAQ and CAMx. We also found an existing error in the RIVAD gas-phase chemistry option and updated the RIVAD chemistry rate constants. And we tried to make sure that all the changes that were made to the model were included as new options so you don't lose any of your earlier options that were already in CALPUFF. For example there are four options for chemistry in CALPUFF (MCHEM=1,2,3,4). So the new chemistry options are MCHEM=5 and MCHEM=6.

Let's look at the chemistry of NOx plumes and the three stages of the gas phase chemistry. So in the early stages of the plume we have NO/NO2/O3 chemistry and the RIVAD chemistry mechanism treats this stage of the plume and part of the second stage where we have formation of sulfate and nitrate. So it takes the ozone concentrations and calculates the OH concentration from that. It doesn't treat the chemistry of the plume in the far field where you will have the full VOC/NOx chemistry and for that of course you need full photochemical mechanism.

The error we found or the mistake we found was that at the end of each time step the ozone concentration is reset to the background concentration in the puffs which is not true near the stack and I will show you a demonstration of that in a minute. So basically after every time step, the code must be corrected to account for the O3 depletion in the puff in the early stages of plume dispersion.

So the way we fixed it was to store the puff O3 history and calculate a new puff O3 concentration at each time step as a weighted averate of the puff O3 concentration at the previous time step and the background O3 concentration.

This slide will illustrate what I'm talking about. This is actually a comparison of SCICHEM with plume measurements, downwind of the Cumberland Power Plant at a distance of 11 km. As you can see, the ozone in the plume is depleted by 45 ppb in the model as compared to 50 ppb in the observations. So that's the kind of depletion that we were trying to get when we made this correction. Of course the further you go downwind, this effect goes away so it's mostly important near the source.

The current treatment of PM chemistry in CALPUFF includes formation of inorganic species (sulfate, nitrate and ammonium) and organic species (secondary organic aerosols, SOA) H2SO4 and HNO3 lead to the formation of ammonium sulfate and ammonium nitrate according to a simple gas/particle algorithm that uses a constant NH3 concentration. It also includes a treatment for the formation of SOA from anthropogenic and biogenic VOCs (developed for Wyoming DEQ). It's a simplified treatment that only includes toluene and xylene as anthropogenic SOA precursors. This option is not documented in the users guide because I believe the users guide was last updated in 2000.

Okay. So for the new chemistry, like I said, the objective was to bring CALPUFF more in line with existing models like CMAQ and CAMx.

The new PM chemistry in CALPUFF is the following: Formation of ammonium sulfate and ammonium nitrate is treated with the thermodynamic equilibrium model ISORROPIA; inorganic PM formation that is now consistent with that of other operational models (e.g., CMAQ) while retaining computational efficiency; formation of SOA includes oxidation of anthropogenic VOCs (aromatics, long-chain alkanes and PAH) by OH to form condensable products, which are partitioned according to Pankow's absorption algorithm (based on MADRID formulation). Tomorrow I will talk briefly about MADRID.

Coming to the original CALPUFF cloud chemistry, there is no explicit treatment of aqueous-phase chemistry. In the MESOPUFF-II chemistry option uses a simple parameterization is used to approximate the increased oxidation of SO2 in the presence of clouds or fog: it is a function of relative humidity (RH) and may significantly under estimate SO2 oxidation rates when clouds are present and may overestimate SO2 oxidation when clouds are not present but RH is high.

So the new aqueous-phase chemistry module implemented in CALPUFF is again based on CMAQ treatment. It includes SO2 oxidation by hydrogen peroxide and ozone as well as iron and manganese catalyzed oxidation by oxygen. And it includes gas-aqueous equilibria to calculate liquid-phase concentrations and cloud pH.

So, the updates were implemented and tested in both versions of CALPUFF that are currently available which are version 6 or 6.1.1.2 (I think), which was discussed earlier. (Version 6 is the MMS version) as well as the EPA approved version 5.8 which was released in June, 2007. We also conducted box model sensitivity studies with the old and new inorganic PM modules to look at the effect of a number of variables with both the current version of the PM module and with the new version (ISORROPIA).

We also did some CALPUFF testing using a plume chemistry data base that we have used in previous studies with SCICHEM and CALPUFF. As I mentioned before, the new options are MCHEM = 5,6. MCHEM=5 is the new treatment including the ozone correction for the gas phase chemistry and the ISORROPIA module. And MCHEM=6 includes the organic PM module; the cloud chemistry is activated by using a switch which already exists in CALPUFF called MAQCHEM. This switch existed but was not used in the current version of CALPUFF.

I'll briefly discuss the box-model sensitivity studies with the inorganic PM modules. We looked at the sensitivity of the original CALPUFF module (MESOPUFF) and new CALPUFF module (ISORROPIA) to relative humidity; temperature; background ammonia; background sulfate, and total nitrate.

I won't go over all the studies but just give you a flavor what we found. We actually have a report that describes these studies in more detail. So looking at the sensitivity to relative humidity (MESOPUFF refers to not just the MESOPUFF chemistry option but to the inorganic PM module which is currently in CALPUFF. We just gave it the name of MESOPUFF for comparison purposes) you can see for all the cases we tested here where we kept all the parameters constant and varied the RH, there is a difference between the

MESOPUFF and the ISORROPIA results where ISORROPIA tends to predict much lower particulate nitrate than the current scheme. If you look at the last figure on the right hand side, it shows the fraction of the total nitrate that is in the particulate form. As you go up to higher humidity you get more particulate nitrate, but MESOPUFF is always considerably higher than ISORROPIA.

If you look at the temperature sensitivity, at the high temperature both modules predict a lower fraction of PM nitrate, which makes sense. As you go to lower temperatures, you start having more condensation of gas phase nitric acid to the particle phase.
Again as in the relative humidity case, we see generally higher PM nitrate values predicted by MESOPUFF than by ISORROPIA except at the very lowest temperature, which is -10 degrees Centigrade where we see higher PM nitrate calculated by ISORROPIA than by MESOPUFF.

I talked about the ozone correction, and for this case, the differences are not large at a downwind distance of 11 km. We don't see a lot of differences in the plume NO_2 but there could be situations where the correction could have an impact. For example, the plume could be compact for a long period of time and you could have ozone depletion going on for an extended period of time.

This slide shows the comparison of plume nitric acid and plume particulate nitrate from the original chemistry mechanism and original PM treatment (MCHEM=3) with the results from MCHEM=5, which is the new treatment. You don't see much effect on the plume nitric acid but if you look at the figure below, which is the PM nitrate, we see that for these conditions, which are basically dry, the humidity is low and there is no formation of PM nitrate. You see that the MCHEM=5 option produces much lower particulate nitrate than the MCHEM=3 option. So then we increased the humidity to 95% to see what happens since that's when you would expect more nitrate in the particle phase to form. We see a big difference between the two schemes in terms of the PM nitrate that has formed.

This slide compares the results from the two organic PM modules; this comparison only includes those anthropogenic precursors that are currently in CALPUFF, which are toluene and xylene (we also included PAH and higher aljkanes in the new mechanism but we didn't use them for this comparison because the original CALPUFF doesn't have them).

You can see a fairly large difference again between the two modules in the formation of SOA in the plume. In this case, we see much higher formation in the newer module and part of this is related to the incorrect treatment of temperature dependence in the original CALPUFF SOA partitioning coefficients.

Finally for the aqueous-phase chemistry tests, the cloud cover and liquid water content were hard-coded. This slide shows that a significant amount of SO2 is converted to sulfate by clouds.

One of the short-comings in CALPUFF which people are aware of is the ammonia limitation issue which basically allows the full amount of ammonia to be available to all puffs. That could lead to over estimation of PM nitrate. This short-coming is handled currently in the post-processor of CALPUFF

(CALUTIL) which basically recalculates the inorganic PM partitioning at receptor locations to make sure that this problem doesn't happen.

But this slide kind of shows this problem - if you look at the black line it shows you the maximum PM nitrate you can expect if there was no sulfate to react with the ammonia. So if all the ammonia was available for PM nitrate then that would be the maximum you could form for the given amount of ammonia that we use in this case. But in CALPUFF you can form a lot more than the theoretical maximum, so there is a limitation that we need to be aware of.

So what we are doing right now? We are actually currently evaluating CALPUFF with the Southwest Wyoming Technical Air Forum (SWWYTAF) data base. We are also doing some additional model updates. We are updating the ammonia limitation method in POSTUTIL to use the ISORROPIA algorithm. And we are also looking at allowing vertical profiles in input ammonia concentrations. So this modification accounts for the fact that you expect ammonia concentrations to be higher near the surface because it is usually emitted from surface sources and to go down with altitude.

So I talked briefly about the fact that the gas-phase chemistry was not improved in the sense that we didn't incorporate the full treatment of chemistry in this work. Again partly because of the effort it would require, partly because it was not clear that it was necessary to do it. One possible approach and this is just an extension of what we heard earlier today is to use a photo chemical grid module like CMAQ or CAMx to provide the three-dimensional model outputs that can be used in CALPUFF. So basically it would be tools that convert CMAQ to CALPUFF or CAMx to CALPUFF similar to the MM5 to AERMOD tools that were discussed earlier. This will provide a more realistic specification of the oxidant concentrations like OH and Ozone as well as ammonia and provide temporal and spatial variability. Running the photochemical grid models is becoming more and more common now.

We have an example of this coupling in SCICHEM and there are two versions of SCICHEM. One is a stand alone or off line version where you basically run it just like a puff model. It has the capability to read

3-D outputs from MM5 and CMAQ; SCICHEM also runs on line within a grid model and we'll talk about that tomorrow. In that version you basically embed SCICHEM inside the grid model and there's a two way interaction between SCICHEM and the host grid model. The off line version is cheaper because you only run CMAQ once and basically do all your source simulations with SCICHEM using those outputs. With the on line version, you have more interaction between the plume model and the grid model.

Another recommendation (as I mentioned before we hard-coded the cloud fields to test the aqueous-phase chemistry option), is to incorporate cloud fields in the model, but we believe that actually the newer tools that EPA is looking at will include cloud fields in CALMET and CALPUFF.

I would like to end by thanking API for provided funding for this study and the ongoing CALMET/CALPUFF evaluation study with the SWWYTAF data base and the Wyoming Department of Environmental Quality who provided the SWWYTAF data base for model application and evaluation for the ongoing evaluation study.

Thank you.

Tyler Fox : Thanks Prakash. We appreciate those perspectives from the more chemistry side and the work that you guys are doing with API. Next we have Joe Scire to present CALPUFF Development, Maintenance & Evaluation.

Joe Scire : Thank you very much. I appreciate the time that has been allocated to talk about CALPUFF and being invited to be a part of the conference. I would say you remember I don't get to ask questions at my own session here. There are a number of things I would like to clarify through written comments like those that Roger presented and what Tyler presented. There are some issues related to how some of the tests were done that I don't agree with.

In particular under Lovett evaluation there's a technique used that basically cancels out upper air data with the surface date. We became aware of this just recently but I think more input from us into the evaluation would help solve many of the questions EPA has. Also the issue of PG dependencies in the model. It is very clear there are PG dependencies in the [ed. model] (inaudible) so it's not a mystery or an error it's just the way the model is designed. We can clarify that so that hopefully that doesn't keep getting raised as a concern. You'll understand how it works and why it works that way. Just one other point about the old evaluations. We have done, in fact, evaluation work with Kincaid both with the original version of the model and the more recent version. We found the evaluation studies were quite similar and there was really no change in the performance of the model. I think that may have been published in a conference proceeding if I'm not mistaken. I have a lot to talk about so I want to move ahead. I want to talk about CALPUFF development maintenance and also the evaluation of the model.

First the development. We upgrade the model on a continual basis as clients have certain requirements as new features are implemented. It's a continual project and it's basically in terms of involvement mostly defined by client needs. It results in improvement of the model. An example is what we heard from Prakash about a chemistry set rule becomes part of the model and will be available to everybody under the copyright use agreement so that we will have that eventually a part of the system that can be used for other applications. That's a very good method because it allows everybody to get the advantage of everybody else's work and eventually you will have a very powerful system. CALPUFF system undergoes continual refinement and development, with new features and productivity enhancements. EPA provides no funding for development which I guess is reasonable but they also do not provide maintenance activities. TRC and my previous employer, [ed. Earth Tech], (inaudible) provided maintenance without funding.

In terms of what the modeling community gets for their involvement, we have developed many tools and have made them available to the public without cost. That includes graphical interfaces and visualization tools which are distributed to the public without cost.

In addition the technical developments that are made are put through a BETA process and eventually become part of the developmental version of the model. That includes the EPRI PRIME downwash module, flexible coordinate transformations, all of the MMS updates for coastal applications which were substantial. Some enhancements funded by VISTAS, some enhancements funded by the Forest Service, some enhancements funded by NASA and many others. Because the code is available on the web site and we do allow development, others have developed modules which are useful. That includes the Hybrid puff-particle version of the model which I will talk about tomorrow. This a PH.D Thesis in Switzerland. Also large-particle settling (volcanic ash) - Italy and solar radiation effects on canyon sidewalls and plume shadowing and terrain shadowing efforts. These are special versions of the model and some of them will make their way into the official version or at least the developmental version. Now there's -- we'll probably remain as side versions.

We've tried as best we can to implement procedures that come up as being required by the regulatory community needs without federal funding but we distributes these codes to the public for free. Two examples of the EPA BART 98th percentile computations which were needed. It was done and released. Also the new recently proposed 2008 visibility methodology is part of the version 6 code. We are under restrictions as Tyler mentioned that we cannot change the regulatory codes and we don't. But we put these changes out there for testing and comments and we like to get feedback on things like this as the developmental version of the model or Beta test version.

But there has been a lot of work done in keeping the processors updated to accept new or revised data formats as those of you who deal with surface date knows there is Samson, (inaudible) five or six different versions of met data. Basically, we are up to date on all of those as they come up. Something we undertake. Normally these are not funded but occasionally (inaudible) they are funded.

Also we have developed interfaces to many prognostic meteorological models such as MM5, WRF, RUC, RAMS and ETA and [ed. provide] these codes to the public for free. I was noticing that this might be in the area where EPA could have benefited from ????????

(changed battery in recorder and missed part of Scire's talk)

Sources separately, scaling them, and adding them together. Animating the (inaudible) model with whole range of tools that can be applied to AERMOD.

Model development continues with the processing options for different terrain data. There is what's called the (inaudible) method which attempts to address the issues of the (inaudible) limitations of aerosol nitrate. There is the (inaudible) version of CALMET. The various interfaces to various prognostic models, the core algorithms, the convection mixing over water. some of these have already been mentioned. We put the (inaudible) turbulence profile in CALPUFF. It's meant nothing more than to provide the same type of vertical structure of the turbulence as AERMOD does. CALPUFF has something very similar based on the same science but pre-dating AERMOD so we wanted to see how the two would compare. In the evaluations we have done they were very similar.

There is a sub hourly version of the model that's version 6. There is ability to look at [ed. cooling] (inaudible) tower plumes and visual plume length, turbo advection. I'll talk a little about that later. Back trajectory analysis and oil platform downwash.

We are currently putting in a nested grid option for CALMET and some other changes including the ability to quantitatively evaluate the performance of the meteorological model. We agree as to what was said earlier as to how important that is and this will be part of the system so that that it will be very easy to do. Then animations and looking at different other things.

This is not a complete list but over the years there have been many many tools developed and basically all of them have been made available to the public after some time for shaking out bugs and to develop the documentation. I think that's an important benefit.

In terms of model maintenance, it is a struggle. We are not the government and not a non profit organization. When we give the code away for free and then work to maintain the code it is a strain on the outsets and resources of the company. But we've done it since the development of CALPUFF was started; we continue to do and will continue to do it. We enjoy funding from government agencies such as EPA, but we don't get it. It doesn't matter and we will continue to do the model maintenance, always have been and always will as far as we can.

When we get reports of bugs, and we get dozens of them we investigate each one. Sometimes this takes quite a bit of time because a report might be something like the model stops what should I do? Well, you'll have to give me more information. And a lot of time I'll see in my email box three messages from the same person and the third one I read first says I figured it out. Those I like.

I'd say roughly three quarters of the problems have to do with data, or hardware or input errors, user type issues. If we can figure out what the problem is and how to correct it, we will provide that. Again it is something that is very time consuming and we're not like a service where we have contracts to provide online help or telephone help. When it relates to potential errors we'll take it seriously and fix the problem.

Bugs are isolated and fixed with detailed updates to in-code documentation and version/level journaling, etc. At first, when Roger was talking about the EPA model option tool, it was not available on the web site and we weren't sure what versions and what the tool did exactly. We weren't able to run it in our initial tests that VISTAS consideration back and forth. We did request and receive a copy of this.

So now we've been running it for EPA and providing that not so much for providing that because I think they run it independently themselves. At least we'll catch and fix any issues before it gets to EPA. We've done that in the last model change updates. I think that's been helpful in well potentially explaining the process.

But this is another issue. It has taken a lot of time to get model changes accepted. The first bulletin change was almost two years from the time the bug fixes were released until it was accepted. And EPA has acknowledged that is too long and has committed to try to excel that by working with us and we would also like that to be accelerated.

The separate and more complex issues of model enhancements. If a bug is discovered it really should get into the regulatory version of the model. It should not wait months or years. If we can develop procedures with EPA to make that happen and we are willing to do whatever we can to make that process as simple as possible. It will help.

Part of the problem why the VISTAS code changes were so complicated was simply the large amount of time that has changed since the last update and there was a lot to sort out. It was sorted out and we worked together with EPA to do that but it was a lot of work for us as well as for EPA. Although VISTAS did fund a portion of that I would say less than 50% was funded by VISTAS. There were a lot more hours spent on that than we were awarded on that contract.

That was a major effort but we got through it. In the past as far as I'm concerned it was about 18 months or something like that since we actually did most of the work. Although we talked about it quite a bit today, I think what's more important is procedure going forward. There are two outstanding model bulletin changes that have been noted and they were waived action by EPA. I think I realize things are busy, but yet I think bug fixes should be a prirority with the agency because using a version of the model with a known bug is not acceptable from the user community point of view. We've provided the Model Change Bulletin, software we provided that on DVD and EPA has that and we're waiting some feedback on that. Okay.

What's suppose to happen? The Plan. Much of this was hashed out with EPA several years ago and many staff has changed and management has changed. The idea behind this approach of this public/private partnership was that recognition that we develop with company and that's how we do make our money. We do charge for model enhancement. We don't make money in code we provide everything for free and provide all this other stuff. We do make money in revising the model to improve it. We haven't development of the model or BETA test version which allows us to do whatever we want as long as we try to maintain consistency with the regulatory version with one particular set of options.

That's the thing if we have a new option we try to make sure that it can be turned off so that EPA at various intervals can review can review that option and decide if they like it or if they want it off this regulatory version of the mode. That's how it's suppose to work that's the whole process and was designed that way. Ultimately that is what happened with VISTAS there was an element they didn't like which was this mixing height convection over land. But it was an input not a code issue. All you had to do is change the input to 0 and EPA can issue a memo that says for regulatory use we want that value to 0 and it's nothing more than that on that particular feature.

We appreciate the feedback we got on that but I think we have other ideas on how to accomplish the same sort of thing with the mixing height that would eliminate that particular problem. But without having the ability to put in another mixing height scheme and to have testing done the model would never advance. That's important because that is what makes the funding available for the other things that are important.

Anyway, that's what should happen. I think in reality there has been delays in simple bug fixes like Model Change Bulletin A that were pretty simple. As I pointed out it had almost no change in concentration but it was a two year process to get that adopted. Also it hasn't been a clear path in getting review of model enhancements by EPA. The model enhancements which we think couldn't help the model performance in certain situations, but there is no time table and I don't know if there is any mechanicsm to do that. We are in a bit of a bind on some of this as well. For example, there have been negative comments made by EPA in some of the presentations regarding the sharpness, the continuities in temperature fields and other fields. And it's ironic in a way because one of the VISTAS changes that was removed from the regulatory version (inaudible) rather than the nearest station technique it did a (inaudible). It may be it has to do with the timing that need to get things too quickly at that point in time in the process. I can understand that.

But I think there is a process for having enhancements reviewed and approved it would be very helpful.

Especially because EPA is making negative comments about the lack of that in the model. I think well our hands are tied if we cannot change the model we cannot improve it. That's one example and there are several others actually in that same category. We feel like this should be more of a constructive dialog with the purpose of the criticism to be to resolve the problems rather than to simply disclose or to highlight them.

In terms of (inaudible) TRC the agreements we've got in the regulatory version have been adhered to meretriciously we don't change the model regulatory version even when it has bugs it is out there as if they have approved it.

Why have things been more not going according to plan?

I think partly accordingly what EPA said to me, Tyler in particular, there are staff issues with the loss of staff over a number of years. And I think of there has been some loss of some institutional memory and continuity in the process. Some of the things that EPA has said they wanted to do and maybe they have changed their minds. But I think there is some loss of continuity there.

EPA presentations at 2007 and 2008 R/S/L Modelers Workshops contain misleading statements about CALPUFF, and include examples that do not reflect good modeling practice. One I'll point out which is very much black and white. There is a comment about lack of adequate documentation, user's guide last updated in 2000, and many important technical details are not documented, except in code.

And then there's this kind of non specific issue about reference to serious unresolved technical concerns. Many of those concerns are just a lack of understanding of how the model works. We can help with that and resolve those unresolved issues. But I think there should be more communication about those directly -- exactly what is the question and answers will be provided.

And the documentation -- this is the black and white part. There's a March, 2006, updated users guide that has been available on the internet since 2006. It's 185 pages long and 3 volumes in comparison to the original users guide that was 853 pages long. I think the documentation is in very great detail and it is consistent with the model or any other model. In fact, there is a professor at the University of Calvary that said to me that she thought the MMS reports were like a text book. It explained everything like what she uses in her courses. I think we have criticism about poor documentation while at the same time people are saying the documentation is pretty adequate.

I don't know if this was just not known to EPA or what the issue was. I was surprised to see it in the regional workshop presentation. I will point out that the modeling group of EPA had a representative on the science review board for that project. So that goes to (inaudible) was not known to EPA but in fact participated in that. They made contributions in helping correct the (inaudible) projects. Also Dirk Hirkoff on that project at the 2007 Workshop and he used the users guide and their availability in that presentation. We've also made reference to the evaluation studies that have been done there in condensation. I think it's systematic of a communication problem and I'm not quite sure it's not something I would have thought to ask do you know about it because given the situation it should have been known by EPA.

Constructive criticism is good and helpful and it helps advance the quality of the model. If we have a problem with the model, we'll contact the developer and let them know some of the bugs that we came across. I think it helps with the issues. I think the vague and not very specific criticism is not so helpful and I would say we should try to have details with direct communication. Often I find out about problems by presentations made publicly by EPA at various public forums rather than contacting me. I think that's less than helpful.

I won't get into the VISTAS version. I think it's much too complicated to get into here. There are a number of technical enhancements that are in the model that are worth consideration by EPA. So I think that would be helpful if that could be worked into the priority list in some way. I feel like it would be very helpful to us as well as to the public if the data that EPA is presenting at these various forums is made available to the public. The data sets not just the summary. And I think you know it's part of the checks and balances. Is what you're saying correct, are you doing things correctly, having public input into that will only help the process. It will make everything strong and more reliable so I would request that the EPA provide the data that is used in the presentations and various reports in the workshops and any staff member and any other clearing house memos.

Okay, well. I like the direct communication, much more effect instead of using public forum to criticize the mode. The criticism isn't the problem I think the issue should be constructive with the focus in resolving the issue. I think that's where more work could be done.

This is from Bret Anderson's presentation. He uses an example of a horrible model. What on earth is this? He has attributed it to CALPUFF being less than perfect. What it is showing is a Bull's eye pattern of wind speeds associated with the station located in the center of the bull's eye with the strong flow coming from another source presumably a MM5. What it really represents is MM5 winds do not match observations. Is that a CALPUFF issue or MM5 issues or is it an observations issue. Is that observation representative? I'm not sure, but I think there's more to this instead of saying that MM5 or CALMET is producing a bad wind field.

The other issue is that there are at least 4 ways to run this model and three of them will solve this issue. I can tell you, I can guarantee you there is a way to eliminate it entirely 100% of the time if you want to do that.

One is to run the model in NOOBS mode using MM5 only fields. Very simple to the effort is being done to these processes that have been described earlier today. Those are almost equivalent to the NOOBS that exist in the current version of CALMET. You will not see this bull's eye if you just configure CALMET to run in that mode. That's equivalent to say that you believe the MM5 fields and you want to use them. If you believe the observations, and have less confidence in the MM5 data, you can run CALMET in the pure obserservation mode that would eliminate the problem as well or you can just change.

If you run it in a hybrid mode with MM5 and use inappropriate values of R1/R2, you can get this every time and make it happen whenever you want. But I think you can also make it go away. So I think much of this has to do with running the model in a poor way. So let me show you an example. This is from Sydney in Australia. We have identified data and we have a NOOBS runs and things look okay. There's some variability. This is basically (inaudible) MM5 date. You can see the observations these arrows over here. You can run in the (inaudible) that's only with observation and you will get something that looks reasonably with some constructure to it. There is some variability to the winds and it's reproduced in the resulting field.

You can run it in the hybrid mode and you get more emphasis maybe on the MM5 data and certainly the bull's eye will disappear. Also, you can run it in a mode where you will get the bull's eye. My point is why would you run it this way? Why not run it in one of the three other modes it makes more sense.

Just as another point here. What does AERMOD do? The bull's eye looks ridiculous but what the MM5 has is an infinite bull's eye one station goes out forever. Even if you have the bull's eye in there it doesn't mean that that's actually producing bad results in terms of the concentrations. All you are saying is that there is a change in the direction of the flow. Okay.

What can we do? What I wanted to propose was to have a SAC Committee to help with technical issues to provide feedback, providing a formal mechanism for having input from EPA, land managers, MMS and consultants I believe the introduction of consultants and industry into the review groups would be very valuable. This isn't any kind of regulatory policy and not to set any kind of issues that would infringe on EPA's responsibilities or MMS responsibilities. Yet it's a way of formalizing a mechanism to having input and I think it could help. So we're likely to organize something like invitations to groups to join. Whether or not they do, we can probably go ahead with it. We do this without funding through technology and have meetings through web links and other things like that.

But I think I teach a lot of courses with CALPUFF and the interaction we get during the courses are very extremely valuable. A formalized issue like this where land managers can say what they're thinking and what they want and EPA can say that as well as MMS. Other agencies I don't know. It can only help. It's the kind of the model that EPA is using with the (inaudible) committees so I would say this is worth doing.

The final item is the model applicability and evaluation. I'm not going to go into this too much, but I do have some examples where EPA has expressed concern about the wide (inaudible) change of the concentrations. You have to remember that's point by point hour by hour. If you change the wind by 5 degrees, you make it 1,000% change in the concentration. This doesn't mean there's a terrible thing happening, it just happens.

So I have some examples of this in what is coming up. I am going over and I apologize but it's my one chance to have some input into this.

Comparing the models I believe CALPUFF is the viable option for the near field. It has many new features that EPA says they would like to develop in AERMOD that exists now today. You don't have to wait for two, three, four years to get special variable in flow you can get it today. I think that was the intent of Appendix W when it was promulgated and I think it's something that is allowed; in fact, encouraged. The causality affects which means the plume only travels so far in one time step. You can't if you have 1 meter per second winds the plume only goes to 2.6 km in that time step. CALPUFF accounts for that AERMOD has plume that goes to infinity every hour.

Not just AERMOD any study state model due to

(inaudible)

Surface characteristics I want to talk about. I think there are major problems in how AERMOD handles receptors. It looks upwind to determine downwind dispersion. It looks upwind of the met site. What determines the downwind of dispersion is the turbulence of the downwind source of the met station. You have a backwards situation here.

CALPUFF will treat turbulence downwind of each source. Horizontal wind variability you don't have with AERMOD, you have it with CALPUFF now today with CALPUFF. Calm winds (inaudible) the conservative or not conservative depending on whether you have more than six hours of calm or fewer than six hours of calm. CALPUFF will treat the calm winds.

Now (inaudible) memory of emissions in previous hours. AERMOD doesn't do it every hour (inaudible) it doesn't remember what's been emitted previously. CALPUFF retains previous hours emissions. Coastal effects of fumigation; there is no TIBL of fumigation in AERMOD and CALPUFF has an expensive one.

EPA has said in its clarification that AERMOD is the model for complex terrain. It cannot handle complex terrain. I think there's some issues that need to be considered when you evaluate that. One is its use of the single met station to characterize flow not just for the facility but all background sources. The use of surface characteristics upwind of meteorological station not downwind of all sources. Especially (inaudible) it's lack of causality effects in the straight-line trajectories.

I think EPA's argument is that that really matters is the desired concentration saying more of the line of sight from the source. I think it is flawed for two reasons. One is NAAQS and PSD are not facilities standard, they are cumulative standards. It's not just the impact of one source it's the impact of all the background sources that is dealing with that source.

The second point is it is not just the design concentration that is important. When you have cumulative sources whether you are above the SILs or below the SILs or a predicated violation caused by a different source. In practice it's a very important effect predicted violation those lower concentrations (inaudible) time and space with AERMOD can result in a very serious issue in terms of coming to incorrect conclusions.

This is looking at a complex terrain case. These are CALMET winds you can see the (inaudible) channeling and we'll look at the three sources in the upper portion. CALPUFF suggests that these plume in directions in terms of air value, cumulative impacts (inaudible) and all that. The background sources we're calling the income source which is this one project source. So we're using that data with the AERMOD (inaudible). The AERMOD not surprisingly takes the plume and will drive it into the terrain. It doesn't have the ability to do the complexion and it's not just the AERMOD but any study state model will do this. You're not necessarily guaranteed to have the correct concentration when that plume infringes on the terrain. The alternative model is suggesting the terrain (inaudible) plume. If you look at all three sources, you get this. I think the issue of the representative of the method that is used to model with the AERMOD facility source is the critical issue to determine whether a study state model should apply.

You will also see the other AERMOD characteristics of having upwind shadows associated with the random portion of the plume. I'm going to talk about that as well. I don't think you can say this is an appropriate complex terrain case to use AERMOD. I don't think you have to do a model evaluation. I think based on the characteristics of the model you can argue this is a strong case to use CALPUFF in a near field application.

Let's go to the second case the sea breeze case on flat terrain so terrain is not an issue. This is Boston and we have sea breeze from the Boston Logan airport station. We put in the sources in CALPUFF and you see something like this. Opposite flows you see the interaction of the true background sources here and this source going in an opposite direction. If you run this with AERMOD, using this station as the source of the met data you will get a plume going in this direction and these two plumes going in this direction. I think that is suggesting that there are issues in AERMOD capabilities is doing a correct cumulative impact. Also in random plume there are some problems with the random plume element in AERMOD that creates a halo around every source when you apply cumulative impacts. Basically if the source is larger enough and the situation is right you can up wind concentrations a range of plume that that results in concentrations being predicted upwind concentrations in a random plume that can even exceed downwind concentrations and SILs. You may have a background source interacting with that shadow which causes a violation to which your source will deemed responsible.

In case you are not aware, this is the way the model works. Main plume, coherent plume and there is a circle of the random plume. Some of the plume mass in the coherent plume is taken out and distributed radially around the source including upwind at 50 km including upwind at 90 km. I understand the written rational for that algorithm but I think it can cause some operations difficulties.

How much of that plume is taken out and put in the random plume? Well, under stable conditions it pretty small maybe 15% up to 5 to 15% functioning distance. But in light winds speeds it is substantial from 40% up to 2/3 of the plume mass is actually assigned to the random plume. So let's take that unstable case and look at a situation where we have the source here with the wind blowing to the SE. Behind the source is terrain and if you look at the upwind (inaudible) around the AERMOD impact you can see qualitatively here the numbers are higher than the numbers down wind. How can that happen? It can happen because the (inaudible) between the terrain and the plume is used in that characterization in that random plume. So because this terrain behind the stack you're getting the large area of 15 to 20 km in length that are higher than the highest concentration [ed. predicted] (inaudible). If you happen to have another background source infringing on this source from the other side even though your plume is going down this way there may be a violation here to which you'd be predicted to be significant. That's the issue I see with the random plume and applying it on a regulatory basis when you have multi source impacts. I'm going to skip some of this.

I did want to say a couple of words about the big issue here. We're not talking about the details of one land use type verses another or is it a runway. We're talking about a big issue. When you decide what land use you use to determine the roughness in AERMOD you look upwind at the met station. What really determines the dispersion is what's happening downwind of the source. If you have a number of different sources, and this is what this is representing if you are 1 km radius is this. This says when the wind is blowing downwind you are in the low roughness land but according to the actual land use you're in the high roughness land. So why is this right? What is the direction for using the opposite land use? 50 km downwind would be applied. You could be in the vicinity of sources (inaudible) at some point there after the roughness downwind has (inaudible). I've also plotted the AERMOD roughness on source A and source B. You can imagine the number of sources in the modeling domain. You'll be using the upwind roughness of the met station for all these sources in a typical simulation. If you believe that formulation of the model of the AERMOD and most people do in CALPUFF as well. You believe the turbulence controls the dispersion and the surface characteristics controls turbulence. If you believe all those things how can you accept that? You use the wrong turbulence downwind of these stacks. Does it matter, well it does matter. We looked at the 1 km and 3 km method we just took the first application we had. I don't know if its representative and I doubt if it's the worst or the best. But you're getting changes of 123%, 100% and 89% from design concentration from this source. Looking at the difference of the roughness from the two sites, the fact is of 1/3 and 50% so this matters. The factor (inaudible) is a pretty big change in the concentration when you're doing a regulatory study. The other point I wanted to make was when Roger showed the ratios of the model outputs and said these were huge percentage changes. As I said if you change any input even simple ones and in this case the data mirror that was in AERMOD. Change wind directions or anything, you can get enormous changes. The data mirror for this same case which it was admitted as a serious but you can find 7,000 or 10,000 changes in AERMOD. So I don't think those results that EPA is expressing concern about are really that unusual or unexpected. You change the wind in CALMET a little bit you are going to get a point by point differences because plume goes to a different receptor. (inaudible) Is it a sign of a horrible problem, I don't think so.

Since you've been nice enough to allow me to continue, I won't go through the evaluations. I just want to make one point. I know some of the people involved in AERMOD and respect them greatly and it's a outstanding formulation in terms of its technical content and a big advancement in science. It still has limitations because it's a study state model. All I'm saying is recognize the limitations and allow the use of the non study state model which was the intent of Appendix W when appropriate. There are 17 evaluations studies 7 are promulgated. There are no studies of those 17 where cumulative impact assessment was done and none where there were multiple sources in complex terrain. There was one coastal line group that involved downwash. There were no studies that include large buildings. I understand from the discussions today that you are aware of the issue with large buildings and that is helpful.

Sometimes AERMOD doesn't work well in the case of the large building. AERMOD was predicting over ten times the observation and CALPUFF was conservative but doing much better in terms of the evaluation.

Just in terms of the chemistry this is CALPUFF performance on the data predicting sulfate that Prakash is going to apply on a complete model. This is the one to one line for sulfate even for the simplest chemistry in CALPUFF does very well in predicting the sulfate concentrations. (inaudible) but that's the way the model would be used typically. For nitrate it still looks reasonably good within a factor of two and bouncing around the one to one line. In terms of the numbers for the annual averages, the sulfate pretty close and the nitrate more concern on the SO2 but the factor within a factor of two, the last column is a pretty good relative to expectations.

I will just leave you with this. EPA has highlighted this in one of their memos. It says, consistency in the selection and application of models and data based should be sought, even in case-by-case analyses. I think its valid they chose to highlight that portion of paragraph 1d. I'll just point this out, such consistency is not, however, promoted at the expense of model and data base accuracy. In cases where clearly there are non study state conditions there should not be new obstacles put in the path of applying CALPUFF in those kinds of cases. If an argument can be made and an objective group of people agree that the case is not a study state I think it should be allowed. This is basically following along that. Thanks very much. Am I the last one? Okay.

Tyler Fox: Alright. Thank you Joe for that information and perspective I appreciate it. I appreciate the patience of the folks in the audience as well. I'm not sure we expected an AERMOD sub section in terms of the critique and the like. We are significantly over so I will suggest the following approach. We still have the CALPUFF Performance Evaluation that Bret Anderson is presenting. We could go until 6:30 and then have questions but then we'd get pretty late. So what I'm going to suggest if you will indulge us here is that we go ahead and start the morning with that. We will skip the summary of day 1 discussions and we'll go ahead and start at 8:30 and finish the presentation as it relates to the performance evaluation of CALPUFF and move on and take questions at that point and time. Have you all reflected on what you've heard so far?

A couple of things before we leave is that I fully understand and appreciate and agree with what Joe presented on the need to have two way communication flows and collaboration and have a process that will ensure the integrity of the models under Appendix W. You heard that from Chet and from me and you see that in the work that folks have been doing. I think we have a responsibility as the agency to pursue these things in a way that ensures that that is both part of the process and fortunately or unfortunately the folks who are responsible for interpreting Appendix W are the program office and the regional offices. I think it's pretty clear in terms of Appendix W as was laid out in a clarification memo as we've discussed previously and identified here. We are not reinterpreting the Appendix W or guidance. We are clarifying what has been there. Changes in staff and other types of things are really irrevelevent in terms of that because it is our responsibility, Chet Wayland's responsibility, if not Steve Page's responsibility as the office director of OAQPS to provide the interpretation and the like.

I can tell you we take that we take that seriously and we take it so seriously that we feel as if we need to understand and be able to address these questions and provide the information in a timely way so you can relate to that. We have responsibility to the regional offices, the states and local agencies to inform them of concerns that we have and highlight these things as part of the process to inquire about them and ultimately resolve them. The process that we use is to resolve them as Joe suggested involves a committee and the like parallel to what we've done with AERMOD. But I just want to emphasize the fact that this is not a CALPUFF verses AERMOD and I would really like to get beyond that. I think it lowers the level of the discussion and I think we should be above that.

There is a role for AERMOD and its promulgated after 15 years and its certainly not a perfect model. We will take all the information into advisement as to its ability to handle the complex situations and other routine situations it has to. We hold all models to the same level of critique and demands and the need to be able to address those situations appropriately that fits the purpose through evaluations and the like and apply both to AERMOD and for CALPUFF. It's not as simple an argument under Appendix W to just say that one model cancels another model should be used and can without substantiation that that model can handle it. That is what it means to have integrity in terms of these models and that's what we will be pursuing as long as I'm the group leader of the modeling group, as long as Chet's the division director and as long as we are charged with that responsibility to you and the public you can be assured that that's what we're going to do.

Appreciate your patience, appreciate the first day a lot of material. We'll see you the first thing tomorrow morning.

KEYWORD INDEX

1. AERMAP
2. AERMET
3. AERMOD
4. AERSCREEN
5. AERSURFACE
6. air
7. albedo
8. algorithm
9. algorithms
10. appendix
11. ASOS
12. atmosphere
13. BART
14. Birmingham
15. boundary
16. Bowen
17. calm
18. CALMET
19. calms
20. CALPUFF
21. cell
22. cells
23. chemistry
24. clarification memo
25. Class I
26. clearing house
27. Model Clearing House
28. complex
29. concentration
30. concentrations
31. convective
32. data
33. database
34. databases
35. datum
36. default
37. DEM
38. dispersion
39. domain
40. downwash

KEYWORD INDEX

41. downwind
42. EPA
43. ETA
44. Federal
45. fence line
46. file
47. files
48. grade
49. gridded
50. group
51. groups
52. guidance
53. guide
54. guideline
55. guidelines
56. heat island
57. humidity
58. implement
59. implementation
60. implementing
61. ISC
62. ISC-PRIME
63. IWAQM
64. layer
65. layers
66. long range transport
67. MAKEMET
68. mesoscale
69. met
70. meteorological
71. mixing
72. MM5
73. model
74. model evaluation
75. modelers
76. modeling
77. Monin-Obukhov
78. monitor
79. monitors
80. NATA

KEYWORD INDEX

81. NCDC
82. near-field
83. NEPA
84. non regulatory
85. NOAA
86. NSR
87. NWS
88. OAQPS
89. observation
90. observations
91. observed
92. ozone
93. parameter
94. parameters
95. particle
96. PBL
97. Phase 2
98. photochemical
99. plume
100. precedents
101. PRIME
102. processor
103. processors
104. profile
105. promulgated
106. promulgation
107. protocol
108. protocols
109. PSD
110. puff
111. ratio
112. ratios
113. receptor
114. reformatted
115. regulatory
116. roughness
117. RUC
118. rule
119. run
120. rural

KEYWORD INDEX

121. scale
122. scaling
123. SCRAM
124. screening
125. sensitivity
126. service
127. site
128. slope
129. source
130. speed
131. stack
132. stacks
133. statistical
134. steady state
135. surface
136. surrogate
137. temperature
138. terrain
139. toxic
140. toxics
141. tracer
142. turbulence
143. urban
144. variability
145. weather
146. wind
147. wind speed
148. wind speeds
149. winds
150. work group
151.
152.
153.
154.
155.
156.
157.
158.
159.
160.

Page	Ref No.	Keyword = "AERMAP"
166	2	there that go into Version 06341 of AERMET and AERMAP
166	7	For AERMAP, a lot of issues to associate with how
166	19	that's a complication of AERMAP that we've had to deal
171	22	I'll try to move as quickly as I can. So AERMAP and
171	24	changes. Some things just fix AERMAP but AERMAP we've
172	8	upgraded AERMAP to support newer elevation data
172	12	AERMAP can process. So you go to that server you
173	6	guide. We also gone ahead and enhanced AERMAP to
174	2	again in AERMAP? So you just take the domain now of
174	3	your inputs to AERMAP the default will be to use all
174	11	AERMAP. And let's see I'm trying to remember all the
174	17	AERMAP looks at it the other way so we've decided to
174	19	AERMAP. The only place it really shows up as an issue
193	10	and AERMAP to generate necessary AERMOD inputs and in
194	5	AERSCREEN calls AERMAP to generate terrain height. We
195	14	AERSCREEN give AERMAP something consistent. And it
196	6	on AERMOD and AERMAP output and writes to a log file.
199	4	run BPIPPRM and AERMAP for the source if necessary.
199	5	You can get source elevation from AERMAP if you're not
200	21	to use a previous AERMAP output and that's all in the
204	9	download BPIPPRM, AERMOD, AERMAP and AERSURFACE from
230	20	Dick Perry: Last one is just a nip in AERMAP did you
230	23	AERMAP now.

Page	Ref No.	Keyword = "AERMET"
113	17	in using AERMET. You feed it airport or other input
113	19	AERMET processes it (inaudible) files (inaudible) for
115	15	have AERMET traditional airport results and the MM5
116	17	through AERMET we're going to be not calculating for
117	11	re-ran AERMET with that surface characteristics and
117	25	AERMET with air surface inputs and the ratio dropped
140	2	through AERMET. That's something we still might
140	5	data. Then it can go through AERMET with your own
140	10	go through AERMET. Seems like a pretty straight
141	15	AERMET processing the user goes to all the trouble of
165	20	dispersion model, AERMET met processor and AERMET
166	2	there that go into Version 06341 of AERMET and AERMAP
166	6	changes with AERMET for handling that.
171	18	some plans that AERMET has for enhancing AERMOD I
175	14	AERMET is a bit shorter list. There's been lots going
176	15	AERMET looks for the 12Z sounding to use for
177	5	files that AERMET crashed on. We released a utility
177	8	where we are at with AERMET.

Page	Ref No.	Keyword = "aermet"
180	20	coordinating with the work group and with AERMET some
183	17	AERMET and/or AERSCREEN. Initial version of
184	10	AERMET User Guide was use an area weighted average
189	20	elevation data sets and NED I mentioned for AERMET is
190	12	them into AERMET and (inaudible) greater receptor,
192	17	on AERSCREEN and on the status and update of AERMET
197	8	scales. Then it uses AERMET subroutines to calculate
197	23	Seasonal tables from AERMET User's Guide (Tables 4-1,
198	7	filename or AERMET stage 3 input filename. When you
198	8	run AERMET you have to put surface characteristics in.
215	11	through AERMET. That was an option considered early
219	23	inputs to go to AERMET in stage 3 also produces text
232	18	for the AERMET and the header of the met file and
236	13	modify AERMET to read in that as an optional data

Page	Ref No.	Keyword = "AERMOD"
7	17	first conferences where we have AERMOD, the new
7	18	regulatory model. Not only AERMOD, but we have
9	7	developing AERMOD, we had a lot of communication
9	15	battling with one model now that we have AERMOD, we
11	2	from the regulatory perspective is that AERMOD Model
11	7	familiarity with AERMOD that they've had with ISC and
12	11	AERMOD for this or that and we have to say we're not
21	11	worked a lot on AERMOD and Kirk Baker who is doing a
24	8	because at the time AERMOD was not promulgated and I
24	14	use the ISC or AERMOD. But as of December 9, 2006,
24	15	AERMOD was promulgated and replaced the ISC3. There
27	15	are. I'll start where we are with the AERMOD modeling
27	19	presentation on the AERMOD Implementation Workgroup.
28	7	us AERMOD thankfully. They originally formed in 1991
28	10	AERMOD.
28	13	work in partnership with us and the AERMOD
28	19	throughout the AERMOD implementation work group so
29	2	AERMOD session but this new committee met in RTP
29	15	the AERMOD session from Randy. So that relates to
29	16	AERMOD and the way we are trying to be proactive in
42	3	regulatory status of proprietary versions of AERMOD
42	6	the status of parallelized versions of AERMOD. AIRMET
42	8	AERMOD model but one of the issues we have gotten
42	9	feedback on is that AERMOD is too slow. Our response
43	5	regulatory applications is AERMOD as 2006 the
43	12	where AERMOD may not be appropriate and CALPUFF may be
44	5	AERMOD and treatment of missing airport data in

Page	Ref No.	Keyword = "aermod"
44	6	AERMOD.
44	8	Practice (GEP) stack height in AERMOD which includes
44	12	The one about the airport data and AERMOD. Here is
44	14	that the AERMOD requirements for data completeness
44	16	under regulatory default option. AERMOD doesn't
45	18	Well, how is AERMOD going to respond in that same
45	20	AERMOD implementation workgroup and some assistance
45	22	analysis with AERMOD and actually found that AERMOD
45	23	due to some formulations in AERMOD that it is less
45	25	that's good news. We're better off with AERMOD than
47	16	implementation of GEP formula height in AERMOD and
47	17	this is actually where AERMOD turns currently turns
47	24	AERMOD implementation is consistent with all previous
47	25	versions of AERMOD and all previous versions of ISC
48	3	significant discontinuities in AERMOD impacts have
48	22	AERMOD should be modified to remove this criterion for
50	17	CALPUFF and AERMOD and it really emphasizes the formal
53	17	AERMOD is used it doesn't mean it's automatically
53	18	under Appendix W situation. AERMOD is being used and
55	3	discussing AERMOD experiences w/Birmingham PM2.5
55	14	when we promulgated AERMOD we identified there are
55	23	folks evolving and moving toward the issue of AERMOD
56	7	improved formulations of the AERMOD or basically the
56	15	types of assessments to embrace AERMOD and other types
56	19	evaluation session about the application of AERMOD for
56	22	seeing the use of AERMOD and other dispersion models
70	5	set nationwide and one of the things that AERMOD
84	23	integration and using the AERMOD model to evaluate
85	2	all of the AERMOD modeling so all the questions I will
86	17	be input into AERMOD. Our studies showed a
86	22	guidance chose AERMOD. Which local sources
87	13	participants led to a 1 km X 1 km AERMOD receptor
88	20	first quarter of 2002. So we ran AERMOD for our
88	25	facility wide AERMOD concentration was 0.2 micrograms
89	7	we expected AERMOD to predict lower concentrations
89	14	typically think of AERMOD as a conservative model.
89	16	of our AERMOD results. Let me also say this is an
90	13	distribution and you can see AERMOD did have some
90	20	ug/m3. And AERMOD was rarely greater than 10 times
90	23	saw consistently higher concentrations using AERMOD at
91	25	Should we expect AERMOD to perform poorly for certain
92	3	do too much? What are our expectations for AERMOD?
92	6	affect AERMOD? We don't and don't know if we want to
92	9	I don't know if we will go to AERMOD for our
92	14	have problems with AERMOD we just don't know if this

Page	Ref No.	Keyword = "aermod"
92	15	is the best way to precede. We ran AERMOD for local
93	3	show you the CMAQ and AERMOD runs.
93	10	This is AERMOD so we went from 16.7 in 2009 to 15.7
95	12	there, we are looking at pairing AERMOD results in
99	25	this point there running AERMOD for near-field impacts
100	16	AERMOD for near sources and CALPUFF for far field.
101	19	just use AERMOD and a photochemical grid model for all
103	16	AERMOD for the near source impact. But we'll
107	25	to AERMOD and to CALPUFF respectively. Bret.
108	20	to use AERMOD data and MM5 directly into AERMOD. So
109	16	The next thing is both important for AERMOD and
109	19	compatible either with AERMOD or CALPUFF. But that
110	9	getting into issues especially for AERMOD where we're
110	20	to Roger. He'll be talking about the MM5 to AERMOD
110	25	talking the MM5 to AERMOD tool and I apologize to
111	17	AERMOD. Everybody knows that.
111	20	due to proximity or other issues with AERMOD the
112	22	like AERMOD.
113	2	tool that provides spatially consistent AERMOD inputs.
113	10	So the tool allows AERMOD to use parameters calculated
113	13	height. What's not provided by MM5 data that AERMOD
113	20	AERMOD.
113	21	On the right is the MM5 AERMOD tool currently designed
113	25	it outputs data again formatted for AERMOD. So the
114	11	to feed through MM5 AERMOD. So we applied the tool
115	16	results and the ratio between the two. So the AERMOD
115	17	prediction based on MM5 inputs divided by the AERMOD
116	10	AERMOD impose a minimum wind speed for dilution of
119	2	AERMOD tool versus the airport data both looking at
119	22	for that grid cell and fed that into AERMOD through
120	19	at AERMOD for the NO2 (inaudible) NAAQS review. So
121	18	validate the use of MM5 AERMOD data against some field
121	20	have been used in evaluating AERMOD and that's in our
122	5	done is MCIP to AERMOD so then they can send feed MCIP
123	24	drive ISC3 AERMOD and CALPUFF. The purpose of that
133	16	is treatment of airport data in AERMOD. One is ASOS
133	20	done with ISC in terms of AERMOD sensitivity to ASOS
134	4	Tyler Fox: For the AERMOD tool as Roger
136	15	Roger. If you have gridded met data for AERMOD and
136	18	inputs to AERMOD for the same run?
136	24	change but a relatively manageable change to AERMOD
137	16	Roger Brode: Sure. The MM5 AERMOD tool is
138	12	AERMOD in an ensemble. That might be something to
138	21	far as the MM5 or WRF AERMOD input. Are the surface
139	5	AERMOD so you can something directly from land use.

Page	Ref No.	Keyword = "aermod"
139	10	whatever information is output from MM5 that AERMOD
139	14	(inaudible) star. Whatever is not there, AERMOD the
140	25	on the urban option in AERMOD. Not sure we have a lot
141	4	in the way that AERMOD would need to do that. There's
142	3	development of AERMOD/AERMET at one point talked about
142	7	implemented. I guess in terms of MM5 AERMOD we
142	18	AERMOD and CALPUFF. Thank you.
143	10	to provide an overview and update on the AERMOD
143	23	A little bit of background there was an initial AERMOD
144	7	on how we were going to handle AERMOD implementation
144	11	identify all the unresolved issues related to AERMOD
145	8	technical group associated with AERMOD as Roger
145	16	associate with AERMOD. They did a good job and came
146	22	here. One is updating the AERMOD Implementation
147	2	version that we have of the AERMOD Implementation
147	13	you need to run in AERMOD. And this is one of the
149	8	recommendations if you're modeling urban and AERMOD
149	15	value was that AERMOD was asking for. We clarify in
150	12	ASOS data on AERMOD concentrations. Secondly they
150	15	AERMOD.
150	16	Thirdly impact of light winds in AERMOD and then
150	24	Here the activity was to compare AERMOD comparing
151	7	overall the use of ASOS date in AERMOD was generally
151	11	AERMOD than for the ISCST3.
151	13	You are looking at plot on the left is for AERMOD and
151	24	for AERMOD the inclusion of the ASOS clouds didn't
152	5	the AERMOD which isn't necessarily surprising given
152	7	AERMOD's stabilities are determined. This plot is
152	10	observer based temperature winds and clouds for AERMOD
152	13	difference with AERMOD than when we just replaced the
152	16	was with our AERMOD was good or better than it was
152	18	of ASOS data is overall less of an issue with AERMOD.
153	8	AERMOD?
155	2	been made in the AERMOD Implementation Guide. They
155	11	AERMOD you need population as surrogate to capture the
155	19	The good news is that I don't think AERMOD is
156	3	think the box is for the AERMOD domain that is being
158	21	AERMOD that we heard about earlier or maybe it's the
159	10	I've generated to run in AERMOD is it representative
162	16	bring the issues with AERMOD we'd like to hear about
163	6	and the specifics of the AERMOD modeling of the system
163	10	mentioned that one of the AERMOD implementation work
163	22	gridded met tools for AERMOD and CALPUFF we look to
165	9	I'm going to give you a recap of AERMOD status
165	11	AERMOD modeling system and inform you of some other

Page	Ref No.	Keyword = "aermod"
165	12	AERMOD related activities that have been going on
165	14	everybody here is aware AERMOD was promulgated as EPA-
165	19	made to all of three main AERMOD components AERMOD
166	25	interested in is the recent AERMOD developments and
167	2	the updates to all three AERMOD components have been
167	14	the especially the AERMOD update out is that we want
167	16	version right now the version of AERMOD out there now
168	21	Get into a little more detail about AERMOD in
169	3	urban option for AERMOD and the default value is 1.0.
169	10	option. So what we've done in this version of AERMOD
169	25	model emission from mobile sources in AERMOD. And
171	2	make the change to AERMOD to be able to read the
171	18	some plans that AERMET has for enhancing AERMOD I
171	23	AERMOD have been the main focus on the more recent
172	18	update the AERMOD Implementation Guide to go along
174	9	included keyword that's in AERMOD to feed in receptor
175	12	AERMOD. Should probably have questions after each
177	9	Our AERMOD system updates are very close to being
177	19	reflect AERMOD model. Sort of gotten through the
177	22	there a lot of in house applications of AERMOD that we
177	25	of these tomorrow in terms of evaluating AERMOD for
178	5	AERMOD for use in an exposure assessment for land area
178	8	come up in all of these is that AERMOD has a problem
180	19	other activities to associate to AERMOD course
181	18	AERMOD to (inaudible) characteristics and we presented
182	16	AERSURFACE was released. So that's it on AERMOD model
182	25	want to hear about AERSCREEN. Basically AERMOD has
183	10	issues with AERMOD. I think we knew it was going to
184	2	not currently considered part of the AERMOD regulatory
193	6	AERSCREEN is a DOS tool that runs AERMOD in a
193	10	and AERMAP to generate necessary AERMOD inputs and in
193	14	The SCREEN option was added to AERMOD in 1995 and
193	21	see in an AERMOD run.
194	14	for AERMOD. AERSCREEN does not include deposition and
195	5	PROFBASE keyword in AERMOD even for flat terrain.
195	16	using the RANKFILE output in AERMOD and it will find
196	6	on AERMOD and AERMAP output and writes to a log file.
196	16	several AERMOD and AERSCREEN runs and pretty much the
196	20	a reasonable conservatism compared to AERMOD.
197	14	running AERMOD so you'll generate the dot .SFC and
197	15	.PFL files that you would use in AERMOD.
199	18	and reruns AERMOD and you'll get your final output.
199	20	is the whole file itself is an AERMOD input file but
199	22	asterisk reads as comments for AERMOD. Your source
201	4	fence line direction. AERMOD is executed for each

Page	Ref No.	Keyword = "aermod"
201	6	so if you are doing annual 2 sectors that's two AERMOD
201	9	degree diagonals, AERMOD run for each SC
201	20	whatever direction you're going. And AERMOD is run
202	19	of these through AERMOD for each spatial and temporal
203	12	AERMOD and these are the scaled concentrations that
204	6	release package out right after AERMOD, AERSCREEN at
204	9	download BPIPPRM, AERMOD, AERMAP and AERSURFACE from
205	18	one with the smallest projected width. In AERMOD with
206	7	AERMOD so the projected width and projected building
207	23	listed in the AERMOD Implementation Guide is that the
208	25	goal initially was putting Prime into AERMOD was to
209	25	wind speed issue comes up a lot with AERMOD. AERMOD
210	4	AERMOD is about 0.3 meter per second but what's the
210	13	Activities, and future plans for AERMOD - Overview.
210	18	but AERMOD promulgated Dec. 2006. The committee and
211	5	reviewed status of AERMOD modeling system and
211	10	been the urban formulation in AERMOD. I think that
211	11	was an issue in AERMIC mind even before AERMOD was
212	12	AERMOD to take it out of BPIP Prime so you don't have
212	19	feeding all the data into AERMOD to give us an
213	16	that AERMOD is too slow. The horizontal meander
213	19	AERMOD is required to do calculations for every
214	14	So we're considering implementing this in AERMOD
214	19	sources in AERMOD because right now the horizontal
214	24	use the AERMOD one is a string of volume sources in
215	18	in AERMOD modeling system by using multiple grids and
215	22	Future plans for AERMOD that AERMIC has come up
216	5	incorporate the BPIP Prime functions into AERMOD and
216	7	fed directly to AERMOD as well. So this will
216	8	eliminate preprocessing functions. Then AERMOD would
216	22	really accounting for directly right now in the AERMOD
218	12	This new structure for AERMOD we think would also
218	20	The downside is that it will not make AERMOD faster,
223	2	the capped stack option in AERMOD applies to the
223	9	source in AERMOD. It's just more of a matter has it
224	3	folder you just double click on AERMOD exc. And it
225	6	through that association. When the AERMOD was not a
226	20	phrase that in terms of where is the speed of AERMOD
227	2	run AERMOD is always something that is mentioned and
228	16	meteorology as input for full AERMOD application as a
230	10	ago to the AERMOD?
230	11	Roger Brode: Method 2 is one of the options in AERMOD
230	25	questions revolve around AERMOD equivalence in
231	3	there who have versions of AERMOD that are even faster
232	6	cases developed with AERMOD as a reasonable starting

Page	Ref No.	Keyword = "aermod"
232	11	tests should also be done. The next update to AERMOD
233	3	almost automatic fashion to compare AERMOD performance
235	5	use of ASOS data with AERMOD and dealing with missing
235	6	airport data with AERMOD. I don't think we have an
250	5	AERMOD, we've got quite a bit going on and on our
251	14	promulgation of AERMOD got in the way of that.
263	7	an automatic switch. Just because AERMOD has been
263	24	near-field is AERMOD. CALPUFF is not the EPA-
266	6	then AERMOD is the preferred model. You can
266	13	AERMOD is not appropriate or CALPUFF is more
272	4	concentrations. This is AERMOD for reference it did
272	5	very well. That was one of the data bases AERMOD was
272	8	with half height adjustment, AERMOD turbulence, with
272	10	adjustment in CALPUFF, AERMOD turbulence with the and
272	12	report on page 2 put AERMOD profile date in half
272	17	AERMOD that has been documented. You see quite a
272	22	prediction is AERMOD turbulence with the strain based
272	25	with similar patterns there. CALPUFF with AERMOD
273	8	performance in this case. CALPUFF with AERMOD
276	11	to what we heard about this morning to couple AERMOD
286	15	similar to the MM5 to AERMOD tools that were discussed
292	21	range of tools that can be applied to AERMOD.
293	8	of vertical structure of the turbulence as AERMOD
293	10	same science but pre-dating AERMOD so we wanted to see
306	15	Just as another point here. What does AERMOD do?
308	14	that EPA says they would like to develop in AERMOD
308	23	in that time step. CALPUFF accounts for that AERMOD
308	25	Not just AERMOD any study state model due to
309	4	think there are major problems in how AERMOD handles
309	12	with AERMOD, you have it with CALPUFF now today with
309	18	hours. AERMOD doesn't do it every hour (inaudible) it
309	22	in AERMOD and CALPUFF has an expensive one.
309	23	EPA has said in its clarification that AERMOD is the
310	23	(inaudible) time and space with AERMOD can result in a
311	10	AERMOD (inaudible). The AERMOD not surprisingly takes
311	13	not just the AERMOD but any study state model will do
311	20	with the AERMOD facility source is the critical issue
311	22	You will also see the other AERMOD
312	3	AERMOD. I don't think you have to do a model
312	14	you run this with AERMOD, using this station as the
312	18	issues in AERMOD capabilities is doing a correct
312	20	some problems with the random plume element in AERMOD
313	24	upwind (inaudible) around the AERMOD impact you can
314	20	land use you use to determine the roughness in AERMOD
315	9	also plotted the AERMOD roughness on source A and

Page	Ref No.	Keyword = "aermod"
315	14	of the model of the AERMOD and most people do in
316	9	mirror that was in AERMOD. Change wind directions or
316	13	AERMOD. So I don't think those results that EPA is
316	23	involved in AERMOD and respect them greatly and it's a
317	14	Sometimes AERMOD doesn't work well in the case of
317	15	the large building. AERMOD was predicting over ten
318	25	as well. I'm not sure we expected an AERMOD sub
320	24	with AERMOD. But I just want to emphasize the fact
320	25	that this is not a CALPUFF verses AERMOD and I would
321	5	There is a role for AERMOD and its promulgated
321	13	apply both to AERMOD and for CALPUFF. It's not as

Page	Ref No.	Keyword = "AERSCREEN"
167	15	to release a draft version of AERSCREEN. Screening
167	17	will not work with AERSCREEN. So that wouldn't make
167	18	much sense to get AERSCREEN out first. So that's
171	3	screen meteorology coming from AERSCREEN so we've done
182	25	want to hear about AERSCREEN. Basically AERMOD has
183	17	AERMET and/or AERSCREEN. Initial version of
192	15	Thurman for AERSCREENING.
192	17	on AERSCREEN and on the status and update of AERMET
192	19	workgroup, description and features of AERSCREEN.
192	23	AERSCREEN, a brief summary of the stages in AERSCREEN
193	6	AERSCREEN is a DOS tool that runs AERMOD in a
193	22	The features of AERSCREEN were initially developed by
194	5	AERSCREEN calls AERMAP to generate terrain height. We
194	12	area source or volume sources and AERSCREEN calls
194	14	for AERMOD. AERSCREEN does not include deposition and
195	14	AERSCREEN give AERMAP something consistent. And it
195	21	and AERSCREEN has specified distances of receptors.
195	25	direction. You can re-use previous AERSCREEN run
196	2	files. When you run AERSCREEN it generates an input
196	5	the prompts every time. AERSCREEN does errors checks
196	16	several AERMOD and AERSCREEN runs and pretty much the
196	18	initially AERSCREEN tests have shown good results
197	2	used in AERSCREEN and loops through several
197	11	specify multiple wind directions. For AERSCREEN, uses
197	19	AERSCREEN. User defined one number for albedo, one
198	25	How does AERSCREEN work? Basically as the user you
199	21	AERSCREEN reads its header information and the
200	4	other flags and inputs that are going to AERSCREEN
200	12	inputs in from the prompt or the input file, AERSCREEN
200	19	hit enter and AERSCREEN starts the run.

Page	Ref No.	Keyword = "aerscreen"
202	14	sources, AERSCREEN will calculate the mathematical
203	13	AERSCREEN will calculate from that maximum 1-hour.
203	14	Then AERSCREEN will give you the distance from the
204	5	What's the future of AERSCREEN? We'll have the draft
204	6	release package out right after AERMOD, AERSCREEN at
204	7	the same time. It'll have AERSCREEN and MAKEMET
204	13	support/user guide. It tells you more about AERSCREEN
227	17	Bob Paine: From ENSR with a couple of AERSCREEN
227	22	to AERSCREEN you would run AERSURFACE both for the met
227	23	side and application site, feed it into AERSCREEN, and
228	25	the AERSCREEN workgroup. But we're at a point that we

Page	Ref No.	Keyword = "AERSURFACE"
138	24	with AERSURFACE? Where does AERSURFACE that's
147	9	development of the AERSURFACE methodology and the
147	10	release of the AERSURFACE tool. We'll hear more about
148	12	implements that which is the AERSURFACE tool. In
159	4	the AERSURFACE methodology and testing the different
160	11	from your tower. The recent AERSURFACE methodology
163	9	more specifics on the AERSURFACE tool that Randy
174	14	AERSURFACE in a minute. AERSURFACE uses the standard
182	3	validate your AERSURFACE based on
182	9	AERSURFACE was 1 km or the AERSURFACE is 3 km, does it
182	11	What was noticeable if I used AERSURFACE inputs with a
182	16	AERSURFACE was released. So that's it on AERMOD model
182	20	AERSURFACE tool. You've heard a little bit about it
182	22	implementation issues with AERSURFACE that maybe you
182	24	enhancing AERSURFACE. I'll try to be fast but you
183	14	AERSURFACE what is it? It is a tool designed to
183	18	AERSURFACE was released on SCRAM on January 11, 2008.
183	20	there was a program called AERSURFACE that was
184	8	were implemented in AERSURFACE and they are listed
188	8	We actually have some plans to enhance AERSURFACE in
193	12	AERSURFACE but does not currently call AERSURFACE
193	13	itself so you have to run AERSURFACE.
198	6	AERSURFACE output: User enters AERSURFACE output
198	10	surface roughness sectors. AERSURFACE is run for the
198	20	generate four one for each season and AERSURFACE
200	2	you'll see the nine that means use AERSURFACE. Then
202	20	sector. So if you had monthly AERSURFACE output with
204	9	download BPIPPRM, AERMOD, AERMAP and AERSURFACE from
212	2	development of AERSURFACE and looked at the idea of
212	3	supplementing AERSURFACE, the land (inaudible) and

Page	Ref No.	Keyword = "aersurface"
212	4	AERSURFACE with the elevation files. So it was very
215	24	Building on plans to enhance AERSURFACE by combining
219	9	AERSURFACE more robust in being able to process land
219	14	export it to the (inaudible) format that AERSURFACE
219	22	One of the ideas in AERSURFACE is it produces the
220	12	Roger Brode: The other again AERSURFACE is not a
220	14	in doing that so you can run AERSURFACE. We hope that
220	15	people will when they look at AERSURFACE outputs
224	8	have heard that AERSURFACE might not work under VISTAS
227	21	suggest that when you have AERSURFACE input available
227	22	to AERSCREEN you would run AERSURFACE both for the met

Page	Ref No.	Keyword = "air"
7	5	as the division director of Air Quality Assessment
7	7	started in EPA back in 1991 in the Air Quality
7	21	talking about air quality modeling is the integrity of
11	21	it's an exciting time to be in the air quality
13	8	airplanes around like that. But I do think change is
17	22	challenges I think are opportunities that our air
26	16	in my group and our division support air quality
27	3	recommendations to our the Air Division Directors:
35	21	by Roger (inaudible) and that is in our Air Quality
40	23	through Air Quality Policy Division Office of General
41	7	directly or in some case to the Air Division Directors
42	6	the status of parallelized versions of AERMOD. AIRMET
44	5	AERMOD and treatment of missing airport data in
44	12	The one about the airport data and AERMOD. Here is
44	21	observer-based data from airports. There were some
44	23	surface observing systems being put in airports had
46	9	for reporting airport data. We've seen a lot more
46	12	within the modeling community. Missing airport data
47	11	reduce the calm and missing winds in the airport
53	15	including PSD. It's applicable to criteria air
54	24	update on the 2002 National Air Toxics Assessment
55	16	facility-specific and community-scale air toxics risk
55	17	assessments. They are available through the Air
60	3	projects national air toxic assessments. We're also
60	19	What is NATA? NATA is characterization of air toxics
60	21	them, air toxics, now across the nationwide. At a
61	24	our air toxic website which is also on the TTN where
62	10	in the air toxic program. It's pretty daunting when
63	8	integrate at that point criteria air toxics into one
63	18	for our mobile air toxic rule a few years ago but we

Page	Ref No.	Keyword = "air"
63	24	with our air toxic monitoring network that we've set
63	25	up on air national toxic trend sites. We use it to
68	21	eight HPAS HAPS in the Clean Air Act. We modeled the
69	11	air toxic option which does the sampling time period
70	10	used airport surface data around these airports to
72	5	looked at the results from NATA compared to the air
75	11	results look like from the national air toxic. We
75	17	NATA. Essentially we think the clean act Clean Air
76	18	HAPS that make up about 92% of the national air toxic
77	5	reduce that chunk of the pie. If we had an air toxic
77	11	are shrinking which is good news. Like I said the air
78	11	we should be looking at both the criteria and air
78	16	both criteria and air toxic.
79	6	get both criteria and air toxics. Obviously with
88	4	ASOS station at our airport which is probably four
96	14	Appendix W. I started air quality as a consultant 29
97	18	expose the impacts not just the air quality impacts,
97	23	This is not guided by Appendix W on the air quality,
98	10	air quality impacts plus all the impacts. I'm going
98	23	includes air quality modeling to show project impacts
99	20	Continental Divide-Creston EIS use PGM for air
101	3	because of the work by the Western Regional air
101	20	the air quality and AQR/AQRV impacts. This a fairly
105	13	Community Multiscale Air Quality (CMAQ) model for
105	14	Uinta Basin Air Quality Study in northeast Utah.
105	17	NEPA EIS/EA air quality assessments. We talked about
106	11	the Uinta Basin Air Quality Study (UBAQS). The Utah
106	12	Four Corners Air Quality Task Force NM/CO. Finally
111	16	data are key inputs to air quality models such as
111	24	dimension in the problem. Upper air data sparsely
112	3	airport data that we have significant gaps in NWS data
113	6	the nearest airport for something I can just pick the
113	17	in using AERMET. You feed it airport or other input
114	7	containing the Detroit metropolitan airport. And we
114	12	and the traditional airport data to AERMED approach
114	20	the airport tower is located. That's the metropolitan
114	21	airport right there. We're right on the edge of the
114	23	There's windroses for 2002 airport on the left and the
115	3	adjusted. On the left the anemometer at the airport
115	15	have AERMET traditional airport results and the MM5
115	18	prediction based on airport input. Generally it
116	13	Let's see what's going on at the airport for the same
116	16	between the two except when you feed the airport data
116	24	this we didn't have air surface. Is this working at
116	25	all? So we didn't have air surface and we just used

Page	Ref No.	Keyword = "air"
117	6	Later air surface was developed. Went back and re-ran
117	7	it with the roughness estimated at the airport from
117	8	air surface which was quite a bit lower. This was
117	21	and supplemented the airport with the 1-minute ASOS
117	24	supplemented airport data through air surface through
117	25	AERMET with air surface inputs and the ratio dropped
118	14	encouraging especially when we supplement the airport
119	2	AERMOD tool versus the airport data both looking at
120	4	metropolitan airport because it's the major airport
120	7	air surface there is some uncertainty when you run air
121	14	domain like we do now for the airport data. There are
122	19	to models expands, we have airport data we have
125	9	friction velocity, Monin-Obukhov length, air density,
131	15	evaluation using the (inaudible) buoys and upper air.
133	9	that I don't have any airport data is representative
133	16	is treatment of airport data in AERMOD. One is ASOS
134	10	experiences we've had with air screen and air surface.
140	4	use the profiles to develop (inaudible) upper air
140	8	using. But there's no upper air data in sight using
140	9	gridded met to generate (inaudible) upper air data to
141	20	air description.
142	2	upper air (inaudible). I know early on in the
142	21	Tyler Fox: James will do Air Screen and Roger
142	22	will do Air Surface and then we'll have an AERMIC
148	14	processing upper air data. Just some recommendations
176	20	motivated by if we do go down the road (inaudible) air
177	18	of Air Pollution, Theory and Model Application, to
183	4	upper air data. It's also designed to accept more
185	22	estimating roughness at airports. If you notice one
185	24	transportation. So at an airport, it's the airport
186	8	(inaudible) at an airport or not and if I am then I
186	12	assumed roughness for an airport and there it is if
186	13	you're not at an airport. That's the best we can do
186	16	Raleigh/Durham areas and the airport is down there and
188	25	surface roughness at airports. All of the developed
189	7	developed open space. So basically at an airport you
190	11	Raleigh/Durham airport and that's SRTM. We brought
192	5	models. We've got airport data what else are you
195	8	You can specify ambient air distance or fence line
198	12	representative problem when you use airport data. It
198	19	surface and one for upper air. Seasonal you will
211	23	the airport site where the met data is being corrected
229	23	of the airport setting between the two?
229	25	in the airport setting it was simply a difference in
230	4	Dick Perry: It was an airport setting for both

Page	Ref No.	Keyword = "air"
235	6	airport data with AERMOD. I don't think we have an
239	22	Class I AQRV [ed. Air Quality Related Values]
246	10	determination in working with Air Quality Policy
247	22	situation to deal with in clearing the air on CALPUFF
253	14	situations where use of CALPUFF in the air field might
285	18	Wyoming Technical Air Forum (SWWYTAF) data base. We
288	19	technique used that basically cancels out upper air
311	6	directions in terms of air value, cumulative impacts
312	10	airport station. We put in the sources in CALPUFF and

Page	Ref No.	Keyword = "albedo"
183	7	characteristics: albedo, Bowen ratio, surface
185	3	roughness and for Bowen ratio albedo the
185	7	and albedo affect the convective boundaries
185	13	separate them so for Bowen ratio and albedo. The
197	19	AERSCREEN. User defined one number for albedo, one

Page	Ref No.	Keyword = "algorithm"
208	22	horizontal meander algorithm currently not
213	11	algorithm. As I mentioned earlier one of the big
213	17	algorithm is one factor in making it slower because
213	18	that algorithm incorporates up wind dispersion and
214	20	meander algorithm (inaudible) and volume sources in
237	13	capability of the downwash algorithm the fact that we
237	24	comfortable feeling that what the downwash algorithm
278	18	according to a simple gas/particle algorithm that uses
279	15	according to Pankow's absorption algorithm (based on
285	21	use the ISORROPIA algorithm. And we are also looking
313	13	rational for that algorithm but I think it can cause

Page	Ref No.	Keyword = "algorithms"
49	18	Pre-PRIME downwash algorithms defined vertical extent
127	3	algorithms, and methods that are being used so that
183	6	layer algorithms require the search surface
206	23	algorithms might not always be applicable for prime
207	2	Well with the old algorithms ISC3 didn't really know
207	20	ISC3 in relation to prime downwash algorithms. We
208	9	sources and prime algorithms. So we haven't gotten a
208	17	downwash algorithms. If there is some wind tunnel

Page	Ref No.	Keyword = "algorithms"
257	12	mixing height algorithms. You mentioned the MMS
293	4	models, the core algorithms, the convection mixing

Page	Ref No.	Keyword = "appendix"
21	17	We'll be starting with the Appendix W Refresher and
24	16	is a new Appendix W available as I said and is
26	15	that's in the Appendix W but broadly speaking as folks
30	4	under Appendix W. And consistently with UARG these
31	15	workshops. In fact Appendix W refers to these and
33	24	Appendix W here appropriate venue and avenue by which
36	9	interpreting Appendix W and the likes having that type
39	8	Appendix W but to clarify Appendix W for all of you so
39	16	in Appendix W that Tyler has already shown you in
40	10	Appendix We might not be followed in some cases.
40	12	application of Appendix W guidance. So these issues
41	14	the Appendix W guidance there's a link for
41	20	several places in Appendix W that discusses the need
41	24	you all are familiar with Appendix W... I'm sure.
42	13	their status. Appendix W clearly addresses that in
42	22	concerns that Appendix W guidance might not being
43	16	Appendix W, when there is no preferred model or where
51	23	something I think is formerly required by Appendix W,
52	16	interpreting the guidance or interpreting Appendix W
52	25	roles as part of that process. As I said Appendix W
53	8	flexibility under Appendix W to do so. That's the
53	12	applications and those who follow Appendix W and those
53	18	under Appendix W situation. AERMOD is being used and
53	21	other avenues. I think that Appendix W and the
53	25	(inaudible) where it didn't fall under Appendix W but
54	2	we should be consistent and respect Appendix W to the
54	7	there are situations when Appendix W applies and when
55	10	outside of Appendix W but may be very relevant for
55	12	Appendix W.
55	13	For toxic risk assessment in Appendix W, as revised
60	8	even though it doesn't say in Appendix W; we have to
96	14	Appendix W. I started air quality as a consultant 29
97	23	This is not guided by Appendix W on the air quality,
231	5	believe compilers are the answer. On reading Appendix
239	17	version of CALPUFF. It's also identified in Appendix
239	23	analyses, not under Appendix W purview. But obviously
242	15	Appendix W requirements for regulatory models. You
246	9	under Appendix W and some that don't. We had made a
247	9	VISTAS which was not currently approved under Appendix

Page	Ref No.	Keyword = "appendix"
247	21	as they are applied under Appendix W. Not a very good
264	5	authority approval. The reference in the Appendix W
265	23	are listed in Section 3.2.2e of Appendix W to
271	15	paragraph 7.2.8 of Appendix W, which is to "fully
308	18	Appendix W when it was promulgated and I think it's
317	5	of Appendix W when appropriate. There are 17
319	20	under Appendix W. You heard that from Chet and from
320	2	interpreting Appendix W are the program office and the
320	4	of Appendix W as was laid out in a clarification memo
320	6	are not reinterpreting the Appendix W or guidance. We
321	14	simple an argument under Appendix W to just say that

Page	Ref No.	Keyword = "ASOS"
44	3	memo. One has to do with the use of ASOS vs.
44	20	done the sensitivity of the ISCST3 model to ASOS vs.
45	10	ASOS data produced higher concentrations than using
45	15	acknowledge there may be cases where ASOS data might
46	6	ASOS is with the Missing NWS data more extensive with
46	7	advent of ASOS these automotive surface observing
46	15	not that rare with ASOS and METAR. Basically METAR
46	24	archive (inaudible) set because the one minute ASOS
88	4	ASOS station at our airport which is probably four
88	11	one minute data that was augmented by ASOS data were
112	5	increased with the advent of ASOS began in the 1990's
117	14	Then I'll mention the 1-minute ASOS data so that's a
117	20	we looked at the 1-minute ASOS data so we went back
117	21	and supplemented the airport with the 1-minute ASOS
122	20	onsite, we have 1-minute ASOS on site, gridded met
132	8	fix ASOS data until it matched MM5 data. Is that
132	10	Roger Brode: I filled in gaps in the ASOS data
132	11	with other ASOS data that were more highly resolved
132	19	but the fact that supplementing the ASOS data with the
132	23	does suggest is using standard ASOS data as is for
133	16	is treatment of airport data in AERMOD. One is ASOS
133	20	done with ISC in terms of AERMOD sensitivity to ASOS
146	3	ASOS/Met Data - Alan Dresser (NJDEP) /
149	25	ASOS data met data group, the urban issues group and
150	9	respect to the ASOS and met data processing sub group
150	11	focus on. One was the impact ASOS data versus pre-
150	12	ASOS data on AERMOD concentrations. Secondly they
150	17	lastly use of hourly average ASOS winds and this is
150	23	In terms of the ASOS verses the pre-ASOS predictions.
150	25	using pre-ASOS and the ASOS met data. Looking at the

Page	Ref No.	Keyword = "asos"
151	3	times. It is essentially redoing the 1997 ASOS and
151	7	overall the use of ASOS date in AERMOD was generally
151	10	get with the ASOS data was much less an issue for
151	18	other case, we've substituted in ASOS clouds so for
151	21	ASOS clouds combined with the observer temperature and
151	24	for AERMOD the inclusion of the ASOS clouds didn't
152	8	similar except where comparing the full ASOS
152	15	with ISCST3. In general we felt the use of ASOS data
152	18	of ASOS data is overall less of an issue with AERMOD.
153	15	winds and thought of what would be the standard ASOS
154	12	concentration to the standard ASOS concentration.
187	9	this partly through this ASOS cyclone wind study there
220	23	data problems that's been in other things like in ASOS
234	17	recommendation for using the new ASOS data sets 23505
235	5	use of ASOS data with AERMOD and dealing with missing
235	22	In terms of the ASOS data, one of the big obstacles we

Page	Ref No.	Keyword = "atmosphere"
259	10	convective turbulence is in the atmosphere. That is

Page	Ref No.	Keyword = "BART"
241	10	for BART. So we've also got similar slides from this
245	5	states and others would be using in the BART process
246	6	The BART applications by the states were moving
246	13	that went into BART and we're pretty clear there was a
246	15	and what models could be used under BART. Certainly
247	19	application in BART and managing that but trying to
291	18	examples of the EPA BART 98th percentile computations

Page	Ref No.	Keyword = "Birmingham"
57	6	example in Birmingham where consistent with our
59	18	the details in Birmingham. With that said let me hand
80	2	of the Birmingham area, part of Jefferson, all of
81	9	These are our monitors in the Birmingham area and
81	18	Birmingham and Wylam have shown values greater than
82	7	local area component to the problem in Birmingham.
83	12	Birmingham monitor.
84	12	This is the North Birmingham monitor. You'll see a
87	25	Birmingham is in a large wide valley with a series of

Page	Ref No.	Keyword = "birmingham"
88	15	PM 2.5 Birmingham monitor. The one minute data is the
89	25	Birmingham monitor. Again that's the monitor with the
90	24	the North Birmingham monitor from the local sources.
91	18	good for Birmingham. There is a marked difference in
91	19	the performance between North Birmingham and Wylam.
91	20	The facilities at North Birmingham are much closer to
93	4	Our 2002. North Birmingham is the first two and Wylam
93	7	at North Birmingham and about the same at Wylam. This
93	17	recognized that Atlanta and Birmingham were having
94	9	Birmingham and Wylam. The third bar the one that's
94	12	Birmingham and I was speechless which is rare. Again,
120	15	Birmingham, AL, sort of building on the work that has
178	4	Birmingham. More recently we got involved in applying

Page	Ref No.	Keyword = "boundary"
93	19	us for our boundary conditions. That was done in July
141	3	prognostic models to simulate the urban boundary layer
141	8	capture the important aspects of the urban boundary
142	5	check on the boundary layer height calculations to see
177	2	sounding probably reflects some reflective boundary
183	5	robust met input and however the advanced boundary
203	19	differences. Under that the ambient boundary this is
203	25	case. So if you see this case at the ambient boundary
257	18	could underestimate the depth boundary layer like the
257	23	of time. So this convective boundary layer could sort
258	22	boundary layer may form for subsequent hours. In the
259	18	This is a plot of convection boundary layer height
259	20	happens as the boundary layer gets higher you need
259	21	more boundary energy flux to sustain it. So you see
259	22	the red is pretty up as boundary layer height. It's
260	10	then it drops and then a little bit of boundary layer.
268	16	boundary layer near the coast during the daytime
268	20	a convective boundary layer that develops thermal
268	21	internal boundary layer. So grid that resolution

Page	Ref No.	Keyword = "Bowen"
183	7	characteristics: albedo, Bowen ratio, surface
184	23	basically in (inaudible) averages a log. For a Bowen
185	3	roughness and for Bowen ratio albedo the
185	6	representative of the met tower we feel. Bowen ratio
185	13	separate them so for Bowen ratio and albedo. The

Page	Ref No.	Keyword = "bowen"
197	20	number for Bowen ration and one number for surface

Page	Ref No.	Keyword = "calm"
46	19	calm. We need to address how this is being handled.
47	4	model if that single 2-minute average is calm the hour
47	5	is treated as calm and so on. But there's actually
47	11	reduce the calm and missing winds in the airport
91	9	per cubic meter. This is calm winds sorry I should
102	21	southeast. Early on with the CALMET modeling in 2002
103	8	CALMET. I think we've talked about that.
112	24	context with CALMET/CALPUFF for long range transport
116	14	day and it's very consistent. Eighteen hours of calm
116	19	hour average with the calm policy you add up the six
116	20	non calm plus twelve zeros and divide by eighteen.
117	15	lot of calm. There's not anything we can do about
123	23	the output from, excuse me, output from CALMET to
124	13	to CALMET not necessarily a replacement. CALMET has
130	6	and fed it to CALMET the surface file for OCS and to
130	11	compare where he used CALMET and we used the
135	11	WRF to CALPUFF and then bypassing CALMET. Since
135	12	CALMET can already take the MM5 data, why do you need
135	13	to bypass CALMET?
135	17	CALMET but as Herman indicated it's intended to be an
135	20	If you're doing three years worth of CALMET you know
135	21	CALMET/CALPUFF. Logistics file side you're talking
136	6	There is clearly an application where CALMET is the
138	8	CALMET.
153	19	with calm, missing and variable. And the various wind
239	6	April, 2003, and includes CALMET and CALPUFF. It was
247	12	meteorological data sets through CALMET there are also
247	14	both CALMET and CALPUFF. Some of the differences we
248	9	model. No you could not use the CALMET meteorological
249	23	regulatory standpoint is CALMET, CALPUFF and CALPOST.
257	15	the issues they addressed in that was the CALMET
257	20	height changes to CALMET for mixing over water. But
258	23	default mode in applying CALMET that behavior is
258	24	masked somewhat by other defaults within CALMET,
261	4	CALMET. Prior to that there was no regulatory default
261	5	switch in CALMET. There was one in CALPUFF that would
262	3	Maybe it's more so in the CALMET data and (inaudible)
271	12	bypassing CALMET. So it didn't rely on non space
271	23	complex wind evaluation with Lovett using CALMET.
272	19	CALPUFF modeling system with CALMET generated wind

Page	Ref No.	Keyword = "calm"
273	14	insights into treatment of tower data in CALMET. So
276	12	and CALMET and we're going to extend the same concept
287	18	in CALMET and CALPUFF.
287	21	funding for this study and the ongoing CALMET/CALPUFF
293	3	CALMET. The various interfaces to various prognostic
293	20	CALMET and some other changes including the ability to
304	23	more to this instead of saying that MM5 or CALMET is
305	10	exist in the current version of CALMET. You will not
305	11	see this bull's eye if you just configure CALMET to
305	15	in the MM5 data, you can run CALMET in the pure
309	13	CALPUFF. Calm winds (inaudible) the conservative or
309	15	than six hours of calm or fewer than six hours of
309	16	calm. CALPUFF will treat the calm winds.
311	3	are CALMET winds you can see the (inaudible)
316	15	unexpected. You change the wind in CALMET a little

Page	Ref No.	Keyword = "CALMET"
102	21	southeast. Early on with the CALMET modeling in 2002
103	8	CALMET. I think we've talked about that.
112	24	context with CALMET/CALPUFF for long range transport
123	23	the output from, excuse me, output from CALMET to
124	13	to CALMET not necessarily a replacement. CALMET has
130	6	and fed it to CALMET the surface file for OCS and to
130	11	compare where he used CALMET and we used the
135	11	WRF to CALPUFF and then bypassing CALMET. Since
135	12	CALMET can already take the MM5 data, why do you need
135	13	to bypass CALMET?
135	17	CALMET but as Herman indicated it's intended to be an
135	20	If you're doing three years worth of CALMET you know
135	21	CALMET/CALPUFF. Logistics file side you're talking
136	6	There is clearly an application where CALMET is the
138	8	CALMET.
239	6	April, 2003, and includes CALMET and CALPUFF. It was
247	12	meteorological data sets through CALMET there are also
247	14	both CALMET and CALPUFF. Some of the differences we
248	9	model. No you could not use the CALMET meteorological
249	23	regulatory standpoint is CALMET, CALPUFF and CALPOST.
257	15	the issues they addressed in that was the CALMET
257	20	height changes to CALMET for mixing over water. But
258	23	default mode in applying CALMET that behavior is
258	24	masked somewhat by other defaults within CALMET,
261	4	CALMET. Prior to that there was no regulatory default
261	5	switch in CALMET. There was one in CALPUFF that would

Page	Ref No.	Keyword = "calmet"
262	3	Maybe it's more so in the CALMET data and (inaudible)
271	12	bypassing CALMET. So it didn't rely on non space
271	23	complex wind evaluation with Lovett using CALMET.
272	19	CALPUFF modeling system with CALMET generated wind
273	14	insights into treatment of tower data in CALMET. So
276	12	and CALMET and we're going to extend the same concept
287	18	in CALMET and CALPUFF.
287	21	funding for this study and the ongoing CALMET/CALPUFF
293	3	CALMET. The various interfaces to various prognostic
293	20	CALMET and some other changes including the ability to
304	23	more to this instead of saying that MM5 or CALMET is
305	10	exist in the current version of CALMET. You will not
305	11	see this bull's eye if you just configure CALMET to
305	15	in the MM5 data, you can run CALMET in the pure
311	3	are CALMET winds you can see the (inaudible)
316	15	unexpected. You change the wind in CALMET a little

Page	Ref No.	Keyword = "calms"
112	4	due to calms and variable winds; frequency of gaps has
117	23	to the number of calms and variable. We ran that
153	5	this would reduce the number of calms and reduce the
153	21	of calms is reduced when you do the hourly average.
154	6	hourly average you see the reduction in calms. See
160	4	the number of calms you get less than 0% and 24% calms
234	23	many calms and start calculating 24 hour values and
234	24	the more calms we get the lower our numbers go so the

Page	Ref No.	Keyword = "CALPUFF"
7	19	CALPUFF as well. One of the things I learned back in
9	16	have CALPUFF as well and we can't have models out
29	18	We also have CALPUFF and we have an update process
29	20	independent assessment of CALPUFF when updating to new
29	24	complexity of CALPUFF requires a pretty extensive
30	6	What we did is we developed a CALPUFF update tool and
30	11	CALPUFF session. It basically compares two versions
31	9	in the application of CALPUFF there. We looked at
31	12	afternoon session about CALPUFF.
42	20	the regulatory status of CALPUFF modeling system for a
43	2	clarification memo for CALPUFF. We'll be talking
43	3	about that this afternoon in the CALPUFF session. One
43	6	guideline does refer to CALPUFF as an option that may

Page	Ref No.	Keyword = "calpuff"
43	12	where AERMOD may not be appropriate and CALPUFF may be
43	20	regarding technical issues related to CALPUFF near-
50	17	CALPUFF and AERMOD and it really emphasizes the formal
99	6	was the first big CALPUFF applications. Pinedale EIS
99	10	CALPUFF Database and that was used for many years.
99	21	quality, visibility and deposition (No CALPUFF)
100	2	and CALPUFF for far-field AQ and AQRV impacts but they
100	16	AERMOD for near sources and CALPUFF for far field.
101	11	of wondering why we're running CALPUFF to get sulphur
101	15	dropping CALPUFF and doing everything with the
103	7	take 12km MM5 data and put it through CALPUFF or
104	14	(inaudible) and with CALPUFF we don't have to worry
107	25	to AERMOD and to CALPUFF respectively. Bret.
109	17	CALPUFF is to develop testing protocols for the
109	19	compatible either with AERMOD or CALPUFF. But that
121	23	You'll hear more about MM5 CALPUFF in a minute. But
121	25	taking MM5 data directly into CALPUFF model. Should
123	12	is going to talk next about the MM5 CALPUFF tool.
123	24	drive ISC3 AERMOD and CALPUFF. The purpose of that
124	6	CALPUFF and the (inaudible) version that Joe Scire
124	11	meteorology data from MM5 and WRF and CALPUFF.
124	18	meteorological data used using CALPUFF.
124	20	MM5 data and it could be read directly into CALPUFF.
126	18	goes into CALPUFF without providing statistics to us.
127	25	transport called CALPUFF version 6 point. I don't
129	17	In the 2006 version of CALPUFF, MMS requested Joe
129	18	Scire include the core product elements into CALPUFF.
130	2	test CALPUFF Version 6 using tracer gas experiments.
131	18	in CALPUFF or over water so that we won't have to do
131	21	the reformat program and the CALPUFF over water
131	22	program. Again the CALPUFF version 6 is intended to
131	24	you read the introduction to the users guide CALPUFF
134	12	CALPUFF side I guess I should commend Herman not only
135	11	WRF to CALPUFF and then bypassing CALMET. Since
135	24	going straight from MM5 to CALPUFF and then bypassing
138	7	sort of consistent with what the MM5 CALPUFF or
142	18	AERMOD and CALPUFF. Thank you.
163	22	gridded met tools for AERMOD and CALPUFF we look to
233	6	CALPUFF modeling system that test data set. For now,
238	7	afternoon off with CALPUFF.
238	23	so in respect to CALPUFF. Just to make sure we have
239	6	April, 2003, and includes CALMET and CALPUFF. It was
239	17	version of CALPUFF. It's also identified in Appendix
241	20	CALPUFF rights to TRC in April 2006 and that kind of
242	23	the status of CALPUFF and we had general agreement on

Page	Ref No.	Keyword = "calpuff"
243	7	multiple versions. NOTE: CALPUFF model/code cannot
244	18	new updated version of CALPUFF and the VISTAS version
246	16	CALPUFF fit the bill in terms of being able to address
246	18	model that could but a number of states used CALPUFF.
247	14	both CALMET and CALPUFF. Some of the differences we
247	22	situation to deal with in clearing the air on CALPUFF
248	11	approved part of the CALPUFF modeling system. We had
249	22	2007, establishing the CALPUFF modeling system from a
249	23	regulatory standpoint is CALMET, CALPUFF and CALPOST.
253	14	situations where use of CALPUFF in the air field might
253	20	CALPUFF is approved for regulatory use and the tool is
257	14	CALPUFF modeling system for use over water. One of
259	2	and the mixing height that goes to CALPUFF is the
259	9	CALPUFF as a parameter that determines how much
261	5	switch in CALMET. There was one in CALPUFF that would
261	11	another threshold parameter in CALPUFF that also had
262	17	previous version of CALPUFF sort of raises some
262	19	evaluations that were done to support CALPUFF
263	3	verses turbulence dispersion option in CALPUFF.
263	10	CALPUFF. It doesn't say that we don't agree
263	24	near-field is AERMOD. CALPUFF is not the EPA-
264	12	that CALPUFF can be considered. But still needs to
264	20	Federal Registry Notice promulgating CALPUFF. "We
264	22	accepting CALPUFF for complex wind situations, as this
264	24	using CALPUFF for complex wind situations, acceptance
265	12	understanding CALPUFF and how best to apply it in
266	7	always submit CALPUFF as an alternative model but
266	11	appropriate than CALPUFF; that's where you get
266	13	AERMOD is not appropriate or CALPUFF is more
270	16	when applying CALPUFF in a near-field situation. The
270	18	CALPUFF modeling system performance for near-field
270	21	ago when they were looking at in promulgating CALPUFF
270	22	and what role will CALPUFF have for near field
270	24	CALPUFF evaluation results for Kincaid (flat terrain)
271	4	This is a figure from the IWAQM phase showing CALPUFF
271	10	over prediction but CALPUFF actually does better.
271	11	However, CALPUFF was applied with CTDMPLUS met inputs,
271	14	motivation for CALPUFF near-field applications under
271	24	Looked at a range of options in CALPUFF and actually
272	6	developed on. In CALPUFF there was quite a range
272	10	adjustment in CALPUFF, AERMOD turbulence with the and
272	19	CALPUFF modeling system with CALMET generated wind
272	25	with similar patterns there. CALPUFF with AERMOD
273	8	performance in this case. CALPUFF with AERMOD
273	9	profiles did the best in terms of the CALPUFF

Page	Ref No.	Keyword = "calpuff"
274	10	CALPUFF and they contracted with AER. Prakash
274	19	to the CALPUFF chemistry. This work was sponsored by
274	21	that the treatment of chemistry in CALPUFF was
275	5	perspective I would like to compare CALPUFF with
275	11	will talk about it in a minute. So like CALPUFF
275	13	splitting of puffs like CALPUFF. It uses 2nd order
275	14	closure diffusion. The key difference between CALPUFF
275	18	expensive than CALPUFF, which can restrict its use for
275	25	recoding within the current framework of CALPUFF. It
276	6	full chemistry in CALPUFF, which would make it more
276	14	the background concentrations to CALPUFF.
276	23	earlier options that were already in CALPUFF. For
276	25	CALPUFF (MCHEM=1,2,3,4). So the new chemistry options
278	13	The current treatment of PM chemistry in CALPUFF
279	4	objective was to bring CALPUFF more in line with
279	6	The new PM chemistry in CALPUFF is the following:
279	19	Coming to the original CALPUFF cloud chemistry, there
280	6	in CALPUFF is again based on CMAQ treatment. It
280	13	versions of CALPUFF that are currently available which
280	23	We also did some CALPUFF testing using a plume
280	25	studies with SCICHEM and CALPUFF. As I mentioned
281	7	exists in CALPUFF called MAQCHEM. This switch existed
281	8	but was not used in the current version of CALPUFF.
281	12	sensitivity of the original CALPUFF module (MESOPUFF)
281	13	and new CALPUFF module (ISORROPIA) to relative
281	21	inorganic PM module which is currently in CALPUFF. We
284	3	CALPUFF, which are toluene and xylene (we also
284	6	original CALPUFF doesn't have them).
284	13	original CALPUFF SOA partitioning coefficients.
284	20	One of the short-comings in CALPUFF which people are
284	25	handled currently in the post-processor of CALPUFF
285	12	that we use in this case. But in CALPUFF you can form
285	17	currently evaluating CALPUFF with the Southwest
286	13	be used in CALPUFF. So basically it would be tools
286	14	that convert CMAQ to CALPUFF or CAMx to CALPUFF
287	18	in CALMET and CALPUFF.
288	7	Scire to present CALPUFF Development, Maintenance &
288	10	time that has been allocated to talk about CALPUFF and
289	14	talk about CALPUFF development maintenance and also
290	5	powerful system. CALPUFF system undergoes continual
293	6	We put the (inaudible) turbulence profile in CALPUFF.
293	9	does. CALPUFF has something very similar based on the
294	13	it since the development of CALPUFF was started; we
301	4	Workshops contain misleading statements about CALPUFF,
304	14	this? He has attributed it to CALPUFF being less than

Page	Ref No.	Keyword = "calpuff"
304	20	observations. Is that a CALPUFF issue or MM5 issues
307	15	But I think I teach a lot of courses with CALPUFF
308	12	Comparing the models I believe CALPUFF is the viable
308	23	in that time step. CALPUFF accounts for that AERMOD
309	10	CALPUFF will treat turbulence downwind of each
309	12	with AERMOD, you have it with CALPUFF now today with
309	13	CALPUFF. Calm winds (inaudible) the conservative or
309	16	calm. CALPUFF will treat the calm winds.
309	20	CALPUFF retains previous hours emissions. Coastal
309	22	in AERMOD and CALPUFF has an expensive one.
311	5	upper portion. CALPUFF suggests that these plume in
312	6	CALPUFF in a near field application.
312	10	airport station. We put in the sources in CALPUFF and
315	15	CALPUFF as well. You believe the turbulence controls
317	16	times the observation and CALPUFF was conservative but
317	18	Just in terms of the chemistry this is CALPUFF
317	22	simplest chemistry in CALPUFF does very well in
318	17	applying CALPUFF in those kinds of cases. If an
319	4	approach. We still have the CALPUFF Performance
319	12	performance evaluation of CALPUFF and move on and take
320	25	that this is not a CALPUFF verses AERMOD and I would
321	13	apply both to AERMOD and for CALPUFF. It's not as

Page	Ref No.	Keyword = "cell"
92	25	'all-source' runs used the 1x1 and 3x3 grid cell
113	3	So you select the Grid cell based on
113	7	grid cell where my source resides. And you can get
113	8	surface and upper-air data located in same grid cell.
113	9	And hourly values available for every grid cell.
114	6	have extracted 2002 MM5 data for the grid cell
114	8	extracted 30x30 grid cell
114	17	30x30 grid cell sub-domain of the data we extracted to
114	18	feed with the tool. That shows the grid cell that was
117	3	the MM5 model for that grid cell which was about 0.3
119	22	for that grid cell and fed that into AERMOD through
120	11	that tower would have put it in the next grid cell
136	22	covers more than one grid cell why not use each source
136	23	with its own grid cell. It would be not an over night
137	20	latitude, longitude, (inaudible) or a grid cell if you
137	22	for that grid cell.
138	5	And that becomes your grid cell. Again, there are
140	24	urban grid cell from MM5 or WRF and not have to turn
148	16	downloading data from the upper cell web site.

Page	Ref No.	Keyword = "cell"
189	10	Depending on how much of the grid cell is on the
191	21	30 meter grid cell and this is supposed to be the
215	20	data why not pick the grid cell for each source
258	21	turbulence for that grid cell. But a new convective

Page	Ref No.	Keyword = "cells"
93	9	using those cells.
121	11	grid cells over the whole city. Why not use grid
121	12	cells for each source. May not be a perfect solution
259	7	grid cells. That would mask this effect to some
260	5	convective mixing height where one of the grid cells

Page	Ref No.	Keyword = "chemistry"
97	7	up with new (inaudible) chemistry for (inaudible).
101	14	more complete chemistry. So at that point we are
105	21	chemistry and plume dispersion. The ozone and PM
274	9	had put out an RFP to address some of the chemistry in
274	15	formation in chemistry that we haven't been looking
274	19	to the CALPUFF chemistry. This work was sponsored by
274	21	that the treatment of chemistry in CALPUFF was
275	2	handling those aspects of the chemistry that were not
275	7	it is a reactive puff model which is a chemistry
275	10	developed by ARAP. SCICHEM includes chemistry which I
275	21	chemistry, the PM chemistry and the
275	22	aqueous-phase chemistry, The gas-phase chemistry is
275	24	comprehensive chemistry - it requires a fair amount of
276	4	chemistry and it would be like reinventing the wheel
276	6	full chemistry in CALPUFF, which would make it more
276	10	chemistry can be improved by using techniques similar
276	16	treatments for PM formation and cloud chemistry to
276	19	gas-phase chemistry option and updated the RIVAD
276	20	chemistry rate constants. And we tried to make sure
276	24	example there are four options for chemistry in
276	25	CALPUFF (MCHEM=1,2,3,4). So the new chemistry options
277	3	Let's look at the chemistry of NOx plumes and the
277	4	three stages of the gas phase chemistry. So in the
277	5	early stages of the plume we have NO/NO2/O3 chemistry
277	6	and the RIVAD chemistry mechanism treats this stage of
277	11	chemistry of the plume in the far field where you will
277	12	have the full VOC/NOx chemistry and for that of course
278	13	The current treatment of PM chemistry in CALPUFF

Page	Ref No.	Keyword = "chemistry"
279	3	Okay. So for the new chemistry, like I said, the
279	6	The new PM chemistry in CALPUFF is the following:
279	19	Coming to the original CALPUFF cloud chemistry, there
279	20	is no explicit treatment of aqueous-phase chemistry.
279	21	In the MESOPUFF-II chemistry option uses a simple
280	5	So the new aqueous-phase chemistry module implemented
280	24	chemistry data base that we have used in previous
281	4	the gas phase chemistry and the ISORROPIA module. And
281	6	chemistry is activated by using a switch which already
281	20	to not just the MESOPUFF chemistry option but to the
283	10	chemistry mechanism and original PM treatment
284	15	Finally for the aqueous-phase chemistry tests, the
286	5	chemistry was not improved in the sense that we didn't
286	6	incorporate the full treatment of chemistry in this
287	15	chemistry option), is to incorporate cloud fields in
288	5	perspectives from the more chemistry side and the work
289	22	from Prakash about a chemistry set rule becomes part
317	18	Just in terms of the chemistry this is CALPUFF
317	22	simplest chemistry in CALPUFF does very well in

Page	Ref No.	Keyword = "clarification memo"
34	12	clarification memo to get at the more general broad
38	15	through here. Also the clarification memo section
39	11	what clarification memoranda is all about? First
40	19	a clarification memo goes out it certainly goes
43	2	clarification memo for CALPUFF. We'll be talking
49	2	through a clarification memo as to what the issue is
133	15	thinking about addressing through a clarification memo
235	4	this idea putting out a clarification memorandum on
239	20	the clarification memo earlier and will get into more
253	12	field clarification memo on a little more detail.
263	21	is the near-field Clarification Memo. Thought I'd
320	4	of Appendix W as was laid out in a clarification memo

Page	Ref No.	Keyword = "Class I"
239	9	for Class I increments analysis. At the time the
239	22	Class I AQRV [ed. Air Quality Related Values]

Page	Ref No.	Keyword = "clearing house"
10	23	Clearing house. We're re-energizing it and getting
17	13	Model Clearing House that we will get into shortly in
33	12	Now you heard Chet mention the Clearing House quite a
33	14	to have an active and effective Clearing House. For
33	17	using the Clearing House. We didn't maintain it and
34	7	issues arise, the clearing house is really focused on
35	8	Now in terms of the operation of the clearing house,
35	10	the focus of the clearing house. Obviously there have
35	18	those would be submitted to the clearing house but
38	14	Clearing House. You can access the Clearing House
40	4	Clearing House process that Tyler has just presented.
41	19	the Clearing House as far as process. There are
50	15	Clearing House process has been stressed as of late.
50	21	constitute consulting with the Clearing House. If
50	23	is fine and I've talked to the Clearing House or
51	6	or by the Clearing House and if you feel as if you
51	13	Clearing House hasn't really said anything.
52	2	background if you are going through the clearing house
52	20	Clearing House, it puts us all in potentially harms
53	9	Clearing House process that provides that.
127	19	Model Clearing House.
134	21	the situation. And using the clearing house probably
207	24	Model Clearing House procedures for simulating a
208	15	that Model Clearing House procedure for non-downwash
222	8	Roger Brode: Right. The Model Clearing House
223	3	clearing house procedure. You don't have to do
265	9	clearing house so you didn't. So now we're in a
265	14	sort of the Model Clearing House needs to be
304	5	any staff member and any other clearing house memos.

Page	Ref No.	Keyword = "Model Clearing House"
17	13	Model Clearing House that we will get into shortly in
127	19	Model Clearing House.
207	24	Model Clearing House procedures for simulating a
208	15	that Model Clearing House procedure for non-downwash
222	8	Roger Brode: Right. The Model Clearing House
265	14	sort of the Model Clearing House needs to be

Page	Ref No.	Keyword = "complex"
14	11	problems and move modeling forward. It's a complex
29	24	complexity of CALPUFF requires a pretty extensive
43	9	involving complex winds. So if (inaudible)
83	9	complexes. These monitors are literally on
83	19	those first complexes. The problem with this and it
194	4	complex terrain and when you are into complex terrain
253	13	Discuss in more detail some examples of complex wind
264	7	cases when there is no preferred model. So a complex
264	22	accepting CALPUFF for complex wind situations, as this
264	24	using CALPUFF for complex wind situations, acceptance
266	4	treatment of complex winds is critical to
266	16	consideration become complex winds by their
266	23	Let's talk about what complex winds are. There
266	24	are examples of complex winds not deeply
269	7	have to understand what the complex wind
269	18	So there's a lot of complexity involved there and
270	5	features of the complex winds toward that
270	19	complex wind applications is not well-documented yet
271	23	complex wind evaluation with Lovett using CALMET.
273	23	applied with the assumption if I have complex winds
276	2	also increases the complexity of model and as you just
276	3	heard we talked about SCICHEM which has the complex
276	7	expensive and complex and kind of hinder its use for
296	10	The separate and more complex issues of model
309	24	model for complex terrain. It cannot handle complex
311	2	This is looking at a complex terrain case. These
311	12	doesn't have the ability to do the complexion and it's
312	2	this is an appropriate complex terrain case to use
317	9	complex terrain. There was one coastal line group
321	8	its ability to handle the complex situations and other

Page	Ref No.	Keyword = "concentration"
48	6	much lower concentration on the stack just below.
48	8	much higher concentration in orders of magnitude in
61	8	concentration as many of you are familiar with and
61	9	then calculate inhalation exposure concentration. Now
61	21	HAPS, we don't have at risk or reference concentration
64	23	now. So how does that concentration outside relate to
64	24	the concentration in this room or wherever you spend
65	2	relate that to the concentration from the dispersion
65	6	up with an exposure concentration or a breathing level
65	7	concentration that someone might breathe. Then we do
71	14	concentration. What a background concentration

Page	Ref No.	Keyword = "concentration"
71	23	background concentration. We looked at things like
72	7	that we do have a background concentration and the
73	18	and once you have this ambient concentration at a
74	6	take that breathing level concentration and apply the
75	21	our background concentration. So that might not be
81	15	are the monitors that show higher concentration than
88	25	facility wide AERMOD concentration was 0.2 micrograms
138	14	concentration or something like that.
154	12	concentration to the standard ASOS concentration.
161	6	concentration prediction for a whole slug of
193	15	forces the model to calculate centerline concentration
195	17	the concentration, date, direction, distance, and
195	19	concentration. We also added a feature to find the
195	20	maximum concentration for automatic receptor distances
195	24	finds the max concentration of distance regardless of
201	25	the overall maximum concentration from PROBE or
202	3	associated with maximum concentration as well as
202	6	concentration and then refine receptor spacing to 1,
202	8	refine the maximum concentration as close to the max
203	9	This is an example of output see the concentration is
203	11	is the maximum 1-hour concentration calculated by
203	20	the max concentration for all directions calculated
227	24	see if the actual modeled peak concentration peak are
272	3	Concentration so for three hours Robust Highest
277	10	concentration from that. It doesn't treat the
277	15	the end of each time step the ozone concentration is
277	16	reset to the background concentration in the puffs
277	23	and calculate a new puff O_3 concentration at each time
277	25	concentration at the previous time step and the
278	2	background O_3 concentration.
278	19	a constant NH_3 concentration. It also includes a
299	9	pointed out it had almost no change in concentration
308	7	concentration. This doesn't mean there's a terrible
310	10	is the desired concentration saying more of the line
310	18	concentration that is important. When you have
311	15	correct concentration when that plume infringes on the
314	7	length that are higher than the highest concentration
315	24	and 89% from design concentration from this source.
316	4	concentration when you're doing a regulatory study.

Page	Ref No.	Keyword = "concentrations"
45	10	ASOS data produced higher concentrations than using
62	3	concentrations all that we would suggest you use in
71	19	So we developed background concentrations and I won't
72	9	concentrations as we've gone through time from the
74	7	unit risk estimations and the reference concentrations
81	21	we have had amazing lower concentrations. We don't
87	17	attainment demonstration, concentrations will be
87	19	and RACT, concentrations at the monitor were
89	7	we expected AERMOD to predict lower concentrations
90	23	saw consistently higher concentrations using AERMOD at
98	24	on criteria pollutant concentrations, visibility, and
150	12	ASOS data on AERMOD concentrations. Secondly they
155	15	concentrations that you'll get. So there is a desire
155	18	conservative on your concentrations.
161	3	concentrations is one of the things the sub group is
195	9	distance to calculate concentrations. You can specify
203	12	AERMOD and these are the scaled concentrations that
214	13	long term averages would be for lower concentrations.
266	5	estimating design concentrations; if it isn't
272	4	concentrations. This is AERMOD for reference it did
276	14	the background concentrations to CALPUFF.
277	9	ozone concentrations and calculates the OH
280	10	calculate liquid-phase concentrations and cloud pH.
285	23	concentrations. So this modification accounts for the
285	24	fact that you expect ammonia concentrations to be
286	17	specification of the oxidant concentrations like OH
306	20	results in terms of the concentrations. All you are
308	4	concentrations. You have to remember that's point by
310	22	effect predicted violation those lower concentrations
312	24	concentrations a range of plume that that results in
312	25	concentrations being predicted upwind concentrations
313	3	concentrations and SILs. You may have a background
317	23	predicting the sulfate concentrations. (inaudible)

Page	Ref No.	Keyword = "convective"
125	8	calculating will be convective velocity scale, surface
138	23	convective parameters, etc., or is there some blend
176	16	calculating the convective mixing heights and it gives
185	7	and albedo affect the convective boundaries
197	3	parameters: Wind speed (stable and convective), cloud
197	4	cover (stable and convective), max/min ambient temp
197	5	(stable and convective), solar elevation angle (stable
197	6	and convective), convective velocity scale (w*)

Page	Ref No.	Keyword = "convective"
197	9	u* and L, and also calculates convective mixing
209	20	the model especially for convective conditions where
257	16	didn't count for the convective mixing height over
257	19	Gulf of Mexico. So they made some convective mixing
257	22	convective for day and night on end for a long period
257	23	of time. So this convective boundary layer could sort
258	15	flux required to sustain convective mixing height
258	18	heat flux falls below the threshold, the convective
258	20	for that hour which eliminates any convective
258	21	turbulence for that grid cell. But a new convective
259	3	higher of the mechanical and convective mixing
259	8	degree. The convective velocity scale which is path to
259	10	convective turbulence is in the atmosphere. That is
259	11	also set to 0 for convective mixing height. That
260	5	convective mixing height where one of the grid cells
260	6	within that domain showing convective mixing height so
260	8	convective mixing height increases then drops
267	5	differential heating under convective conditions
268	20	a convective boundary layer that develops thermal

Page	Ref No.	Keyword = "data"
26	21	improvement in modeling science and data but make it
36	21	archive these decisions in a searchable database
37	15	allows full public access as to the database. So you
38	22	guidance database there at the bottom. That really is
44	4	observer-based National Weather Service data with
44	5	AERMOD and treatment of missing airport data in
44	12	The one about the airport data and AERMOD. Here is
44	14	that the AERMOD requirements for data completeness
44	21	observer-based data from airports. There were some
45	10	ASOS data produced higher concentrations than using
45	11	observant based data. That might be okay for us but
45	15	acknowledge there may be cases where ASOS data might
46	6	ASOS is with the Missing NWS data more extensive with
46	9	for reporting airport data. We've seen a lot more
46	10	missing data than we did in the early 90's or earlier
46	12	within the modeling community. Missing airport data
46	13	was pretty rare when ISC required 100% data capture so
46	14	it wasn't that big of a deal but today missing data is
46	23	looking at which is to potentially use another data
46	25	wind data. It turns out right now we're using a
66	16	don't want to over analyze data and spend all sorts of
67	15	updating it was the meteorology data. Everyone who

Page	Ref No.	Keyword = "data"
67	17	SCRAM and get all sorts of meteorology data and
67	18	download it and with all the five year data sets that
67	20	and we actually developed meteorology data to run a
68	2	with this data set we have. And it's also been
68	3	supplemented by many states data. Wisconsin sent me
68	6	Wisconsin and other states have been sending me data
68	8	So we're building a nice archive of meteorology data
69	20	had the data for building downwash would add a lot of
70	10	used airport surface data around these airports to
71	11	bins that we broke up the data a few seconds ago.
71	24	different clean wind sectors using monitoring data.
72	3	monitoring data.
72	14	monitors as compared to the NATA data. The value of
73	4	particulate that we looked at and the monitoring data
73	5	that is out there is broken up into two data sets. We
74	17	NATA data into what's called a KML format. You click
74	22	in here who want some of the finer resolution data, I
74	23	can work on that when that data comes available.
75	5	there were some issues with the data and inventory.
75	6	The states look at the data for about two or three
87	20	used. We used 2002 met data - same as base case
87	21	emission data year. This is where Roger and
87	24	We have some pretty good met data in the area.
88	9	data sometimes. We had the one minute data that Roger
88	11	one minute data that was augmented by ASOS data were
88	12	necessary. We really like the SEARCH data but we had
88	15	PM 2.5 Birmingham monitor. The one minute data is the
88	16	green and the SEARCH data is the blue. So the SEARCH
88	17	data was valuable but it was unfortunate that we
88	19	line represents the data that we did use. This is the
99	10	CALPUFF Database and that was used for many years.
101	4	partnership developing background databases. We did
102	24	observed data which is a different year is (inaudible)
103	3	we run MM5 to get the surface data and we see we can
103	7	take 12km MM5 data and put it through CALPUFF or
105	23	source impacts. The other is the advances in database
106	2	model databases across the US and also trained a lot
106	14	extra effort kept these databases in use.
107	24	building tools to deliver these gridded data directly
108	10	data including state-of-practice "National Weather
108	16	on how can gridded meteorological model data be used.
108	18	case study where MM5 data had been extracted and been
108	20	to use AERMOD data and MM5 directly into AERMOD. So
109	14	documentation for the gridded meteorological data
109	22	this so that we understand are the data files getting

Page	Ref No.	Keyword = "data"
110	13	better than National Weather Service data going to the
111	16	data are key inputs to air quality models such as
111	18	NWS data currently used in most cases; however but met
111	24	dimension in the problem. Upper air data sparsely
112	3	airport data that we have significant gaps in NWS data
112	13	meteorological data collection is an option but is
113	5	sparsity of observed data. I don't have to look for
113	8	surface and upper-air data located in same grid cell.
113	13	height. What's not provided by MM5 data that AERMOD
113	18	data input data plus surface characteristics and
113	22	to take gridded MET data from MM5 in this case.
113	25	it outputs data again formatted for AERMOD. So the
114	6	have extracted 2002 MM5 data for the grid cell
114	12	and the traditional airport data to AERMED approach
114	17	30x30 grid cell sub-domain of the data we extracted to
114	24	gridded data on the right for the lowest level. They
116	3	data for that H1H 24-hour average again this is a
116	16	between the two except when you feed the airport data
117	14	Then I'll mention the 1-minute ASOS data so that's a
117	20	we looked at the 1-minute ASOS data so we went back
117	24	supplemented airport data through air surface through
118	3	factor of 7 higher with the MM5 data to a factor ratio
119	2	AERMOD tool versus the airport data both looking at
119	25	we had partial sub-sets of the MM5 data. We don't how
121	2	terms of the use of gridded MET data just based on EPA
121	14	domain like we do now for the airport data. There are
121	18	validate the use of MM5 AERMOD data against some field
121	19	studies data. We have a lot of field studies that
121	25	taking MM5 data directly into CALPUFF model. Should
122	6	with either MM5 or more data. They don't need to
122	19	to models expands, we have airport data we have
122	21	data whatever. Other (inaudible) that are either here
122	24	whatever meteorological data you have for whatever
123	7	data, have fun or do we actually does EPA develop an
123	8	archive of MM5 data and you just go online and
123	9	download the data. I'm all set to go. Put all the
123	16	Model Data Reformatted Program that we have been
124	3	(inaudible) in using Mesoscale data being either from
124	5	right now we're interested in using this data to drive
124	11	meteorology data from MM5 and WRF and CALPUFF.
124	18	meteorological data used using CALPUFF.
124	20	MM5 data and it could be read directly into CALPUFF.
126	21	measure data for stuff like wind direction. We also
126	25	measured data. Another aspect of this is to develop
128	8	2006, we asked Shell Oil to collect meteorology data a

Page	Ref No.	Keyword = "data"
128	12	Shell saying that I strongly urge you that data that
128	15	and agreed that they would collect data using buoys
128	21	We expect Shell to collect that data sometime in last
128	25	What I intend to do with the data and I let Shell know
129	2	that. We will provide that data to University of
129	8	provide that data for them to use to assimilate that
129	9	data to WRF and to use it to (inaudible) to do the
129	24	(inaudible) shelf data and weight information.
130	5	the information data he used. Basically he used it
131	17	to use. It is my desire to take that data and use it
131	20	that they don't want to do this. Use this WRF data in
132	8	fix ASOS data until it matched MM5 data. Is that
132	10	Roger Brode: I filled in gaps in the ASOS data
132	11	with other ASOS data that were more highly resolved
132	19	but the fact that supplementing the ASOS data with the
132	21	with what we're seeing in the MM5 data was an
132	23	does suggest is using standard ASOS data as is for
132	25	because you're throwing out large chunks of data that
133	6	be using 1-minute data not necessarily going to MM5.
133	9	that I don't have any airport data is representative
133	11	that. If I can use prognostic data and we have
133	16	is treatment of airport data in AERMOD. One is ASOS
133	21	verses observant based data. You will see a little
135	12	CALMET can already take the MM5 data, why do you need
135	22	multiple gigabytes worth of data. This presents to
135	25	large (inaudible) data sets and large (inaudible) data
136	15	Roger. If you have gridded met data for AERMOD and
137	13	you are extracting the data from the grid? Is it a
137	14	grid file that you're extracting the data from. Just
137	17	(inaudible) program that extracts data from MM5.out
137	21	know which one you want to do. Then extract MM5 data
139	21	specific data set. Currently it's been tested on 2002
139	22	MM5 platform data that's used in all CMAQ
139	25	discussion about other approaches taking the data
140	5	data. Then it can go through AERMET with your own
140	6	surface data. Especially out west if I have site
140	8	using. But there's no upper air data in sight using
140	9	gridded met to generate (inaudible) upper air data to
141	19	done at utilizing that data for a little better upper
146	3	ASOS/Met Data - Alan Dresser (NJDEP) /
147	6	data in the processing area as well as some new text
148	3	fall under the meteorological data and processing
148	14	processing upper air data. Just some recommendations
148	16	downloading data from the upper cell web site.
148	20	national weather data or site specific onsite data

Page	Ref No.	Keyword = "data"
149	25	ASOS data met data group, the urban issues group and
150	9	respect to the ASOS and met data processing sub group
150	11	focus on. One was the impact ASOS data versus pre-
150	12	ASOS data on AERMOD concentrations. Secondly they
150	14	data and improving quality assessment and reporting in
150	25	using pre-ASOS and the ASOS met data. Looking at the
151	10	get with the ASOS data was much less an issue for
151	15	difference in the two met data sets that were used.
151	17	conventional observation met data in one case. In the
151	19	the observational data it's observer temperature,
152	15	with ISCST3. In general we felt the use of ASOS data
152	18	of ASOS data is overall less of an issue with AERMOD.
152	19	Another area of work that the met data issues group is
153	6	number of missing data currently reported. Also what
153	12	much data do you need to do your average. So we've
153	16	data compared with the hybrid or the average. Here
154	16	prediction when using the hourly met data. It varies
154	20	met data.
156	10	does it helps to organize the data a little better.
157	14	combining the population information with other data
157	17	This is some land cover data that shows impervious
157	24	generate population data from that application.
158	12	information to sort of collaborate the population data
158	18	representative met data. What do you do if you don't
158	19	have any representative met data and I think the
158	20	future is possibly gridded met data or the MM5 to
159	7	Then lastly representativeness process met data you
159	9	criteria or some information on is the met data that
159	16	data and source information and this is a site
161	23	the field studies relative to these data basis as
166	4	surface weather service data. Think we've got a
166	15	of newer elevation data is in that 83 but some
166	16	elevation data is in that 27. So dealing with the
172	8	upgraded AERMAP to support newer elevation data
172	11	from USGS Seamless Data Server in GeoTIFF format which
172	22	familiar with the data to make sure there aren't other
172	24	quality data set than DEM. We know a lot of issues
172	25	with DEM data. One being just the fact that you have
173	2	different horizontal data in neighboring DEM files so
173	3	that's an issue. Now the default format for that data
173	9	7.5-min DEM file or data for your application. If
173	12	is no data for that quadrangle and that can create
173	15	all 7.5 data you have and then if you have a gap like
173	17	It'll use the higher resolution data to first get the
173	19	degree data. Of course with the met data you don't

Page	Ref No.	Keyword = "data"
173	23	key words optional. So if I go to the seamless data
173	24	server and download the domain of NED data while I've
174	4	the available data. That basically controls just how
175	19	with (inaudible) if it was missing in the data file.
175	23	have the elevation in the data file which we were not
176	4	it's missing any data rather than using the default
176	7	inputs for site-specific data that came up recently.
176	11	if we had site specific data in one time zone and
176	12	wanted to use with surface data from the next time
176	21	data derived from MM5 data then we don't want to be
176	22	limited to the 12Z (inaudible) data because we're have
177	6	as an interim solution to fix the data. You don't
178	10	the representativeness of the meteorological data and
179	24	evaluation databases to make sure there is any changes
181	16	well. And then the met data representative issue we
182	2	met data representativeness even sort of evaluate or
182	5	evaluation data sets to understand what's going on. I
182	8	actual source and the actual field study data; if the
182	12	10 meter on site data. It appeared to improve model
183	2	met data needs as summarized it was designed to accept
183	4	upper air data. It's also designed to accept more
183	23	same concept but uses different land covered data and
185	16	available. Current version supports 1992 data and
185	17	NLCD data this is 30 meter horizontal resolution and
185	21	land cover data is not designed for the purpose of
186	15	what 1993 NLCD data for North Carolina. That's
188	11	NCLD data for one thing is more representative
188	18	attention. If you want to supplement NLCD data with
189	20	elevation data sets and NED I mentioned for AERMET is
189	21	being upgraded to handle the NED data. There's also
189	22	SRTM data. We think we can use both these data sets
189	23	at roughly same resolution as the land cover data to
189	24	estimate the average height of obstacles. That data
190	3	the signal to the Shuttle. The elevation data are
190	7	of obstacles within the land covered data we can
190	10	work. That's the NED data on the left for
190	17	is low. That's the overlay on the land cover data so
190	23	how it would work in the city. That's the SRTM data
191	6	same sort of thing. There is land cover data,
191	12	This is Chicago. That's NED data pretty flat. That's
191	13	kind of a busier SRM data and that area looks kind of
191	14	weird and that's a data gap. We see elevations of
192	4	have been data limited in terms of these dispersion
192	5	models. We've got airport data what else are you
192	6	going to use. We've got land covered data what else

Page	Ref No.	Keyword = "data"
192	8	data driven now so we got land covered data plus these
192	10	We've got gridded prognostic met data. We've got
193	23	Jim Haywood. You can enter the data via prompts or by
198	12	representative problem when you use airport data. It
199	2	would input and validate the data. Then the program
199	23	date is here, this is a point source, building data.
199	25	and other inputs. Here's your met data and under surf
200	3	terrain data flags and the coordinates and then the
200	6	from the prompts your data can be English but from the
200	9	It's a pretty good way of inputting the data this file
200	15	source data, building data, terrain data or met data.
200	17	source data you cannot change source type. You can
200	20	When you run terrain data it will ask you if you want
208	12	we need is some test data to do some kind of
208	18	data out there or something that could inform that
211	18	Met Data. Urban issues and surface characteristics
211	23	the airport site where the met data is being corrected
212	6	with an idea to utilize more of this data in the model
212	19	feeding all the data into AERMOD to give us an
215	6	prognostic meteorological data with the model and we
215	10	processing gridded met data as pseudo-observations
215	20	data why not pick the grid cell for each source
215	25	land cover and elevation data, AERMIC is working on an
216	3	utilizing this data directly in the model. As I
216	6	the land cover and elevation data (SRTM-NED) will be
217	12	The representativeness of met data will always be an
217	19	performance field data actually improves. Then that
217	24	access to the data might allow some other enhancements
218	13	better accommodate future enhancements as new data
219	2	issued in the cases of 1992 and 2001 and old data may
219	10	cover data in the SIP format maybe from an alternative
219	11	data source so if you have land cover data in
219	24	files that is a data dump of the gridded land cover
220	18	land cover data where there has been recreational
220	23	data problems that's been in other things like in ASOS
220	24	there's data problems, land cover there's data
221	3	and we hope people will take some time and QA the data
221	16	systems with their own state land cover data set up
228	18	replace if you don't have onsite data or
228	19	representative meteorological data. Could you use
228	22	data?
231	14	evaluation data base. Now we checked on your web site
231	19	Is the creation and maintenance of this data base an
231	22	data base that is agreed upon by both OAQPS and the
232	15	tests that can be used. As far as the evaluation data

Page	Ref No.	Keyword = "data"
232	16	bases the data is out there and I think the only
232	20	know that this outweighs evaluation data sets by
232	25	along with was to get the evaluation data bases
233	6	CALPUFF modeling system that test data set. For now,
234	17	recommendation for using the new ASOS data sets 23505
234	21	or 2 minute [ed. averaged] (inaudible) data to kind of
235	5	use of ASOS data with AERMOD and dealing with missing
235	6	airport data with AERMOD. I don't think we have an
235	9	of that data set especially for applications involving
235	10	lower level releases where part of the data that
235	15	as to whether the met data being used for the
235	22	In terms of the ASOS data, one of the big obstacles we
235	24	with that is that the data files themselves are not in
236	2	the files but the data files themselves don't always
236	4	obstacles in processing the 1 minute data cleanly. So
236	7	given us an opportunity to learn more about that data
236	13	modify AERMET to read in that as an optional data
236	14	resource to supplement the other types of data
247	3	you develop meteorological data sets which take quite
247	12	meteorological data sets through CALMET there are also
248	10	data set because they were not based on a regulatory
259	14	illustrate one of the scenarios in test the data set.
262	3	Maybe it's more so in the CALMET data and (inaudible)
267	13	data may be significant issues for a near-field.
267	14	Do you have adequate data resolution to resolve
268	22	and representative of met data may be significant
271	25	tried to utilize the onsite data from the Lovett site.
272	5	very well. That was one of the data bases AERMOD was
273	14	insights into treatment of tower data in CALMET. So
273	16	representatives on sight, met data documenting the
280	24	chemistry data base that we have used in previous
285	18	Wyoming Technical Air Forum (SWWYTAF) data base. We
287	22	evaluation study with the SWWYTAF data base and the
287	24	provided the SWWYTAF data base for model application
288	20	data with the surface date. We became aware of this
292	5	processors updated to accept new or revised data
292	8	different versions of met data. Basically, we are up
292	23	options for different terrain data. There is what's
295	4	do with data, or hardware or input errors, user type
303	20	data that EPA is presenting at these various forums is
303	21	made available to the public. The data sets not just
304	3	that the EPA provide the data that is used in the
305	15	in the MM5 data, you can run CALMET in the pure
305	24	Sydney in Australia. We have identified data and we
306	10	emphasis maybe on the MM5 data and certainly the

Page	Ref No.	Keyword = "data"
311	9	project source. So we're using that data with the
312	15	source of the met data you will get a plume going in
316	8	input even simple ones and in this case the data
316	10	anything, you can get enormous changes. The data
317	19	performance on the data predicting sulfate that
318	10	and data based should be sought, even in case-by-case
318	14	expense of model and data base accuracy. In cases

Page	Ref No.	Keyword = "database"
36	21	archive these decisions in a searchable database
37	15	allows full public access as to the database. So you
38	22	guidance database there at the bottom. That really is
99	10	CALPUFF Database and that was used for many years.
105	23	source impacts. The other is the advances in database

Page	Ref No.	Keyword = "databases"
101	4	partnership developing background databases. We did
106	2	model databases across the US and also trained a lot
106	14	extra effort kept these databases in use.
179	24	evaluation databases to make sure there is any changes

Page	Ref No.	Keyword = "datum"
166	8	the horizontal datum conversion reference datum
166	12	to an older datum, North America Datum 27 is basically
166	14	coordinates. And the newer datum is NAD 83 so a lot
166	17	conversion from your source coordinates in one datum
166	18	to terrain elevation coordinates in another datum
172	14	datum so you don't have to worry about mixed datum

Page	Ref No.	Keyword = "default"
44	16	under regulatory default option. AERMOD doesn't
149	21	for and we've set a default value in the
169	3	urban option for AERMOD and the default value is 1.0.
169	9	other than 1.0 should be treated as a non default
169	11	is make it explicitly a non default option. It
169	13	will have to turn off the default switch and provide
170	23	Fortunately it's a non default option so it's not used

Page	Ref No.	Keyword = "default"
173	3	that's an issue. Now the default format for that data
174	3	your inputs to AERMAP the default will be to use all
176	4	it's missing any data rather than using the default
185	2	default domain recommend 1 km radius for surface
185	14	default is no sector or distance dependency average or
194	24	make the default of 5 km for flat terrain with or
200	25	no downwash. 5 km default probe distance (25 m
212	23	we want to do that as a default option but at least it
255	11	factors, the new default parameters for optional
255	18	the new default parameters and the final column is
255	20	default parameters -- well this is a little more
257	25	So some new default parameters were incorporated. The
258	23	default mode in applying CALMET that behavior is
258	25	including the default minimum mixing height of 50m,
259	6	height, and the default option for upwind a of the
259	19	with the default threshold is 0.05 W/m2/m. So it
261	3	Then a new regulatory default switch was added to
261	4	CALMET. Prior to that there was no regulatory default
262	5	have come to realize there is no default value for
262	10	to turn on the regulatory default. Just to make you

Page	Ref No.	Keyword = "DEM"
49	11	modeling demonstration.
55	2	Then we'll have Leigh Bacon from Alabama DEM
57	24	to demonstrate attainment, it's necessary to address
59	13	monitors as part of their demonstration efforts. You
79	9	Next we have Leigh Bacon from Alabama DEM. And
80	12	we had to develop had an attainment demonstration
84	21	demonstration. We awarded the contract in December,
87	17	attainment demonstration, concentrations will be
92	10	attainment demonstration. We do think that future
95	21	or attainment demonstration given the nature of those
106	8	related studies demonstrate utility of PGMs for this
114	4	being studied for multi pollutant SIPS demonstration
137	6	be a perfect solution but if we can demonstrate that
145	23	very democratic voting process. Further narrowed it
163	15	a lot of testing and work through the demos or beta
167	9	certainly a demanding process to go through these
172	2	problems with processing Alaska DEM files. As you go
172	24	quality data set than DEM. We know a lot of issues
172	25	with DEM data. One being just the fact that you have
173	2	different horizontal data in neighboring DEM files so
173	7	support use of mixed DEM files. When the issues have

Page	Ref No.	Keyword = "dem"
173	9	7.5-min DEM file or data for your application. If
173	10	part of your domain for the DEM 7.5 minute quadrangle
173	22	by both the mixed DEM and NED is to make the domain
217	17	we can do it and demonstrate value at it in doing
227	19	demonstrate that a meteorological site is
231	10	equivalence demonstration according to Appeneix W.
231	24	it suitable for use in an equivalence demonstration to
232	3	demonstration until we have clear guidance on this.
232	22	equivalency demonstration in this context or not. As
233	10	demonstration is for that given application.
248	7	go through the process of demonstrating it
273	25	demonstration that it is working and how best to apply
277	18	demonstration of that in a minute. So basically after
321	10	the same level of critique and demands and the need to

Page	Ref No.	Keyword = "dispersion"
56	22	seeing the use of AERMOD and other dispersion models
58	6	specified dispersion modeling in unmonitored areas
58	9	for the potential use of both dispersion models or
58	25	dispersion modeling that would be and could be
59	11	trying to apply dispersion models or fine grid models
64	13	actually do the dispersion modeling. One of the steps
64	15	dispersion modeling analysis is generally not what
65	2	relate that to the concentration from the dispersion
85	17	(inaudible) dispersion models. Joe Sims and Tim
105	21	chemistry and plume dispersion. The ozone and PM
108	25	dispersion modeling. In addition to this, EPA
110	2	dispersion modeling applications. That's something
112	11	that's not very helpful for this dispersion model
112	17	meteorological models to drive the dispersion models.
112	21	these could be beneficial for use in dispersion models
115	13	rural dispersion. On the left you have is the H1H,
119	3	the meteorology more closely as well as dispersion
122	16	with dispersion model experts and figure what the
141	9	layer for dispersion modeling purposes before we could
155	7	And then lastly have an issue of enhanced dispersion
155	12	enhanced dispersion you'll see in the nighttime due to
165	20	dispersion model, AERMET met processor and AERMET
169	22	the release heights and initial dispersion coefficient
177	17	resources to update the APTI course 423 on Dispersion
181	12	with the zero release and zero dispersion and others
192	4	have been data limited in terms of these dispersion
209	5	up wind dispersion for plume released within the

Page	Ref No.	Keyword = "dispersion"
213	18	that algorithm incorporates up wind dispersion and
214	3	implementation but eliminates upwind dispersion
214	8	dispersion I am only doing short term averages so it
250	13	dispersion model standpoint. And despite the fact
258	5	dispersion. But the way they were implemented they
263	3	verses turbulence dispersion option in CALPUFF.
263	8	promulgated and using turbulence as dispersion doesn't
267	22	properly simulate non study state dispersion.
271	17	effects on transport and dispersion."
272	7	though. In terms of the options we had PG dispersion
272	9	half height, PG dispersion with the strain based
273	4	some significant sensitivity to the dispersion and
273	6	advanced option turbulence based dispersion strain
275	9	dispersion model in the EPA guidelines and SCIPUFF was
277	21	plume dispersion.
309	6	dispersion. It looks upwind of the met site. What
309	7	determines the downwind of dispersion is the
314	22	determines the dispersion is what's happening downwind
315	16	the dispersion and the surface characteristics

Page	Ref No.	Keyword = "domain"
103	9	This is the photochemical grid model domain where we
103	10	have a 36 domain from the (audible) carrying all the
103	11	continental US domain. We have more than 60,000
103	13	12/4km domain where we do our impact which is shown
114	9	sub-domain from the larger 12 kilometer MM5 domain to
114	14	This just shows the domain. The larger red box on the
114	15	right is the 12 kilometer eastern domain and the
114	16	smaller red box is not an MM5 domain. That is the
121	10	modeling over the domain of Detroit city I could have
121	14	domain like we do now for the airport data. There are
131	4	Oh man...Okay. This is the modeling domain that the
131	8	see that this domain is 10 km (inaudible) and
136	21	about looking at. Yeah. If you have a domain that
149	4	at the modeling domain and the area that is impacting
156	3	think the box is for the AERMOD domain that is being
172	13	download one file for your domain, you have but one
172	15	within your domain and basically have one file for
172	16	your whole domain is possibly one option. I think
173	10	part of your domain for the DEM 7.5 minute quadrangle
173	11	is completely over water for part of your domain there
173	14	so on your domain. So what you can do now is feed it
173	22	by both the mixed DEM and NED is to make the domain

Page	Ref No.	Keyword = "domain"
173	24	server and download the domain of NED data while I've
173	25	already defined the domain why do I have to do it
174	2	again in AERMAP? So you just take the domain now of
174	20	is if you define your domain in terms of latitude and
174	21	longitude. If you don't define a domain doesn't
174	22	matter at all. If you define a domain in terms of
174	24	as domain it will interpret negative as West longitude
184	25	because it is a ratio. And then as the domain a
185	2	default domain recommend 1 km radius for surface
185	10	be influenced over a much larger domain. There's sort
185	15	10x20 km domain. There's a number of options
219	25	for each of the domain for the surface roughness and
256	7	through a range of scenarios domain sizes,
256	17	at what the percent difference is across the domain
256	21	that was done a percent difference across the domain.
259	24	meters perhaps. In the next hour parts of the domain
260	6	within that domain showing convective mixing height so
269	23	domain. Trying to look for the main points
315	11	the modeling domain. You'll be using the upwind

Page	Ref No.	Keyword = "downwash"
44	9	prime downwash. It's an issue triggered by the fact
44	10	that implementation relates to the prime downwash
47	18	off building downwash effects if stack height is
48	5	height so the stack just above gets no downwash effect
48	23	turning off downwash effects. So before doing that we
49	18	Pre-PRIME downwash algorithms defined vertical extent
69	16	include things like building downwash and surface
69	20	had the data for building downwash would add a lot of
70	3	permit application where a downwash application might
115	9	buoyancy some with downwash and some without. From a
194	8	building downwash. You would need to give stack
194	25	without building downwash or rectangular area sources.
199	9	running flat terrain with no downwash and you're not
199	12	terrain with or without downwash or rectangular area
200	25	no downwash. 5 km default probe distance (25 m
201	16	building downwash. Receptors every 10 degrees out to
202	4	terrain and/or downwash, use terrain heights and
204	23	what about BPIP downwash issues. Why is that not in
206	22	selecting the dominate tier for the downwash
207	20	ISC3 in relation to prime downwash algorithms. We
208	8	bit. So you shouldn't use that procedure for downwash
208	17	downwash algorithms. If there is some wind tunnel

Page	Ref No.	Keyword = "downwash"
209	14	switch is all-or-nothing either its downwash or not.
209	24	building downwash is going to apply or not. The light
212	8	Also discussed the building downwash in issues so
221	21	the beta option to turn stack to downwash for
221	24	downwash for individual sources?
222	4	It has to do with stack to downwash as to whether or
222	10	to the issue of stack to downwash that you could set
222	12	diameter and turn stack downwash off. That's kind of.
222	13	The fact is if it's (inaudible) downwash it didn't
222	14	apply downwash so you wouldn't need to do it there.
222	17	downwash. My guess is that most capped stacks are
222	18	subject to building downwash.
222	25	if your stack is not subject to building downwash then
223	7	apply downwash for that so I think there's no reason
237	9	downwash may be affecting the emissions from the
237	10	roadway that currently unaccounted for. Downwash is
237	13	capability of the downwash algorithm the fact that we
237	15	building downwash effects on blind sources or even
237	22	nearby then the building downwash would likely apply.
237	24	comfortable feeling that what the downwash algorithm
290	20	includes the EPRI PRIME downwash module, flexible
293	18	downwash.
317	10	that involved downwash. There were no studies that

Page	Ref No.	Keyword = "downwind"
209	7	stack is downwind from the building and you have a
278	5	measurements, downwind of the Cumberland Power Plant
278	11	downwind, this effect goes away so it's mostly
282	24	case, the differences are not large at a downwind
309	5	receptors. It looks upwind to determine downwind
309	7	determines the downwind of dispersion is the
309	8	turbulence of the downwind source of the met station.
309	10	CALPUFF will treat turbulence downwind of each
310	6	station not downwind of all sources. Especially
313	2	in a random plume that can even exceed downwind
314	22	determines the dispersion is what's happening downwind
315	2	blowing downwind you are in the low roughness land but
315	6	downwind would be applied. You could be in the
315	8	after the roughness downwind has (inaudible). I've
315	19	downwind of these stacks. Does it matter, well it

Page	Ref No.	Keyword = "EPA"
6	4	to our nice and lovely EPA facility here in RTP, North
6	24	of change in EPA in the past three years. We had
7	7	started in EPA back in 1991 in the Air Quality
7	25	do that necessarily alone with just EPA. I think the
8	8	just for EPA. It's a modeling community. One of the
9	22	with these models. And that doesn't mean that EPA
14	12	issue as you all know and it's not something EPA can
19	17	somebody with you who has an EPA or Federal badge in
23	24	efforts the EPA has taken on and the efforts you have
26	9	working relationships not just within EPA, but across
29	7	the public or EPA arena. Co-chaired by Roger Brode
29	23	into the EPA approved version. Obviously the
30	5	approvals are made by EPA.
32	8	limited to EPA, OAQPS folks or broadly EPA and
32	15	had representation from 10 EPA Regional Offices, 29
37	13	epa.gov folks. Formal memos and MICHISRS records were
43	4	main point EPA preferred model for near-field
44	7	The implementation of EPA formula for Good Engineering
47	19	greater than or equal to EPA formula for GEP formula
48	12	committee that recommended the EPA consider changing
48	13	ISC-PRIME. To eliminate discontinuity the EPA
49	9	- EPA formula height; or
49	12	So based on the definition, EPA formula height does
49	19	of wake influence generally consistent with EPA
49	25	formulation can extend well above the EPA formula
50	5	above EPA formula height for some stack/building
51	16	early in the process both by EPA and FLM's. I don't
65	13	and EFIG here at EPA put together a really good
74	13	maps on the website. It's internal EPA funny money
79	24	know EPA designated areas for the annual PM.2.5
79	25	standard a few years back and EPA designated part
80	13	to provide EPA with the plan for coming into
87	12	discussions with EPA and among the study
92	19	our future projections. We followed EPA model
92	21	EPA Region 4 for all their involvement, not just
96	21	can't be because it's the EPA guideline model there
104	10	One is how to use EPA-guidance projection approach
105	12	Wyoming and the Four Corners region. And also EPA
107	21	have Bret Anderson from EPA Region 7 here to basically
108	25	dispersion modeling. In addition to this, EPA
109	3	In 2007 EPA published MM5-AERMOD Philadelphia Study
109	6	prototype in 2007-2008. Most recently in 2008 EPA
109	12	that EPA has undertook to develop. We have to
118	20	better on its own without EPA having to fund it. So
120	25	EPA we're probably not getting where we want to be in

Page	Ref No.	Keyword = "epa"
121	2	terms of the use of gridded MET data just based on EPA
123	7	data, have fun or do we actually does EPA develop an
123	19	EPA programs. In fact about nine or ten years ago, we
127	13	including EPA, Forest Service, National Park Service
127	24	Back in 2006 MMS submitted to EPA an over water
129	25	Now EPA Region 10 will work with MMS to evaluate and
130	14	pressure on EPA Region 10 to permit of drilling permit
143	8	my name is Randy Robinson. I work with EPA Region 5
144	5	EPA Regional offices. They set up 3 goals for
147	23	for EPA to revise and update and also easier for
162	5	using the model to advise EPA on these implementation
165	14	everybody here is aware AERMOD was promulgated as EPA-
168	6	In terms of the EPA executables that are going to be
180	16	problems to EPA but haven't figured out exactly what
181	21	conference paper to more complete EPA report
193	2	Michigan, Karen Wesson, EPA, Roger Brode, EPA, James
193	3	Thurman, EPA, Bob Paine, ENSR, Lloyd Schulman, TRC and
193	4	I want to acknowledge Herman Wong, EPA Region 10 who
208	21	straddle the EPA formula height earlier? The
210	23	- Al Cimorelli, EPA Region 3
210	24	- Bret Anderson, EPA Region 7
210	25	- Vlad Isakov, EPA/ORD/AMD
225	4	collaboration between AMS and EPA. Some individuals
231	4	than [ed. the EPA version] (inaudible) and we don't
231	17	the EPA do in evaluating its model before release. So
238	24	the context in which EPA has been working under with
239	3	and from the EPA side Bret's evaluation as well.
239	7	promulgated as EPA's preferred model for long-range
239	15	Earth Tech] (inaudible) that EPA as I mentioned
241	17	federal agencies in particle EPA, FLM, MMS for those
246	22	regional office modeling community from the EPA
247	17	modeling system. So again EPA was faced with the
248	2	EPA has quite a role in that. We had to make a clear
250	11	available through NOAA to EPA and they provided quite
253	18	This is stuff Tyler mentioned about EPA role as far as
263	23	while. The main is that the EPA-preferred model for
263	24	near-field is AERMOD. CALPUFF is not the EPA-
274	7	done we wanted. What we have next is at the time EPA
275	9	dispersion model in the EPA guidelines and SCIPUFF was
280	16	well as the EPA approved version 5.8 which was
287	17	tools that EPA is looking at will include cloud fields
288	22	evaluation would help solve many of the questions EPA
290	7	productivity enhancements. EPA provides no funding
291	18	examples of the EPA BART 98th percentile computations
292	16	where EPA could have benefited from ????????

Page	Ref No.	Keyword = "epa"
294	15	funding from government agencies such as EPA, but we
295	14	etc. At first, when Roger was talking about the EPA
295	20	So now we've been running it for EPA and providing
295	23	catch and fix any issues before it gets to EPA. We've
296	6	fixes were released until it was accepted. And EPA
296	14	procedures with EPA to make that happen and we are
296	21	together with EPA to do that but it was a lot of work
296	22	for us as well as for EPA. Although VISTAS did fund a
297	9	waived action by EPA. I think I realize things are
297	15	EPA has that and we're waiting some feedback on that.
297	18	hashed out with EPA several years ago and many staff
298	8	make sure that it can be turned off so that EPA at
298	17	do is change the input to 0 and EPA can issue a memo
299	12	model enhancements by EPA. The model enhancements
299	18	EPA in some of the presentations regarding the
300	5	Especially because EPA is making negative comments
300	19	I think partly accordingly what EPA said to me, Tyler
300	24	EPA has said they wanted to do and maybe they have
301	3	EPA presentations at 2007 and 2008 R/S/L Modelers
302	9	I don't know if this was just not known to EPA or what
302	12	the modeling group of EPA had a representative on the
302	14	to (inaudible) was not known to EPA but in fact
302	25	been known by EPA.
303	10	problems by presentations made publicly by EPA at
303	16	that are worth consideration by EPA. So I think that
303	20	data that EPA is presenting at these various forums is
304	3	that the EPA provide the data that is used in the
307	2	having input from EPA, land managers, MMS and
307	7	on EPA's responsibilities or MMS responsibilities.
307	19	what they want and EPA can say that as well as MMS.
307	21	the kind of the model that EPA is using with the
308	2	but I do have some examples where EPA has expressed
308	14	that EPA says they would like to develop in AERMOD
309	23	EPA has said in its clarification that AERMOD is the
310	9	I think EPA's argument is that that really matters
316	13	AERMOD. So I don't think those results that EPA is
318	7	I will just leave you with this. EPA has

Page	Ref No.	Keyword = "ETA"
292	14	ETA and [ed. provide] these codes to the public for

Page	Ref No.	Keyword = "Federal"
19	17	somebody with you who has an EPA or Federal badge in
24	11	November, 2005 and was published in the Federal
26	10	the Federal agencies, and scientific community to
51	17	believe we have any federal land representatives here
94	16	practical based on the implementation of federal,
98	5	and then the federal agencies whoever is in charge.
98	9	public and to the other federal agencies of what the
98	19	gas production project on federal land usually
165	15	preferred near-field model in Federal Register notice
239	24	we coordinate closely with the Federal Land Managers
241	2	about the discussions especially within the federal
241	17	federal agencies in particle EPA, FLM, MMS for those
242	5	needed to step back and talk with the federal
242	9	address any issues from Federal community, despite
242	12	federal agencies. In response to that, we contacted
250	2	and our federal agency partners and you all in the
251	5	planned when we had originally talked to the Federal
264	20	Federal Registry Notice promulgating CALPUFF. "We
291	16	community needs without federal funding but we

Page	Ref No.	Keyword = "fence line"
64	19	fence line of the facility. People don't live at a
69	22	fence line application. It's an application that
70	2	type impact not fence line impact for somebody's
195	8	You can specify ambient air distance or fence line
201	4	fence line direction. AERMOD is executed for each

Page	Ref No.	Keyword = "file"
18	17	We will file out the exits here and go upstairs and
109	18	gridded met products. Yes you get a file that is
114	10	be a little bit more manageable in terms of file size
130	6	and fed it to CALMET the surface file for OCS and to
135	21	CALMET/CALPUFF. Logistics file side you're talking
137	2	sort just to assign it to which met file you wanted or
137	14	grid file that you're extracting the data from. Just
142	10	to use because if you feed it into the profile file as
169	18	file option that allows you to (inaudible) by hour for
172	13	download one file for your domain, you have but one
172	15	within your domain and basically have one file for
173	9	7.5-min DEM file or data for your application. If
173	16	that just feed it one degree file to fill that gap.

Page	Ref No.	Keyword = "file"
174	5	much of the elevation file is used to determine the
175	19	with (inaudible) if it was missing in the data file.
175	23	have the elevation in the data file which we were not
186	25	1 km radius of the met tower. But the standard file
193	19	eliminate date sequence checking in the met file
193	24	input file and I'll show you an example of an input
193	25	file. Source types currently support a point, volume,
196	3	file and then you can use that input file changing
196	6	on AERMOD and AERMAP output and writes to a log file.
198	7	filename or AERMET stage 3 input filename. When you
198	18	you use user define you will generate one file for
199	19	This is an example of an input file and basically this
199	20	is the whole file itself is an AERMOD input file but
200	7	input file they are metric. And R/U, Population,
200	9	It's a pretty good way of inputting the data this file
200	12	inputs in from the prompt or the input file, AERSCREEN
224	2	input file name if you have everything in the right
232	18	for the AERMET and the header of the met file and
236	11	file that we may run across and haven't accounted for.
262	4	file that's provided with the modeling system. We

Page	Ref No.	Keyword = "files"
109	22	this so that we understand are the data files getting
113	19	AERMET processes it (inaudible) files (inaudible) for
119	23	the profile files. As if I had a tower that went up
137	18	files. So the raw and then the .out files and the
172	2	problems with processing Alaska DEM files. As you go
173	2	different horizontal data in neighboring DEM files so
173	7	support use of mixed DEM files. When the issues have
177	5	files that AERMET crashed on. We released a utility
188	20	some additional files to give an average height of
192	9	elevation files to give us some useful information.
196	2	files. When you run AERSCREEN it generates an input
197	13	you will generate surface and profile files for
197	15	.PFL files that you would use in AERMOD.
198	17	and met files generated for each combination. So when
199	3	will take over and generate meteorological files and
212	4	AERSURFACE with the elevation files. So it was very
219	24	files that is a data dump of the gridded land cover
235	24	with that is that the data files themselves are not in
236	2	the files but the data files themselves don't always

Page	Ref No.	Keyword = "grade"
18	14	graders coming in too. Are they joining us? No

Page	Ref No.	Keyword = "gridded"
107	4	the next session with respect to gridded met and
107	20	The next session is on the Use of Gridded MET. We
107	24	building tools to deliver these gridded data directly
108	9	the use of gridded meteorological
108	16	on how can gridded meteorological model data be used.
108	23	gridded meteorological workgroup in 2005 to discuss
108	24	sources and various uses of gridded meteorology in
109	14	documentation for the gridded meteorological data
109	18	gridded met products. Yes you get a file that is
109	25	application of gridded meteorological products in
110	10	using the gridded meteorological products. And we're
110	16	in the gridded meteorological modeling community that
112	16	issues by using outputs from prognostic gridded
113	22	to take gridded MET data from MM5 in this case.
114	24	gridded data on the right for the lowest level. They
121	2	terms of the use of gridded MET data just based on EPA
122	12	hosting an invited workshop on use of gridded
122	20	onsite, we have 1-minute ASOS on site, gridded met
136	15	Roger. If you have gridded met data for AERMOD and
140	9	gridded met to generate (inaudible) upper air data to
156	9	gridded on the 6x6 km basis and I think one thing that
157	5	fourteen and a half million using the gridded approach
158	20	future is possibly gridded met data or the MM5 to
163	22	gridded met tools for AERMOD and CALPUFF we look to
192	10	We've got gridded prognostic met data. We've got
215	5	So AERMIC has discussed the use of gridded
215	10	processing gridded met data as pseudo-observations
215	13	that. Also suggested to invite experts in gridded
215	19	we talked about that this morning. As for gridded met
219	24	files that is a data dump of the gridded land cover

Page	Ref No.	Keyword = "group"
7	3	was Tyler's first as a group leader for the modeling
7	4	group. For me, this is my first modeling conference
7	8	Modeling Group under Joe Tikvart and I think everybody
7	9	in the modeling group has ties to Joe. I learned a
7	11	the group today with the modeling in particular goes
8	4	of course. It really is a great group of individuals

Page	Ref No.	Keyword = "group"
11	23	with this group, we were just starting the
13	23	ourselves in this division in this modeling group. We
19	13	is our group secretary and her number is 541-5561.
21	6	you should as well. We also have folks in my group
25	17	group what we wanted to do is restate what our mission
26	16	in my group and our division support air quality
28	14	implementation work group to identify scientific
28	19	throughout the AERMOD implementation work group so
29	14	issues. We'll hear more about the work group later in
35	14	issues to be handled by our group OAQPS and other
35	20	will be referred to our new source review group headed
35	24	division. The new source review group would be the
35	25	group responsible and Roge (inaudible) is the group
40	20	through internal review from our group and our
54	23	We'll have Ted Palma of OAQPS group here to give us an
56	11	indication of the success there. (inaudible) group
56	17	effectively with the (inaudible) standard group.
57	8	(inaudible) Timin is the lead in the group and we've
57	17	PDF form. Again, our lead in our group is Brian
59	24	a bunch of mavericks. My group, SBAG, handles most of
60	7	closely as we can with his group to try to make sure,
79	20	you to Tyler and his group for having us talk. This
95	14	I mentioned, with Karen Martin's group and Mrs.
95	15	(inaudible) group and CMAQ. Roger will be talking
143	11	Implementation Workgroup. This was a work group that
143	15	on AIWG. That's the acronym for our group. Discuss
143	16	group organization and purpose. Discuss issue
143	19	group. Then talk about the issues that are currently
143	21	going on with the sub group which I'll mention in a
143	24	implementation work group that was initiated in April
144	2	Warren Peters (OAQPS). The members of that group I
144	3	believe it was a pretty large group. There may be 25-
144	13	group. I say it was successful because they had a
144	17	the implementation work group which I'm going to talk
144	19	This full AIWG group is co-chaired by myself and Roger
145	7	the AERMIC group which is the sort of scientific
145	8	technical group associated with AERMOD as Roger
145	14	I mentioned the initial AIWG group. One of their
146	15	mention in addition to this an ad hoc group that has
146	24	group had listed as a goal. They did put out an
147	15	group.
149	6	impact might be on the group of sources. Other
149	25	ASOS data met data group, the urban issues group and
150	2	the surface characteristic group. I'm going to
150	3	briefly talk about each sub group sort of highlight

Page	Ref No.	Keyword = "group"
150	7	from the sub group chairs so I appreciate that. I
150	8	think Joe is the only sub group chair here. With
150	9	respect to the ASOS and met data processing sub group
150	10	they determined a group of issues they were going to
150	21	provide some information on what the sub group has
151	6	group came up with based on that analysis was that
152	19	Another area of work that the met data issues group is
154	3	would be classified as a missing for our group. The
154	21	We'll move on to the urban issues sub group which some
154	24	input for urban option. The urban issues work group
155	22	should we be using? The group has borrowed some of
158	24	sort of out of this sub group's hands but we'll see
158	25	what happens there. This sub group has also been
159	13	of the road that this group is going down.
159	15	the sub group has done and it's focused on Baldwin met
161	3	concentrations is one of the things the sub group is
161	19	with the National Weather Service station. The group
162	7	that's been done by this group at this point and
162	19	the AIWG group as they are donating their time and
164	21	people hardly miss a call usually with the full group
164	22	and the sub group that's like two calls a month very
165	2	maybe rotations of membership on the group or could a
165	3	different sub group for a while that's something we
168	23	the Implementation Work Group and one of the items in
179	9	they are grouped it turns out that group call
179	14	truncated in the group (inaudible) but as they were
179	15	grouped there was there wasn't as wide a range and
180	20	coordinating with the work group and with AERMET some
204	20	the AERMIC Implementation Work Group and the three sub
204	24	the top three so basically presented to the group so
204	25	maybe we could form an ad hoc group anybody want to
205	4	group. We've had some calls not a lot but I think we
205	9	Just want to briefly share what the group came up with
210	8	group because this was an issue that came up with
211	7	activities of the Implementation Work Group sort of
212	10	Hoc work group first. One of the recommended
250	10	my group had a branch of NOAA meteorologist that were
250	15	over time, they were part of the group in providing
302	12	the modeling group of EPA had a representative on the
317	9	complex terrain. There was one coastal line group
318	18	argument can be made and an objective group of people
321	19	long as I'm the group leader of the modeling group, as

Page	Ref No.	Keyword = "groups"
8	2	modeling group right now is one of the best groups of
14	9	groups in passing information back to Tyler and his
145	6	us to work with other groups. Primarily that would be
145	25	up for those sub groups. They're listed here. The
146	2	three sub groups that we have are:
149	24	Okay I've mentioned we have the 3 sub groups. The
163	11	sub groups was focusing on and I think Bob Paine
179	11	you summed the impact from all the sub groups. And
181	11	groups say you should (inaudible) [model] a haul road
204	21	groups who were formed to focus three main areas. I
205	7	groups at a time. But I think we're going to get back
307	4	and industry into the review groups would be very
307	10	organize something like invitations to groups to join.

Page	Ref No.	Keyword = "guidance"
7	15	appreciate the guidance he gave me as a young staff
25	7	start a more broader guidance and information to all.
31	21	clarify the intent of the guidance. Again showing
34	6	terms of the interpretation of guidance. Again as
35	6	guidance ultimately through the process of consensus
37	5	guidance as appropriate being aware of these issues
38	22	guidance database there at the bottom. That really is
39	18	guidance or the intent of guidance and consistency in
39	19	application of guidance. Then remind you or mention
40	9	guidance is in relation to that issue or concerns that
40	12	application of Appendix W guidance. So these issues
41	13	the permit modeling guidance down at the bottom under
41	14	the Appendix W guidance there's a link for
41	21	to clarify guidance in some cases and the importance
41	22	of consistency in the application of guidance. So I
42	22	concerns that Appendix W guidance might not being
52	16	interpreting the guidance or interpreting Appendix W
52	17	or providing recommendations and not seeking guidance
52	19	guidance from us or not putting it through the
53	22	guidelines provide best practices and good guidance
57	7	guidance that we provide separately. Brian
57	10	guidance. We actually have a single guidance now
57	11	instead of a separate guidance for ozone and PM and
57	18	(inaudible). Timin. And within that guidance we bring
58	4	local analysis and new guidance replaces what was
58	8	analysis as defined in the guidance we have now looks
58	21	standard guidance as those would apply. We're doing
59	5	guidance provides a framework not a prescripted but a

Page	Ref No.	Keyword = "guidance"
86	22	guidance chose AERMOD. Which local sources
92	20	guidance again we can't stress how thankful we are to
99	11	Moving on to 2000 we had the flag guidance. More
109	24	would lead to development of guidance on the
110	4	exist in the form of PM ozone regional haze guidance
150	13	wanted to look at the guidance and tools for missing
154	23	urban/rural determination and guidance on population
181	25	improve the guidance on surface characteristics and
207	19	of the criteria for guidance to develop EPD for older
214	10	results at all. May require additional guidance on
218	25	questions. Is there going to be any interim guidance
219	7	think we have interim guidance really clearly in mind
232	3	demonstration until we have clear guidance on this.
266	19	clarification of guidance aspect of it but I
320	6	are not reinterpreting the Appendix W or guidance. We

Page	Ref No.	Keyword = "guide"
11	16	following the guidelines that we've laid out as to how
27	20	We are relying on this workgroup to effectively guide
33	23	guidelines. And it is actually referred to under
43	6	guideline does refer to CALPUFF as an option that may
53	22	guidelines provide best practices and good guidance
55	15	separate guidelines related to the modeling for
59	23	with the non guideline models. I guess that makes us
60	9	do under the guidelines. We're trying to mimic that
62	2	guidelines, unit risk estimates and reference
96	18	in the RAM model which was the guideline model at that
96	21	can't be because it's the EPA guideline model there
97	6	the guideline model for ozone modeling. Then we came
97	23	This is not guided by Appendix W on the air quality,
106	9	kind of application is not guideline application. I
106	17	House but model guideline applications. They're the
122	13	meteorological for dispersed model and guide to the
123	18	10 has interested in using this scale model to guide
131	24	you read the introduction to the users guide CALPUFF
144	9	Implementation Guide that would be useful to help
146	23	Guide. That was something that the original AIWG
146	25	original guide in September, 2005. The latest
147	3	Guide is dated January 9, 2008. Generally the
148	2	use. In terms of the other updates to the guide that
149	22	implementation guide that represents the regulatory
155	2	been made in the AERMOD Implementation Guide. They
156	24	is in the guideline and delineated and it's a bit of

Page	Ref No.	Keyword = "guide"
165	25	User Guide. Two key areas of focus when I first got
168	15	components have a main User Guide and an Addendum so
168	24	the Implementation Guide Update addressed the use of
169	8	reflected in the Implementation Guide that any value
172	18	update the AERMOD Implementation Guide to go along
173	6	guide. We also gone ahead and enhanced AERMAP to
184	5	in the January updates to the Implementation Guide the
184	10	AERMET User Guide was use an area weighted average
185	4	implementation guide already acknowledged distinction
187	25	highlighted in the user's guide. At this point, I
197	23	Seasonal tables from AERMET User's Guide (Tables 4-1,
204	11	and example case. We've written a limited user guide
204	13	support/user guide. It tells you more about AERSCREEN
207	23	listed in the AERMOD Implementation Guide is that the
221	22	individual sources become guidelines. Isn't there an
264	14	guidelines. One issue is as far as I know no such
275	9	dispersion model in the EPA guidelines and SCIPUFF was
278	24	is not documented in the users guide because I believe
278	25	the users guide was last updated in 2000.
301	8	documentation, user's guide last updated in 2000, and
301	20	part. There's a March, 2006, updated users guide that
301	23	original users guide that was 853 pages long. I think
302	18	used the users guide and their availability in that

Page	Ref No.	Keyword = "guideline"
43	6	guideline does refer to CALPUFF as an option that may
59	23	with the non guideline models. I guess that makes us
96	18	in the RAM model which was the guideline model at that
96	21	can't be because it's the EPA guideline model there
97	6	the guideline model for ozone modeling. Then we came
106	9	kind of application is not guideline application. I
106	17	House but model guideline applications. They're the
156	24	is in the guideline and delineated and it's a bit of

Page	Ref No.	Keyword = "guidelines"
11	16	following the guidelines that we've laid out as to how
33	23	guidelines. And it is actually referred to under
53	22	guidelines provide best practices and good guidance
55	15	separate guidelines related to the modeling for
60	9	do under the guidelines. We're trying to mimic that
62	2	guidelines, unit risk estimates and reference

Page	Ref No.	Keyword = "guidelines"
221	22	individual sources become guidelines. Isn't there an
264	14	guidelines. One issue is as far as I know no such
275	9	dispersion model in the EPA guidelines and SCIPUFF was

Page	Ref No.	Keyword = "heat island"
149	5	your sources as a whole to see what the heat island
149	10	heat island impact. There are some recommendations in
155	5	quantifying heat island effect and I'll show some
155	13	the heat island. The magnitude of the population that
156	12	that might be contributing to the heat island impact.
157	15	that may help delineate the urban heat island which is
211	21	urban heat island effect and also have higher
217	9	variability of urban heat island influence which we
218	19	to inform the urban heat island aspect of the model.

Page	Ref No.	Keyword = "humidity"
125	10	and surface relative humidity. I'm sorry I have been
279	24	is a function of relative humidity (RH) and may
281	14	humidity; temperature; background ammonia; background
281	19	the sensitivity to relative humidity (MESOPUFF refers
282	7	go up to higher humidity you get more particulate
282	16	Again as in the relative humidity case, we see
283	15	which are basically dry, the humidity is low and there
283	19	humidity to 95% to see what happens since that's when

Page	Ref No.	Keyword = "implement"
27	17	implementation issues. You'll know that back in the
27	19	presentation on the AERMOD Implementation Workgroup.
27	21	OAQPS through the implementation issues so that we can
28	14	implementation work group to identify scientific
28	19	throughout the AERMOD implementation work group so
33	21	get our program offices current on implementation
44	7	The implementation of EPA formula for Good Engineering
44	10	that implementation relates to the prime downwash
45	20	AERMOD implementation workgroup and some assistance
47	16	implementation of GEP formula height in AERMOD and
47	24	AERMOD implementation is consistent with all previous
48	15	implementation is a requirement imposed by GEP Stack
94	16	practical based on the implementation of federal,

Page	Ref No.	Keyword = "implement"
111	22	come to the forefront as far as issue in implementing
137	5	implemented but we need to study it. But it may not
138	2	implementation picks the closest dot point. The wind
142	7	implemented. I guess in terms of MM5 AERMOD we
143	11	Implementation Workgroup. This was a work group that
143	24	implementation work group that was initiated in April
144	7	on how we were going to handle AERMOD implementation
144	9	Implementation Guide that would be useful to help
144	17	the implementation work group which I'm going to talk
145	3	implementation issues, provides input for budgeting
146	22	here. One is updating the AERMOD Implementation
147	2	version that we have of the AERMOD Implementation
149	22	implementation guide that represents the regulatory
155	2	been made in the AERMOD Implementation Guide. They
157	23	with a methodology that people can implement to
162	5	using the model to advise EPA on these implementation
162	11	communicate. So we try when we get new implementation
163	8	implementation work and after Roger talks we'll get
163	10	mentioned that one of the AERMOD implementation work
165	4	haven't implemented yet. Also with the (inaudible)
168	23	the Implementation Work Group and one of the items in
168	24	the Implementation Guide Update addressed the use of
169	8	reflected in the Implementation Guide that any value
172	18	update the AERMOD Implementation Guide to go along
182	22	implementation issues with AERSURFACE that maybe you
183	9	characteristics is one of the main implementation
184	5	in the January updates to the Implementation Guide the
184	8	were implemented in AERSURFACE and they are listed
185	4	implementation guide already acknowledged distinction
204	20	the AERMIC Implementation Work Group and the three sub
207	21	have implemented some Beta test options to deal with
207	23	listed in the AERMOD Implementation Guide is that the
211	7	activities of the Implementation Work Group sort of
213	10	alternative implementation for horizontal meander
214	3	implementation but eliminates upwind dispersion
214	14	So we're considering implementing this in AERMOD
215	9	recommend implementing and testing approach of
216	14	to do that and we plan to implement it and start
216	25	implementation issues, especially related to urban
218	8	implement that than it would be right now. So you
251	3	and implementation standpoint and really reminded us
252	9	implementation within the model. So that we can then
254	13	additional implementation working with TRC and what I
258	5	dispersion. But the way they were implemented they
258	17	as it has been implemented as soon as the sensible

Page	Ref No.	Keyword = "implement"
280	5	So the new aqueous-phase chemistry module implemented
280	12	So, the updates were implemented and tested in both
289	18	as new features are implemented. It's a continual
291	14	We've tried as best we can to implement procedures

Page	Ref No.	Keyword = "implementation"
27	17	implementation issues. You'll know that back in the
27	19	presentation on the AERMOD Implementation Workgroup.
27	21	OAQPS through the implementation issues so that we can
28	14	implementation work group to identify scientific
28	19	throughout the AERMOD implementation work group so
33	21	get our program offices current on implementation
44	7	The implementation of EPA formula for Good Engineering
44	10	that implementation relates to the prime downwash
45	20	AERMOD implementation workgroup and some assistance
47	16	implementation of GEP formula height in AERMOD and
47	24	AERMOD implementation is consistent with all previous
48	15	implementation is a requirement imposed by GEP Stack
94	16	practical based on the implementation of federal,
138	2	implementation picks the closest dot point. The wind
143	11	Implementation Workgroup. This was a work group that
143	24	implementation work group that was initiated in April
144	7	on how we were going to handle AERMOD implementation
144	9	Implementation Guide that would be useful to help
144	17	the implementation work group which I'm going to talk
145	3	implementation issues, provides input for budgeting
146	22	here. One is updating the AERMOD Implementation
147	2	version that we have of the AERMOD Implementation
149	22	implementation guide that represents the regulatory
155	2	been made in the AERMOD Implementation Guide. They
162	5	using the model to advise EPA on these implementation
162	11	communicate. So we try when we get new implementation
163	8	implementation work and after Roger talks we'll get
163	10	mentioned that one of the AERMOD implementation work
168	23	the Implementation Work Group and one of the items in
168	24	the Implementation Guide Update addressed the use of
169	8	reflected in the Implementation Guide that any value
172	18	update the AERMOD Implementation Guide to go along
182	22	implementation issues with AERSURFACE that maybe you
183	9	characteristics is one of the main implementation
184	5	in the January updates to the Implementation Guide the
185	4	implementation guide already acknowledged distinction
204	20	the AERMIC Implementation Work Group and the three sub

Page	Ref No.	Keyword = "implementation"
207	23	listed in the AERMOD Implementation Guide is that the
211	7	activities of the Implementation Work Group sort of
213	10	alternative implementation for horizontal meander
214	3	implementation but eliminates upwind dispersion
216	25	implementation issues, especially related to urban
251	3	and implementation standpoint and really reminded us
252	9	implementation within the model. So that we can then
254	13	additional implementation working with TRC and what I

Page	Ref No.	Keyword = "implementing"
111	22	come to the forefront as far as issue in implementing
214	14	So we're considering implementing this in AERMOD
215	9	recommend implementing and testing approach of

Page	Ref No.	Keyword = "ISC"
8	14	ISC, we were a beginning process and people were
8	21	running ISC for years and we know how to do this and
11	3	is much more complicated than ISC and as a result
11	7	familiarity with AERMOD that they've had with ISC and
24	14	use the ISC or AERMOD. But as of December 9, 2006,
24	15	AERMOD was promulgated and replaced the ISC3. There
45	6	Sensitivity analysis was conducted with ISC and there
45	8	the time. For ISC generally if there was a
46	2	ISC in regard to that. So it would be good to get
46	13	was pretty rare when ISC required 100% data capture so
47	25	versions of AERMOD and all previous versions of ISC
48	2	including ISC5. What's happened is that we've seen
48	13	ISC-PRIME. To eliminate discontinuity the EPA
55	24	and not ISC. There's a lot of ISC based and older
67	13	was ran with the ISC model. When Tyler and I sat
67	16	has done some modeling in the past with ISC can go to
71	6	older ISCLT2 model. We modeled these, rather than
123	24	drive ISC3 AERMOD and CALPUFF. The purpose of that
133	20	done with ISC in terms of AERMOD sensitivity to ASOS
151	14	the plot on the right is for ISC. The Y Axis is the
151	22	winds for the ISC. There's a variety average of times
151	25	really make too much of a difference. The ISC plot
152	4	differences in the ISC version in the ISC plot than
152	6	how ISC stabilities are determined compared with
152	11	and for ISC. The different symbols are for the six
152	17	with ISC. Overall that's less of an issue. The use

Page	Ref No.	Keyword = "isc"
183	3	the same met input as ISC basically in NWS surface and
207	2	Well with the old algorithms ISC3 didn't really know
207	13	relation to the same issue. You know in ISC3 the
207	20	ISC3 in relation to prime downwash algorithms. We
213	20	source, every receptor every hour. Where ISC only
265	18	what happened with ISC. Things started to become

Page	Ref No.	Keyword = "ISC-PRIME"
48	13	ISC-PRIME. To eliminate discontinuity the EPA

Page	Ref No.	Keyword = "IWAQM"
251	7	IWAQM process. IWAQM goes through performance
251	9	our IWAQM were irrelevant. The model had passed us by
270	23	situations. The IWAQM Phase 2 report includes some
271	4	This is a figure from the IWAQM phase showing CALPUFF
272	11	the strain based and sort of like we did with IWAQM

Page	Ref No.	Keyword = "layer"
141	3	prognostic models to simulate the urban boundary layer
141	9	layer for dispersion modeling purposes before we could
142	5	check on the boundary layer height calculations to see
177	3	layer and we don't adjust for that. Finally we fixed
183	6	layer algorithms require the search surface
257	18	could underestimate the depth boundary layer like the
257	23	of time. So this convective boundary layer could sort
258	22	boundary layer may form for subsequent hours. In the
259	18	This is a plot of convection boundary layer height
259	20	happens as the boundary layer gets higher you need
259	22	the red is pretty up as boundary layer height. It's
260	10	then it drops and then a little bit of boundary layer.
268	16	boundary layer near the coast during the daytime
268	20	a convective boundary layer that develops thermal
268	21	internal boundary layer. So grid that resolution
269	17	layer it could be going in a different direction.

Page	Ref No.	Keyword = "layers"
185	8	(inaudible) layers in the model which is going to be

Page	Ref No.	Keyword = "long range transport"
76	16	But most is coming from long range transport. You
112	24	context with CALMET/CALPUFF for long range transport

Page	Ref No.	Keyword = "MAKEMET"
192	22	brief description MAKEMET which is meteorology for
193	5	helped with MAKEMET.
193	9	each source one at a time. It calls MAKEMET, BPIPPRM
194	15	the meteorology comes from the MAKEMET program. The
194	19	internal matrices in MAKEMET.
196	25	MAKEMET is the program to generate the meteorology
197	10	heights. In MAKEMET, if you run stand alone you can
198	16	MAKEMET is run for each temporal, sector combination
204	7	the same time. It'll have AERSCREEN and MAKEMET
228	15	MAKEMET output could be used in lieu of onsite
228	20	MAKEMET input and deem it conservative enough to

Page	Ref No.	Keyword = "mesoscale"
123	15	Herman Wong: I'll be talking about the Mesoscale
123	22	the Mesoscale model up in Alaska specifically using
124	3	(inaudible) in using Mesoscale data being either from

Page	Ref No.	Keyword = "met"
10	5	the best method to move science forward in these
26	12	promote best science and evaluation methods. Chet
29	2	AERMOD session but this new committee met in RTP
30	21	approach or methodology for assessing the and then
42	16	what requirements would need to be met in order for
46	8	systems and also the adoption of the METAR standard
46	15	not that rare with ASOS and METAR. Basically METAR
49	8	- 65 meters (de minimis GEP height);
49	13	not apply below 65 meters. The discontinuities we
49	16	about 65 meters were not aware of an issue with that
66	18	characterize those down to the nearest meter when I
67	15	updating it was the meteorology data. Everyone who

Page	Ref No.	Keyword = "met"
67	17	SCRAM and get all sorts of meteorology data and
67	20	and we actually developed meteorology data to run a
67	22	We developed over 200 meteorology stations nation wide
67	24	Essentially we have the closest Met station nationwide
68	8	So we're building a nice archive of meteorology data
69	24	meters from the facility where they spend the majority
70	4	be important. As I mentioned we had the meteorology
73	3	This is some of the non gases some of the metals
73	13	Chromium is one of our most toxic metals out there.
77	14	are where you would expect in a large metropolitan
82	18	microgram per cubic meter reduction. But
83	11	industry is 300 meters from our north
87	14	grid with 100 meter spacing. We had a lot of
87	16	m Cartesian grid with 100 meter spacing. For the
87	20	used. We used 2002 met data - same as base case
87	24	We have some pretty good met data in the area.
88	24	(inaudible) cubic meter. The facilities whose
89	2	per cubic meter or higher we flagged it and then
89	4	0.2microgram per cubic meter was asked to do a RACT
90	2	industry literally 300 meters away.
91	9	per cubic meter. This is calm winds sorry I should
106	6	MM5/WRF meteorological; SMOKE/CONCEPT emissions; post-
107	4	the next session with respect to gridded met and
107	20	The next session is on the Use of Gridded MET. We
108	9	the use of gridded meteorological
108	11	Service (NWS) meteorological analyses to improve
108	16	on how can gridded meteorological model data be used.
108	23	gridded meteorological workgroup in 2005 to discuss
108	24	sources and various uses of gridded meteorology in
109	14	documentation for the gridded meteorological data
109	18	gridded met products. Yes you get a file that is
109	25	application of gridded meteorological products in
110	6	evaluations for meteorological that are used for
110	10	using the gridded meteorological products. And we're
110	16	in the gridded meteorological modeling community that
111	15	So the problem statement is of course meteorological
111	18	NWS data currently used in most cases; however but met
112	7	METAR standard in July, 1996 which they introduced a
112	13	meteorological data collection is an option but is
112	17	meteorological models to drive the dispersion models.
113	22	to take gridded MET data from MM5 in this case.
114	7	containing the Detroit metropolitan airport. And we
114	20	the airport tower is located. That's the metropolitan
115	4	resumes 10 meters and on the right is the first-half
115	5	sigma level from MM5 for about 19 meters. So that is

Page	Ref No.	Keyword = "met"
115	10	ground level non buoyant source up to a 100 meter
116	7	column there. Those are meters per second. There's
116	8	quite a few wind speeds below 1 meter per second, but
116	11	about .28 or 0.3 meters per second. We'll talk about
117	4	meters and that seemed reasonable. So that was the
117	10	of meters so about a factor of five differences. We
117	18	meteorological conditions that we're throwing out.
119	3	the meteorology more closely as well as dispersion
119	5	Do additional sensitivity analyses using the MET input
119	24	5,000 meters we could do some sensitivity analysis if
120	4	metropolitan airport because it's the major airport
120	8	surface you feed it to location of your MET tower. We
121	2	terms of the use of gridded MET data just based on EPA
122	4	the met process for the CMAQ model. And what UNC has
122	13	meteorological for dispersed model and guide to the
122	15	meteorological modeling community experts together
122	18	So as the range of options for developing met inputs
122	20	onsite, we have 1-minute ASOS on site, gridded met
122	24	whatever meteorological data you have for whatever
124	11	meteorology data from MM5 and WRF and CALPUFF.
124	18	meteorological data used using CALPUFF.
124	22	have those needed meteorology parameters that the
126	8	including the reading and reformatting of meteorology
126	24	predicted meteorology so we can compare to the
127	3	algorithms, and methods that are being used so that
127	15	benchmarks, and methods to calculate missing
128	4	program to grant meteorology to go into the over water
128	8	2006, we asked Shell Oil to collect meteorology data a
136	15	Roger. If you have gridded met data for AERMOD and
136	25	just to add multiple met input option and then pre
137	2	sort just to assign it to which met file you wanted or
137	11	meteorologist. I have a question for Roger. What
139	3	meteorology model? In addition to that, could this be
140	9	gridded met to generate (inaudible) upper air data to
141	7	urbanize prognostic met model that actually does
147	5	structure. There are a lot of new sections in the met
147	9	development of the AERSURFACE methodology and the
148	3	fall under the meteorological data and processing
148	10	the new method on determining surface characteristics
148	17	Also information on processing sites specific met in
149	19	site and your met sight. I think there has been some
149	25	ASOS data met data group, the urban issues group and
150	9	respect to the ASOS and met data processing sub group
150	25	using pre-ASOS and the ASOS met data. Looking at the
151	15	difference in the two met data sets that were used.

Page	Ref No.	Keyword = "met"
151	17	conventional observation met data in one case. In the
152	12	met stations. And again here you can see more of a
152	19	Another area of work that the met data issues group is
153	13	come up with a methodology, it may not be the
153	14	methodology, but it's a methodology of averaging the
154	16	prediction when using the hourly met data. It varies
154	20	met data.
155	4	roughness length. They were involved with methods for
157	23	with a methodology that people can implement to
158	18	representative met data. What do you do if you don't
158	19	have any representative met data and I think the
158	20	future is possibly gridded met data or the MM5 to
159	4	the AERSURFACE methodology and testing the different
159	7	Then lastly representativeness process met data you
159	9	criteria or some information on is the met data that
159	15	the sub group has done and it's focused on Baldwin met
159	18	site specific met tower Belleville is the National
160	11	from your tower. The recent AERSURFACE methodology
163	22	gridded met tools for AERMOD and CALPUFF we look to
165	20	dispersion model, AERMET met processor and AERMET
170	11	ozone limiting method option if you use OLM with the
171	3	screen meteorology coming from AERSCREEN so we've done
173	19	degree data. Of course with the met data you don't
178	10	the representativeness of the meteorological data and
181	16	well. And then the met data representative issue we
182	2	met data representativeness even sort of evaluate or
182	12	10 meter on site data. It appeared to improve model
182	14	that we came up with earlier to sound meteorological
183	2	met data needs as summarized it was designed to accept
183	3	the same met input as ISC basically in NWS surface and
183	5	robust met input and however the advanced boundary
183	24	different processing method. So don't get them
184	6	recommended methods to determine surface
184	7	characteristics were changed. Those change methods
184	11	within 3 km of the source of the met tower. Plain and
184	18	further from the met tower more than closer
185	6	representative of the met tower we feel. Bowen ratio
185	17	NLCD data this is 30 meter horizontal resolution and
186	23	one of the key input is the location of the met tower
186	25	1 km radius of the met tower. But the standard file
187	13	somebody out to the met tower and they determined the
187	22	immediate difference seems to be about 500 meters.
191	15	over 100 meters so we are picking up very tall
191	17	if it's a 100 meter or 200 meter. If its 1 meter or
191	21	30 meter grid cell and this is supposed to be the

Page	Ref No.	Keyword = "met"
192	10	We've got gridded prognostic met data. We've got
192	22	brief description MAKEMET which is meteorology for
193	19	eliminate date sequence checking in the met file
194	15	the meteorology comes from the MAKEMET program. The
195	18	meteorological conditions associated with that max
196	25	MAKEMET is the program to generate the meteorology
197	18	methods of inputting surface characteristics into
198	17	and met files generated for each combination. So when
199	3	will take over and generate meteorological files and
199	25	and other inputs. Here's your met data and under surf
200	5	such as are they metric or English. You'll get inputs
200	7	input file they are metric. And R/U, Population,
200	15	source data, building data, terrain data or met data.
202	2	FLOWSECTOR. REFINE is to use meteorology and SC
203	18	meters below our source in terms of terrain
204	2	at 30 meters which I think is the ambient distance
207	6	basically a structure that is a 100 meters high right
207	9	102 meter structure. So somehow that needs to be
210	2	is designed to accept wind speed below 1 meter per
210	4	AERMOD is about 0.3 meter per second but what's the
211	18	Met Data. Urban issues and surface characteristics
211	23	the airport site where the met data is being corrected
215	6	prognostic meteorological data with the model and we
215	10	processing gridded met data as pseudo-observations
215	14	meteorological modeling community to next (or future)
215	19	we talked about that this morning. As for gridded met
216	10	might not be up or down approach to adjust meteorology
216	19	Those meteorology adjustments will account for effect
216	21	affect of the urban area on meteorology would not
217	12	The representativeness of met data will always be an
220	25	problem, we don't know where the met tower is thought
221	5	well informed meteorological sound judgment kind of
221	18	methodology. We may learn more from their activities
227	19	demonstrate that a meteorological site is
227	22	to AERSCREEN you would run AERSURFACE both for the met
228	2	conclude that the met site is adequately represented
228	12	quantitative way to say how to compare the met site to
228	16	meteorology as input for full AERMOD application as a
228	19	representative meteorological data. Could you use
228	21	replace the need for representative meteorological
230	9	that Method 2 (two) that was also added not too long
230	11	Roger Brode: Method 2 is one of the options in AERMOD
232	18	for the AERMET and the header of the met file and
234	6	less than a meter per second for example. As long as
235	12	that is worse case meteorology for that kind of

Page	Ref No.	Keyword = "met"
235	15	as to whether the met data being used for the
242	20	In fact I met with Joe [ed. Scire] in Denver during a
243	21	sources of meteorology and terrain should provide for
247	3	you develop meteorological data sets which take quite
247	12	meteorological data sets through CALMET there are also
248	9	model. No you could not use the CALMET meteorological
250	10	my group had a branch of NOAA meteorologist that were
250	12	a bit of support both from meterology standpoint and
256	8	meteorological inputs, other options and different
259	24	meters perhaps. In the next hour parts of the domain
267	12	resolution and availability of representative met
268	22	and representative of met data may be significant
269	25	The availability of representative met input to
271	11	However, CALPUFF was applied with CTDMPLUS met inputs,
271	13	state meteorology inputs. This is not consistent with
271	16	treat the time and space variations of meteorology
271	20	So there are various methods for evaluating models.
273	16	representatives on sight, met data documenting the
285	20	updating the ammonia limitation method in POSTUTIL to
290	2	other applications. That's a very good method because
291	20	the new recently proposed 2008 visibility methodology
292	8	different versions of met data. Basically, we are up
292	13	meteorological models such as MM5, WRF, RUC, RAMS and
292	24	called the (inaudible) method which attempts to
293	22	meteorological model. We agree as to what was said
308	22	meter per second winds the plume only goes to 2.6 km
309	6	dispersion. It looks upwind of the met site. What
309	8	turbulence of the downwind source of the met station.
310	3	the single met station to characterize flow not just
310	5	of surface characteristics upwind of meteorological
311	19	representative of the method that is used to model
312	15	source of the met data you will get a plume going in
314	21	you look upwind at the met station. What really
315	12	roughness of the met station for all these sources in
315	20	does matter. We looked at the 1 km and 3 km method we

Page	Ref No.	Keyword = "meteorological"
106	6	MM5/WRF meteorological; SMOKE/CONCEPT emissions; post-
108	9	the use of gridded meteorological
108	11	Service (NWS) meteorological analyses to improve
108	16	on how can gridded meteorological model data be used.
108	23	gridded meteorological workgroup in 2005 to discuss
109	14	documentation for the gridded meteorological data

Page	Ref No.	Keyword = "meteorological"
109	25	application of gridded meteorological products in
110	6	evaluations for meteorological that are used for
110	10	using the gridded meteorological products. And we're
110	16	in the gridded meteorological modeling community that
111	15	So the problem statement is of course meteorological
112	13	meteorological data collection is an option but is
112	17	meteorological models to drive the dispersion models.
117	18	meteorological conditions that we're throwing out.
122	13	meteorological for dispersed model and guide to the
122	15	meteorological modeling community experts together
122	24	whatever meteorological data you have for whatever
124	18	meteorological data used using CALPUFF.
148	3	fall under the meteorological data and processing
178	10	the representativeness of the meteorological data and
182	14	that we came up with earlier to sound meteorological
195	18	meteorological conditions associated with that max
199	3	will take over and generate meteorological files and
215	6	prognostic meteorological data with the model and we
215	14	meteorological modeling community to next (or future)
221	5	well informed meteorological sound judgment kind of
227	19	demonstrate that a meteorological site is
228	19	representative meteorological data. Could you use
228	21	replace the need for representative meteorological
247	3	you develop meteorological data sets which take quite
247	12	meteorological data sets through CALMET there are also
248	9	model. No you could not use the CALMET meteorological
256	8	meteorological inputs, other options and different
292	13	meteorological models such as MM5, WRF, RUC, RAMS and
293	22	meteorological model. We agree as to what was said
310	5	of surface characteristics upwind of meteorological

Page	Ref No.	Keyword = "mixing"
176	16	calculating the convective mixing heights and it gives
197	7	(convective only), and mechanical mixing heights
197	9	u* and L, and also calculates convective mixing
257	12	mixing height algorithms. You mentioned the MMS
257	16	didn't count for the convective mixing height over
257	17	water. So it's just mechanical mixing height you
257	19	Gulf of Mexico. So they made some convective mixing
257	20	height changes to CALMET for mixing over water. But
258	15	flux required to sustain convective mixing height
258	19	mixing height is immediately assigned the value of 0m
258	25	including the default minimum mixing height of 50m,

Page	Ref No.	Keyword = "mixing"
259	2	and the mixing height that goes to CALPUFF is the
259	3	higher of the mechanical and convective mixing
259	5	Also there's an average of as the overall mixing
259	11	also set to 0 for convective mixing height. That
260	5	convective mixing height where one of the grid cells
260	6	within that domain showing convective mixing height so
260	8	convective mixing height increases then drops
260	12	convection mixing height goes up and drops at noon to
293	4	models, the core algorithms, the convection mixing
298	15	which was this mixing height convection over land.
298	23	of thing with the mixing height that would eliminate
298	25	ability to put in another mixing height scheme and to

Page	Ref No.	Keyword = "MM5"
84	22	2006 using the CMAQ platform with MM5/SMOKE
102	18	Just to show you MM5 evaluations. As for the Jonah
102	23	Wind River Range. Excuse me with 12km MM5 and the
103	3	we run MM5 to get the surface data and we see we can
103	4	get that at 4km. So we you can see using MM5 high
103	7	take 12km MM5 data and put it through CALPUFF or
106	6	MM5/WRF meteorological; SMOKE/CONCEPT emissions; post-
108	18	case study where MM5 data had been extracted and been
108	20	to use AERMOD data and MM5 directly into AERMOD. So
109	2	development of MM5-to-AERMOD tool in 2006.
109	3	In 2007 EPA published MM5-AERMOD Philadelphia Study
109	7	development of MM5-to-CALPUFF prototype.
110	20	to Roger. He'll be talking about the MM5 to AERMOD
110	25	talking the MM5 to AERMOD tool and I apologize to
113	11	by MM5's advanced atmospheric physics options
113	13	height. What's not provided by MM5 data that AERMOD
113	21	On the right is the MM5 AERMOD tool currently designed
113	22	to take gridded MET data from MM5 in this case.
114	6	have extracted 2002 MM5 data for the grid cell
114	9	sub-domain from the larger 12 kilometer MM5 domain to
114	11	to feed through MM5 AERMOD. So we applied the tool
114	16	smaller red box is not an MM5 domain. That is the
115	5	sigma level from MM5 for about 19 meters. So that is
115	15	have AERMET traditional airport results and the MM5
115	17	prediction based on MM5 inputs divided by the AERMOD
115	21	level source where you see MM5 results much higher.
116	2	So just decided to look at what's happening. The MM5
117	3	the MM5 model for that grid cell which was about 0.3
118	3	factor of 7 higher with the MM5 data to a factor ratio

Page	Ref No.	Keyword = "mm5"
118	25	more detail comparisons with results from the MM5
119	7	types; different options for interpolation of MM5
119	10	Basically you've got the MM5 as a staggered grid so
119	21	full profile winds and temperature derived from MM5
119	25	we had partial sub-sets of the MM5 data. We don't how
121	18	validate the use of MM5 AERMOD data against some field
121	23	You'll hear more about MM5 CALPUFF in a minute. But
121	25	taking MM5 data directly into CALPUFF model. Should
122	6	with either MM5 or more data. They don't need to
123	6	community. Do we give a tool, you get your own MM5
123	8	archive of MM5 data and you just go online and
123	12	is going to talk next about the MM5 CALPUFF tool.
124	4	WRF or MM5 to drive (inaudible) models. Particularly
124	11	meteorology data from MM5 and WRF and CALPUFF.
124	20	MM5 data and it could be read directly into CALPUFF.
124	21	We also wrote in options in there where MM5 doesn't
126	17	studies from contractors to just use the MM5 and it
130	9	other analysis but we were often running MM5 or WRF
132	8	fix ASOS data until it matched MM5 data. Is that
132	21	with what we're seeing in the MM5 data was an
133	6	be using 1-minute data not necessarily going to MM5.
133	7	Roger Brode: Right. I think MM5 is the longer
135	10	Bob Paine: A follow up question is on the MM5
135	12	CALMET can already take the MM5 data, why do you need
135	24	going straight from MM5 to CALPUFF and then bypassing
137	16	Roger Brode: Sure. The MM5 AERMOD tool is
137	17	(inaudible) program that extracts data from MM5.out
137	21	know which one you want to do. Then extract MM5 data
138	7	sort of consistent with what the MM5 CALPUFF or
138	21	far as the MM5 or WRF AERMOD input. Are the surface
138	22	parameters coming directly from the MM5 such as the
139	10	whatever information is output from MM5 that AERMOD
139	17	in MM5. Some MM5 options will give you certain output
139	19	be generic for whatever MM5 options you might select.
139	22	MM5 platform data that's used in all CMAQ
140	24	urban grid cell from MM5 or WRF and not have to turn
141	5	been some work that's been done in urbanizing MM5 and
142	7	implemented. I guess in terms of MM5 AERMOD we
158	20	future is possibly gridded met data or the MM5 to
176	21	data derived from MM5 data then we don't want to be
286	15	similar to the MM5 to AERMOD tools that were discussed
287	2	3-D outputs from MM5 and CMAQ; SCICHEM also runs on
292	13	meteorological models such as MM5, WRF, RUC, RAMS and
304	18	coming from another source presumably a MM5. What it
304	19	really represents is MM5 winds do not match

Page	Ref No.	Keyword = "mm5"
304	20	observations. Is that a CALPUFF issue or MM5 issues
304	23	more to this instead of saying that MM5 or CALMET is
305	6	One is to run the model in NOOBS mode using MM5 only
305	13	believe the MM5 fields and you want to use them. If
305	15	in the MM5 data, you can run CALMET in the pure
305	18	If you run it in a hybrid mode with MM5 and use
306	2	variability. This is basically (inaudible) MM5 date.
306	10	emphasis maybe on the MM5 data and certainly the
306	16	The bull's eye looks ridiculous but what the MM5 has

Page	Ref No.	Keyword = "model"
7	2	modeling conference. I believe the last conference
7	3	was Tyler's first as a group leader for the modeling
7	4	group. For me, this is my first modeling conference
7	8	Modeling Group under Joe Tikvart and I think everybody
7	9	in the modeling group has ties to Joe. I learned a
7	11	the group today with the modeling in particular goes
7	18	regulatory model. Not only AERMOD, but we have
7	21	talking about air quality modeling is the integrity of
8	2	modeling group right now is one of the best groups of
8	7	folks to use. Modeling is not something that's done
8	8	just for EPA. It's a modeling community. One of the
8	9	things I appreciate about the 9th Modeling Conference
8	10	and the modeling conferences in the past is that it's
8	16	make this model work and how do we use this, how do we
8	17	make it better. We developed a Modeling Clearinghouse
9	13	modeling community and with the regulatory community
9	15	battling with one model now that we have AERMOD, we
10	10	Clearinghouse. If someone wants to use the model in a
11	2	from the regulatory perspective is that AERMOD Model
11	14	model. It's an extremely powerful tool and it has
11	22	modeling field. When I was here in the early nineties
12	6	a revitalization as far as the new modeling goes. We
12	8	turn the crank and do the modeling. We're now seeing
13	6	great omen for the modeling conference if the wind can
13	14	the modeling world we have to do the same thing. Five
13	23	ourselves in this division in this modeling group. We
14	2	process. One of the reasons this modeling conference
14	11	problems and move modeling forward. It's a complex
15	19	modeling community and to the modeling program is
15	24	work on modeling and I think they are exceptional
17	13	Model Clearing House that we will get into shortly in
21	3	program offices as well. If not for the modeling

Page	Ref No.	Keyword = "model"
22	14	discussions we had in the 8th Modeling Conference and
24	6	course those of you at the 8th Modeling Conference may
24	18	information about the modeling system and the code
25	2	from the 8th Modeling Conference. I'll walk through the
25	10	of you here who were at the 8th Modeling Conference
26	19	community approach to model development and acceptance
26	21	improvement in modeling science and data but make it
26	25	Soon after the 8th Modeling Conference there was a lot
27	8	effective model clearinghouse to bring that expertise
27	15	are. I'll start where we are with the AERMOD modeling
27	16	systems. Obviously a new model we're going to have
27	18	8th Modeling Conference (inaudible) Al Cimorelli did a
27	23	betterment of the model and for your benefit. That
28	4	improving that model to meet the needs that you have.
28	12	scientific aspects of the model and make sure they
28	15	aspects and other items within the model that really
28	21	scientific issues related to the model and have both
28	23	model and in support of you and across the modeling
29	22	types of changes in the model that need to be brought
30	3	arena the confidence in that model as it is applied
30	8	Bailey and Roger Brode at the 8th Modeling Conference.
30	12	of the model 1 proposed a new version (beta) and the
30	18	situations to be able to test the model. Again to the
30	23	the model in that very clear and transparent process
31	6	engaged quite a bit with the model developer and folks
32	19	SCRAM and find the modeling conferences and find each
33	22	issues related to modeling under the modeling
34	20	justification and cover for the modeling that we've
35	9	technical issues are the focus so modeling issues are
35	13	are really trying to focus on the technical model
38	13	Here's a screen shot of SCRAM with the Modeling
40	3	permit application which would go through the Model
40	7	arise. We have a new model out there and new issues
40	16	with regional office modeling contacts. We have
41	2	so far gone through review by Regional Office modeling
41	6	Regional Offices either through modeling contacts
41	13	the permit modeling guidance down at the bottom under
42	8	AERMOD model but one of the issues we have gotten
42	15	preferred model cannot be proprietary. We laid out
42	20	the regulatory status of CALPUFF modeling system for a
43	4	main point EPA preferred model for near-field
43	8	alternative model for near-field applications
43	13	appropriate since it's a (inaudible) puff model. This
43	16	Appendix W, when there is no preferred model or where
43	17	another model is considered more appropriate. So

Page	Ref No.	Keyword = "model"
44	20	done the sensitivity of the ISCST3 model to ASOS vs.
45	5	impact might that have on our modeling programs.
46	12	within the modeling community. Missing airport data
47	4	model if that single 2-minute average is calm the hour
48	11	the 7th Modeling Conference and it was the (inaudible)
49	4	would result in a change in the model perHAPS. This
49	11	modeling demonstration.
51	15	modeling protocol in order to get review and input
51	22	your modeling, it is critically important. It's not
52	12	said before, the confidence and integrity of the model
53	11	is a distinction between the regulatory model
53	20	the conference we are actively using the model for
54	11	model in the right way. After all the types of
54	12	applications will affect the integrity of the model
54	15	process that will hopefully improve that model as we
55	15	separate guidelines related to the modeling for
56	8	modeling itself as we move forward and incorporate
57	9	revised the ozone PM and regional haze modeling
58	2	to the types of broader grid based chemical modeling
58	6	specified dispersion modeling in unmonitored areas
58	15	model you're going to be smoothing those things out
58	25	dispersion modeling that would be and could be
59	4	chemical modeling that's also being done and the
60	13	NATA as the single largest modeling application done
60	17	perHAPS 99% of the modeling. Some of the numbers are
61	7	We start out with the inventory we model ambient
63	9	cohesive modeling. That's still on the drawing board
64	13	actually do the dispersion modeling. One of the steps
64	15	dispersion modeling analysis is generally not what
65	9	model model comparison and I'll show you some of the
66	12	are. So how I treat those in my modeling scenario
67	7	Now getting to the modeling component, how did I model
67	10	Exposure Model and this is also available on our FERA
67	13	was ran with the ISC model. When Tyler and I sat
67	16	has done some modeling in the past with ISC can go to
68	10	the HEM model for the NATA application as well. Just
68	14	the Gaussian model ever. Out of those sixty thousand
68	21	eight HPAS HAPS in the Clean Air Act. We modeled the
69	5	complain about their model taking an overnight run.
69	9	go over a couple of model options we did. One of the
69	12	through the model. It kind of expedites the model and
70	16	of these are located. We felt like rather than model
70	19	ASPEN model. This model is still on SCRAM and I saw
70	20	it the other day. The model EMSHAP is an emission
71	2	emissions out over your county and model it at a

Page	Ref No.	Keyword = "model"
71	4	where you shouldn't really have them. So we modeled
71	5	these using the ASPEN model which is based on an even
71	6	older ISCLT2 model. We modeled these, rather than
71	7	model these at the census block; we felt we would over
71	8	analysis them so we modeled them at the census tract.
72	4	Finally we did a model to monitor comparison where we
72	11	We have model to monitor comparisons that may be of
73	21	a model called HAPEM that we run and develop these
74	4	commuting and what not. And this HAPEM model that we
74	15	money on modeling and risk characterization. One of
75	15	model. On and off road and the background, you can
78	20	together from a modeling standpoint as we move forward
81	3	modeling using VISTAS which is our (inaudible)
81	5	and then we did some 2009 modeling and now we're
82	12	haze. We did some modeling some 2009 and
82	13	2018 modeling for haze. We also looked at
82	14	the CAIR modeling that was done. What it
84	2	area. So what do we do? We'll just model and see
84	23	integration and using the AERMOD model to evaluate
85	2	all of the AERMOD modeling so all the questions I will
85	8	extensions, revisions additional modeling. We have so
85	23	been involved in a modeling study like this. We
86	23	should be modeled? We decided to cast our net
89	6	did model performance we looked at the monitors. So
89	14	typically think of AERMOD as a conservative model.
89	19	model performance is a little better. As you can see
90	3	So this is some of our model performance statistics.
90	5	are modeled values and the observation are in black.
90	14	issues at the lower level. Again the model
90	19	(inaudible) modeled values were approximately 6.
90	22	Again red is the model and black is the observed. We
91	4	(inaudible) As you can see the model values are always
91	17	These model performance plots show you they're pretty
92	2	source characterizations or are we asking the model to
92	11	modeling and exercises modeling exercises like this
92	19	our future projections. We followed EPA model
92	22	modeling but a lot of policy discussions and
92	24	this is an appropriate model for this situation. CMAQ
93	6	reduction in the model of about a microgram and a half
93	18	some issues in 2009 so they ran some 2012 modeling for
93	22	put the BAPS inventory into that modeling. And so
94	18	best year for us. However, we are going to model both
94	20	this point our modeling is running we are going to
96	18	in the RAM model which was the guideline model at that
96	21	can't be because it's the EPA guideline model there

Page	Ref No.	Keyword = "model"
96	24	silence. You're going to modify (inaudible) model so
97	4	get the (inaudible) model listed as model, the
97	5	photochemical grid model. In 1990 I succeeded it was
97	6	the guideline model for ozone modeling. Then we came
98	23	includes air quality modeling to show project impacts
99	16	modeling to address ozone so they had to do a
99	17	photochemical grid model. (inaudible)
100	4	grid model.
100	25	grid modeling to do their assessments to look at the
101	9	snuff. We had to go back and redo all the modeling
101	13	model to get the sulphur and nitrate impacts using a
101	16	photochemical grid modeling.
101	19	just use AERMOD and a photochemical grid model for all
101	23	first EIS to propose to use photochemical grid model
102	13	photochemical grid modeling for these oil and gas
102	15	modeling. This is the 36/12 km environmental modeling
102	19	model which is further south and next to the Wind
102	21	southeast. Early on with the CALMET modeling in 2002
103	9	This is the photochemical grid model domain where we
104	3	have some ideas on what's causing it. Will the model
104	6	modeling for about 28 years. This is not a typical
104	11	using relative modeling results? How to perform model
104	15	about that because you don't have to compare model
104	17	model applications we always (inaudible) the model
104	19	model is performing correctly.
105	11	studies. We are also using CMAQ model for southwest
105	13	Community Multiscale Air Quality (CMAQ) model for
105	20	tomorrow about the plume in grid model for near source
106	2	model databases across the US and also trained a lot
106	16	of agencies involved. It's not the Model Clearing
106	17	House but model guideline applications. They're the
107	2	the photochemical model is being used here and trying
108	5	we were at the 8th Modeling Conference. Tyler
108	7	the 8th Modeling Conference. This was the second
108	12	modeling science and performance for near-field,
108	15	Modeling Conference and there was a panel discussion
108	16	on how can gridded meteorological model data be used.
108	21	what's happened since the 8th Modeling Conference?
108	22	After the 8th Modeling Conference, OAQPS formed a
108	25	dispersion modeling. In addition to this, EPA
109	23	better and how the model responds. Ultimately this
110	2	dispersion modeling applications. That's something
110	7	photochemical modeling things along this line. This
110	16	in the gridded meteorological modeling community that
111	23	the model and applying the model so that's a new

Page	Ref No.	Keyword = "model"
112	11	that's not very helpful for this dispersion model
112	23	They are being used in other regulatory modeling
117	3	the MM5 model for that grid cell which was about 0.3
118	18	for regulatory modeling. It's something that we have
121	10	modeling over the domain of Detroit city I could have
121	25	taking MM5 data directly into CALPUFF model. Should
122	4	the met process for the CMAQ model. And what UNC has
122	13	meteorological for dispersed model and guide to the
122	15	meteorological modeling community experts together
122	16	with dispersion model experts and figure what the
122	25	model you have for that application. That's kind of
123	16	Model Data Reformatted Program that we have been
123	18	10 has interested in using this scale model to guide
123	22	the Mesoscale model up in Alaska specifically using
124	15	looking to do with that model (inaudible) we didn't
127	19	Model Clearing House.
128	5	model. In preparing for this, Shell came in 2006
129	4	the WRF model which they are currently developing an
129	5	ice model up there. As you know, there's a lot of ice
131	4	Oh man...Okay. This is the modeling domain that the
131	6	the ice model currently. They'll do some additional
131	13	terms of the WRF model using their new icing program.
132	24	modeling low level plume. This may be problematic
136	8	model that you may find where there might be where
138	16	regulatory application model where that type of
139	3	meteorology model? In addition to that, could this be
139	23	photochemical modeling. Again that's just one
141	7	urbanize prognostic met model that actually does
141	9	layer for dispersion modeling purposes before we could
144	10	people out there using the model. And also to try and
145	19	done, model improvements. Those kind of things. In
149	4	at the modeling domain and the area that is impacting
149	8	recommendations if you're modeling urban and AERMOD
149	23	mode of the model.
154	9	modeled it to see what the results looked like. And
155	10	input issue. As you know if you're modeling urban and
155	14	you use is inversely related to the model
155	17	you'll be using in the model to make sure you're being
157	11	right number to model if you've got a source or two
157	21	model area. As I said this is still work in progress
158	9	radiance for our urban kinds of modeling and maybe the
158	11	input into the model or maybe we can use this kind of
159	14	Real quickly this is some of the modeling work that
161	2	does that translate to in terms of model
161	20	is doing more modeling of different sites and trying

Page	Ref No.	Keyword = "model"
162	5	using the model to advise EPA on these implementation
163	6	and the specifics of the AERMOD modeling of the system
165	11	AERMOD modeling system and inform you of some other
165	15	preferred near-field model in Federal Register notice
165	20	dispersion model, AERMET met processor and AERMET
165	24	Model Change Bulletin as well as some addenda to the
166	13	what model of the earth was use to represent those
168	9	upgrade will speed the model up to I think about 40%
168	20	need to run the model.
169	24	lot of focus recently on modeling and how best to
169	25	model emission from mobile sources in AERMOD. And
170	14	in Addendum to Model Change Bulletin. It's the worst
170	15	kind of bug that you can have with the model. Its
170	16	model runs gives you numbers and the numbers are
170	21	getting the model fixed anyway. You'll read more
171	8	integer variables in the model. So there's been some
177	18	of Air Pollution, Theory and Model Application, to
177	19	reflect AERMOD model. Sort of gotten through the
178	13	applying the model in a different context here that
178	16	evaluating how the model performs at this specific
178	19	has been placed on the model for routine regulatory
178	23	efficient updates to the modeling system. I wish we
179	2	assessment of the impact of model changes for example
179	19	model changes prior to release, including going
179	23	and also we want to do the same with the model
179	25	in model performance that might be expected if some
180	14	information you need to apply the model appropriately.
180	22	modeling impacts from haul roads has come up a lot in
181	3	emissions is an important part and the model is not
181	9	modeling haul roads emissions. Part of it is the
182	10	impact model performance? In face it didn't much.
182	12	10 meter on site data. It appeared to improve model
182	16	AERSURFACE was released. So that's it on AERMOD model
184	3	modeling system but as a tool to assist in that
184	20	sensitivity of the model to roughness or (inaudible)
185	8	(inaudible) layers in the model which is going to be
188	7	information and share it with modelers.
192	21	regional model workshop. Some initial test results,
193	15	forces the model to calculate centerline concentration
194	21	for terrain processing. I think at the 8th Modeling
195	22	When you're doing terrain or buildings modeling, you
199	13	source, execute FLOWSECTOR. In the 8th Modeling
201	13	invoke the TOXICS option to speed up the model. Other
205	11	the 2007 regional model work shop and like I said it's
207	14	model didn't know where the building was in relation

Page	Ref No.	Keyword = "model"
207	17	displaced. The model didn't care but with prime it
207	24	Model Clearing House procedures for simulating a
208	6	into the model to define the initial radius of the
208	15	that Model Clearing House procedure for non-downwash
209	20	the model especially for convective conditions where
210	15	Model Improvement Committee (AERMIC) initially formed
211	5	reviewed status of AERMOD modeling system and
212	6	with an idea to utilize more of this data in the model
213	22	each source so that by itself slows the model down by
214	9	would speed the model up with hardly any difference in
214	21	the model but not area sources. So the reason that's
214	22	important is if I'm doing a modeling of mobile source
215	6	prognostic meteorological data with the model and we
215	14	meteorological modeling community to next (or future)
215	18	in AERMOD modeling system by using multiple grids and
216	3	utilizing this data directly in the model. As I
216	16	to provide that information to the model gives us a
217	5	information available for the model. That would mean
217	18	that. And when I mean value it I mean the model
217	23	model can eliminate the preprocessors but having
218	7	there in the model would make it much easier to
218	10	direction specific height scale to the model first and
218	19	to inform the urban heat island aspect of the model.
222	8	Roger Brode: Right. The Model Clearing House
222	9	procedures for modeling capped stacks could send you
224	14	the model. It doesn't seem as though there is any
225	7	regulatory model and in the development phase that was
225	8	appropriate. But once the model is in the regulatory
226	3	the context of the modeling conference itself. Of
227	13	the validity and integrity of how the model is applied
227	16	model in many cases.
227	24	see if the actual modeled peak concentration peak are
231	7	determination of the acceptability of the model is the
231	12	practical purposes as the preferred model." This
231	13	leads to the issue of the availability of the model
231	17	the EPA do in evaluating its model before release. So
231	21	1. Question number 2. Is there a model evaluation
233	6	CALPUFF modeling system that test data set. For now,
236	22	model it so now you're shopping geometry. There's a
238	25	the community, model and the like and where we stand.
239	5	Obviously the modeling system was promulgated in
239	7	promulgated as EPA's preferred model for long-range
239	10	model developer arranged to maintain control of code
240	11	the way for regulatory use of this model. There were
240	12	two versions of the VISTAS model and I'll talk about

Page	Ref No.	Keyword = "model"
240	15	coordination with the model developer to get an
240	16	updated version of this model. Version 5.8 and that's
240	19	familiar with modeling system are aware in April,
240	22	model that they contracted directly with the model
241	6	Modelers Work Shop. Those presentations are
241	19	this model system. The reason is Earth Tech sells
242	14	of the model that there is a requirement that it meets
242	18	that we understood that the model would be maintained
243	7	multiple versions. NOTE: CALPUFF model/code cannot
243	10	indicating the continued copy write of the model as
244	2	Version 5.7 to Version 5.711a. We got the Model
244	15	outlined in the 8th Modeling Conference to do that and
245	25	model developer and others in the community. While we
246	18	model that could but a number of states used CALPUFF.
246	19	And they wanted to use the best available model
246	22	regional office modeling community from the EPA
247	5	use this model and the modeling system in one context
247	11	permit modeling. And through the provision of the
247	17	modeling system. So again EPA was faced with the
248	4	modelers and that occurred in January, 2007. That
248	9	model. No you could not use the CALMET meteorological
248	11	approved part of the CALPUFF modeling system. We had
248	14	modeling and have anything overturned or you in the
249	21	model, to update the regulatory version 5.8 in June,
249	22	2007, establishing the CALPUFF modeling system from a
249	25	the world in dealing both with the modeling developer
250	7	that model. around that time our office director,
250	13	dispersion model standpoint. And despite the fact
251	9	our IWAQM were irrelevant. The model had passed us by
252	9	implementation within the model. So that we can then
252	15	to spend more time engaging with the model developer
252	17	effective engagement here at the 9th Modeling
254	15	interim versions of the modeling system to facilitate
254	16	isolating impact to different types of model changes.
256	16	regulatory nitch for the model. So we started looking
256	19	that the same model you might ask. That added to the
257	14	CALPUFF modeling system for use over water. One of
258	13	difference between these two versions of the model.
259	12	effect is still going to be path to the modeling
260	16	the modeling system and this is an issue that we are
261	6	allow technical enhancements to be in the model code
262	4	file that's provided with the modeling system. We
262	8	actually encountered a few people using the model that
262	18	questions of the validity of the original modeling
263	16	dependencies in the modeling system even with

Page	Ref No.	Keyword = "model"
263	23	while. The main is that the EPA-preferred model for
263	25	preferred model for near-field applications, but may
264	2	be considered as an alternative model on a case-by-
264	6	that link it to the alternative model section are for
264	7	cases when there is no preferred model. So a complex
264	10	plume model cannot give me a reliable answer. So when
264	11	there's no preferred model then that's a situation
264	15	applications have come through the Model Clearing
265	14	sort of the Model Clearing House needs to be
265	24	meet for use of an alternative model in cases
265	25	where there is no preferred model or this model
266	2	is better than the preferred model.
266	6	then AERMOD is the preferred model. You can
266	7	always submit CALPUFF as an alternative model but
266	10	preferred model is not appropriate or less
267	16	to inform the model to get the wind speeds
270	4	for the modeling system to resolve the important
270	7	Will the modeling system be able to utilize that site
270	9	considerations and then model performance and
270	17	modeling evaluation is certainly one of those.
270	18	CALPUFF modeling system performance for near-field
272	19	CALPUFF modeling system with CALMET generated wind
273	18	modeling system with that information. How can I
275	7	it is a reactive puff model which is a chemistry
275	9	dispersion model in the EPA guidelines and SCIPUFF was
275	12	SCICHEM is a non-study state puff model which allows
276	2	also increases the complexity of model and as you just
276	13	by using photochemical grid model results to provide
276	21	that all the changes that were made to the model were
278	7	the plume is depleted by 45 ppb in the model as
279	8	treated with the thermodynamic equilibrium model
280	17	released in June, 2007. We also conducted box model
285	19	are also doing some additional model updates. We are
286	12	provide the three-dimensional model outputs that can
286	25	just like a puff model. It has the capability to read
287	3	line within a grid model and we'll talk about that
287	5	inside the grid model and there's a two way
287	6	interaction between SCICHEM and the host grid model.
287	11	model and the grid model.
287	16	the model, but we believe that actually the newer
287	24	provided the SWWYTAF data base for model application
288	23	has. Also the issue of PG dependencies in the model.
288	25	model] (inaudible) so it's not a mystery or an error
289	2	it's just the way the model is designed. We can
289	8	version of the model and the more recent version. We

Page	Ref No.	Keyword = "model"
289	11	model. I think that may have been published in a
289	15	the evaluation of the model.
289	16	First the development. We upgrade the model on a
289	21	improvement of the model. An example is what we heard
289	23	of the model and will be available to everybody under
290	12	In terms of what the modeling community gets for their
290	19	part of the developmental version of the model. That
291	4	includes the Hybrid puff-particle version of the model
291	10	model and some of them will make their way into the
292	2	developmental version of the model or Beta test
292	20	together. Animating the (inaudible) model with whole
292	22	Model development continues with the processing
293	13	There is a sub hourly version of the model that's
293	22	meteorological model. We agree as to what was said
294	8	In terms of model maintenance, it is a struggle. We
294	17	to do the model maintenance, always have been and
294	22	the model stops what should I do? Well, you'll have
295	15	model option tool, it was not available on the web
295	24	done that in the last model change updates. I think
296	4	to get model changes accepted. The first bulletin
296	10	The separate and more complex issues of model
296	12	get into the regulatory version of the model. It
297	7	going forward. There are two outstanding model
297	11	with the agency because using a version of the model
297	13	community point of view. We've provided the Model
297	23	charge for model enhancement. We don't make money in
298	2	model to improve it. We haven't development of the
298	3	model or BETA test version which allows us to do
299	2	have testing done the model would never advance.
299	7	there has been delays in simple bug fixes like Model
299	12	model enhancements by EPA. The model enhancements
299	13	which we think couldn't help the model performance in
300	6	about the lack of that in the model. I think well our
300	7	hands are tied if we cannot change the model we cannot
300	15	meretriciously we don't change the model regulatory
301	3	EPA presentations at 2007 and 2008 R/S/L Modelers
301	5	and include examples that do not reflect good modeling
301	14	understanding of how the model works. We can help
301	25	consistent with the model or any other model. In
302	12	the modeling group of EPA had a representative on the
303	3	helps advance the quality of the model. If we have a
303	4	problem with the model, we'll contact the developer
303	15	number of technical enhancements that are in the model
304	13	uses an example of a horrible model. What on earth is
305	2	run this model and three of them will solve this

Page	Ref No.	Keyword = "model"
305	6	One is to run the model in NOOBS mode using MM5 only
305	22	of this has to do with running the model in a poor
307	21	the kind of the model that EPA is using with the
307	24	The final item is the model applicability and
308	25	Not just AERMOD any study state model due to
309	24	model for complex terrain. It cannot handle complex
311	13	not just the AERMOD but any study state model will do
311	16	terrain. The alternative model is suggesting the
311	19	representative of the method that is used to model
311	21	to determine whether a study state model should apply.
312	3	AERMOD. I don't think you have to do a model
312	5	the model you can argue this is a strong case to use
313	8	model works. Main plume, coherent plume and there is
315	11	the modeling domain. You'll be using the upwind
315	14	of the model of the AERMOD and most people do in
316	6	the ratios of the model outputs and said these were
317	2	has limitations because it's a study state model. All
317	4	use of the non study state model which was the intent
317	20	Prakash is going to apply on a complete model. This
317	24	but that's the way the model would be used typically.
318	14	expense of model and data base accuracy. In cases
321	6	after 15 years and its certainly not a perfect model.
321	15	one model cancels another model should be used and can
321	16	without substantiation that that model can handle it.
321	19	long as I'm the group leader of the modeling group, as

Page	Ref No.	Keyword = "model evaluation"
231	21	1. Question number 2. Is there a model evaluation

Page	Ref No.	Keyword = "modelers"
188	7	information and share it with modelers.
241	6	Modelers Work Shop. Those presentations are
248	4	modelers and that occurred in January, 2007. That
301	3	EPA presentations at 2007 and 2008 R/S/L Modelers

Page	Ref No.	Keyword = "modeling"
7	2	modeling conference. I believe the last conference
7	3	was Tyler's first as a group leader for the modeling
7	4	group. For me, this is my first modeling conference

Page	Ref No.	Keyword = "modeling"
7	8	Modeling Group under Joe Tikvart and I think everybody
7	9	in the modeling group has ties to Joe. I learned a
7	11	the group today with the modeling in particular goes
7	21	talking about air quality modeling is the integrity of
8	2	modeling group right now is one of the best groups of
8	7	folks to use. Modeling is not something that's done
8	8	just for EPA. It's a modeling community. One of the
8	9	things I appreciate about the 9th Modeling Conference
8	10	and the modeling conferences in the past is that it's
8	17	make it better. We developed a Modeling Clearinghouse
9	13	modeling community and with the regulatory community
11	22	modeling field. When I was here in the early nineties
12	6	a revitalization as far as the new modeling goes. We
12	8	turn the crank and do the modeling. We're now seeing
13	6	great omen for the modeling conference if the wind can
13	14	the modeling world we have to do the same thing. Five
13	23	ourselves in this division in this modeling group. We
14	2	process. One of the reasons this modeling conference
14	11	problems and move modeling forward. It's a complex
15	19	modeling community and to the modeling program is
15	24	work on modeling and I think they are exceptional
17	21	terms of these models, modeling science, and these
21	3	program offices as well. If not for the modeling
22	14	discussions we had in the 8th Modeling Conference and
24	6	course those of you at the 8th Modeling Conference may
24	18	information about the modeling system and the code
25	2	from the 8th Modeling Conference. I'll walk through the
25	10	of you here who were at the 8th Modeling Conference
26	21	improvement in modeling science and data but make it
26	25	Soon after the 8th Modeling Conference there was a lot
27	15	are. I'll start where we are with the AERMOD modeling
27	18	8th Modeling Conference (inaudible) Al Cimorelli did a
28	23	model and in support of you and across the modeling
30	8	Bailey and Roger Brode at the 8th Modeling Conference.
32	19	SCRAM and find the modeling conferences and find each
33	22	issues related to modeling under the modeling
34	20	justification and cover for the modeling that we've
35	9	technical issues are the focus so modeling issues are
38	13	Here's a screen shot of SCRAM with the Modeling
40	16	with regional office modeling contacts. We have
41	2	so far gone through review by Regional Office modeling
41	6	Regional Offices either through modeling contacts
41	13	the permit modeling guidance down at the bottom under
42	20	the regulatory status of CALPUFF modeling system for a
45	5	impact might that have on our modeling programs.

Page	Ref No.	Keyword = "modeling"
46	12	within the modeling community. Missing airport data
48	11	the 7th Modeling Conference and it was the (inaudible)
49	11	modeling demonstration.
51	15	modeling protocol in order to get review and input
51	22	your modeling, it is critically important. It's not
55	15	separate guidelines related to the modeling for
56	8	modeling itself as we move forward and incorporate
57	9	revised the ozone PM and regional haze modeling
58	2	to the types of broader grid based chemical modeling
58	6	specified dispersion modeling in unmonitored areas
58	25	dispersion modeling that would be and could be
59	4	chemical modeling that's also being done and the
60	13	NATA as the single largest modeling application done
60	17	perHAPS 99% of the modeling. Some of the numbers are
63	9	cohesive modeling. That's still on the drawing board
64	13	actually do the dispersion modeling. One of the steps
64	15	dispersion modeling analysis is generally not what
66	12	are. So how I treat those in my modeling scenario
67	7	Now getting to the modeling component, how did I model
67	16	has done some modeling in the past with ISC can go to
74	15	money on modeling and risk characterization. One of
78	20	together from a modeling standpoint as we move forward
81	3	modeling using VISTAS which is our (inaudible)
81	5	and then we did some 2009 modeling and now we're
82	12	haze. We did some modeling some 2009 and
82	13	2018 modeling for haze. We also looked at
82	14	the CAIR modeling that was done. What it
85	2	all of the AERMOD modeling so all the questions I will
85	8	extensions, revisions additional modeling. We have so
85	23	been involved in a modeling study like this. We
92	11	modeling and exercises modeling exercises like this
92	22	modeling but a lot of policy discussions and
93	18	some issues in 2009 so they ran some 2012 modeling for
93	22	put the BAPS inventory into that modeling. And so
94	20	this point our modeling is running we are going to
97	6	the guideline model for ozone modeling. Then we came
98	23	includes air quality modeling to show project impacts
99	16	modeling to address ozone so they had to do a
100	25	grid modeling to do their assessments to look at the
101	9	snuff. We had to go back and redo all the modeling
101	16	photochemical grid modeling.
102	13	photochemical grid modeling for these oil and gas
102	15	modeling. This is the 36/12 km environmental modeling
102	21	southeast. Early on with the CALMET modeling in 2002
104	6	modeling for about 28 years. This is not a typical

Page	Ref No.	Keyword = "modeling"
104	11	using relative modeling results? How to perform model
108	5	we were at the 8th Modeling Conference. Tyler
108	7	the 8th Modeling Conference. This was the second
108	12	modeling science and performance for near-field,
108	15	Modeling Conference and there was a panel discussion
108	21	what's happened since the 8th Modeling Conference?
108	22	After the 8th Modeling Conference, OAQPS formed a
108	25	dispersion modeling. In addition to this, EPA
110	2	dispersion modeling applications. That's something
110	7	photochemical modeling things along this line. This
110	16	in the gridded meteorological modeling community that
112	23	They are being used in other regulatory modeling
118	18	for regulatory modeling. It's something that we have
121	10	modeling over the domain of Detroit city I could have
122	15	meteorological modeling community experts together
131	4	Oh man...Okay. This is the modeling domain that the
132	24	modeling low level plume. This may be problematic
139	23	photochemical modeling. Again that's just one
141	9	layer for dispersion modeling purposes before we could
149	4	at the modeling domain and the area that is impacting
149	8	recommendations if you're modeling urban and AERMOD
155	10	input issue. As you know if you're modeling urban and
158	9	radiance for our urban kinds of modeling and maybe the
159	14	Real quickly this is some of the modeling work that
161	20	is doing more modeling of different sites and trying
163	6	and the specifics of the AERMOD modeling of the system
165	11	AERMOD modeling system and inform you of some other
169	24	lot of focus recently on modeling and how best to
178	23	efficient updates to the modeling system. I wish we
180	22	modeling impacts from haul roads has come up a lot in
181	9	modeling haul roads emissions. Part of it is the
184	3	modeling system but as a tool to assist in that
194	21	for terrain processing. I think at the 8th Modeling
195	22	When you're doing terrain or buildings modeling, you
199	13	source, execute FLOWSECTOR. In the 8th Modeling
211	5	reviewed status of AERMOD modeling system and
214	22	important is if I'm doing a modeling of mobile source
215	14	meteorological modeling community to next (or future)
215	18	in AERMOD modeling system by using multiple grids and
222	9	procedures for modeling capped stacks could send you
226	3	the context of the modeling conference itself. Of
233	6	CALPUFF modeling system that test data set. For now,
239	5	Obviously the modeling system was promulgated in
240	19	familiar with modeling system are aware in April,
244	15	outlined in the 8th Modeling Conference to do that and

Page	Ref No.	Keyword = "modeling"
246	22	regional office modeling community from the EPA
247	5	use this model and the modeling system in one context
247	11	permit modeling. And through the provision of the
247	17	modeling system. So again EPA was faced with the
248	11	approved part of the CALPUFF modeling system. We had
248	14	modeling and have anything overturned or you in the
249	22	2007, establishing the CALPUFF modeling system from a
249	25	the world in dealing both with the modeling developer
252	17	effective engagement here at the 9th Modeling
254	15	interim versions of the modeling system to facilitate
257	14	CALPUFF modeling system for use over water. One of
259	12	effect is still going to be path to the modeling
260	16	the modeling system and this is an issue that we are
262	4	file that's provided with the modeling system. We
262	18	questions of the validity of the original modeling
263	16	dependencies in the modeling system even with
270	4	for the modeling system to resolve the important
270	7	Will the modeling system be able to utilize that site
270	17	modeling evaluation is certainly one of those.
270	18	CALPUFF modeling system performance for near-field
272	19	CALPUFF modeling system with CALMET generated wind
273	18	modeling system with that information. How can I
290	12	In terms of what the modeling community gets for their
301	5	and include examples that do not reflect good modeling
302	12	the modeling group of EPA had a representative on the
315	11	the modeling domain. You'll be using the upwind
321	19	long as I'm the group leader of the modeling group, as

Page	Ref No.	Keyword = "Monin-Obukhov"
125	9	friction velocity, Monin-Obukhov length, air density,

Page	Ref No.	Keyword = "monitor"
57	21	across the country with the monitoring network and the
58	18	line conditions that are affecting that monitor that
63	20	of these other things are doing. With monitoring,
63	24	with our air toxic monitoring network that we've set
64	4	monitoring. We're also using it to support some other
71	24	different clean wind sectors using monitoring data.
72	3	monitoring data.
72	4	Finally we did a model to monitor comparison where we
72	11	We have model to monitor comparisons that may be of

Page	Ref No.	Keyword = "monitor"
73	4	particulate that we looked at and the monitoring data
81	12	the county, we also have a monitor and we have
81	13	another monitor just south of the Hoover monitor.
82	3	is our far western monitor. We kind of call it
83	12	Birmingham monitor.
84	4	This is just some of the pictures of the monitor of
84	6	the... that's the monitor. It's not actually there it's
84	12	This is the North Birmingham monitor. You'll see a
84	18	took the findings from the monitoring study and
87	2	either monitor with PM2.5 emissions greater than
87	4	km of either monitor, any source with PM2.5
87	19	and RACT, concentrations at the monitor were
88	5	miles from the nearest monitor. We also had a SEARCH
88	7	located at the NBHM monitor which we thought would be
88	15	PM 2.5 Birmingham monitor. The one minute data is the
89	8	than daily FRM since the monitor doesn't know the
89	25	Birmingham monitor. Again that's the monitor with the
90	6	The Wylam monitor looks pretty good. The first
90	8	monitor doesn't know the difference in local, urban or
90	24	the North Birmingham monitor from the local sources.
91	21	the monitor than at Wylam. I guess this isn't a
103	15	there with the monitoring sites and we still use
104	8	There are some challenges in this. One is monitoring
104	12	evaluation without a detail monitoring (inaudible)

Page	Ref No.	Keyword = "monitors"
57	23	influences of primary PM on these monitors. In order
59	13	monitors as part of their demonstration efforts. You
72	6	toxic monitors out there. These are the pollutants
72	14	monitors as compared to the NATA data. The value of
73	6	have TSP monitors that are measuring these
73	7	particulates and you have PM 2.5 monitors that are
80	17	inner monitors. They are clearly higher than
80	18	other monitors in the county. We have very good
80	19	distribution of monitors in that area. Based on
80	23	monitors. It obviously relies on reductions from
81	9	These are our monitors in the Birmingham area and
81	14	The two monitors directly in the middle of the map
81	15	are the monitors that show higher concentration than
82	2	above the other monitors in the areas. Providence
83	9	complexes. These monitors are literally on
89	6	did model performance we looked at the monitors. So
90	17	they are always lower than the monitors. Again we

Page	Ref No.	Keyword = "monitors"
91	3	monitors [ed. were]reading about 25 ug/m3.
99	13	2005 they made a mistake and put ozone monitors in out
178	15	temperature at 2.5 or actually 2. Two monitors

Page	Ref No.	Keyword = "NATA"
59	20	2002 NATA.
60	12	So I'm going to talk about NATA. I'd like to refer to
60	13	NATA as the single largest modeling application done
60	19	What is NATA? NATA is characterization of air toxics
62	8	What is NATA? NATA is a tool for most of our states,
62	13	NATA points you in the right direction as where you
62	17	actually our third application of NATA. One of the
63	3	than that. We are also planning on some future NATA's
63	12	on that. I had mentioned who uses NATA. We have
63	14	the only. Actually NATA went in front of a science
63	16	said they didn't want NATA to be just a regulatory
63	17	application standing on its own. We have used NATA
63	21	other assessments, local assessments along with NATA
64	6	communities are using NATA on a regular basis.
64	9	steps to developing NATA. Like I said we're at the
66	24	into subsets so if I want to look into NATA and see
68	10	the HEM model for the NATA application as well. Just
72	5	looked at the results from NATA compared to the air
72	10	different NATA assessments we've done.
72	14	monitors as compared to the NATA data. The value of
72	15	one would be equal comparison with our NATA results.
73	9	the NATA results to the PM 2.5 it actually did pretty
73	14	We did a pretty decent job in the 2002 NATA compared
74	10	with our previous NATA characterization we had a
74	17	NATA data into what's called a KML format. You click
75	17	NATA. Essentially we think the clean act Clean Air
77	7	like. This is the NATA results at the county level.
97	14	So I'm going to talk not about NATA and not NAPA. I'm

Page	Ref No.	Keyword = "NCDC"
187	10	are some links on the NCDC site for two hundred states
187	16	locations. That information is available on the NCDC

Page	Ref No.	Keyword = "near-field"
27	6	generation of near-field models. The other related to
43	4	main point EPA preferred model for near-field
43	8	alternative model for near-field applications
99	25	this point there running AERMOD for near-field impacts
108	12	modeling science and performance for near-field,
165	15	preferred near-field model in Federal Register notice
239	18	W for near-field applications involving "complex
263	21	is the near-field Clarification Memo. Thought I'd
263	24	near-field is AERMOD. CALPUFF is not the EPA-
263	25	preferred model for near-field applications, but may
264	3	case basis for near-field applications involving
267	13	data may be significant issues for a near-field.
270	16	when applying CALPUFF in a near-field situation. The
270	18	CALPUFF modeling system performance for near-field
271	14	motivation for CALPUFF near-field applications under
271	19	to near-field applications under that paragraph.
271	22	Bret had worked on was to actually redo the near-field

Page	Ref No.	Keyword = "NEPA"
55	6	photochemical models for NEPA and addressing new
98	20	involves the preparation of an EIS or EA under NEPA
103	20	NEPA mantra we are trying to use the best science
105	10	we are doing photochemical models and NEPA related
105	17	NEPA EIS/EA air quality assessments. We talked about
106	7	processing tools. So the current round of NEPA

Page	Ref No.	Keyword = "non regulatory"
68	9	to run for these non regulatory applications through
178	2	non regulatory applications. One of them was

Page	Ref No.	Keyword = "NOAA"
250	9	agency agreement with NOAA. As some of you may know,
250	10	my group had a branch of NOAA meteorologist that were
250	11	available through NOAA to EPA and they provided quite
250	21	NOAA or other accommodations. We're in a situation

Page	Ref No.	Keyword = "NSR"
53	14	revisions of existing and new sources and NSR and
247	10	W which provides the rules of the game for NSR/PSD

Page	Ref No.	Keyword = "NWS"
46	6	ASOS is with the Missing NWS data more extensive with
111	18	NWS data currently used in most cases; however but met
112	3	airport data that we have significant gaps in NWS data
183	3	the same met input as ISC basically in NWS surface and

Page	Ref No.	Keyword = "OAQPS"
27	4	One related to the need for OAQPS to enhance its
27	21	OAQPS through the implementation issues so that we can
32	8	limited to EPA, OAQPS folks or broadly EPA and
35	14	issues to be handled by our group OAQPS and other
40	14	may be things that come up through our ongoing OAQPS
54	23	We'll have Ted Palma of OAQPS group here to give us an
61	25	you can get all sorts of good information on OAQPS
78	22	environmental problems. Chet mentioned that OAQPS is
87	22	James Thurman and others at OAQPS provided us
108	22	After the 8th Modeling Conference, OAQPS formed a
127	18	well, we will submit to OAQPS for approval to the
145	2	The purpose of the current AIWG is to advise OAQPS on
145	10	in general provide feedback to OAQPS on how the
210	20	- Roger Brode, OAQPS, Co-chair
224	23	OAQPS. So we're working on the assumption that they
231	20	OAQPS or a regional responsibility? That's questions
231	22	data base that is agreed upon by both OAQPS and the
231	25	which both OAQPS and the regional office would be in
248	25	get the information that OAQPS needed. Allow time for
251	22	if it weren't for his efforts and others at OAQPS and
320	11	responsibility as the office director of OAQPS to

Page	Ref No.	Keyword = "observation"
47	3	hour. That's our standard weather observation for the
90	5	are modeled values and the observation are in black.
128	19	collecting surface observation as well sea surface
151	17	conventional observation met data in one case. In the
151	19	the observational data it's observer temperature,
306	5	observation and you will get something that looks

Page	Ref No.	Keyword = "observation"
317	16	times the observation and CALPUFF was conservative but

Page	Ref No.	Keyword = "observations"
47	10	the standard observations that could drastically
278	8	compared to 50 ppb in the observations. So that's the
304	20	observations. Is that a CALPUFF issue or MM5 issues
304	21	or is it an observations issue. Is that observation
305	14	you believe the observations, and have less confidence
306	3	You can see the observations these arrows over here.

Page	Ref No.	Keyword = "observed"
90	22	Again red is the model and black is the observed. We
91	5	higher than the observed values. Then again that was
102	24	observed data which is a different year is (inaudible)
104	18	back to what was observed to give us a sense if the
113	5	sparsity of observed data. I don't have to look for
126	15	statistical comparisons observed to measure from the
245	19	observed differences to our understanding of the

Page	Ref No.	Keyword = "ozone"
12	15	the past and we had ozone exceedances in Wyoming which
57	9	revised the ozone PM and regional haze modeling
57	11	instead of a separate guidance for ozone and PM and
78	7	attainment nation wide for the ozone and PM. We have
82	17	nonattainment ozone plans. We'd get about a
96	8	address ozone and other types of issues and
97	6	the guideline model for ozone modeling. Then we came
99	13	2005 they made a mistake and put ozone monitors in out
99	15	Supplemental EIS was going on and they had to do ozone
99	16	modeling to address ozone so they had to do a
100	3	don't feed ozone so they had to bring a photochemical
100	11	divide is way over on the right. But the high ozone
100	17	Pretty much a standard practice. We had the ozone
100	19	field studies and measured the ozone exceedance and
101	2	ozone issues in about 2007. And we're doing this
101	5	that and did some ozone analysis including the
101	7	because we were not looking at ozone in the past.
101	24	to perform both ozone and AQ/AQRV analysis at the far
104	2	simulate the winter high ozone events in SWWY. We

Page	Ref No.	Keyword = "ozone"
104	5	traditional ozone events. I've been doing ozone
104	22	use ozone and PM source apportionment to obtain
104	23	incremental contributions? Use ozone and PM source
105	2	projects are contributing to the ozone in the high
105	3	ozone areas.
105	21	chemistry and plume dispersion. The ozone and PM
110	4	exist in the form of PM ozone regional haze guidance
170	11	ozone limiting method option if you use OLM with the
277	9	ozone concentrations and calculates the OH
277	15	the end of each time step the ozone concentration is
278	6	at a distance of 11 km. As you can see, the ozone in
280	7	includes SO2 oxidation by hydrogen peroxide and ozone
281	3	the new treatment including the ozone correction for
282	23	I talked about the ozone correction, and for this
283	5	you could have ozone depletion going on for an
286	18	and Ozone as well as ammonia and provide temporal and

Page	Ref No.	Keyword = "parameter"
127	16	parameter. Outside testers and evaluators of the
155	20	extremely sensitive to this parameter. But there is
159	2	involved in the surface parameter determination and
168	25	the urban roughness length parameter it's an optional
169	2	parameter on the urban option part when you select an
259	9	CALPUFF as a parameter that determines how much
261	11	another threshold parameter in CALPUFF that also had
262	6	that parameter and assigned to the value of 0 which is
279	22	parameterization is used to approximate the increased

Page	Ref No.	Keyword = "parameters"
113	10	So the tool allows AERMOD to use parameters calculated
124	22	have those needed meteorology parameters that the
124	24	parameters. At the same time we also wrote a work
125	7	Some of the calculated parameters that we'll be
126	9	and geophysical parameters. (inaudible) Review
126	10	parameters that will have to be diagnosis/calculated.
127	2	documentation that describes all parameters,
129	20	parameters over water. At this point and time,
138	4	interpolates the smaller parameters to that location.
138	22	parameters coming directly from the MM5 such as the
138	23	convective parameters, etc., or is there some blend
139	2	all these parameters coming directly out of the

Page	Ref No.	Keyword = "parameters"
159	6	parameters. I'll talk more about that in a second.
170	3	parameters may vary depending on the wind direction
197	3	parameters: Wind speed (stable and convective), cloud
200	18	change parameters. If you are happy with everything
223	4	anything; just input the normal stack parameters,
255	11	factors, the new default parameters for optional
255	18	the new default parameters and the final column is
255	20	default parameters -- well this is a little more
257	25	So some new default parameters were incorporated. The
258	3	water. So these are new parameters that were part of
258	9	parameters. The defaults for these parameters are
258	11	didn't have those parameters. So that was something
281	24	here where we kept all the parameters constant and

Page	Ref No.	Keyword = "particle"
230	12	for deposition particle deposition fairly small
241	17	federal agencies in particle EPA, FLM, MMS for those
282	15	gas phase nitric acid to the particle phase.
283	20	you would expect more nitrate in the particle phase to

Page	Ref No.	Keyword = "PBL"
113	12	including the heat flux, friction velocity, PBL

Page	Ref No.	Keyword = "Phase 2"
131	7	testing in Phase 2.. But I just wanted you folks to
270	23	situations. The IWAQM Phase 2 report includes some

Page	Ref No.	Keyword = "photochemical"
11	24	photochemical regulatory aspects and it was really
55	6	photochemical models for NEPA and addressing new
55	8	situation where we will look at photochemical models
92	12	should focus on refining photochemical models to
96	9	photochemical models are one area we need to pursue.
97	5	photochemical grid model. In 1990 I succeeded it was
99	17	photochemical grid model. (inaudible)
99	19	photochemical grid models. In 2008 and 2009 there's a
100	3	don't feed ozone so they had to bring a photochemical

Page	Ref No.	Keyword = "photochemical"
101	16	photochemical grid modeling.
101	19	just use AERMOD and a photochemical grid model for all
101	23	first EIS to propose to use photochemical grid model
102	13	photochemical grid modeling for these oil and gas
103	9	This is the photochemical grid model domain where we
103	23	So this is some of our PGO photochemical models and
104	16	results to measurements. These photochemical grid
104	20	How do you use photochemical grid models to obtain
105	10	we are doing photochemical models and NEPA related
105	25	six years has developed advanced photochemical grid
107	2	the photochemical model is being used here and trying
107	5	tomorrow with respect to the use of photochemical grid
110	7	photochemical modeling things along this line. This
139	23	photochemical modeling. Again that's just one
141	2	of confidence in current grid models photochemical or
276	13	by using photochemical grid model results to provide
277	13	you need full photochemical mechanism.
286	19	spatial variability. Running the photochemical grid

Page	Ref No.	Keyword = "plume"
105	20	tomorrow about the plume in grid model for near source
105	21	chemistry and plume dispersion. The ozone and PM
107	6	models and techniques within those models like plume
112	12	where we need to say where the plume is going. Onsite
132	24	modeling low level plume. This may be problematic
208	7	plume. That can mess up the plume calculation quite a
209	5	up wind dispersion for plume released within the
209	12	PRIME was designed to include partial plume
209	22	influences on the plume maybe that all or nothing may
264	10	plume model cannot give me a reliable answer. So when
269	2	a apartment right on the coast the plume is going
269	16	wind fields but if the plume is in the wrong grid
277	5	early stages of the plume we have NO/NO2/O3 chemistry
277	7	the plume and part of the second stage where we have
277	11	chemistry of the plume in the far field where you will
277	21	plume dispersion.
278	4	This is actually a comparison of SCICHEM with plume
278	7	the plume is depleted by 45 ppb in the model as
280	23	We also did some CALPUFF testing using a plume
283	2	in the plume NO2 but there could be situations where
283	4	plume could be compact for a long period of time and
283	8	This slide shows the comparison of plume nitric acid
283	9	and plume particulate nitrate from the original

Page	Ref No.	Keyword = "plume"
283	12	new treatment. You don't see much effect on the plume
284	9	the two modules in the formation of SOA in the plume.
287	10	version, you have more interaction between the plume
291	8	canyon sidewalls and plume shadowing and terrain
308	20	causality affects which means the plume only travels
308	22	meter per second winds the plume only goes to 2.6 km
308	24	has plume that goes to infinity every hour.
311	5	upper portion. CALPUFF suggests that these plume in
311	11	the plume and will drive it into the terrain. It
311	15	correct concentration when that plume infringes on the
311	17	terrain (inaudible) plume. If you look at all three
311	24	with the random portion of the plume. I'm going to
312	15	source of the met data you will get a plume going in
312	19	cumulative impact. Also in random plume there are
312	20	some problems with the random plume element in AERMOD
312	24	concentrations a range of plume that that results in
313	2	in a random plume that can even exceed downwind
313	8	model works. Main plume, coherent plume and there is
313	9	a circle of the random plume. Some of the plume mass
313	10	in the coherent plume is taken out and distributed
313	15	How much of that plume is taken out and put in
313	16	the random plume? Well, under stable conditions it
313	19	from 40% up to 2/3 of the plume mass is actually
313	20	assigned to the random plume. So let's take that
314	4	the plume is used in that characterization in that
314	5	random plume. So because this terrain behind the
314	10	from the other side even though your plume is going
314	13	issue I see with the random plume and applying it on a
316	17	because plume goes to a different receptor.

Page	Ref No.	Keyword = "precedents"
34	14	precedents that may get set. It allows us to engaged
99	5	precedents. Jonah and Pinedale EIS in and around 1997
246	25	potential bad precedents. Very good intentions but

Page	Ref No.	Keyword = "PRIME"
44	9	prime downwash. It's an issue triggered by the fact
44	10	that implementation relates to the prime downwash
49	24	The vertical extent of wake influence in PRIME
194	7	of messy for that. You can also use the PRIME
205	3	volunteered for this sort of ad hoc BPIP prime work

Page	Ref No.	Keyword = "prime"
205	19	prime that is not always going to give you the worst
205	21	Probably wasn't as much an issue before prime. That's
206	4	with prime. On the other hand, another issue with
206	23	algorithms might not always be applicable for prime
207	4	didn't matter. But with Prime it does take into
207	17	displaced. The model didn't care but with prime it
207	20	ISC3 in relation to prime downwash algorithms. We
208	5	with Prime because Prime uses a stack diameter input
208	9	sources and prime algorithms. So we haven't gotten a
208	16	stacks. Sort of adapt those to be used within prime
208	23	incorporated in PRIME part. There was not a lot of
208	25	goal initially was putting Prime into AERMOD was to
209	2	keep Prime as intact as possible. That was just a
209	4	issue but on the other hand Prime doesn't account for
209	12	PRIME was designed to include partial plume
210	7	that. Just a quick background on the BPIP Prime work
212	9	that's why I gave you an overview of the BPIP Prime AD
212	12	AERMOD to take it out of BPIP Prime so you don't have
212	15	processing building information for PRIME. One of the
213	3	from multiple structures. Prime does offer benefit
216	5	incorporate the BPIP Prime functions into AERMOD and
256	15	field even though long term transport is the prime
290	20	includes the EPRI PRIME downwash module, flexible

Page	Ref No.	Keyword = "processor"
165	20	dispersion model, AERMET met processor and AERMET
165	21	(inaudible) processor and briefly summarize those.
212	13	to have a separate BPIPPRM processor. Another thing

Page	Ref No.	Keyword = "processors"
292	5	processors updated to accept new or revised data

Page	Ref No.	Keyword = "profile"
119	21	full profile winds and temperature derived from MM5
119	23	the profile files. As if I had a tower that went up
128	23	to put a profiler on one of the islands so that they
128	24	will be collecting temperature profile there for us.
141	25	can we really extract from that full profile from the
142	8	basically have that full profile every hour. So I

Page	Ref No.	Keyword = "profile"
142	10	to use because if you feed it into the profile file as
142	11	profile of winds and temperatures all the way up.
195	6	That's for potential temperature profile calculation.
197	13	you will generate surface and profile files for
272	12	report on page 2 put AERMOD profile date in half
273	11	CTDMPLUS profile.
273	17	wind or temperature profile, how can I inform the
293	6	We put the (inaudible) turbulence profile in CALPUFF.

Page	Ref No.	Keyword = "promulgated"
24	8	because at the time AERMOD was not promulgated and I
24	15	AERMOD was promulgated and replaced the ISC3. There
55	14	when we promulgated AERMOD we identified there are
165	14	everybody here is aware AERMOD was promulgated as EPA-
210	18	but AERMOD promulgated Dec. 2006. The committee and
211	12	promulgated there were some issues there. Sensitivity
239	5	Obviously the modeling system was promulgated in
239	7	promulgated as EPA's preferred model for long-range
240	5	available. We started with the promulgated version
263	8	promulgated and using turbulence as dispersion doesn't
308	18	Appendix W when it was promulgated and I think it's
317	6	evaluations studies 7 are promulgated. There are no
321	5	There is a role for AERMOD and its promulgated

Page	Ref No.	Keyword = "promulgation"
28	9	time. Their efforts resulted in the promulgation of
50	16	Particularly in regard to the recent promulgation of
55	22	that in this promulgation that we set the stage for
251	14	promulgation of AERMOD got in the way of that.
262	20	promulgation. As Tyler mentioned fortunately we got

Page	Ref No.	Keyword = "protocol"
30	7	protocol that was introduced by (inaudible) Desmond
51	15	modeling protocol in order to get review and input
249	3	process or the protocol process so we got the request
249	8	tool and the process and the protocol itself which was

Page	Ref No.	Keyword = "protocols"
51	20	those protocols in and defining clearly the models or
109	17	CALPUFF is to develop testing protocols for the
109	21	has to be some rigorous testing protocols that go into

Page	Ref No.	Keyword = "PSD"
53	15	including PSD. It's applicable to criteria air
310	12	two reasons. One is NAAQS and PSD are not facilities

Page	Ref No.	Keyword = "puff"
43	13	appropriate since it's a (inaudible) puff model. This
275	7	it is a reactive puff model which is a chemistry
275	12	SCICHEM is a non-study state puff model which allows
277	20	for the O3 depletion in the puff in the early stages of
277	22	So the way we fixed it was to store the puff O3 history
277	23	and calculate a new puff O3 concentration at each time
277	24	step as a weighted averate of the puff O3
286	25	just like a puff model. It has the capability to read
291	4	includes the Hybrid puff-particle version of the model

Page	Ref No.	Keyword = "ratio"
115	16	results and the ratio between the two. So the AERMOD
115	19	doesn't look too bad between ratio of 1 to 2 including
117	12	the ratio went down by almost a factor. So that's
117	25	AERMET with air surface inputs and the ratio dropped
118	3	factor of 7 higher with the MM5 data to a factor ratio
154	11	the Y Axis is the ratio of the hourly average
161	4	looking at. On the Y AXIS is the ratio of the 1 km
161	15	the 3 km ratio increased differences mostly predicting
183	7	characteristics: albedo, Bowen ratio, surface
184	24	ratio, we feel a geometric is more appropriate as well
184	25	because it is a ratio. And then as the domain a
185	3	roughness and for Bowen ratio albedo the
185	6	representative of the met tower we feel. Bowen ratio
185	13	separate them so for Bowen ratio and albedo. The
197	20	number for Bowen ration and one number for surface
220	2	the ratio of the (inaudible) in a form if you have the
313	13	rational for that algorithm but I think it can cause

Page	Ref No.	Keyword = "ratios"
73	22	exposure ratios. That is the ratio between what's
316	6	the ratios of the model outputs and said these were

Page	Ref No.	Keyword = "receptor"
87	13	participants led to a 1 km X 1 km AERMOD receptor
173	13	some problems with setting up your receptor grids and
174	9	included keyword that's in AERMOD to feed in receptor
190	12	them into AERMET and (inaudible) greater receptor,
195	20	maximum concentration for automatic receptor distances
202	6	concentration and then refine receptor spacing to 1,
202	10	These are the receptor networks for PROBE and
203	16	it will give you the receptor relative height to the
203	17	source elevation. In this case our receptor was 5
209	8	receptor closer to the building you're getting no
213	20	source, every receptor every hour. Where ISC only
285	3	PM partitioning at receptor locations to make sure
316	17	because plume goes to a different receptor.

Page	Ref No.	Keyword = "reformatted"
123	16	Model Data Reformatted Program that we have been
130	12	reformatted program. We expect this will take 2-3

Page	Ref No.	Keyword = "regulatory"
7	18	regulatory model. Not only AERMOD, but we have
9	13	modeling community and with the regulatory community
9	18	does is it creates problems for the regulatory side as
11	2	from the regulatory perspective is that AERMOD Model
11	24	photochemical regulatory aspects and it was really
14	20	the regulatory process we have to go through. It may
26	22	timely in terms of use in regulatory arena. I hope
30	13	current regulatory version (base.) It looks at the
42	3	regulatory status of proprietary versions of AERMOD
42	20	the regulatory status of CALPUFF modeling system for a
43	5	regulatory applications is AERMOD as 2006 the
44	16	under regulatory default option. AERMOD doesn't
53	11	is a distinction between the regulatory model
63	13	actually used it some regulatory settings but it's not
63	16	said they didn't want NATA to be just a regulatory
63	22	you can use it in a regulatory setting.

Page	Ref No.	Keyword = "regulatory"
68	9	to run for these non regulatory applications through
69	21	time to the assessment. This is not a regulatory
75	13	When you define Area Sources from a regulatory point
112	23	They are being used in other regulatory modeling
118	18	for regulatory modeling. It's something that we have
138	16	regulatory application model where that type of
138	18	would be used in the regulatory permitting, But yes
149	22	implementation guide that represents the regulatory
178	2	non regulatory applications. One of them was
178	19	has been placed on the model for routine regulatory
184	2	not currently considered part of the AERMOD regulatory
210	14	As Tyler mentioned this morning AMS/EPA Regulatory
214	5	averages. It would be sort of a regulatory option
220	13	regulatory required tool I mean it's a tool to assist
225	7	regulatory model and in the development phase that was
225	8	appropriate. But once the model is in the regulatory
239	16	earlier maintains the approprobilability of regulatory
240	9	to update the regulatory version to address bug fixes
240	11	the way for regulatory use of this model. There were
241	25	update tool to update the regulatory version from what
242	10	regulatory status. Given those issues we felt it was
242	15	Appendix W requirements for regulatory models. You
243	3	described with the update tool. You had a regulatory
245	21	this case for the regulatory version and the new
247	16	coming from that tool as part of the regulatory
247	18	difficult situation in dealing with the regulatory
248	10	data set because they were not based on a regulatory
249	21	model, to update the regulatory version 5.8 in June,
249	23	regulatory standpoint is CALMET, CALPUFF and CALPOST.
253	3	summarize where we are from regulatory standpoint.
253	20	CALPUFF is approved for regulatory use and the tool is
256	16	regulatory nitch for the model. So we started looking
261	3	Then a new regulatory default switch was added to
261	4	CALMET. Prior to that there was no regulatory default
261	8	terms of not being used for regulatory applications
262	7	to not enforce the regulatory defaults and we've
262	10	to turn on the regulatory default. Just to make you
263	4	Currently the regulatory option is to use the PG as
276	8	regulatory applications. We do have ideas on how it
291	15	that come up as being required by the regulatory
291	23	the regulatory codes and we don't. But we put these
296	12	get into the regulatory version of the model. It
298	5	consistency with the regulatory version with one
298	11	regulatory version of the mode. That's how it's
298	18	that says for regulatory use we want that value to 0

Page	Ref No.	Keyword = "regulatory"
299	22	regulatory version (inaudible) rather than the nearest
300	14	in the regulatory version have been adhered to
300	15	meretriciously we don't change the model regulatory
307	5	valuable. This isn't any kind of regulatory policy
314	14	regulatory basis when you have multi source impacts.
316	4	concentration when you're doing a regulatory study.

Page	Ref No.	Keyword = "roughness"
117	2	the same roughness length (inaudible) that came out of
117	7	it with the roughness estimated at the airport from
149	13	a clarification of the urban roughness length. We
149	18	represent the roughness difference between your source
155	4	roughness length. They were involved with methods for
159	5	radius that are recommended for the surface roughness
160	9	calculating your surface roughness based on a 1 km
160	12	recommends the 1 km for surface roughness calculation.
160	16	difference between the 1 km surface roughness and the
160	18	which means that the 1 km surface roughness is 250%
160	23	the 1 km surface roughness value are less that were
161	5	surface roughness prediction to the 3 km radius
161	16	a little bit higher with the 1 km roughness. Had one
168	25	the urban roughness length parameter it's an optional
183	8	roughness. So that sensitivity to surface
184	15	calculation for surface roughness as the sector gets
184	20	sensitivity of the model to roughness or (inaudible)
185	3	roughness and for Bowen ratio albedo the
185	5	between surface roughness which clearly needs to be
185	22	estimating roughness at airports. If you notice one
186	5	roughness influences all in one category without being
186	11	roughness you'd have category 23. Here's the
186	12	assumed roughness for an airport and there it is if
187	15	roughness, a compass points at each of those
188	25	surface roughness at airports. All of the developed
197	21	roughness. It doesn't vary through the year or
198	10	surface roughness sectors. AERSURFACE is run for the
201	12	roughness that's a lot of runs and we decided to
203	4	degrees and whatever surface roughness sector that is
211	22	roughness in the urban area than you typically do at
216	20	of urban canopy on wind profiles. So the roughness
219	25	for each of the domain for the surface roughness and
314	20	land use you use to determine the roughness in AERMOD
315	2	blowing downwind you are in the low roughness land but
315	4	roughness land. So why is this right? What is the

Page	Ref No.	Keyword = "roughness"
315	8	after the roughness downwind has (inaudible). I've
315	9	also plotted the AERMOD roughness on source A and
315	12	roughness of the met station for all these sources in
315	25	Looking at the difference of the roughness from the

Page	Ref No.	Keyword = "RUC"
292	13	meteorological models such as MM5, WRF, RUC, RAMS and

Page	Ref No.	Keyword = "rule"
37	8	the form of a policy memo for a report or rule making
63	18	for our mobile air toxic rule a few years ago but we
77	4	the MSAT rule that came out last year which will help
289	22	from Prakash about a chemistry set rule becomes part

Page	Ref No.	Keyword = "run"
8	21	running ISC for years and we know how to do this and
9	2	models out there running around but we've had rogue
10	18	mode. Yeah, it takes a little more effort to run
11	4	we're running into all kinds of issues on how it's
12	21	the runway in Philadelphia trying to get home and they
12	24	other runway in the opposite direction and there will
13	4	runway and there will be another delay. This went on
65	4	We run what we call exposure models to do that and we
67	20	and we actually developed meteorology data to run a
68	9	to run for these non regulatory applications through
69	4	it took for this to run. I don't want anyone to
69	5	complain about their model taking an overnight run.
69	6	So it was a big time running on many, many PC's and
70	9	feature run through sixty thousand facilities so we
70	18	of months to run. Let's run these through the old
73	21	a model called HAPEM that we run and develop these
86	15	We did run SMOKE outputs were run through CAMx to
88	2	bridges that run northeast to southwest. The valleys
88	6	site which is run by a Southern Company which is co-
93	8	is everybody running CMAQ at about 4km. And it's just
94	20	this point our modeling is running we are going to
96	2	running about 15 minutes over but we'll get that back
96	20	running. I called the person on it and they said it
99	18	In the Four Corners area they started running

Page	Ref No.	Keyword = "run"
99	25	this point there running AERMOD for near-field impacts
101	11	of wondering why we're running CALPUFF to get sulphur
101	12	and nitrate impact when we're running a perfectly good
103	3	we run MM5 to get the surface data and we see we can
103	12	sources. Then we run that to get (inaudible) for our
107	9	We're running 15 minutes behind so we'll take a 15
120	7	air surface there is some uncertainty when you run air
126	12	us to consider. We also want the program to run on
130	9	other analysis but we were often running MM5 or WRF
135	18	alternative to. Part of the running any like okay for
135	19	the people who are running multiple year simulations.
136	9	there's no more to be gain from running one verses the
136	18	inputs to AERMOD for the same run?
138	11	around that line there's an opportunity to perHAPS run
141	16	finding a (inaudible) run and virtually nothing is
147	13	you need to run in AERMOD. And this is one of the
159	10	I've generated to run in AERMOD is it representative
168	20	need to run the model.
175	8	I think in the long run it will make things easier and
175	11	finally allocatable array storage at runtime as in
177	12	but they probably maybe not if you run a spit ball
185	25	runway and the open parking lot and the terminal
186	19	is the developed category and the runway, the terminal
188	22	it to distinguish between the runway and a building.
189	6	the grassy areas around the runway, that shows up as
189	9	intensity just by going from the grass to the runway.
189	11	runway or on the grass.
189	18	runway could be developed open space if it's barely
189	19	runway. What we're looking at is there is two
190	8	distinguish: "Am I at a runway, building or what?".
193	13	itself so you have to run AERSURFACE.
193	21	see in an AERMOD run.
195	25	direction. You can re-use previous AERSCREEN run
196	2	files. When you run AERSCREEN it generates an input
197	10	heights. In MAKEMET, if you run stand alone you can
197	14	running AERMOD so you'll generate the dot .SFC and
198	8	run AERMET you have to put surface characteristics in.
198	10	surface roughness sectors. AERSURFACE is run for the
198	16	MAKEMET is run for each temporal, sector combination
199	4	run BPIPPRM and AERMAP for the source if necessary.
199	9	running flat terrain with no downwash and you're not
199	10	running a rectangular area source, than execute PROBE.
199	11	If there is a dependency that means you are running a
200	19	hit enter and AERSCREEN starts the run.
200	20	When you run terrain data it will ask you if you want

Page	Ref No.	Keyword = "run"
201	9	degree diagonals, AERMOD run for each SC
201	18	each degree radial run separately. Direction specific
201	20	whatever direction you're going. And AERMOD is run
202	12	going to run each of the surface characteristics
202	18	mathematical value. So you're going to run each one
202	21	12 sectors you will run each one of these diagonals
220	14	in doing that so you can run AERSURFACE. We hope that
220	19	grass areas around the runway instead of showing up as
223	15	question about running this as a DOS application.
224	4	will run. I think that shouldn't be an issue as it's
227	2	run AERMOD is always something that is mentioned and
227	7	increase in run time.
227	22	to AERSCREEN you would run AERSURFACE both for the met
236	11	file that we may run across and haven't accounted for.
272	18	range in terms of performance result based on running
286	19	spatial variability. Running the photochemical grid
286	24	alone or off line version where you basically run it
287	7	The off line version is cheaper because you only run
295	17	tool did exactly. We weren't able to run it in our
295	20	So now we've been running it for EPA and providing
295	22	they run it independently themselves. At least we'll
305	2	run this model and three of them will solve this
305	6	One is to run the model in NOOBS mode using MM5 only
305	12	run in that mode. That's equivalent to say that you
305	15	in the MM5 data, you can run CALMET in the pure
305	18	If you run it in a hybrid mode with MM5 and use
305	22	of this has to do with running the model in a poor
306	4	You can run in the (inaudible) that's only with
306	9	You can run it in the hybrid mode and you get more
306	11	bull's eye will disappear. Also, you can run it in a
306	13	why would you run it this way? Why not run it in one
312	14	you run this with AERMOD, using this station as the
314	18	one land use type verses another or is it a runway.

Page	Ref No.	Keyword = "rural"
115	13	rural dispersion. On the left you have is the H1H,
120	12	which would have been all rural. How sensitivity is
139	4	utilized to eliminate urban versus rural switches in
149	2	or rural based on the Auer/Irwin technique to a more
158	4	urban and rural areas. And we've discovered that NASA
195	7	You can do rural or urban source and urban population.

Page	Ref No.	Keyword = "scale"
56	24	for given the current focus on local scale issues such
57	25	these at that local scale. That may not be sufficient
119	12	points and the initial one is to interpolate the scale
123	18	10 has interested in using this scale model to guide
125	8	calculating will be convective velocity scale, surface
174	6	critical (inaudible) height scale. Doesn't affect the
174	7	elevation just the height scale.
197	6	and convective), convective velocity scale (w*)
203	12	AERMOD and these are the scaled concentrations that
218	10	direction specific height scale to the model first and
259	8	degree. The convective velocity scale which is path to

Page	Ref No.	Keyword = "scaling"
292	19	Sources separately, scaling them, and adding them

Page	Ref No.	Keyword = "SCRAM"
24	17	published and there's a copy on SCRAM and for more
24	20	SCRAM. We've taken a lot of effort to update SCRAM
30	24	and provide that documentation through SCRAM to you
32	18	on SCRAM so you can go to the appropriate place in
32	19	SCRAM and find the modeling conferences and find each
33	5	SCRAM on a daily basis or weekly basis you are not in
36	22	MCHISRS which I'll talk about through SCRAM and there
37	14	separate on SCRAM. The new system as of May, 2007,
38	13	Here's a screen shot of SCRAM with the Modeling
41	10	SCRAM. So if a new memo is released you will see it
41	11	on the recent additions under SCRAM website and also
41	12	archived on the SCRAM web page. As you can see under
43	21	field applications posted on SCRAM on September 26,
57	16	it on SCRAM like everything else and it's available in
59	15	that and the workshop itself is available on SCRAM
67	11	website which is a sister website next to SCRAM. You
67	17	SCRAM and get all sorts of meteorology data and
70	19	ASPEN model. This model is still on SCRAM and I saw
162	12	guides we put them up on SCRAM and maybe we need to
167	12	you aware that these are going to be released on SCRAM
168	7	released on SCRAM we've updated to Intel Fortran
177	11	Check SCRAM regularly. I hope they're bullet proof
180	7	alert would go up on SCRAM here's about you really
183	18	AERSURFACE was released on SCRAM on January 11, 2008.
188	15	Should be released on SCRAM soon but currently in

Page	Ref No.	Keyword = "scram"
204	10	SCRAM website. There will be some user documentation
225	19	Roger indicated a need for us to have through SCRAM,
227	6	and we put on SCRAM you will realize that up to 40%
241	7	publically available on SCRAM. We walked through a
254	2	documentation in a report on SCRAM as referred
263	22	give you a little more detail it's been on SCRAM for a

Page	Ref No.	Keyword = "screening"
167	15	to release a draft version of AERSCREEN. Screening
193	7	screening mode for a single source. Right now it
229	5	option basically a multi source screening technique

Page	Ref No.	Keyword = "sensitivity"
44	19	Also over ten years ago there was a sensitivity study
44	20	done the sensitivity of the ISCST3 model to ASOS vs.
45	6	Sensitivity analysis was conducted with ISC and there
115	7	We did a very simple sensitivity analysis. We picked
119	5	Do additional sensitivity analyses using the MET input
119	24	5,000 meters we could do some sensitivity analysis if
120	12	which would have been all rural. How sensitivity is
133	17	because the sensitivity study I mentioned we have
133	20	done with ISC in terms of AERMOD sensitivity to ASOS
161	18	original prediction. A little bit more sensitivity
171	10	sensitivity to resolution or precision in the
179	6	came up that showed greater sensitivity not related to
181	17	did conduct a more detail sensitivity analysis of
181	22	documenting that sensitivity report.
183	8	roughness. So that sensitivity to surface
184	20	sensitivity of the model to roughness or (inaudible)
211	12	promulgated there were some issues there. Sensitivity
212	25	the degree of sensitivity to this issue perHAPS.
213	14	surface characteristics sensitivity or source
220	7	clear answer on that. Hopefully the sensitivity isn't
273	4	some significant sensitivity to the dispersion and
280	18	sensitivity studies with the old and new inorganic PM
281	10	I'll briefly discuss the box-model sensitivity studies
281	12	sensitivity of the original CALPUFF module (MESOPUFF)
281	19	the sensitivity to relative humidity (MESOPUFF refers
282	11	If you look at the temperature sensitivity, at the

Page	Ref No.	Keyword = "service"
44	4	observer-based National Weather Service data with
108	11	Service (NWS) meteorological analyses to improve
110	13	better than National Weather Service data going to the
110	14	nearest National Weather Service site.
127	13	including EPA, Forest Service, National Park Service
127	14	and Fish & Wildlife Service to develop statistics,
151	2	same National Weather Service stations during the same
159	19	Weather [ed. Service] station located about 20 miles
159	23	National Weather Service station which is what you
160	5	at the National Weather [ed. Service] station. Again
160	22	National Weather Service site similar map, I think all
161	14	National Weather Service tower comparing the 1 km to
161	19	with the National Weather Service station. The group
166	4	surface weather service data. Think we've got a
290	24	funded by the Forest Service, some enhancements funded
295	8	like a service where we have contracts to provide

Page	Ref No.	Keyword = "site"
88	6	site which is run by a Southern Company which is co-
110	11	getting into the issues of site
110	14	nearest National Weather Service site.
122	20	onsite, we have 1-minute ASOS on site, gridded met
140	6	surface data. Especially out west if I have site
148	16	downloading data from the upper cell web site.
148	20	national weather data or site specific onsite data
149	19	site and your met sight. I think there has been some
159	16	data and source information and this is a site
159	18	site specific met tower Belleville is the National
159	21	use area around Baldwin which is site specific and the
160	13	This is the 1 km circle this is 3 km for the site
160	22	National Weather Service site similar map, I think all
160	25	percentage than we saw for site specific. So what
161	9	Generally not a whole lot of difference for this site
161	13	difference for the site specific tower. For the
176	7	inputs for site-specific data that came up recently.
176	11	if we had site specific data in one time zone and
182	12	10 meter on site data. It appeared to improve model
187	10	are some links on the NCDC site for two hundred states
187	17	web site. They also had GPS and coordinates and
211	23	the airport site where the met data is being corrected
227	19	demonstrate that a meteorological site is
227	20	representative of an application site. I would
227	23	side and application site, feed it into AERSCREEN, and

Page	Ref No.	Keyword = "site"
228	2	conclude that the met site is adequately represented
228	3	of the application site.
228	12	quantitative way to say how to compare the met site to
228	13	the application site from surface characteristics.
231	14	evaluation data base. Now we checked on your web site
270	7	Will the modeling system be able to utilize that site
271	25	tried to utilize the onsite data from the Lovett site.
291	2	available on the web site and we do allow development,
295	16	site and we weren't sure what versions and what the
309	6	dispersion. It looks upwind of the met site. What

Page	Ref No.	Keyword = "slope"
267	24	illustrate slope flows, night time, radiative
267	25	cooling occurs, cool airs drain down the slope

Page	Ref No.	Keyword = "source"
25	19	efforts in this field to improve source culpabilities
35	20	will be referred to our new source review group headed
35	24	division. The new source review group would be the
66	4	dry cleaners are. It's an area source inventory.
66	17	time on my non point source inventory and try to
66	20	I did spend more time on the point source inventory
66	22	source inventory results and we'll talk about that in
66	23	few seconds. I also have the area source broken down
67	8	the point source category? This is what Tyler was
67	25	approximately 50 km from any given source nationwide
75	14	of view it's the 10/25 tons not the area source as a
76	21	results. This gives you an idea. This is the source
76	24	reductions. The major source is about 6% of the risk
78	25	and area source rules and the risk and technology
83	8	to excess to several geographical source
84	24	local source impacts.
86	25	If you lived within Any source within 5 km of
87	4	km of either monitor, any source with PM2.5
92	2	source characterizations or are we asking the model to
94	21	account for CAIR and any mobile source controls, We
103	16	AERMOD for the near source impact. But we'll
104	22	use ozone and PM source apportionment to obtain
104	23	incremental contributions? Use ozone and PM source
105	20	tomorrow about the plume in grid model for near source
105	22	source apportionment is the way to get individual

Page	Ref No.	Keyword = "source"
105	23	source impacts. The other is the advances in database
107	7	in grid and source apportionment in trying to address
111	19	sites may not be representative of source locations
113	7	grid cell where my source resides. And you can get
115	10	ground level non buoyant source up to a 100 meter
115	11	buoyant source with no building.
115	21	level source where you see MM5 results much higher.
116	4	ground level non buoyant source that not surprisingly
117	17	source that's going to be the worst case
119	6	from each approach, including: wider range of source
121	12	cells for each source. May not be a perfect solution
136	22	covers more than one grid cell why not use each source
148	24	change to the recommendation that moves from source by
148	25	source determination as to whether it should be urban
149	18	represent the roughness difference between your source
151	23	along this. This is for point source. As you can see
154	13	There is a variety of source categories here arranging
154	17	from source to source somewhat but I guess it's not
157	11	right number to model if you've got a source or two
159	11	of my source location or is it conservative or what
159	16	data and source information and this is a site
161	17	source that popped up over two times higher than the
166	10	your source or whatever from old topographic maps
166	17	conversion from your source coordinates in one datum
169	21	(inaudible) for providing to area source to also vary
174	10	information or source information is now supported in
178	11	source characterization issues was mentioned this
179	8	source emissions spread of source emissions and how
181	7	at assessing source characterization options or issues
182	8	actual source and the actual field study data; if the
184	11	within 3 km of the source of the met tower. Plain and
193	7	screening mode for a single source. Right now it
193	9	each source one at a time. It calls MAKEMET, BPIPPRM
193	16	for each source/receptor/meteorology combination. It
193	25	file. Source types currently support a point, volume,
195	4	receptors and the elevation of source location for
195	7	You can do rural or urban source and urban population.
195	10	source location in geographic or UTM coordinates when
198	2	conditions for the source location. Listed are the 8
198	11	source location so you don't have to worry about that
199	4	run BPIPPRM and AERMAP for the source if necessary.
199	5	You can get source elevation from AERMAP if you're not
199	7	source-receptor
199	10	running a rectangular area source, than execute PROBE.
199	13	source, execute FLOWSECTOR. In the 8th Modeling

Page	Ref No.	Keyword = "source"
199	22	asterisk reads as comments for AERMOD. Your source
199	23	date is here, this is a point source, building data.
200	15	source data, building data, terrain data or met data.
200	17	source data you cannot change source type. You can
203	15	source and what direction. If you are using terrain
203	17	source elevation. In this case our receptor was 5
203	18	meters below our source in terms of terrain
213	14	surface characteristics sensitivity or source
213	20	source, every receptor every hour. Where ISC only
213	22	each source so that by itself slows the model down by
214	22	important is if I'm doing a modeling of mobile source
215	20	data why not pick the grid cell for each source
217	4	determine on source by source basis based on the
219	11	data source so if you have land cover data in
222	7	source types.
223	9	source in AERMOD. It's just more of a matter has it
229	5	option basically a multi source screening technique
230	21	add the open PIP source.
230	22	Roger Brode: Yes all source types are supported in
235	13	source. So I think it would be up to right now would
246	17	these single source questions. But it wasn't the only
255	21	detail by source. So you can see there is differences
255	22	for every source and every scenario ranging quite a
256	3	about 5% difference for one source and one scenario
256	9	source configuration source types. The results I just
268	24	vary from source type specifically more important
269	10	be right to your source. If I have a buoyant
269	11	source I'm going to be more concerned about the
269	15	source you could have perfectly resolved ideal
269	21	vary considerably based on the source
269	22	characteristics and where the source is in the
278	12	important near the source.
287	8	CMAQ once and basically do all your source simulations
304	18	coming from another source presumably a MM5. What it
309	8	turbulence of the downwind source of the met station.
309	11	source. Horizontal wind variability you don't have
310	11	of sight from the source. I think it is flawed for
310	14	just the impact of one source it's the impact of all
310	16	source.
310	21	different source. In practice it's a very important
311	8	we're calling the income source which is this one
311	9	project source. So we're using that data with the
311	20	with the AERMOD facility source is the critical issue
312	13	and this source going in an opposite direction. If
312	15	source of the met data you will get a plume going in

Page	Ref No.	Keyword = "source"
312	21	that creates a halo around every source when you apply
312	22	cumulative impacts. Basically if the source is larger
313	4	source interacting with that shadow which causes a
313	5	violation to which your source will deemed
313	11	radially around the source including upwind at 50 km
313	22	the source here with the wind blowing to the SE.
313	23	Behind the source is terrain and if you look at the
314	9	another background source infringing on this source
314	14	regulatory basis when you have multi source impacts.
314	23	of the source. If you have a number of different
315	9	also plotted the AERMOD roughness on source A and
315	24	and 89% from design concentration from this source.

Page	Ref No.	Keyword = "speed"
46	18	missing but the wind speed is not missing and not
106	4	Of course computing speed and doubling computing speed
112	10	is going but we have a wind speed for you. Well,
116	5	shows light wind speed. Don't know if we have a
116	6	pointer yet, but you can sort of see the wind speed
116	10	AERMOD impose a minimum wind speed for dilution of
136	3	able to speed up the permit review process. In come
140	23	ideally we would be able to do that to speed up the
143	13	up to speed on what's been going on since then.
153	18	we have the various wind speed categories starting
153	20	speed category. The thing to point out is the number
160	7	wind speed distribution.
168	9	upgrade will speed the model up to I think about 40%
194	17	location, minimum wind speed, anemometer height and
197	3	parameters: Wind speed (stable and convective), cloud
201	13	invoke the TOXICS option to speed up the model. Other
209	25	wind speed issue comes up a lot with AERMOD. AERMOD
210	2	is designed to accept wind speed below 1 meter per
210	3	second. The affected lower limit for speed used in
210	5	minimum wind speed needed to generate a wake from the
214	9	would speed the model up with hardly any difference in
214	17	something to speed up the mode. And also our goal is
226	20	phrase that in terms of where is the speed of AERMOD
227	10	to speed up many applications. I think it's certainly
227	14	then the speed would be a higher priority. I always
233	14	minimum speed is to create wake effects behind
234	3	to go is to think about what is the minimum speed that
249	12	Now speeding up to more recent times because Roger and

Page	Ref No.	Keyword = "stack"
44	8	Practice (GEP) stack height in AERMOD which includes
47	18	off building downwash effects if stack height is
47	21	Hb = building height above stack base and L = lesser
48	5	height so the stack just above gets no downwash effect
48	6	much lower concentration on the stack just below.
48	15	implementation is a requirement imposed by GEP Stack
48	19	different based on a hair difference in stack height.
49	6	current assessment. If you go to GEP Stack Height
49	7	regulations define GEP stack height as the greater of:
50	5	above EPA formula height for some stack/building
60	25	Now if we have lousy inventories and lousy stack
194	8	building downwash. You would need to give stack
207	3	where the stack was in relation to the building so it
207	5	account the stack building geometry so if you have a
207	7	next to the stack that's going to have a lot more
207	8	influence on the stack in terms of down wash than a
207	15	to the stack so it didn't really matter if you put the
207	16	EPD next to the stack and the actual building was
207	25	capped or horizontal stack which was to set the exit
208	2	velocity very low and put in an effective stack
208	5	with Prime because Prime uses a stack diameter input
209	7	stack is downwind from the building and you have a
212	18	is in relation to the stack that's a problem. By
221	21	the beta option to turn stack to downwash for
221	23	option or a beta version where you can turn stack to
222	4	It has to do with stack to downwash as to whether or
222	10	to the issue of stack to downwash that you could set
222	12	diameter and turn stack downwash off. That's kind of.
222	25	if your stack is not subject to building downwash then
223	2	the capped stack option in AERMOD applies to the
223	4	anything; just input the normal stack parameters,
223	5	stack height, velocity, actual diameter. It does the
268	25	for elevated releases if you have a tall stack or
277	17	which is not true near the stack and I will show you a
314	6	stack you're getting the large area of 15 to 20 km in

Page	Ref No.	Keyword = "stacks"
48	4	been noted for stacks that straddle that formula
49	14	have seen are primarily a concern for shorter stacks,
49	15	usually with squat buildings. So stacks that are
185	9	more of an issue with taller stacks which are going to
207	22	capped/horizontal stacks. At least part of that is
208	16	stacks. Sort of adapt those to be used within prime

Page	Ref No.	Keyword = "stacks"
208	20	Did I mention the discontinuity for stacks that
222	9	procedures for modeling capped stacks could send you
222	16	be used for stacks that are subject to building
222	17	downwash. My guess is that most capped stacks are
222	20	had some capped stacks that were heaters at a gas
223	8	why you couldn't use capped stacks for non-downwash
315	19	downwind of these stacks. Does it matter, well it

Page	Ref No.	Keyword = "statistical"
126	15	statistical comparisons observed to measure from the

Page	Ref No.	Keyword = "steady state"
264	8	wind situation where non steady state effects are so

Page	Ref No.	Keyword = "surface"
44	23	surface observing systems being put in airports had
46	7	advent of ASOS these automotive surface observing
69	16	include things like building downwash and surface
70	10	used airport surface data around these airports to
103	3	we run MM5 to get the surface data and we see we can
111	21	representativeness of surface characteristics have now
113	8	surface and upper-air data located in same grid cell.
113	18	data input data plus surface characteristics and
116	24	this we didn't have air surface. Is this working at
116	25	all? So we didn't have air surface and we just used
117	6	Later air surface was developed. Went back and re-ran
117	8	air surface which was quite a bit lower. This was
117	11	re-ran AERMET with that surface characteristics and
117	24	supplemented airport data through air surface through
117	25	AERMET with air surface inputs and the ratio dropped
120	7	air surface there is some uncertainty when you run air
120	8	surface you feed it to location of your MET tower. We
125	8	calculating will be convective velocity scale, surface
125	10	and surface relative humidity. I'm sorry I have been
128	19	collecting surface observation as well sea surface
130	6	and fed it to CALMET the surface file for OCS and to
134	10	experiences we've had with air screen and air surface.
138	21	far as the MM5 or WRF AERMOD input. Are the surface
140	6	surface data. Especially out west if I have site

Page	Ref No.	Keyword = "surface"
140	7	specific surface measurements that I'm confident in
142	22	will do Air Surface and then we'll have an AERMIC
146	6	Surface Characteristics - Doris Jung (CO DPHE)
147	12	process of generating the surface characteristics that
148	4	section relating to determining surface
148	8	representativeness of your surface characteristics.
148	10	the new method on determining surface characteristics
150	2	the surface characteristic group. I'm going to
158	16	Lastly the surface characteristic subgroup. Their
159	2	involved in the surface parameter determination and
159	5	radius that are recommended for the surface roughness
160	9	calculating your surface roughness based on a 1 km
160	12	recommends the 1 km for surface roughness calculation.
160	16	difference between the 1 km surface roughness and the
160	18	which means that the 1 km surface roughness is 250%
160	23	the 1 km surface roughness value are less that were
161	5	surface roughness prediction to the 3 km radius
166	4	surface weather service data. Think we've got a
175	22	elevation for all surface formats. And some formats
176	12	wanted to use with surface data from the next time
181	25	improve the guidance on surface characteristics and
182	13	performance compared to the surface characteristics
183	3	the same met input as ISC basically in NWS surface and
183	6	layer algorithms require the search surface
183	7	characteristics: albedo, Bowen ratio, surface
183	8	roughness. So that sensitivity to surface
183	16	with determining surface characteristics for use in
184	6	recommended methods to determine surface
184	15	calculation for surface roughness as the sector gets
184	17	area weight is you weight surface characteristics
185	2	default domain recommend 1 km radius for surface
185	5	between surface roughness which clearly needs to be
186	4	category. We're covering the full range of surface
186	10	That's reflected in this table so for surface
187	14	anemometer height and actually estimated surface
188	25	surface roughness at airports. All of the developed
190	4	with respect to the reflective surface, which may be
191	22	height of the reflecting surface and the reflecting
191	23	surface changes from 0 to 300 like very quickly and
194	18	surface characteristics and other variables come from
197	13	you will generate surface and profile files for
197	17	input surface characteristics. There are three
197	18	methods of inputting surface characteristics into
197	20	number for Bowen ration and one number for surface
198	8	run AERMET you have to put surface characteristics in.

Keyword = "surface"

Page	Ref No.	Keyword = "surface"
198	10	surface roughness sectors. AERSURFACE is run for the
198	19	surface and one for upper air. Seasonal you will
201	5	temporal/spatial sector of Surface Characteristic (SC)
201	11	seven diagonals at monthly 12 sectors, for surface
202	12	going to run each of the surface characteristics
203	4	degrees and whatever surface roughness sector that is
203	5	the surface characteristics you will use. So you're
211	17	issues, including Urban, Surface Characteristics and
211	18	Met Data. Urban issues and surface characteristics
211	19	and a lot of the urban issues have to do with surface
213	14	surface characteristics sensitivity or source
217	13	issue, but influence of surface characteristic
218	18	information in terms of surface temperature gradiants
219	25	for each of the domain for the surface roughness and
228	13	the application site from surface characteristics.
285	25	higher near the surface because it is usually emitted
286	2	from surface sources and to go down with altitude.
288	20	data with the surface date. We became aware of this
292	6	formats as those of you who deal with surface date
309	3	Surface characteristics I want to talk about. I
310	5	of surface characteristics upwind of meteorological
315	16	the dispersion and the surface characteristics

Page	Ref No.	Keyword = "surrogate"
149	9	you use population as a surrogate to represent the
155	11	AERMOD you need population as surrogate to capture the
217	7	population as surrogate for urban influences. It

Page	Ref No.	Keyword = "temperature"
119	11	you have winds at dot points, temperature at cross
119	21	full profile winds and temperature derived from MM5
128	24	will be collecting temperature profile there for us.
151	19	the observational data it's observer temperature,
151	21	ASOS clouds combined with the observer temperature and
152	9	temperature winds and clouds with the convention
152	10	observer based temperature winds and clouds for AERMOD
158	3	impact is what is the temperature difference in the
158	8	satellite images that show you the temperature
158	10	future is that the temperature differences is directly
169	20	the exit velocity and exit temperature. But we
178	15	temperature at 2.5 or actually 2. Two monitors

Page	Ref No.	Keyword = "temperature"
195	6	That's for potential temperature profile calculation.
218	18	information in terms of surface temperature gradiants
267	20	discontinuities in wind, temperature, etc. So
273	17	wind or temperature profile, how can I inform the
281	14	humidity; temperature; background ammonia; background
282	11	If you look at the temperature sensitivity, at the
282	12	high temperature both modules predict a lower fraction
282	19	temperature, which is -10 degrees Centigrade where we
284	12	incorrect treatment of temperature dependence in the
299	19	sharpness, the continuities in temperature fields and

Page	Ref No.	Keyword = "terrain"
69	15	terrain. I didn't write it on here but we did not
70	8	that for sixty thousand facilities and do a terrain
123	25	particular study was on terrain and the results that
136	10	other like in flat terrain. You know over the mid
166	18	to terrain elevation coordinates in another datum
194	4	complex terrain and when you are into complex terrain
194	5	AERSCREEN calls AERMAP to generate terrain height. We
194	6	don't use terrain for rectangular area sources; kind
194	21	for terrain processing. I think at the 8th Modeling
194	24	make the default of 5 km for flat terrain with or
195	3	terrain processing. You can include flagpole
195	5	PROFBASE keyword in AERMOD even for flat terrain.
195	11	you're doing terrain processing. Regardless of how
195	22	When you're doing terrain or buildings modeling, you
199	9	running flat terrain with no downwash and you're not
199	12	terrain with or without downwash or rectangular area
200	3	terrain data flags and the coordinates and then the
200	15	source data, building data, terrain data or met data.
200	20	When you run terrain data it will ask you if you want
200	24	The summary of stages are: PROBE is for flat terrain
201	15	circular areas that means you're using terrain or
201	19	terrain and projected building dimensions are used for
202	4	terrain and/or downwash, use terrain heights and
203	15	source and what direction. If you are using terrain
203	18	meters below our source in terms of terrain
218	4	wash. Terrain influences is not identical but there's
243	21	sources of meteorology and terrain should provide for
267	15	the important terrain features and other factors
270	24	CALPUFF evaluation results for Kincaid (flat terrain)
270	25	and Lovett (complex terrain) and Lovett evaluation is
272	23	terrain adjustment which one could argue is the most

Page	Ref No.	Keyword = "terrain"
273	5	terrain options in this type of evaluation. The more
273	7	based terrain adjustments exhibited the poorest
291	8	canyon sidewalls and plume shadowing and terrain
292	23	options for different terrain data. There is what's
309	24	model for complex terrain. It cannot handle complex
309	25	terrain. I think there's some issues that need to be
311	2	This is looking at a complex terrain case. These
311	11	the plume and will drive it into the terrain. It
311	16	terrain. The alternative model is suggesting the
311	17	terrain (inaudible) plume. If you look at all three
312	2	this is an appropriate complex terrain case to use
312	8	on flat terrain so terrain is not an issue. This is
313	23	Behind the source is terrain and if you look at the
314	3	happen because the (inaudible) between the terrain and
314	5	random plume. So because this terrain behind the
317	9	complex terrain. There was one coastal line group

Page	Ref No.	Keyword = "toxic"
55	13	For toxic risk assessment in Appendix W, as revised
56	2	used for toxic risk assessment and broadly other risk
60	3	projects national air toxic assessments. We're also
61	24	our air toxic website which is also on the TTN where
62	10	in the air toxic program. It's pretty daunting when
63	18	for our mobile air toxic rule a few years ago but we
63	24	with our air toxic monitoring network that we've set
63	25	up on air national toxic trend sites. We use it to
64	5	toxic programs. As I said, many states and
69	11	air toxic option which does the sampling time period
72	6	toxic monitors out there. These are the pollutants
73	12	and those of you who are familiar with toxicity,
73	13	Chromium is one of our most toxic metals out there.
75	11	results look like from the national air toxic. We
76	18	HAPS that make up about 92% of the national air toxic
77	5	reduce that chunk of the pie. If we had an air toxic
77	12	toxic program is kicking in and it's doing its job.
78	8	compared to where the higher toxic areas. Black means
78	12	toxic programs. We need to develop controls that take
78	16	both criteria and air toxic.

Page	Ref No.	Keyword = "toxics"
54	24	update on the 2002 National Air Toxics Assessment
55	16	facility-specific and community-scale air toxics risk
55	18	Toxics Risk Assessment Reference Library and the link
60	19	What is NATA? NATA is characterization of air toxics
60	20	across the nation. Keep in mind toxics are 187 of
60	21	them, air toxics, now across the nationwide. At a
63	8	integrate at that point criteria air toxics into one
65	14	inventory every three years on toxics. The 2005
77	25	is how do these toxics overlay with criteria
79	6	get both criteria and air toxics. Obviously with
108	13	permits, toxics and direct PM)."
201	13	invoke the TOXICS option to speed up the model. Other
202	23	hours but now with the TOXICS option only a few

Page	Ref No.	Keyword = "tracer"
130	2	test CALPUFF Version 6 using tracer gas experiments.
130	3	Shell will providing tracer gas experiments to us and
130	7	compare tracer gas experiments results. We'll do the

Page	Ref No.	Keyword = "turbulence"
233	21	(inaudible) turbulence so you almost always have a
234	8	turbulence that would stay behind the building. If
258	21	turbulence for that grid cell. But a new convective
259	10	convective turbulence is in the atmosphere. That is
263	3	verses turbulence dispersion option in CALPUFF.
263	8	promulgated and using turbulence as dispersion doesn't
263	11	turbulence is better than PG as far as the basic
263	17	turbulence option. That's something we need to get a
272	8	with half height adjustment, AERMOD turbulence, with
272	10	adjustment in CALPUFF, AERMOD turbulence with the and
272	22	prediction is AERMOD turbulence with the strain based
273	6	advanced option turbulence based dispersion strain
293	6	We put the (inaudible) turbulence profile in CALPUFF.
293	8	of vertical structure of the turbulence as AERMOD
309	8	turbulence of the downwind source of the met station.
309	10	CALPUFF will treat turbulence downwind of each
315	15	CALPUFF as well. You believe the turbulence controls
315	17	controls turbulence. If you believe all those things
315	18	how can you accept that? You use the wrong turbulence

Page	Ref No.	Keyword = "urban"
82	6	is a regional component, an urban component and
83	4	general urban - ~2 mg/m3, local - ~3-4 mg/m3
90	8	monitor doesn't know the difference in local, urban or
104	9	network not as dense as is typical for urban areas.
104	13	that we used to have when we had to do urban
139	4	utilized to eliminate urban versus rural switches in
140	20	The question about urban is one that has been talked
140	24	urban grid cell from MM5 or WRF and not have to turn
140	25	on the urban option in AERMOD. Not sure we have a lot
141	3	prognostic models to simulate the urban boundary layer
141	5	been some work that's been done in urbanizing MM5 and
141	7	urbanize prognostic met model that actually does
141	8	capture the important aspects of the urban boundary
141	10	say yes turn off the urban switch. It's something we
146	5	Urban Issues - Margaret Valis (NYDEC)
147	7	in the urban applications. I'll talk a little more
148	18	urban areas. Some general considerations to take into
148	19	account if you are in an urban area whether using
148	22	updated include Urban Applications. In terms of the
148	23	urban/rural determination an update to that is a
148	25	source determination as to whether it should be urban
149	8	recommendations if you're modeling urban and AERMOD
149	13	a clarification of the urban roughness length. We
149	16	there it is to be used to characterize the urban heat
149	25	ASOS data met data group, the urban issues group and
154	21	We'll move on to the urban issues sub group which some
154	23	urban/rural determination and guidance on population
154	24	input for urban option. The urban issues work group
155	3	also contributed in the text that clarified the urban
155	10	input issue. As you know if you're modeling urban and
156	6	is the urbanized area and what is the population I
156	11	It helps you get a handle on what is the urban area
157	2	urban population was in that 750 people per square km
157	15	that may help delineate the urban heat island which is
157	20	of what is the urban core that might be impacting your
158	4	urban and rural areas. And we've discovered that NASA
158	9	radiance for our urban kinds of modeling and maybe the
168	25	the urban roughness length parameter it's an optional
169	2	parameter on the urban option part when you select an
169	3	urban option for AERMOD and the default value is 1.0.
186	17	the orange is the urban recreational grass category
189	5	urban recreational grass category we had before for
191	19	Apparently in the very downtown urban core there's
195	7	You can do rural or urban source and urban population.
198	4	forest, swamp, cultivated land, grassland, urban,

Page	Ref No.	Keyword = "urban"
211	10	been the urban formulation in AERMOD. I think that
211	17	issues, including Urban, Surface Characteristics and
211	18	Met Data. Urban issues and surface characteristics
211	19	and a lot of the urban issues have to do with surface
211	21	urban heat island effect and also have higher
211	22	roughness in the urban area than you typically do at
216	20	of urban canopy on wind profiles. So the roughness
216	21	affect of the urban area on meteorology would not
216	25	implementation issues, especially related to urban
217	7	population as surrogate for urban influences. It
217	9	variability of urban heat island influence which we
217	10	don't do now. Right now if it's urban it's urban even
217	11	though we know it's not a uniform urban influence.
218	19	to inform the urban heat island aspect of the model.
220	20	urban recreational grass shows up as low density

Page	Ref No.	Keyword = "variability"
120	3	the grid to grid variability, we picked Detroit
217	9	variability of urban heat island influence which we
217	14	variability should be mitigated if an approach like
286	19	spatial variability. Running the photochemical grid
306	2	variability. This is basically (inaudible) MM5 date.
306	7	some variability to the winds and it's reproduced in
309	11	source. Horizontal wind variability you don't have

Page	Ref No.	Keyword = "weather"
44	4	observer-based National Weather Service data with
47	3	hour. That's our standard weather observation for the
108	10	data including state-of-practice "National Weather
110	13	better than National Weather Service data going to the
110	14	nearest National Weather Service site.
148	20	national weather data or site specific onsite data
151	2	same National Weather Service stations during the same
159	19	Weather [ed. Service] station located about 20 miles
159	23	National Weather Service station which is what you
160	5	at the National Weather [ed. Service] station. Again
160	22	National Weather Service site similar map, I think all
161	14	National Weather Service tower comparing the 1 km to
161	19	with the National Weather Service station. The group
166	4	surface weather service data. Think we've got a

Page	Ref No.	Keyword = "wind"
12	22	pulled us away from the gate and said the wind has
13	3	wind shifted again and we're going off on another
13	6	great omen for the modeling conference if the wind can
13	12	that. One guy sitting behind me said wind changes and
43	10	characteristics in the wind fields are crucial to
43	11	determine the wind values, that might be a situation
46	16	introduced a new variable wind code which means when
46	17	the wind direction is variable we don't know what is
46	18	missing but the wind speed is not missing and not
46	25	wind data. It turns out right now we're using a
50	2	height and that's what's gotten us into these wind
50	4	Wind tunnel studies clearly support wake influences
71	24	different clean wind sectors using monitoring data.
84	17	indicate this is a predominate wind direction. So we
90	12	This is another quarter. The is the wind frequency
102	19	model which is further south and next to the Wind
102	23	Wind River Range. Excuse me with 12km MM5 and the
103	2	the Wind River Range that channels the flow. And then
112	9	direction is missing and we don't know where the wind
112	10	is going but we have a wind speed for you. Well,
114	23	There's windroses for 2002 airport on the left and the
115	2	there. The wind speeds at this point have not been
116	5	shows light wind speed. Don't know if we have a
116	6	pointer yet, but you can sort of see the wind speed
116	8	quite a few wind speeds below 1 meter per second, but
116	10	AERMOD impose a minimum wind speed for dilution of
119	13	of perimeters to the nearest dot point of the wind and
126	21	measure data for stuff like wind direction. We also
126	23	compare wind roses. We also incorporate output hourly
138	2	implementation picks the closest dot point. The wind
153	18	we have the various wind speed categories starting
153	19	with calm, missing and variable. And the various wind
153	25	and 6 knots but the wind direction varies by 60
159	25	Here is wind roses for Baldwin and Belleville I guess
160	7	wind speed distribution.
168	8	Compiler for Windows for those. Just making that
170	3	parameters may vary depending on the wind direction
176	19	define that window differently. Part of it is
187	9	this partly through this ASOS cyclone wind study there
194	17	location, minimum wind speed, anemometer height and
197	3	parameters: Wind speed (stable and convective), cloud
197	11	specify multiple wind directions. For AERSCREEN, uses
197	12	wind direction of 270 from the West is easier. So
206	9	building then the wind is at an angle. Projected
207	11	some issues perHAPS with the use of wind power to

Page	Ref No.	Keyword = "wind"
208	17	downwash algorithms. If there is some wind tunnel
209	5	up wind dispersion for plume released within the
209	10	impacts. That is showing up in some wind tunnel
209	25	wind speed issue comes up a lot with AERMOD. AERMOD
210	2	is designed to accept wind speed below 1 meter per
210	5	minimum wind speed needed to generate a wake from the
213	18	that algorithm incorporates up wind dispersion and
214	7	change and you could say I don't want up wind
216	20	of urban canopy on wind profiles. So the roughness
223	18	it that Windows will not be allowing that interaction
223	24	you get into upgrades of Windows.
233	24	look alike over a wide range of wind speeds. even if
253	13	Discuss in more detail some examples of complex wind
264	8	wind situation where non steady state effects are so
264	22	accepting CALPUFF for complex wind situations, as this
264	24	using CALPUFF for complex wind situations, acceptance
267	3	light wind stable conditions. That's one
267	16	to inform the model to get the wind speeds
267	20	discontinuities in wind, temperature, etc. So
268	7	situations. Especially if there are light wind
269	7	have to understand what the complex wind
269	16	wind fields but if the plume is in the wrong grid
270	19	complex wind applications is not well-documented yet
271	23	complex wind evaluation with Lovett using CALMET.
272	19	CALPUFF modeling system with CALMET generated wind
273	17	wind or temperature profile, how can I inform the
304	16	of wind speeds associated with the station located in
304	24	producing a bad wind field.
308	5	point hour by hour. If you change the wind by 5
309	11	source. Horizontal wind variability you don't have
312	23	enough and the situation is right you can up wind
313	22	the source here with the wind blowing to the SE.
314	2	numbers down wind. How can that happen? It can
314	25	are 1 km radius is this. This says when the wind is
316	9	mirror that was in AERMOD. Change wind directions or
316	15	unexpected. You change the wind in CALMET a little

Page	Ref No.	Keyword = "wind speed"
46	18	missing but the wind speed is not missing and not
112	10	is going but we have a wind speed for you. Well,
116	5	shows light wind speed. Don't know if we have a
116	6	pointer yet, but you can sort of see the wind speed
116	10	AERMOD impose a minimum wind speed for dilution of

Page	Ref No.	Keyword = "wind speed"
153	18	we have the various wind speed categories starting
160	7	wind speed distribution.
194	17	location, minimum wind speed, anemometer height and
197	3	parameters: Wind speed (stable and convective), cloud
209	25	wind speed issue comes up a lot with AERMOD. AERMOD
210	2	is designed to accept wind speed below 1 meter per
210	5	minimum wind speed needed to generate a wake from the

Page	Ref No.	Keyword = "wind speeds"
115	2	there. The wind speeds at this point have not been
116	8	quite a few wind speeds below 1 meter per second, but
233	24	look alike over a wide range of wind speeds. even if
267	16	to inform the model to get the wind speeds
304	16	of wind speeds associated with the station located in

Page	Ref No.	Keyword = "winds"
43	9	involving complex winds. So if (inaudible)
47	11	reduce the calm and missing winds in the airport
91	8	issues with our winds especially greater than 50 mg
91	9	per cubic meter. This is calm winds sorry I should
112	4	due to calms and variable winds; frequency of gaps has
112	8	variable wind code. Variable winds means one
117	22	winds to calculate hourly average when reducing draft
118	15	with 1-minute winds. We think the basic approach is
119	11	you have winds at dot points, temperature at cross
119	21	full profile winds and temperature derived from MM5
132	20	1-minute winds brought it in to pretty close agreement
142	11	profile of winds and temperatures all the way up.
150	16	Thirdly impact of light winds in AERMOD and then
150	17	lastly use of hourly average ASOS winds and this is
150	18	referring to the 2-minute average winds that Roger was
151	20	winds and clouds. In the other case we substituted in
151	22	winds for the ISC. There's a variety average of times
152	9	temperature winds and clouds with the convention
152	10	observer based temperature winds and clouds for AERMOD
152	20	looking at is the hourly average winds. You heard a
152	23	used 2-minute average winds taken about 10 minutes
152	24	before the hour. 2-minute winds averages are
153	4	compute hourly average winds. The expectation is that
153	15	winds and thought of what would be the standard ASOS
178	9	with light winds and over predicts or not. And then

Page	Ref No.	Keyword = "winds"
239	19	winds" on a case-by-case basis. Roger touched upon
264	4	"complex winds," subject to approval by the reviewing
266	4	treatment of complex winds is critical to
266	16	consideration become complex winds by their
266	23	Let's talk about what complex winds are. There
266	24	are examples of complex winds not deeply
270	5	features of the complex winds toward that
273	23	applied with the assumption if I have complex winds
304	19	really represents is MM5 winds do not match
306	7	some variability to the winds and it's reproduced in
308	22	meter per second winds the plume only goes to 2.6 km
309	13	CALPUFF. Calm winds (inaudible) the conservative or
309	16	calm. CALPUFF will treat the calm winds.
311	3	are CALMET winds you can see the (inaudible)
313	18	distance. But in light winds speeds it is substantial

Page	Ref No.	Keyword = "work group"
28	14	implementation work group to identify scientific
28	19	throughout the AERMOD implementation work group so
29	14	issues. We'll hear more about the work group later in
143	11	Implementation Workgroup. This was a work group that
143	24	implementation work group that was initiated in April
144	17	the implementation work group which I'm going to talk
154	24	input for urban option. The urban issues work group
168	23	the Implementation Work Group and one of the items in
180	20	coordinating with the work group and with AERMET some
204	20	the AERMIC Implementation Work Group and the three sub
211	7	activities of the Implementation Work Group sort of
212	10	Hoc work group first. One of the recommended