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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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SUBCOMMITTEE ON SAFETY RESEARCH PROGRAM

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FRIDAY

APRIL 17, 2009

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ROCKVILLE, MARYLAND

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The Subcommittee met at the Nuclear Regulatory Commission, Two White Flint North, Room T2B3, 11545 Rockville Pike, at 8:30 a.m., Dana A. Powers, Chairman, presiding.

COMMITTEE MEMBERS:

DANA A. POWERS, Chairman

SAID ABDEL-KHALIK, Member

OTTO L. MAYNARD, Member

HAROLD B. RAY, Member

ACRS STAFF PRESENT:

WILLIAM HINZE, Consultant

MICHAEL LEE

A-G-E-N-D-A

P-R-O-C-E-E-D-I-N-G-S

8:31 a.m.

CHAIRMAN POWERS: Let's come back into session. Today is the second day of our meeting of the Safety Research Program Subcommittee. I'm Dana Powers, chairman of the subcommittee. Other ACRS members in attendance today are Said Abdel-Khalik, Sam Armijo, Otto Maynard, Harold Ray and Bill Hinze is here as our consultant. Mike Lee of the ACRS staff is the designated federal official and will do designated federal official stuff, right?

MR. LEE: Right.

CHAIRMAN POWERS: As stated in the earlier Federal Register notice, a transcript of the meeting is being prepared and will be made publicly available in the near future on the ACRS website. We request anyone wishing to address the subcommittee on the record to use one of the microphones located throughout the room.

We ask that you identify yourself, speak with sufficient volume and clarity so that you can be readily understood. Let's see. Mike mentioned to me that any of the members interested in getting electronic versions of the slides, he will have those available at the close of the meeting. Any members of

the audience wanting to get them can negotiate with Mike. And for a small fee, or future consideration he may accommodate your interest.

One of the common threads uniting yesterday's suite of presentations concerned the estimation of seismic hazard in the form of earthquake ground motion that needs to be accounted for in the design of nuclear power plants. Our first and only speaker today is Mr. Lawrence Salomone and he will talk about an industry-government partnership under way to develop a new seismic source characterization model for the Central and Eastern United States. And I'll turn the meeting over to you.

MR. SALOMONE: Thank you, Dan. I appreciate the opportunity to share some of the insights and perspective for this timely and landmark project. Based on my discussions with Mike I'm going to focus on kind of the status and overview on my slides, but I also could provide information with respect to some of the things we talked about yesterday about how work like this can be managed, some of the lessons learned that I've already assembled in terms of a project like this. So I'd be happy to share that during the course of our discussion today. I will also provide the CD with the

Workshop No. 2. It's an excellent example of how the SSHAC process works to augment what you heard yesterday. One of the things that I can do with our presentation today is actually fill in some of the details. Where some of the concepts might be abstract you'll actually see it living in terms of this project.

And then we'll look a little closer on an important topic. We talked about it a little today. It's very important. As you will learn, I've actually expanded the scope of this project from the original conceptual plan regarding paleoliquefaction, assembling the data as well as what do you do with the data in terms of reoccurrence and maximum magnitude. And then finally I'm already looking ahead to 2011 when we will be making this a very transparent process and put information out in the public domain so you also will have a list, a draft list that have already begun EPRI in terms of starting the design of the website on what would be included in that. And we'll talk a little about that, and I'd encourage you to comment, you know, send any comments you might in terms of what you think we need to add or subtract with respect to that.

So it's really a product of the community,

the end users, and the team that we have assembled are essentially the instruments of that goal, to achieve a new CEUS seismic source characterization project.

With that said let me just some of my background so you understand whence I come and where I am right now and how I fit into some of the things that are going on in the energy field. I have 40 years of experience in the environmental earth sciences. If I had to summarize the tasks I've been assigned it's been mostly as a troubleshooter and a team builder.

In the `60s it was projects like Disney World and Orlando, Florida. In the `70s it was the first range of plants, nuclear power plants. In the `80s and `90s it was Superfund, environmental cleanup. Then in the early `90s I was asked to essentially do the characterization of the Savannah River site. There was quite a bit of fragmented information done by a variety of contractors, and so in assembling a 75-person staff, creating what was then unknown but it is the GIS technology for that to represent electronically everything we have assembled, and we built the characterization model that is still used today since that time. My counterpart at DOE headquarters at that time was Jeff Kimball so we

worked closely in some of those comparisons that you heard about, and we learned a lot about that.

Some of the guiding principles that I've used over that 40-year career I'll share with you because it helps me as we look at this particular project. My definition of leadership is that you walk out beyond the headlights into the darkness. Usually when you look around there's nobody there, so it's important to look for ways to bring others to that vision. If you were out and you had issues and there were other people who understood those issues I would call that management. So really all of us and you saw evidence of that today. There's leadership as well as management in the work we do.

The other important guidelines that I've used at Savannah River and I'll share with you is an integrated safety management for seismic safety approach. Recalling what that is, it's basically a clockwise wheel. The first box is scope of work. The second box would be the hazard evaluation. The third would be monitoring. The next box say at 7 o'clock would be design and operation, and the last box at 10 o'clock would be feedback. When you consider the work you're doing think about the work scope. That is basically the standards, the rules of the game, you

know, whether it's an NRC project or in the case of Savannah River maybe a DOE project, there are certain rules that we're asked to follow. The hazard evaluation, it's important here to think of it as expert groups, and that's the way I've approached it at Savannah River.

So we have, you know, EPRI, the original EPRI work. We have Lawrence Livermore. We have the various studies that were on the slide yesterday with respect to TIPs and other work, and we have the USGS. It is very, very important not to base on one particular hazard model. From what I have seen in doing the comparisons it's important to consider some of the uncertainties by considering all the hazard models. And this was important because it helped shape the vision.

From July 2006 through January 2008 is where I basically walked the halls of potential sponsors to pull this industry-government partnership together. And in doing that a guiding principle that I think reflects what our future is as a profession is that industry and government can do more for less to reduce the risk through standardization and partnering. And that was a key thought, key phrase that I used to help encourage and - the potential

sponsors to understand the need and to understand the importance and the opportunity to get important work done without having to do it totally in isolation from some other group.

With that said, I want to show you the first product that has come out of this project, that is publicly available, is the work plan. In order to really know what you're going to do you must have a plan. This is our plan. It's - to put on the record it's EPRI. It's an EPRI Technical Update Report called Project Plan, Central and Eastern United States, Seismic Source Characterization for Nuclear Facilities. Its number is 1016756. Now, one of our groups that I approached was the Advanced Nuclear Technology Action Plan Working Group. If you go to that website on epri.com this project plan is available electronically for anybody interested in seeing the overall plan.

Let's take a look at the project goals. I was frequently asked are we going to update the EPRI model, or you know, what exactly are we going to do. That title was very, very well thought out. We got a lot of input in just developing that title because there was a gap that existed between some of the hazard models out there. And one of the primary goals

was to close that gap. So we intended to replace the EPRI and the Livermore models and basically start with a clean piece of paper.

And we'll talk a little about today how you do that. So we will start from scratch. We have encouraged our participants not to have any bias in work that they've already done. It should be obvious that they obviously have done work before, that's why they're part of the team, but again, we start with a clean piece of paper. The other important goal was to close that gap that I mentioned and to have transparency.

If you've ever tried to use the EPRI model or as was stated yesterday we couldn't use the Livermore even if we wanted to because we don't know really where the details are and how we could assemble it. So it's very important when I first met with the team as we were assembling the team is to have a public transparent process. So if you were not part of the team but this was a topic of interest and you were an end user you could walk the talk with us after the project and understand the background basis for the model and be able to use it. And so public transparency and documentation was important. You will not have to know who to talk to, you will not

have to say the secret password, you will have the information available in a ready format.

As you heard yesterday, the SSHAC process captures the knowledge and uncertainties of the informed scientific community. I'm frequently asked, well, how will you test and validate the process? To build off what you heard today, the key way that we're going to test and validate in terms of an overall sense is that we will be reviewed based on how we have implemented the SSHAC process. We also will be reviewed, and again, to review the SSHAC process, you know, it calls for interaction at the workshops, the feedback and review from the project participants and the review of not only the technical work, but the process from our Participatory Peer Review Panel, and the check of the documentation that results.

So the answer to that question is how well we've implemented the SSHAC process. Now, we will also as a team be checking internally the model. One of the things I've observed of other published efforts of this magnitude is that the test occurred after it was published which made it far more difficult, actually in a regulatory sense, to do that test and to get that feedback. So we will test this model before it is published.

In working with our specialty contractor who will do the hazard calculations, I've also asked them to help begin the process of answering that elusive question: what is significant? What is change? When will you essentially have to update the model? So I'm hopeful that through all the sensitivity analysis that we'll be doing during the course of this project we'll get a better understanding of what is noise and what is significant in order to change that model. And as we heard yesterday it could be a portion of the model or it could be other aspects of the model. But, we should know.

And I also put out to you too that in my own mind when I've worked on the legal side the ultimate question is safety. You know, the risk and safety, how it's related. So perhaps that question of significance will come into the safety basis because if I have a certified design spectrum and I just enveloped my ground motion response spectrum which is the demand versus the capacity, 4 percent change might be a big deal. But if I have those response spectra where there is a 10 percent gap in certain frequency ranges, then it may not be significant. We have to consider these aspects. But ultimately it should come

down to the safety basis is what I think the ultimate answer is. But we will try to provide it, you know, at the earthquake engineering level as well to see what we learn from our sensitivity analysis.

The last thing we will do is present this information to our sponsors and to the oversight group for DOE and to the regulatory agent, the NRC, for review. So that they in the firsthand sense will understand the basis for the model and its application, and then the formal process of how to implement it into practice and the various guidance could then be made by the appropriate oversight group or agency.

CHAIRMAN POWERS: It seems to me that you have an orthogonality of objectives here. If I'm trying to create a model of something to feel successful I want to try to narrow the variance down on that model to account for as much of the data as I can with as few parameters as I possibly can. If on the other hand I'm trying to capture the knowledge and uncertainty of the informed scientific community, it seems to me that I want to maximize the variance in my model. And so I'm not sure what you're trying to - what takes precedence over here? Something that's useful, or something that informs?

MR. SALOMONE: Let me see about answering that. The focus of the project from day one was to look at those parameters that actually affect the hazard calculation because ultimately that's what we're doing, and again, to review. We have inputs to the probabilistic seismic hazard assessment. On the source site we use the source characterization model, and then moving the energy to a particular site you have the attenuation models. So the ultimate in using those inputs is to get hazard at a particular location.

And again, this was the generic regional study so that you can use and save the time and money associated with doing on an individual site-by-site basis and the hazard is really what you're looking for. So part of our task, part of our work of Workshop No. 1 is to work with the resource experts, do our own sensitivity analysis, share that with our resource experts in Workshop No. 1 and to identify those parameters that ultimately are important in affecting hazard. Some of the others that may be -

CHAIRMAN POWERS: Aren't those obvious? Don't we know what those are right now?

MR. SALOMONE: I don't think it was that obvious. I think we did some sensitivity. It did - I

can share with you that we saw source geometry was one of those key parameters. Maximum magnitude is a key -

CHAIRMAN POWERS: Did this surprise anyone? It didn't surprise me.

MR. SALOMONE: I don't think it surprised, but I think it was - we're able to document the answer and also to cross-check -

CHAIRMAN POWERS: You could have done that on the back of an envelope.

MR. SALOMONE: But we were able to cross-check that these were the key parameters. Any other parameters or variables we'll leave to the research group you know to pursue for its own merits. But that, again, that was one of the tasks as part of our project that we did that, and that is essentially the conclusion we came to. And again, what we're trying to do is give the whole picture because the variety of knowledge of our end users are varied. So we can't assume that they may think it is as obvious what the key issues are. So again, we did that, we documented it and that's the answer.

You saw the org chart yesterday. One other portion of the org chart that wasn't discussed so I'll share that is the EPRI side. They're providing the administrative support. All the

contracts are run through the EPRI organization. We communicate with industry through the Advanced Nuclear Technology Action Plan Working Group. There are approximately 19 utilities that are part of that program that have contributed to the sponsorship of this research and other research because this is just one of the topics that they fund in order to facilitate the next generation plant in a variety of technical subjects.

My contact there is Jeff Hamel and Bob Kassawara, and the head of the program that I also work with is Tom Mulford. The chart shows essentially the communications that exist on the project. You have two boxes, TI team and TI staff. We considered that as total technical integration team. Even though it's shown as a separate box, we considered that as one entity. We have the specialty contractors that are part of that TI team. You see AMEC Geomatrix is doing the seismicity catalog.

And I guess I should point out too, this will be a major product from this project because up until now a comprehensive catalog in moment magnitude did not exist. So we are assembling all the information in the catalogs that do exist and doing the development of a new catalog that will be in

moment magnitude that will be the basis of the development of our model. The database in the GEIS system is being managed by William Lettis and Associates. And the hazard calculations and sensitivity analysis is risk engineering.

And in building this team we began initially with the TI team and the sponsors, and then moved to the other boxes that you see on this chart. The Participatory Peer Review Panel, you heard some of the names. They have contributed greatly. I will show that when we had talked to our international observers, the feedback that we get is how unique this project really is because it is a fully integrated team. If you look at the SSHAC process being implemented in other parts of the world it doesn't have the feature of this full interaction among regulators, technical agencies of the government, industry and other resources.

So I think we're setting a precedent and paving a new path that will show how this integrated group can work together to come up with the needed product. And so in assembling the peer review panel we wanted to get a representation of that integrated group. We have international experts like Carl Stepp and Walter Arabasz co-chairing the group, Jon Ake and

Annie Kammerer as experts. And I should point out, you do not see the affiliations there because in this box they're acting as experts with their particular areas of expertise to support the project. Jeff Kimball, Bill Hinze and each one of them have helped in their own way. Bill Hinze has been extremely helpful with the database, with the geophysical work that we're assembling, the importance of which database we should be looking for, and Annie and Jon have been extremely helpful in their areas of expertise, and in helping us as a sponsor as well.

Jeff Kimball also, you heard his insights and they've been fully reflected in the framing of this project, and I think that we have fully taken advantage of the expertise. Mark Peterson as you heard yesterday is the head of the USGS hazard model and Don Moore represents industry.

Let me pick up while I have this org chart to understand a little about the USGS. It was identified as an issue yesterday and I can understand the basis for that. But in my experience I have worked very hard with Mark Peterson with respect to fully engaging the USGS on this project.

And I would say their engagement is growing as the project is unfolding. And speaking at

least at the technical level they are very interested in our product and the comparison that we will do ultimately with the USGS to help understand our model, from my discussions with Mark they are open to looking at ways to refine the USGS model. So it's a two-way street in terms of what we will learn as the source of the differences. And with calls that I've gotten from experts like Walter Mooney and Charles Mueller and Russ Wheeler they are getting engaged. They are interested at that level with respect to this product and so I would be very positive in terms of the support that they're giving the project and that they are looking to have a means of improving and refining their product for the next edition in 2013 or so.

The resource experts box, that's a very limited example. We'll go through and we'll show there were 12 experts at the first Workshop No. 1 which is issues, and those issues I mentioned as well as database compilation. Anything that was missed in the original database that we knew existed they helped making sure what gaps we needed to fill and we'll see evidence of what we learned from workshop one. Workshop No. 2, there were over 60 participants and 24 experts that were proponents of various interpretations of source characterization in the

Central and Eastern United States. So it's a bold group. And then in August of this year we will have Workshop 3 which is the feedback, and we'll talk a little about the schedule and how it works together. Now the sponsor review side, Dr. Shields -

CHAIRMAN POWERS: Let me ask a question about the resource experts and experts in general. When we discussed the SSHAC process yesterday there was a great deal of emphasis on one of the slides on the selection of the experts, but you've chosen not to discuss that at all here. I mean, how did you pick the experts that you picked? And why does that capture the range of opinion and uncertainty within what you call the knowledgeable technical community? Or is it a case of I define that community by the experts I picked?

MR. SALOMONE: I would simply say the experts were defined by the expertise of the project team and the Participatory Peer Review Panel.

CHAIRMAN POWERS: But I think that's - I got the impression that a more transparent or scrutible process was called for in SSHAC in assuring that in fact you had representation adequately from the knowledgeable community. John, do you want to comment?

DR. AKE: If I could Dana. Yes, the concept for the selection of the experts, especially for both the first two workshops, but especially for Workshop No. 2 was based on identifying central key issues that the team felt were important in the source characterization process. And then reaching out then within the literature, you know, informal discussions with the colleagues in the broader community, who are the people that on these four, five, or six different issues have published a lot, have particular viewpoints, proponent viewpoints on particular issues like New Madrid. Is New Madrid going to continue to have deformation at the same rate its had for the last 200 or 2,000 years, for the next - foreseeable future? So we identified particular issues and then invited experts to try and address those issues.

MR. SALOMONE: I would also add too that after beginning the process of assembling the model and looking at what the available information was, there were specific questions that the TI team and staff were interested in getting answered by the resource experts. So each of the resource experts prior to the workshop had specific questions that their presentation should answer so that that is an important part I think of the interaction and the

feedback from the resource experts as we built the model.

CHAIRMAN POWERS: Well, I'm playing an uncomfortable role here of sitting in for Professor Apostolakis and I think he would be bouncing off the roof right now. You have selected your experts based on credentials, not on position. In other words, you said well, they have to have published a lot to get selected here. That means that the young man whose just finished his thesis that takes the wild-eyed radically different view which may be right is excluded from the potential of being on your panel.

MR. SALOMONE: But your assumption there is that the only information we've assembled is what these particular resource experts -

CHAIRMAN POWERS: I make no assumption. I do - I understand how you've selected your experts only based on what you've told me. You haven't told me very much except that they have to have published a lot. That's the only criterion I've got down here on - as a basis for picking. You picked the old boys' network.

DR. KAMMERER: Can I just jump in here for just one second? Annie Kammerer for the minutes. I don't think that's actually what did happen.

CHAIRMAN POWERS: Come on, Annie. I can look at the names up here and take 15 studies, I can duplicate these names.

DR. KAMMERER: But as far as the resource experts the people who actually came and presented as proponents of all of the different alternate hypotheses and models on the areas - the specific topics of interest, we actually had some people straight out of school. We were given in terms of the paleoliquefaction we were actually - some of us sat in on some of the TI meetings where these were chosen and I actually had to suggest that they didn't invite a couple of the recent doctors who had some paleoliquefaction work because I thought it would kind of be a little bit unfair to have them standing up there and trying to represent something when if you read it there were a lot of issues possibly with it.

And I thought it would have been unfair to say - actually, that did try to include a lot of - a breadth of opinion in the proponent experts that they had in the second workshop. And I think actually if you look at what that group of people was it was a very broad representation with a lot of people who were sort of the young, fresh bright minds with the new theories. So it's sort of a separate group. When

we were talking about the SSHAC, there are - you remember the picture with all of the different people with the wizards and the grey beards and the hat.

CHAIRMAN POWERS: I tried hard to forget that, by the way.

(Laughter)

DR. KAMMERER: There were a few others.

CHAIRMAN POWERS: It still appears to me.

DR. KAMMERER: There's two separate - the experts fall into a bunch of different boxes. Some of them are the proponents which are responsible for really representing a particular - their particular hypothesis or concept, and then others are asked to be expert evaluators and so it's important in terms of the evaluators that you do have people with - that from a historical perspective are familiar with everything that's out there.

So it's important that they do have a level of experience. But in terms of the proponents and making sure that we heard from a very wide variety of people and did get the breadth of all of the alternate hypotheses, I think there's a lot of effort to do that. So there's sort of two separate sets of criteria from what I've seen.

CHAIRMAN POWERS: Well, I haven't seen any

criteria except the publication record.

DR. HINZE: Could I make a comment here? The breadth in terms of the personnel that are involved in this program come in the lower right in the resource experts. And that comes from the working group meetings and that's already been set. But I think that needs to be emphasized because the other names, yes, they're kind of the old boy system. But really the breadth comes in that lower right. Now, the PPRP had an intimate role in recommending - I think that's the proper term - participants or resource experts that would be involved. I can tell you that of the probably 35 that have already made presentations or 40, there's only one that was in the EPRI workshops and that's Mark Silback. There was a GPS, there's a very important item in the GPS data. That was represented at the first working group meeting by a recent graduate that teaches at Georgia Tech, and as far as I know he's just published -

CHAIRMAN POWERS: Professional recommendation, is it?

(Laughter)

DR. HINZE: In the second working group meeting on the alternative views there was a young lady from Stanford that has just - who has one

publication, one pertinent publication to this. And in addition, there were people brought in from Canada that brought in some entirely new ideas to this in terms of geodynamic modeling which were very important I think in opening up the eyes of the entire group. So the old boy system was not there in the resource experts.

CHAIRMAN POWERS: Bill, there are only two possibilities I can see. Is that either they have failed in the - trying to capture the entire breadth in their selection of experts, or they have failed in their objective of being transparent in how they select their objectives. I mean, it's one or the other because I certainly don't understand how it was done. I ask and I come back with credentials, but when I criticize that then I go well, you know, not everybody has great credentials. So, you know, I'm sitting here saying how did we select experts to assure we're going to capture this entire knowledgeable community and I come back and I said well, I don't know how they did that. I guess they did, but I don't know how they did it.

DR. HINZE: Well, one of the things that encourages me is if you look at the TI team. And that's where the rubber meets the road. And if you

look at the four first names, they're old standbys. They're part of the old boy system, they were very much all - well, maybe Bill Lettis wasn't, but the Copper, Smith, McGuire and Youngs were very much involved in essentially all these probabilistic studies.

The thing that is encouraging to me is that Gerry Stirewalt representing the NRC has not - is very knowledgeable, very competent and he brings a different view to this. The same is true of Steve McDuffie who used to work for the NRC and now is working for DOE and is a young man compared to most of us at least, but I don't know whether he'd appreciate that, the young man, but he's got some new ideas. So, I think - I look at Gary and Steve as really bringing some new insight into this TI team.

CHAIRMAN POWERS: Okay, well I will certainly accept that you're happy with him because I don't have any reason to think you're not. What I'll tell you is it's certainly not scrutible how you picked to assure that you've gotten - met one of your primary goals which is to capture the knowledge and uncertainty of the informed technical community, and certainly don't know how if you take as your standard for performance conformance with the SSHAC review, how

anybody is going to be able to say well, they did a pretty good job here so far.

MR. SALOMONE: Well, I would also add that in addition to the resource experts, there will be a comprehensive bibliography in terms of all the references that have been considered and utilized during the course of this project. So the full answer and scrutiny with respect to answering your question will be upon that documentation. I'll also encourage you to look at the breadth of information on the CD that I passed out and looking at just Workshop No. 2 alone because in terms of seismic source characterization there's really a full range of interpretation with professionals of a wide variety of experience and impact in terms of the profession. So we hope that as we unveil more of the documentation that the answer to your question will be more obvious. With that I'll keep moving.

And again, I was just mentioning our sponsors. They've been very helpful. Martha Shields with DOE and our technical reviewers now representing the agency, Cliff Munson and Brent Gutierrez on the NRC and DOE respectfully are very important contributors.

We are trying to get reviews from a wide

variety of directions and perceptions so that the product will represent a wide variety of reviews. And your question I think is important because at one point our participatory peer review would have had the same questions that you had with respect to our resource experts. But over time, working together and working the SSHAC process the peer review panel were comfortable with respect to the answer to that question.

This is - when we talk about the study area, this shows essentially the study area that we are defining. You hear the term "Central and Eastern United States." In terms of this project, this is our study area. We used as a guidance geologic features as well as the requirements by the NRC with respect to 320 kilometers and 200 miles as a point. Now, there is some issues on the western boundary with respect to maintaining the 200-mile, so - as well as in the south.

We would start to get into a whole `nother geologic setting as we moved 200 miles into the Rocky Mountains, and likewise if we went too far south as an example and got into Cuba we would get a whole `nother tectonic province that was beyond the scope of the stable continental region that we were concentrating

on in the Central and Eastern United States. But those plants if you were at the tip of Florida or the tip of Texas or say in Denver, site-specific experts combined with the regional model will essentially provide the necessary information.

MEMBER ARMIJO: Is the seismicity in northern or northeastern Mexico so well known that you can put the boundary of your study area right at the Rio Grande? I mean, you barely - in Canada you seem to go pretty much parallel to the border, but I don't understand why you don't do the same thing in Texas.

CHAIRMAN POWERS: Dangerous there.

MEMBER ARMIJO: I don't think that's a criteria. It just seems in line to me.

MR. SALOMONE: In that western area we also considered the Rio Grande Rift which is an important geologic feature that is outside - that's basically 105 degrees west and so we've taken the Rio Grande Rift also as part of the study area as well. And again, this was another iterative process working with the peer review panel and the experts on our team to look at essentially the appropriate study area.

MEMBER ARMIJO: So seismicity and those excluded areas of Mexico wouldn't have any impact on let's say the Texas nuclear plants? Is that your?

MR. SALOMONE: Well, keep in mind one of the baselines in terms of the model is the applications that have already been filed. So the fact that we have a study area defined this way doesn't mean we are not considering the information that is in our database and the database that has been compiled as part of Task 2 in our project plan. Same thing, you know, there are - our TI team has worked on Turkey Point, for example, so we know and we are aware of the information that is in the work being developed there. And that was one of the things that we did. We went through each of the utilities and even though it was in the public domain they cooperated fully in making available the information, typically Section 2.5 in the applications that were all available to the project team as we shape the model.

This is just an example of some of the databases. That's to show some of the geologic data and the gravity and aeromag data. Moving along just to give you an idea of the timeline with respect to development. The project plan was completed in June. Workshop No. 1 was in July of `08. Workshop 2 was completed in February 18 to the 20th of this year and in June we will finish the database and the seismicity catalog, and the - from February to May we are

developing the preliminary model and in May we will showcase that model to the Participatory Peer Review Panel and we will get feedback on the preliminary model from the Participatory Peer Review Panel.

And from that point on, from May to August we will be doing the sensitivity analysis that I'll show later in order to provide deeper insights in how the model was working at the feedback workshop August 25 and 26. From February 10 to December we'll have a draft report in February 2010 and you can see the activities in the documentation, in the transparency, in the clearances that are required for all the data that we'll be using, and then the final presentation to our sponsors in the oversight and regulatory groups. The final date is December 31, 2010.

One of the developments on this project, beyond the scope of the original SSHAC concept, if you think back on the original SSHAC, you look at the original SSHAC concept, a Participatory Peer Review Panel would be involved in the development of the process, they would be involved in each of the workshops providing some kind of report at the end of each workshop and then they would review the final report. I think one of the advances we made has been a more active and interactive arrangement with the

Participatory Peer Review Panel, and these are some of the tools. As the project manager I wanted to have tracking milestones in between the large dates you saw on the previous slide so that we would know how things were progressing with respect to the various major tasks that we have.

So we have tracking milestones. We also had conference calls, and this was all the people on the U.S. project org chart had access to a call-in number in order to participate in the conference calls. As required we had special conference calls or meetings. The May 13 meeting I alluded to is an example of an extra meeting that was added to provide the Participatory Peer Review Panel an opportunity to look at the preliminary model prior to Workshop No. 3.

The - we also developed a procedure, a formal procedure in terms of the interaction with the Participatory Peer Review Panel. We have a comment letter at the end of each of the workshops. The TI team and project manager then respond to the comment letter. We have an intermediate phone call that essentially discusses and clarifies any information that the Participatory Peer Review Panel has, and then as shown we have the May 13 meeting as an additional point of interaction with the panel.

These are some of the intermediate documents. Again, just oral communication is not always effective so these are some of the documents that the peer review panel have which is beyond the scope of the original SSHAC concept when we began this project, but all helps for the technical review and the identification of the process - process to document TI response to the participatory peer review comment letter.

Again, that's how we developed that formal response between the TI team and the panel. Again, transparency criterion timeline for the demonstration sites. There are seven demonstration sites in different hazard environments and different soil profiles that we'll be using to test the model. Since it's only a source model we want to test, again, the ultimate answer in terms of hazards. So we have seven locations that will be used to test the different hazard environments. And that criterion timeline was provided to the peer review panel for review.

The working plan. We actually had a working plan beyond the project plan that I showed you. We had a working plan for the TI team in terms of developing the model, working with Bill Hinze. We had a map of the seismic reflection lines in the GEIS

database to make sure we had the appropriate aeromag and gravity data. Sensitivity analysis from Workshop 1 again identifying the issues that are important to hazard. Again, the list of candidate proponents, we were discussing that a few minutes ago, again trying to build from our team and our resources not only those who would participate in the workshop, but also other important people that we will talk to in the course of the development of the model.

They do not have to be experts at the workshop for us to talk to them and to get access to their information and insight. The specialized tools that we will use for the source characterization model has also been discussed and shared, and as we said, the list of participants and the agenda has worked in concert with input from the panel.

Summary of technical developments. Again, in preparing for Workshop 2 - and again, this is part of the answer to your question about which experts and who we captured. We looked at developing the tectonic framework. We call it the conceptual seismic source characterization framework. This is a systematic way to look at why you're identifying certain sources, and it was important to the panel that we have this framework and working with them. And again, when I

say working with them, there's two ways that they can help the team.

Certainly the review as a panel, but also they have particular areas of expertise. So they can be invited to a working meeting as a resource expert to help shape some of the work coming out of the TI team. And so this is an example of how that resulted in this framework that is being developed and that will be a document that will be available as part of the report for people to see what was the criteria, and there will be - and again, everything we're trying to do is have, you know, tables or other tools used to make it easy to understand the comprehensive amount of information that we considered and the criteria that we used.

In preparing for Workshop 2 we took a look at the available information and hazard models with respect to these key regions. And again, questions came up in terms of further information we needed. We discussed among ourselves as well as the peer review panel who would know about answering those questions that we had with respect to these regions, and that helped shape that list. We looked at the review of the alternate maximum magnitude approaches, and again, the synergy I might add with Annie's program for the

NRC and the work we were doing cannot be overstated. It really was very helpful with certain things going on in different areas so that the project could take advantage of the work that we were doing and some of the work that was going on with the NRC research to utilize what was happening with respect to our project.

So there was a very, I think, dynamic that existed with respect to - and still exists with respect to the various activities going on. We took a look at how to approach the background zones. And again, the new seismicity catalog based upon moment magnitude which in itself will be a major contribution to the state of practice.

Here's some of the tests that we will have. I mentioned it earlier. We will have seven generic sites that will not be any particular site, but they will be chosen based on the hazard environment and we will have different soil profiles. So there will be rock, shallow soil and deep soil in order to test the hazard model. The choice of sites and the criteria was discussed with the peer review panel and that criteria will be part of the documentation in the final report. We will also, and again, in talking to Mark Peterson on how we could

engage the USGS he and I teamed together and agreed that - and from my regulatory experience I know the question would be asked how does this model compare to the USGS hazard model, so why not do it as part of our project. And so working with Mark and with the support that we have from our sponsor we will be looking at the USGS.

And they are open to refining their models for the next edition and we will be open in terms of modification to our model depending on any differences and the sources of those differences. So we'll make adjustments as required.

MEMBER MAYNARD: I'm not sure I understand exactly what you mean by generic test sites. First of all, are these existing sites something that's been analyzed before, or are these just randomly picked out there to have different characteristics? What's really meant by the generic test sites?

MR. SALOMONE: The latter. Yes, so you know, as opposed to - take Savannah River site as an example. We will not use Savannah River site, but somewhere that the influence of the Charleston is significant will be chosen in terms of latitude-longitude, okay? And then we put a generic profile on that. We'll have a rock answer, we'll have a shallow

soil answer, and we'll have a deep soil answer to see how the model is performing.

CHAIRMAN POWERS: But how do you know how the model is performing? The model predicts something, I'm sure it does that. So what? I mean, I can predict something right now.

MEMBER ARMIJO: What do you compare it against as your reference? You're testing it against something. I'm confused about that.

MR. SALOMONE: Well, the quantitative comparison will be with the USGS as the model. I know personally - I haven't thoroughly investigated that model. I know where it - how it compares to the EPRI and the Livermore model, and we will be having that comparison to see with a known hazard model. Also, the answers that we get with respect to the different hazard environments, the individuals that have done numerous sensitivity analysis and hazard analysis for the various COLA submittals also know what to expect with respect to the different hazard environments. Remember, these individuals have access to the answers that were submitted with respect to the various applications. So we will see how those models compare to the baseline of information that was part of our overall database. So those will provide insights in

terms of how the model is working.

CHAIRMAN POWERS: But it's going to be different?

MR. SALOMONE: Excuse me?

CHAIRMAN POWERS: It'll be different.

MR. SALOMONE: Yes, I would think it would be. It would be different, but in terms of how it is functioning with those tests at seven different sites as well as the comparison with USGS, comparison with the site-specific answers that have accumulated with the numerous submittals that we have already will provide a thorough baseline I think for seeing how this model is performing with respect to the baseline of information that have been assembled as part of our database compilation.

MR. MUNSON: If I could make a comment. I see this more as like a sanity check rather than - something that you would look at and say well USGS is a little bit higher here, maybe we should go back and tweak our model. You know, if they did something - if that was - we would be up and screaming. So I don't see this as like a huge, you know, go/no-go thing. It's more of a sanity check.

MR. SALOMONE: Some of the challenges that we're meeting actually are on the administrative side.

Just keeping the cash flow with respect as fast as this schedule is is important. It's an aggressive schedule technically and keeping the administrative details moving along to have the money available to the project team as it's needed to meet the schedule.

What you have in the first bullet item is the result of Workshop No. 1 in terms of the engagement with the resource experts. Additional information to improve the quality, not necessarily to have quality with respect to the project, but to improve the quality of the end product. We have added funds for the additional gravity processing and compilation. Same thing with magnetic, aeromag data. I've encouraged the TI team to expand the paleoliquefaction task. It's one of the biggest increased fundings for the paleoliquefaction.

We'll talk a little about that towards the end. The world stress map will be updated for this project. We've added a seventh demonstration site. Originally you'll read in the project plan that there were six sites and at the request of the PPRP we've added another demonstration site to cover nother hazard environment that wasn't fully covered in the six. This would be a Nebraska-Kansas site that was recommended. The comparison was funded and there was

additional PPRP participation that had to be funded, and additional GIS support.

So we've added another senior GIS specialist to help us in the communication of the information. No matter how well we do technically if we are not able to communicate it to our audience then we will not - it will not be clear to our audience how much work has been done, reviewed, interpreted and utilized in the course of achieving our goal.

MEMBER RAY: Tell me how you avoid this work impinging on existing plants.

MR. SALOMONE: I will answer that generally and I will defer to regulators in the room if they want to add. But I would say generally this is the philosophy that I use in terms of managing work like this. The Savannah River site, comprehensive work in terms of direction to the operating divisions. This should be considered research until it's published. So until it's published it's not done and it's not complete and it hasn't been completely vetted. So with that introduction I'll defer -

MEMBER RAY: Well, but I'm thinking about it clear through the publication obviously.

MR. SALOMONE: I'll defer to the regulators on that.

MR. MUNSON: Definitely as you've heard the past couple of days we've had that generic issue 199 ongoing and we're looking at how the hazard - perception of the hazard is changing, characterization of the hazard is changing since the mid-`90s. And so this will be another data point to look at.

MEMBER RAY: So you think the GSI serves to insulate these deliberations from the implications that might otherwise attach to existing plants. For example we can talk about sites, many of which are COL sites. But there are existing sites, lots of them. I don't know -

MR. MUNSON: Can you clarify what you mean by "insulate?"

MEMBER RAY: Well, the chairman was asking about the selection of the experts. That's in order to demonstrate that the deliberations are fully comprehensive in terms of the expertise that should exist and isn't biased to some desired outcome. Well, the existence of plants out there is a similar question. A cynic would say well this is just a process of getting everybody to agree on something that takes into account what already exists. I say a cynic would say that. I'm not saying that.

CHAIRMAN POWERS: Well, I'll say that.

MEMBER RAY: In setting this process up the obvious question seems to me and I haven't heard it talked about quite yet the way I'm asking it, is how do you carry forward this work given that there are a lot of sites out there already that have existing seismic hazard implicit in their license? I happen to have had to upgrade a plant seismically once in my life and I know how difficult it can be to do. And so I think you're answering the question the way at least I would answer it is well, the GSI is intended to address whatever new insights may exist as a result of this work or anything else and the world of existing plants that are out there.

MR. CHOKSHI: This is Nilesh Chokshi. I think as a regulatory process, you know, this is not only in the seismic area that new information may come that you have some impact on the operating plant. And GSIs, or the generic issues, the one process by which you examine what the impact of the new information.

MEMBER RAY: Okay, but you've got industry involved here. They're funding the project manager. And so it seems like it would be important to credibly be able to say the chips will fall wherever they may.

MR. CHOKSHI: I see what you -

MEMBER RAY: And that's the question I'm

asking. How do you accomplish that given that the project manager is EPRI which is funded by the industry?

MR. CHOKSHI: I think that's the multi-agency program and SSHAC guidelines, you know. You have to - the people who do the professional job, I mean it seems to me there are enough checks and balances in the process, in the SSHAC process, and enough different perspectives that the process should take care of that.

MEMBER RAY: Okay, well that's fine and I don't have any better answer for you than that, but it's an important element and it seems like it needs to be kept in mind. I mean, we've been sitting for an hour listening to process stuff basically, and the process needs to take into account the fact that you inevitably have some potential for impacting a whole bunch of existing plants, okay? And that ought to be central.

Like I say, the terms asking you about picking the people, but I'm asking a different but related question which is well how do you credibly demonstrate that you've come up with the right answer given the potential implications for a whole lot of existing plants? That's as simple as I can make it.

And you know, you're trying to address this in various ways. I'm just trying to sharpen your focus to say look, how do you make sure that the right answer will emerge regardless of what the consequences are?

MR. MUNSON: I guess I don't know what you mean by "right answer."

MEMBER RAY: Well, that's sophistry. I will tell you there is a right answer when it comes to the mission of the agency and the - I'm sure you're going to arrive at the right answer ultimately.

MR. KIMBALL: If I may, Jeff Kimball again. The point of my presentation yesterday for the existing set of applications that are coming in, if you don't go the extra step and make sure the right set of sensitivity studies are done frankly to protect the applicant, then you're setting the applicant up for whatever comes out of this and that's the wrong mentality I guess I'd say. You really have to - you really have to push yourself hard. Both the NRC and the applicants and their experts have to push themselves hard to make sure the right set of sensitivity studies are being done for the current PSHAs in the applications or indeed you're exactly doing what you're concerned about. Because you're going to set yourself up.

MEMBER RAY: That's a valid point. The motivations on the part of the industry should be to not be vulnerable to second-guessing later on. But that has, like I said, the plant I'm talking about, we built a new plant next to an old plant and we wound up having to make very, very substantial modifications to the old plant as a result. So I've been there, I know how it works.

MEMBER MAYNARD: I guess, while I was at the mic I want to speak as one PPRP person, but I can have influence at times. I think Dr. Powers your point was right on the money. Now that this project is underway and we've had two workshops it should be easy on a few viewgraphs to explain why the experts at either workshop in fact fairly represent the community distribution. And we should be able to do that. I mean, it's - you know, I think you've heard from people that we believe that in fact it represents, but you know, for a person who's not been involved, you know, I think it's putting - I'll call them loosely "criteria" down to explain why that set up people is in fact - represents the community distribution should be done. I mean, we're into this now a year we've had the workshops. Forty people at each workshop, we should explain well why were those the right 40 people

or 35 people. That shouldn't be too hard.

MEMBER MAYNARD: I think you should be able to explain that. I think that's kind of an after-the-fact thing. I think what's really needed in this process is what was the up-front criteria. Right now if you put the criteria together you're primarily going to be justifying what you did as opposed to identifying a criteria of why you - I'm sure there's a criteria there and I'm sure proper consideration was given, but from a transparency standpoint it looks like we're - it kind of appears like we picked the experts and now we're going to justify why those represent the community. That's kind of the image that I get.

DR. KAMMERER: Annie Kammerer. I just want to make one point that I think - I guess for me personally is really pertinent I suppose as a younger member of the seismic hazard community which is that this particular project is very different from the EPRI-SOG in that it's going to be public and transparent and out there for everybody. You know, when I was in grad school we heard about this thing but we could never see it, and so there was not the ability for the broader community to say whether or not their views were represented, whether there was -

it was very challenging to say whether the center and body and range has been captured because the body and range couldn't even see the product.

And so ultimately this study, we'll end up with a very large body of documentation, the model will be out there for the public to view, and I think really ultimately that will be the ultimate challenge. Because if the goal is to represent the center and body and range, and we then have the community whose views are supposed to be represented, I mean, I think ultimately we'll see what they think and that will give us the level of comfort in the end.

MEMBER ARMIJO: Well, you're - in the various workshops you're going to wind up, you know, assuming they're not the same guys over and over again, 30, 40, or more experts presenting or working on this project. You know, I think it would be rather difficult to conspire to avoid certain experts if you have an open system. Can anyone attend these workshops?

MR. SALOMONE: Yes.

MEMBER ARMIJO: So has anyone been excluded that says hey, my views aren't being taken into account, I'd like to be on these expert panels? Have you had those kind of requests? You know, I

don't see this as a biased project. I think it's a very open project. I guess I don't understand my colleagues' concerns as much as I should, but it seems to me very straightforward.

MEMBER MAYNARD: My concern is not that they went out and biased it or whatever. It's more from typically if you're going to be selecting people for a transparent program you need to have some criteria defined before you select that's visible, not just in somebody's mind, but something that's written down or you can document. I don't have any concern that this is biased, it's just more what was the criteria before they started selecting. I think I'm hearing the criteria after they were selected.

CHAIRMAN POWERS: I'm quite convinced that's what it is. It's incredibly biased. Automatically excludes anybody that isn't funded to attend.

MR. CHOKSHI: Can I make a comment? Listening to I think - I think I appreciate I think the point you are making, and what is not clear in my mind whether the selection process is not clearly explained or we need to go back and look at that, make sure that, you know, we are truly presenting what we set out to do. That is goal, okay? And I think that

we need to go back and look at this as the sponsors that you know, because I couldn't answer your question so we need to understand how this, you know. So I think that's something we need to be able to - what process we need to explain fully, or look at our process and see if it does capture what we really want to do.

MR. SALOMONE: What I will get to is actually the documentation that's on the CD. You know, you have quite a bit of information beginning with the project plan.

You also will see the documentation that's on the CD and that may help. When you see the breadth of information we had access to, and again, this is only those who were able to make and participated in the Workshop No. 2. But there is a whole host of other experts who have something that they can contribute. I will also show you the questions that were asked to each of these individuals and you will see why these individuals were chosen for this particular workshop because in assembling the baseline for this model it was clear that certain answers had to be obtained from our resource experts that were available to us.

This just quickly is the status that you

can read. Again, this is the next steps that are coming. We talked about that again on this CD in the documentation there will be an agenda. You can click on Bookmarks and you'll see this outlined, the agenda. You'll be able to open up the agenda to each of the speakers and based on what topic interests you you can see what the information was with respect to that. There will be a summary of the proceedings, essentially a transcript of the workshop. At the end of that proceeding you will see the questions that were given to the experts prior to the workshop because of their area of expertise to cover the full range of information we needed in order to answer the question.

And remember, the TI team takes the ownership for the project, they are responsible to assemble all the information, tap whatever expert is out there to provide this information. And again, to make the point again, this is not an industry - this is an industry-government partnership to do this. So the industry is not influencing the project team. We are performing the research associated with developing this new model independent of any commercial involvement at this point. They will receive the information as others will - as the other sponsors

will at the time it is completed.

So with that let me just show you as an example. I mentioned we expanded the paleoliquefaction database. Let me just quickly tell you with respect to paleoliquefaction, how important this is. In fact, the largest uncertainty is associated with the recurrence model because the uncertainty in the interpretation of the recurrence rates from paleoliquefaction data. We also learned in the workshop the differences between tectonic strain rates and some of the recurrence rates that are coming from the paleoliquefaction data. So what we're going to do with the team that we've assembled, and again, this is a geologic, seismologic and geotechnical issue, so we need access to those expertise. This is how we formulate the team in order to help us with the answers.

We have a responsibility for the ownership of this project. We are going to tap whoever we need that is out there that has something to contribute to get the best answer available for our sponsors. There are 17 sources that have been identified and what they will do is they will populate a data set that will include the feature location, the feature type - by that I mean sand blow versus sand dike, feature size,

quantitative or qualitative descriptor, the age constraint, is it a maximum, is it a minimum, is it temporary age, and some data quality indicator. Now, some of this information is not readily available in all of these 17 study areas. There's also areas that were studied and there was non-detects. But understanding the liquefaction mechanism you can have changes with respect to where the water table is in a given time when an event occurs and maybe that's why there wasn't liquefaction.

One of the things I would add in terms of looking ahead for further research, as I said earlier, we need a procedure so that the information that is obtained is a bit more formal in terms of those that get out there to assemble the data. Also, what we see missing quite often, the Vincennes location is an example of what can be done, but in understanding the liquefaction phenomenon you need a geotechnical characterization of the soils that are being seen in terms of grain size as an example to understand, well, if I have one area where I didn't see liquefaction and I do see an area of liquefaction was it due to the grain size differences that could have made that impact? And we don't have that good of geotechnical information at these study areas as we should.

But again, if we develop a procedure with the input from the seismologist, the geologist and the geotechnical engineer, we will have the necessary information being assembled. But again, one of the elements of this project is we are not creating new data, we are assembling the available data and so we are taking the available study area so we will have a team developing this data set.

Now in addition to that some of the users that try to estimate the recurrence interval from paleoliquefaction data will also be working on what to do with the information and this data set. So some of their expertise with respect to how one - and the approaches that could be used to define maximum magnitude or recurrence interval will also be going, and that will be a document in the report, that will also be provided to the TI team with respect to this element.

MEMBER ABDEL-KHALIK: Could you tell us something about the data quality indicators that you mentioned?

MR. SALOMONE: Yes. Depending on what we find when we go to these different study areas, there will be some indication, whether it be a numbering system where 5 is excellent documentation like we

might get from the Vincennes location because there's a comprehensive geotechnical information that is helping guide that, or you have another quality indicator, you know, maybe it's a 3 versus 1 would be just observed the information, there is very sketchy information with respect to these parameters. So that's what we're thinking right now, that there be some indication maybe in a quantitative scale or qualitative message that would give the reviewer an opportunity to know how well the material is - you know, that was obtained is viewed with respect to what you need.

And again, let me illustrate the importance of the geotechnical aspect of this. We were involved with some work on the Charleston project. We observed again a researcher was a master's degree student, and not very well known, probably not working in paleoliquefaction today. But they were publishing a paper with respect to going from the paleoliquefaction data that had been published by Talwani and Schaeffer in the Charleston area and they were re-computing the size of the earthquake, and it was in the lower magnitude, the 7's that they basically computed.

When we examined the details we learned

that they didn't consider some of the age effects with respect to the formations that we knew existed for that particular formation. We then suggested that to the authors and the researchers. They changed their look, published again, and what you now see is a magnitude that's in the high 6's. So it is an art at this point and a lot more work, and that would be an area for research that I would suggest to the panel as you provide guidance, that much could be done to organize the approach that's used to obtain the data and then to work hard on what you do once you have the data.

MEMBER ARMIJO: Does the USGS map include this paleoliquefaction data, and do they treat it the same way evaluating the quality of data and how to use it? I guess that's my question.

MR. SALOMONE: I think we'll be taking a look at it in a lot more detail than USGS. They certainly have some experts that have attended the workshops and they have made judgments with respect to the use of that to find their seismic zones and to set recurrence rates and maximum magnitudes. But I would say this project will be looking at it in a bit more detail.

The next thing I wanted to share with you,

you should have copies of this. I'm looking ahead right now in terms of that issue about documentation and public transparency. I've left a card so you have access to me. If you have any ideas in terms of that transparency and I certainly will add the criteria that were used to define resource experts as part of our documentation. And what this is is a first attempt to provide EPRI with a feel for what information we would be looking to put on a public website. The way I think of it, I think of it in two major bins.

One would be the documentation to understand the basis for the model, and then the second bin would be I want to use the model and how do I use the model and what information do I need to use the model. So at your leisure you can go down that list and if you think of anything else that was missed or should be deleted or added I welcome any comment.

So you see, see that. And again, part of the transparency. We'll have the plan, we'll have the CDs from the workshop which have a wealth of information, we'll have the final report in digital form, the bibliography to show all the information that was accessed and all the researchers and others who have contributed and have been contacted or their

work known to the project team. And this is way beyond those who have attended the workshops or participated in the workshops.

Any new computer codes to estimate seismicity rates and b-values, the sensitivity analysis that showed the significant issues again so people who it may not be fully apparent to them what the significant issues on hazard are. I know in some of the national workshops it wasn't always clear. There was a lot of discussion on what the key factors are. And then the results of our sensitivity analysis and the comparison with the USGS, and then some sample hazard calculations for the end user to check their model and see if they can get the answer that we would get using the model so that they know their software is working.

CHAIRMAN POWERS: Why aren't you focusing on sensitivity rather than doing full-blown parametric uncertainty analysis?

MR. SALOMONE: Repeat the question?

CHAIRMAN POWERS: You highlight and in fact throughout the last day and a quarter you've highlighted sensitivity analyses. And my question is why not do a full-blown uncertainty analysis?

MR. SALOMONE: What we will be doing to

answer the uncertainty analysis, we will have the logic trees that essentially account for the uncertainties. And again, the key parameters would be the source geometry, the maximum magnitude and the recurrence rates. So in looking at the results of the preliminary model and the demonstration sites, if a particular issue comes up in terms of the uncertainty we can remove parts of the tree and see what the effect on the ultimate answer is.

CHAIRMAN POWERS: I'm sure you can. I'm asking why you're not propagating a simple Monte Carlo analyses through the whole thing?

MR. SALOMONE: It's the standard procedure. So I think we are.

DR. KAMMERER: My understanding is that they are, that actually what they're doing is -

CHAIRMAN POWERS: Then we get the drill of going through all the correlations and the variables. How are you handling correlations, Annie?

DR. KAMMERER: We'll have to see. I mean, we'll just have to see what it is they're doing.

CHAIRMAN POWERS: I mean, he cites to two parameters right off the top of his head says source geometry, maximum magnitude, totally correlated. And so you have to come up with a correlation model. How

are you going to do that?

DR. KAMMERER: Well, we're going to have to see what they provide us for us. But I understood that's what they're doing, but we're going to have to -

CHAIRMAN POWERS: He's very explicit. He's only doing that sensitivity analyses, and I think that's what he's actually doing. The question is given that you have this model, given that you have a consistent fault line in this model, why not do the uncertainty analysis? The answer probably is you can't handle the correlations because you don't know what they are.

MR. SALOMONE: Okay. Section B is an example of what would be available for the end users. And again, we'll have the logic trees, the parameter distributions and the derived maximum magnitude and recurrence parameters. We would expect to have a list of files for the geometry, the rates and the maximum magnitude information. You want to switch now?

MR. KIMBALL: While you're switching out I did want to clear up a confusion. My comment was to go back and see what documentation existed beforehand, not to create anything. So I wanted to make that clear. There may be little, I don't know. I believe

there was some documentation on picking the experts and we'll just have to see what it was and how it was documented. I'm going to avoid the C-word this time. I'm not sure there was explicit criteria used, but I - you know, there was some documentation of why the expert. It may be that it did involve a fair amount of judgment and that'll have to be reflected.

MR. SALOMONE: Jeff, you reviewed the list. What criteria were you using?

MR. KIMBALL: I'm going to avoid the word for a minute, but you know, whether we have to say that there was judgment involved - I don't recall - not being on the TI team, you know, it's their job is to have to look at this documentation - what existed. But I know that we wanted to get the range of views, we wanted to represent the geographic regions. I think from our knowledge we wanted to reflect the full literature ideas that we were aware of, or the academic research ideas that we were aware of. You know, off the top of my head I'm answering, but you know, I think there was quite a bit. How much was written down I'll just have to see.

But you know I know for example, the obvious example that Bill was pointing out is there's been some literature in the last 10 years on strain

rates in New Madrid implying that New Madrid is dying down or has gone into a cycle where there is not the threat that we might expect from the paleoliquefaction. We made sure that that was fully vetted at the workshop too. Now, how that gets reflected in the PSHA we'll have to see, but views like that we made sure that we did get the - call it - I wouldn't call it the outlier. We wanted to get the full range of views of people.

MR. SALOMONE: Another major area too was the strain rates, you know, are they telling you anything important versus the paleoliquefaction data. So again, this was part of what went in. But this is the CD that you see. The agenda that you see here.

MEMBER MAYNARD: We only have 960 pages of it.

MR. SALOMONE: This is the agenda. You will see it. Most of it is the presentations, but the agenda is really about three pages.

DR. HINZE: In addition to the items that Jeff mentioned, I think the one he didn't mention was methodologies, and that's kind of what you were getting at, Jeff. And that's incorporated into that list. You won't be able to read it, but that's been incorporated into that.

MR. SALOMONE: Now, what you see here is essentially a listing of everything that's there. We have the agenda. If you click on the plus sign you will get each of the speakers that presented with their information. The attendee list is also there so you can see the number of observers as well as resource experts beyond those that spoke that were present including the international observers. We also had opportunity in addition to the pre-meeting the day before the 3-day workshop. We did this for Workshop No. 1 with the international observers to have a dinner with the international guests to informally talk about things that were happening.

CHAIRMAN POWERS: How many people from Canada participated?

MR. SALOMONE: Excuse me?

CHAIRMAN POWERS: How many people from Canada participated?

MR. SALOMONE: In the workshop?

CHAIRMAN POWERS: Yes.

MR. SALOMONE: There were over 60 participants in the workshop and there were 18 in the pre-meeting that included the experts from the countries that Annie cited as well as the young professionals that were learning the process.

DR. KAMMERER: From Canada.

CHAIRMAN POWERS: How many from Canada was it?

MR. SALOMONE: Oh, from Canada?

MR. CHOKSHI: Alexandro Forte.

MEMBER MAYNARD: You've got to go to the microphone.

DR. KAMMERER: We're just trying to -

MR. CHOKSHI: Four or five.

MR. KIMBALL: It's an interesting question, by the way, because this is a good example of making sure the breadth is the right set of people. There was a geologics site at America's special publication a couple of years ago. I'm getting older too, I don't remember dates. Just the other day I'll say. Any case, there were some profound papers in that GSA publication on the overall understanding of tectonic framework and why are we seeing seismicity in intraplate environments. Those - some of the profound papers were our Canadian colleagues and we made sure that they were involved in this process.

CHAIRMAN POWERS: I noticed that there are no liquefaction events apparently in Canada. That's why I asked.

MR. KIMBALL: There are in the St.

Lawrence area.

CHAIRMAN POWERS: Well, I would think so. And since we have plants right across the other side.

MR. SALOMONE: We'll go back but can we blow that up at all? Okay. Here's the list that you'll have and you can count the Canadian experts that were there. Let's go back. And so that's the attendee list. Let me click on the agenda. So you can see here, on the left side, the topic and again, as you move, scroll to the right, you can pick up, you know. This is Frank Pazzaglia and you can see his entire presentation, the amount of information that he provided. Again, you have the authors on the right and so you can go through that and look at each of the presentations.

Let's see. There it is there. If we go back, let's see. Go through the list. And again, the way - when you look at the agenda, the way it was organized is the proponents were speaking close to each other so that you could easily get the different positions with respect to certain issues. And one thing -

DR. HINZE: One of the tweaks that happened during the workshop is that the PPRP was concerned about a lack of formal or informal

interaction between the resource experts because this is part of SSHAC. And one of our early meetings right after the process started - we were meeting all the time - is that we informed the leaders of the working group to make certain that there was more interaction. And that finally - I mean, that was implemented.

DR. KAMMERER: We were promised we'd hear some fighting and we didn't get it day one.

CHAIRMAN POWERS: Well, what Bill said is absolutely true. My experience is with NUREG 1150 and the panels there when the formal presentations, there were orthogonal views that emerged not to be quite so orthogonal upon less formal interaction. And in the final elicitation in fact the distributions tended to be - the spread in the distributions tended to be dominated by things that were not the original areas of orthogonality, but collegially defined were uncertainties.

DR. HINZE: To avoid a few people taking over the meeting, what you really need to hear is the entire view and so sometimes that takes a formal structure to bring out reactors to it.

MR. SALOMONE: What I have here up now on the screen is the first page. This goes from Page 21 to 27. These are the questions that each of the

researchers obtained prior to the workshop. They did not see the other questions that the other researchers got, so they got simply their questions. And the summary of all the questions are essentially in the documentation for - so, like Stephane Mazzotti, you know.

What criteria should be used to define seismic sources? Do glacial rebound processes influence seismicity? So these are just typical questions that you can read at your leisure. All the different experts. As you move through the agenda you will also start to see the breadth of information and through these questions you'll also know what was on the mind of the TI team and staff of what they needed to get from our resource experts.

And again, further dialogue with any of these experts still going on as we need to augment what came up in the 3-day workshop as well as those who are not on the list, but also accessible based on their knowledge that they can contribute. And just to show you we have the PPRP letter report so you can see the observations of the panel. That's available.

And again, just to show you some of the participants. This is the international observer group and the young professionals that we had at the

pre-meeting. This is some of the action photos working at the workshop. And again, the way this worked, there was two rows reserved for the TI team and TI staff and an additional row for the PPRP so that they were not scattered throughout the conference room that was used for the over 60 attendees. Here's more shots there. Again, these two rows here and here were reserved for the TI team. These are the resource experts. This is the Participatory Peer Review Panel minus one and I'll let you see who was busy during that break, the lunch break. Here's the TI team and staff, and here are some of the observers.

CHAIRMAN POWERS: I have to admit that I'm puzzled on how this helps us.

MR. SALOMONE: And with that said I think I'll take any additional questions.

MEMBER ARMIJO: Okay, I have a question. On the final technical report that's going to be published, is that going to be an EPRI document, a Savannah River Nuclear Solutions document, a NUREG?

MR. SALOMONE: It will be an EPRI document and it will be made available to the NRC and how it's reflected in terms of any formal NUREG, that would be a decision upon submittal.

MEMBER ARMIJO: And maybe some of the

concerns raised that might be addressed - had it been a NUREG, you would typically go out for public comments where people who said gee, you never listen to my views and here they are. Would NRC consider doing something like that if they referenced this in a NUREG?

DR. KAMMERER: You know, there's been a lot of discussion about that, of how do we do this feedback loop with the people who have participated to make sure that their views were captured in the right way. How do we make sure that this body of people, these 40 people at each of the workshops have some sort of possibility to review back what's provided. I think that's a topic of ongoing discussion right now in terms of both the conference calls, the peer review panel, we've discussed it quite a bit.

We've actually ended up to add some additional review at least with us internally, the peer review panel, an extra internal meeting for us to get one first look at it, and that's going to be happening in May, the first - second week of May I believe to look at it. And then I think we're going to need to discuss that then, first of all to go back to the technical community who participated. And then I think we as a group here at the NRC have been

talking about how we will address this, the need for us to also be doing - to develop some of our own software, to do our own parametric look and sensitivity, and how we might go to the community and make some of these decisions ourselves.

MR. CHOKSHI: I think that's an excellent question. From a regulatory point of view all stakeholders beyond this technical community, you know, the people that are ultimately going to be affected by this opportunity. And I think we need to figure out how we do that. Right now I don't have an answer for you. If you go through our regulatory guidance process it does provide an opportunity, but you know, but you are right, this technical study, it needs to be, you know, we need to provide opportunities to our stakeholders.

DR. HINZE: Question if I may. Larry, you were here yesterday afternoon and there was some discussion regarding the selection of the level of a SSHAC study. You have in the project plan a page on this topic. Can you put into words how you arrived - what criteria you used to arrive at the level of the SSHAC study that is currently underway?

MR. SALOMONE: When you look at the procedure with respect to a SSHAC Level 4 versus SSHAC

Level 3, the first response to your question is that when we began assembling the TI team and the peer review panel that was discussed as an option. What level do you think we need to go to in order to meet our goal? So when you looked at the schedule demands or a SSHAC Level 4 versus a SSHAC Level 3, this information based on being timely required an approach that would allow this information to be available in the two and a half years that you see as part of our schedule.

If we were to use a SSHAC Level 4 we would go beyond those two and a half years. And keep in mind that - and again, this question can also be answered by walking the talk for a year and a half trying to look for sponsors. There were certain input and sensitivities on the part of the sponsors in order to have a viable project. So in terms of dollars available for funding as well as the schedule to meet the needs of those end users that will be using it, that helped shape it as well as the technical input in the original.

We also reserved the right in going to a SSHAC Level 3 of - when you read the SSHAC approach you can go to a higher level of SSHAC level for a particular issue. So that if we had a particular

issue that demanded beyond the SSHAC Level 3 we could do that.

MEMBER ARMIJO: Are you doing it?

MR. SALOMONE: I think paleoliquefaction would come closest to putting more meat and more time involved on that particular task. If you look at the original conceptual plan it was - is more like a Level 3 and now we're approaching a Level 4 with respect to the paleoliquefaction task. So we reserve that right. Now, to my knowledge in terms of SSHAC level they've not mixed it up in a particular project, but we wanted the flexibility to be able to go to a higher SSHAC level if there was a particular issue that demanded it.

But in summary I would say number one, the TI team working with the peer review panel made the final decision with respect to SSHAC level. There was also certain constraints with respect to the realities in terms of funding and schedule that also was clear. And I would say that for what I found in the year and a half is you know, the experiences with the SSHAC Level 4 were such that the time and the amount of effort and some of the issues that developed as SSHAC 4 was developed made the SSHAC Level 3 more viable.

And I would say in the future if I had to

make a prediction depending on the choices on the part of the sponsors I think the SSHAC Level 3 in terms of updates for this work may become the rule of thumb with respect to that, in terms of that. Now I think by meeting the schedule I think the credibility of the SSHAC Level 3 process I think will also enhance its use in future work.

DR. HINZE: Could I have another question? In the introduction to the program plan and the discussion of the objectives, two words stand out: stability and longevity. I think stability is pretty clear as to its meaning. Longevity seems to give a few people heartburn if you will. Could you discuss what you conceive of as longevity in terms of how this program leads to it?

MR. SALOMONE: The way we look at longevity, it's really providing the technical underpinnings for future work. I mentioned in my comments yesterday, if you think of this as the parental foundation for seismic source characterization in the Central United States, other end users will be able to build off of this technical input for their particular needs. So if you're in the building community you might be looking at the 10^{-4} whereas in nuclear where it might be 10^{-5} and 10^{-6}. But

the genetic profile, the makeup will have come from the same parent with respect to that. So if the foundation can be strong, the robustness and the uncertainty that's included in the model, then it will have that longevity. And then as new information comes available judgments can be made with respect to the need to update it in part or to whatever extent the data suggests.

And again, with the information that will be available judgments could be made in terms of what is considered noise with respect to changes and what is real in terms of importance in terms of updating that. But again, the simple answer of longevity is the strength of this providing the technical underpinning for seismic source characterization in the Central and Eastern United States.

CHAIRMAN POWERS: The way to make most long expert elicitations have a long viability in the community is to make them complicated and expensive enough that no one wants to repeat them.

MR. SALOMONE: Could you do that a little slower? I want to get all those words.

(Laughter)

CHAIRMAN POWERS: How do you see this from NUREG 1150? It's not going to be repeated because you

made it complicated enough and expensive enough that people blanch at the idea of repeating it even though it's horribly out of date now. Are there any other questions for this speaker? I'm going to take a 15-minute break at this point and we are going to go off the record at this point.

MR. MUNSON: Can I ask a question before we do that?

CHAIRMAN POWERS: Sure.

MR. MUNSON: We're a little hazy on the final steps in this whole process and you know, how it eventually gets sent to us in DOE and you know, presumably we'll have questions, RAIs, you know, send it out for public comment and all that. And my question would be who's going to be there to answer the questions when this project is done?

MR. SALOMONE: Do you want me to comment?

CHAIRMAN POWERS: The project manager.

MR. SALOMONE: The product of this effort will be the final report and the documentation of what went into the report. And there will be a public website with respect to the report and all the background as I explained. It will then be presented to the NRC, to the Defense Nuclear Facilities Safety Board and to DOE.

At that point it will be their decision on how to handle this information. The service that our project team can provide will be what you consider a new task from that point on, and we would have to work with the sponsors to continue the project beyond that approach, beyond that point. So - but our deliverable is to provide the report and then later on if there are ARIs and other inputs that team could still be utilized but would be considered additional task for doing that work. And I should mention why that's the case in terms of the steps is because at the time the project plan was conceived we really are not sure exactly how it will be implemented in the various organizations.

So you could not really plan for that. But we're not going anywhere and we will certainly be able to work with the sponsors in terms of additional - as an additional task as required depending on the choices that are made by the sponsors on how to utilize the product.

DR. KAMMERER: So one of the things that we saw in the SSHAC presentation yesterday is there was a significant amount of discussion of intellectual ownership of the products that come out of a SSHAC-informed process. And in a Level 3 the ownership is

with the TI team so which would be Dr. Coppersmith, et al. So I think we definitely - you might start talking to EPRI now about the fact that they're going to need to be available as the intellectual owners of the product to be able to ask the technical or be able to answer the technical questions because of course it's inevitable that there will be some.

CHAIRMAN POWERS: It sounds to me like you better make sure that your technical review is high quality because otherwise it's going to cost you some money.

DR. KAMMERER: Absolutely. It's going to cost us no matter what, so. For me personally, I mean one of the things that I am very enthusiastic about this is the fact that this will be a public transparent product in the end because again, when I was a young engineer you know and hearing that these things existed and not being able to delve into them, and learn from them, and read about the documentation, it was - there was some level of discomfort there. And so I think that this is a large - big step forward.

CHAIRMAN POWERS: Any other comments? Good. I'm going to take a recess for 15 minutes. We'll come back and I just want to touch base back to

the research program to make sure we're on pace there. This material I think goes to our seismic subcommittee who will do with it as they will. We're off the record at this point.

(Whereupon, the foregoing matter went off the record at 10:31 a.m. and went back on the record at 10:48 a.m.)

CHAIRMAN POWERS: All I really wanted to do is discuss what we plan to do in writing up this section for the research board. My intention is not to write anything till I've completed the retreat, and I - probably just buttonhole and say nothing major changed, two or three items changed, something like that. I mean, whatever comes out of that, just to reflect - yes, just more timely stuff. And then to go ahead and produce a draft. I know that Bill's going to give me a list of specifics he thinks needs to be highlighted in the thing.

DR. HINZE: More than you want, I think.

CHAIRMAN POWERS: I count on that happening. By the way, Said was so distraught at the idea of there being seismic activity in the vicinity of Georgia that he's raced back to take out insurance -

(Laughter)

CHAIRMAN POWERS: - and things of that nature. The man was just quivering. I swear he thought that the South Carolina border protected him or something. What I'm asking is that if you have thoughts - and they need not be coherent, they can be piecemeal - on things you think ought to be said in the research with respect to the research program itself, I would appreciate just a note. I mean, you don't have to develop language -

MEMBER RAY: Can I ask a question on that?

CHAIRMAN POWERS: Sure.

MEMBER RAY: I realize this is a comment on research and I want to really respect that and not make it sound like I don't understand it. I do. But is there an implication when research is done as to its ultimate use in the agency? And I think we got to that question which was sort of back in my mind toward the end here. I don't know that that's appropriate to comment on in this context, Dana, but nevertheless this - is this research - you know a lot more about this than I - is this research different in the way it's being conducted?

And I find no fault with the way it's being conducted, by the way. But is it different insofar as it is later on going to have this problem

of, well, we've got questions as an agency, who do we ask the questions of and what are the implications of this research for the process that the agency is involved in, which is a regulatory process. A lot of research is done that doesn't directly link up with regulation, I understand that, and this may be the case here as well, but I think that there's - I sense a bit of a difference here, that this research is intended to be used and not just by new applicants necessarily.

And maybe I've wandered around enough with my question. You can respond a bit. I just don't know to what extent our comments have to do with well, how is this going to be implemented given the very good way that it's being conducted?

CHAIRMAN POWERS: It is - if we have comments in that particular area - I think you're talking about the Central and Eastern United States?

MEMBER RAY: I am, yes.

CHAIRMAN POWERS: That component to which we can blame the NRC staff to the extent that they're a sponsor of it where the commission expects us in this report, unlike the quality report, to comment specifically on this - on how is this research going to be used. Is it useful to the agency? In your

case, it's transparently clear it's useful to the agency. There's a question on how does it actually get used by the agency and where does the expertise arise.

I think if I were - I mean, that is a legitimate field to comment on. I think if I were responding from the staff on that I would say well, we have expertise at several points in this program and we fully intend to preserve that expertise as far as being the reference point that the line organizations can come to and say okay, my applicant has appealed to this latest seismic survey in the design of his application and I'm reviewing it and I have these questions. Research, please answer my questions for me so to save me from having to ask the licensee.

MEMBER RAY: Well, your NUREG example is a good example I think of a way of taking this forward into the agency. And the question might be well, that's what we intend to do, we intend to publish this as some kind of agency document, invite comments on it and based on that to make it a part of our regulatory regime. That's an answer, you know.

CHAIRMAN POWERS: I would suspect that they would - that eventually it will get referenced in a reg guide in which case it becomes part of the

regulatory process. It can be referenced in one of two ways. It can be referenced as a resource document in a REG guide or it can be endorsed. And endorsing is the same as if the NRC had written it.

MEMBER RAY: So then it would go through the normal public comment process and resolution.

MR. CHOKSHI: I think Dr. Powers characterized the process as I think, that you know, in principle it's no different than what we do. Right now when we say you can start at the EPRI or Livermore models, instead of that we will be reporting to this new site and so that is where you start, and then you have to do your site-specific studies, then the application comes in. We review with the expertise and that will be - it's the normal process of re-review at that point in time. So in terms of from the regulatory point of view it's not that big a challenge.

MEMBER RAY: Well, I'm not suggesting it's a big challenge. I will say that like a lot of research - it's not unique to seismic - where you're dealing with something that affects a lot of existing plants there is ultimately or inevitably an issue that has to be dealt with. Like I say, it's not unique to seismic at all. But still, the status of this work is

a part of the regulatory process whether it's in any one of the things that the chairman suggested. It might be a reference-able document, an endorsed document, a document that the agency sought comment on, God knows what you'll decide to do. Those are choices yet to be made. That might come out of your workshop, I don't know, and be relevant.

CHAIRMAN POWERS: No, I think that'll come out of the regulatory deliberations. They have to look at what they've got.

MEMBER RAY: I didn't mean workshop, I meant the retreat, but in any event.

MR. CHOKSHI: Because in that process we involve the stakeholders, you know.

CHAIRMAN POWERS: Yes, it won't come out of the retreat. They can't make that judgment until they see what they have. And that - I guess I agree that right now on the face of it it's just going to be - there's going to be an update to a reg guide and one sentence is going to come out and another sentence is going to come in.

MR. CHOKSHI: Exactly. That will be it seems to me the same thing, the most practical and easiest way to do it.

MR. LEE: I think we heard yesterday that

case of the EPRI CEUS Project 1.208 would be amended to - you'd redact - I mean, I'm not saying this is what's going to happen, but the expectation is substitute the EPRI Livermore methodologies for the CEUS work.

MR. MUNSON: It's an expectation but it's certainly not de facto -

CHAIRMAN POWERS: It's not decided.

MEMBER MAYNARD: It's similar to ASME or IEEE things where it's cooperative?

CHAIRMAN POWERS: Because it's not explicitly guidance it would surprise me if it looked like that.

MEMBER MAYNARD: Well I mean as far as the process.

CHAIRMAN POWERS: The process, kind of the same.

MEMBER MAYNARD: And that they may take the document, they may have some regulatory positions that are slightly different or considerably different, public comment, NUREG or reg guide whatever.

CHAIRMAN POWERS: Yes, and I suspect you know when you use it a couple of times or try it a couple of times they'd find out well, there's room for substantial misinterpretation. They put out another

reg guide that says here's how you read these sentences, or here's the way to do the calculation that doesn't get cross-wise with Cliff, get him upset.

DR. HINZE: I think we have to remember that this is not an end itself, that this is just one step in the process. And I think that kind of gets lost in the discussion here, and that is that really what happens is that this is then connected to the next generation Eastern U.S. ground motion. And once that then is put in there, then we will be at the place where we can actually do some Monte Carlo-ing, we can do some studying and have meaningful results. At this point this is just an SSC. This is just a seismic site characterization, and so it's just one step and -

CHAIRMAN POWERS: But it's been one that's been fraught with past difficulties and quite frankly a duplication of effort that we think we can get rid of.

DR. HINZE: You know, and I think this really gets at what Jeff was saying yesterday. It's working towards that at least in terms of a consensus or harmonization or whatever terms he uses. I guess that comes close to it anyhow.

CHAIRMAN POWERS: I like the theses under

which the original Livermore and EPRI work were done. I think this one comes too close to trying to create a model rather than a characterization, which is going to drive narrowing of variances in ways that - I mean, narrowing a variance when it's justified I think is great. Narrowing a variance in order to have a nifty-looking model I get more concerned about.

DR. HINZE: I think all of the reviews that this will go through should take at heart your comment and I'm sure they will.

CHAIRMAN POWERS: All right well, again Harold, everything you've mentioned, fair game. The research report really addresses are we doing the right research, is the right research meeting a regulatory need, have we satisfied the regulatory need. The usual problems we run into in our review is that people will examine it and say well, there's a scientific need which is different from a regulatory need. And part of our function is to say well, has the research gone on enough that it's met the regulatory need. If science needs to be done, please call NSF or somebody like that. That's usually where we run to counter purposes in this thing. But the question of is there a regulatory need that the research is meeting, that's explicitly and exactly in

our charge.

MEMBER RAY: I think the answer is yes in my opinion.

CHAIRMAN POWERS: Yes, I think that came through. I mean, the opening speaker laid out in here and say what we need and we've seen it in every single early site permit, we'll see it in every COL. Yes, there's an absolute need here and like I said, what I thought was just delightful was not only were the needs identified but I can track them one to one with -

MEMBER RAY: I just thought from the opening speaker I would see more of a clear path to its application and that's not the case.

CHAIRMAN POWERS: I agree with you here. That is - and I do remind people not so much in this context, but in the context of the overall research program, the commission does - is asking us to look at the research programs and ascertain have they met the regulatory need. And what they're essentially asking is can I free up other - those resources to meet other needs.

And they do rely on us very much for that. Now this is a new program so it's kind of hard for it to have met a regulatory need, but there's a point at

which it will. And in other areas we can see where things have met the regulatory need and whatnot, which is distinct from the scientific need. And again, if you - I'll take anything I can get from you.

As far as points to be made you don't have to worry about the language, just tell me to make that point and I will do so. The intention is we'll iterate a draft around to ourselves. Once we're happy with it we'll fire it out to the staff, ask them to look at it. You guys are free to comment on anything, but recognize we'll probably only take the comments on factual accuracy and things like that.

(Laughter)

CHAIRMAN POWERS: Then we'll amend it and then it goes to the full ACRS to get reviewed and things like that. I did not see - I saw a huge amount in this research program that I would love to appoint the full ACRS committee if they had all kinds of time on their hands. They don't. I think we'll wait for products to come out of this to bring it forward to the full committee, but I think you're in good stead to come to the full committee when you get those products available. Any other comments?

MR. LEE: Yes. They'll have their retreat, they'll bang out an email or something to the

committee? And then you're also going to get us that list?

CHAIRMAN POWERS: Yes. I need pins and titles.

MR. CHOKSHI: Yes. I think that's going to that -

CHAIRMAN POWERS: And that's just to meet my obligation to the commission. I mean, we're - what we'll be actually examining is what you presented to us. Pins and titles we don't exactly look into real closely, but I have to meet their requirements. Otherwise let's thank you all for attending. Thank you for wonderful presentations and we are adjourned.

(Whereupon, the foregoing matter went off the record at 11:03 a.m.)