SOARCA ACRS Issues Report

Sessions: Sept. 2006, Dec. 2006, July 2007

Issue:

CDF

Members	Comments/Questions	Remarks	Action/Resolution
DR. CORRADINI Sept. 2006	Can you remind me what a SPAR model is? (pg. 239)	Mr. Hunter: A SPAR model is an internal PRA. It's simplified. It stands for Standardized Plan Analysis Risk Model, but it's essentially the NRC's internal model for internal events and we have them per site or per plant. Sometimes if the plants are mirror images of each other it will be just be, say it's Byron, Byron 1 and 2 will have one SPAR model. But plants that have a little bit differences like Indian Point 2 and 3 they will have separate models.	Answered
DR. APOSTOLAKIS, CHAIRMAN SHACK Sept. 2006	...The agency HRA's model does not consider time explicitly. You're in trouble. You will have to switch to the EPRI HCR ORE which you don't have. (pg. 249) -- We are trying to review it and nobody comes here to talk to us about it [SPAR HRA model]. You will have a big problem there because the available model to the agency does not consider time explicitly.... (pg. 250) -- ATHENA does not. SPAR HRA does not. (pg. 250) -- That's a take-away for you. (pg. 250)	Mr. Hunter: I will communicate that to the folks that need to know that. We have HRA tasked to look at how we're going to go about this. We're actually going into a couple pilot plants and actually look at their SAMGs and EDMGs to look at what's proceduralized to try to determine what kind of credit is appropriate for these type of actions.	Criticism
DR. KRESS Dec. 2006	Okay. Using what, ten to the minus six cutoff [gives you everything that has a consequence]?	MR. PRATO: Yes, for core damage frequency.	Answered
CHAIRMAN WALLIS Dec. 2006	Is evaluating scenario selection using core damage frequency, but then that doesn't tell me what you're doing with it. It's simply a screening for a cutoff value. Is that all it is?	MR. HUNTER: Yes.	Answered
CHAIRMAN WALLIS Dec. 2006	So [the lack of information for the sequences or the mitigation measures] might constrain what you can do, right?	MR. PRATO: Right now that's correct, sir, without additional information.	Answered

Q/1

DR. APOSTOLAKIS July 2007	My question is really, Do you need this? Do you need to have a cutoff frequency? I mean, why don't you -- because in my mind, the cutoff frequency is determined, having in mind, roughly, what the order of magnitude of the frequency of the event you are evaluating is. So, you know, for core damage we say, yes, the frequency will be at about 10 to the minus 5, or somewhere there. So if I keep the, all the sequences that have frequencies, maybe lowered by a factor of a thousand, that'll be okay. So when I go to the fatalities, I should follow similar logic, and say, you know, the kinds of frequencies I expect to see are in the neighborhood of 10 to the minus 7, or so, so I should keep "freq" sequences that are maybe a factor of a 100 or a 1000 lower. Put it another way. If you are calculating deaths, is it really reasonable to use a cutoff frequency of the CDF? You should use a cutoff frequency on the whole sequences of the latent deaths, and since EPRI claims that they can it without any cutoff frequencies, I'm wondering we can't do that. We should be able to do it, I if they can do it.	TINKLER: It's not -- it's clearly not a question of whether or not it can be done. The question is, is what is the meaningfulness of a to the minus 12 sequence group. You know, 10 to minus 12 times point one early fatalities is bigger than any other numbers times zero. Okay. So I mean, you can do that, but for effectively communicating what we think is the real risk for nuclear plant plants, we believe that a cutoff, to focus on the dominant frequencies, is appropriate. Now I presume that EPRI's exercise was to show that the rest of that stuff didn't make a lot of difference in any -- I mean, they're multiplying in terms of frequencies, so they're going to come up with a very low risk number.	Answered
DR. APOSTOLAKIS, CHAIRMAN SHACK July 2007	But in terms of communication, it seems to me if the public finds out that you're communicating extremely low or ext to zero deaths, because of the cutoff frequency, I mean, that would be a public disaster, actually. -- Yes, but I mean, it comes back to what Charlie says. What's the consequences of an accident that happens once a billion years?		Criticism
DR. APOSTOLAKIS July 2007	If you have to go to deaths, you have to say something about that. If it's a billion years, it's a billion years. I mean, that's what the best technology right now tells us. But to say that you get zero, or something, you know, insignificant, because you cut off the frequency of the sequences, that doesn't make sense to me.	MR. TINKLER: Well, I understand that. It's just that the other argument is of course someone can do the calculation and the multiplication. But if you started looking really hard at the quantification of 10 to the minus 10 and 10 to the minus 12 sequences, and in a consistent, fully consistent way, what might be the initiator of such a thing, it's not clear to me that much is gained in your overall knowledge of risk, if anything.	Criticism

DR. APOSTOLAKIS July 2007	I would change the argument and argue the complete opposite, precisely because this is done because the previous studies have been misused. You have to be very careful, to make sure that what you present is real, in the sense that it is consistent with what the state of the art is. It would be a disaster, I think, if you come out with very low numbers of current depths, say, and then somebody points out that it's because of the analytical method you use. Then why are we doing this? And I don't know that the 10 to the minus 6 sequence is more real than a 10 to the minus 9. Both of them are incredible to me.		Suggestion
DR. BONACA July 2007	As our initial focus. But do not say that you should not go beyond that, the initial focus. And how do you interpret it in terms of this report? So you're going to go beyond that at a later time?	MR. PRATO: I don't know at this stage. I mean, it's too early to tell.	Answered
DR. BONACA July 2007	I think the point that George is making has merit, so I think that as you review, once you do this, you have to evaluate what it means to go beyond 10 to the minus 6, and see what the effect is.	MR. TINKLER: I have not read the [EPRI] study you refer to, but again, I believe that the thrust of that additional consideration by EPRI was to show that that residual risk, if you will, was very, very low, and so in order to buttress their arguments on the issue of completeness, they opted to do that additional calculation. But to the extent they demonstrated that residual risk is quite low, there would be no reason for us to believe that we would generate results that would be, in any way, different from that general concept. I mean, the use of a cutoff, of a threshold we believe is supported by such a conclusion, and as a last proffer on this, I would say that using values we are, we're selecting, are already a very small fraction of the safety goal. We're not excluding anything that would be, by definition, quite large. I mean, we're --	Suggestion
DR. KRESS July 2007	You're looking at process for selecting sequences. Don't we already have enough PRAs for the variety of plants, to know which sequences are likely to be the risk-dominant ones, even though we've got improvements in MACCS and MELCOR, that may change this, wouldn't that be a place to say we'll select the risk-dominant sequences for this type of reactor, based on existing PRAs, and not have a cutoff rate, just select those sequences that are risk-dominant from the standpoint of death?	MR. TINKLER: Absolutely, and we are very mindful of that, and I believe you'll hear more about our selection process, it does identify those sequences that have customarily --	Answered

DR. APOSTOLAKIS July 2007	These 10 to the minus 6 for CDF will become 10 to the minus 8 for risk. Won't it? Because additional things must fail. So don't tell me 10 to the minus 6 we understand. This is just CDF. I have to fail the containment. I have to move with -- so this 10 to the minus 6 eventually will go down to minus 8 or 9.	MR. SHIU: But George, I think the bottom line is that I think we would think that the risk is small whether you go down to 10 to the minus 9 sequences or not, and as long as we couch the results of our study with the fact that we started looking at sequences at 10 to the minus 6 CDF level, for example, we have to clearly explain our boundary conditions for our study. I think that the message to the public would not be skewed as long as we are clear as to what we are looking at.	Answered
DR. APOSTOLAKIS July 2007	We should have more frequent meetings before things are cast in stone and the staff is defending what they have done [with the cutoff frequency], to death. I don't know. But if I see this in the fall, I'm going to write additional comments, if the committee doesn't agree with me. Because this is not acceptable and I think Commissioner Jaczko, in his dissenting comments, talked about a complete picture of risk and that he disagree with the cutoff.		Disagreement
CHAIRMAN SHACK July 2007	What's an enhanced SPAR? Is that a version 3.31 or is that an enhanced SPAR, an even more enhanced SPAR?	MR. SHERRY: That's the 3.31 models with cut-set level we use. For the internal event-initiated sequences, we used both the plan-specific SPAR model that we have and insights from the plant PRA to identify the sequences. We also then, once the sequences had been determined, we collected the sequences into groups based on similarity in the availability of frontline systems that impacted core damage, and on the timing of the sequences. So now, at that point we're dealing with groups of sequences, and we went to frequencies well below the screening criteria at this point, okay, down to approximately 10 to the minus 8.	Answered
DR. BONACA July 2007	This [enhanced] SPAR version is the one that has the improved pump seal model?	MR. SHERRY: Yes.	Answered
DR. BONACA July 2007	[The enhanced SPAR model is] the one you used at Surry?	MR. SHERRY: It has the Westinghouse Owners Group.	Answered

DR. CORRADINI July 2007	So let me -- I'm late but I'm sure you -- George already asked this, but just a short version of it. So between 10 to the minus 8 and 10 to minus 6, that is the sum of the CDF up to that point, excluding containment failure probabilities, but just to get to a core damage frequency?	MR. SHERRY: That is the core damage frequency; yes.	Answered
DR. APOSTOLAKIS July 2007	That's what he said. He said that if I consider the unavailability of the sprays, 10 to the minus 2, and multiply by the frequency of the sequence that leads to the need for the sprays, I may end up with a frequency of 10 to the minus 8, which is below the cutoff -- and that doesn't make sense to me. The cutoff was supposed to be used only up to CDF, not continually.	MR. SHERRY: But remember, the cutoff, as initially proposed, was at the release, and it was brought back to CDF essentially because of the screening, essentially based on the fact that the staff does not have models to extend out to essentially the release end point. Okay.	Answered

Issue:

Code

Members	Comments/Questions	Remarks	Action/Resolution
DR. BANERJEE Dec. 2006	Just for my information, does MACCS stick into account topography?	MR. PRATO: No. No, it doesn't.	Answered
DR. KRESS, DR. BANERJEE Dec. 2006	It [the radiation] goes in the direction of the wind. -- And spreads in a Gaussian way.	MR. PRATO: Yes.	Answered
CHAIRMAN WALLIS Dec. 2006	There's nothing about valleys and hills and things like that?	MR. PRATO: No.	Answered
DR. CORRADINI Dec. 2006	Well, that's what I guess I wanted to ask, since Dr. Shack threw that one in. When you do a MACCS calculation, since I'm not familiar with that part of the calculation, and it is not time dependent but really an average of how it flows, that's a fairly quick calculation or am I wrong about that?	MR. SULLIVAN: When you don't use a threshold, it's a fairly quick calculation. If you go to a threshold that really draws the run time out.	Answered

DR. CORRADINI Dec. 2006	Does it draw it [the calculation] out as a function of the distance you consider? I would think no.	MR. SULLIVAN: No, I think distance is a parameter, yeah, but I mean the more cells we have to calculate a result in --	Answered
DR. BANERJEE Dec. 2006	So MACCS has built into it these evacuation models and things or how does it work?	MR. SULLIVAN: yes.	Answered
DR. CORRADINI Dec. 2006	Now, when you say MACCS is a probabilistic calculation, every time I run MACCS I get essentially another sample in a distribution. So essentially I have to run MACCS over and over again even to get my distribution. It does it, right?	MS. MITCHELL: If I can understand your question, when you run a MACCS calculation, right now the only probabilistic aspect of it is the weather so that you have 8,760 possible hours in a year that that the accident could actually begin, and so that is sampled, and you may take several hundred of the 8,760 values, and so you get an answer that way. Each one of those weather scenarios represents others, and so each one has a weight. So if I choose this one, it has a weight. If I choose another one, it has another weight.	Answered
DR. KRESS July 2007	Does [the model for release of fission products from the fuel] include a consideration of burn-off or is it just sort of an average? Because some of the MERCORS tests went to high burn.	MR. SCHAPEROW: Yes. I think it's meant to cover that, the higher burn-offs; but I'm not sure. I can get back to you on it.	Deferred
DR. KRESS July 2007	Does that molten cool modeling include fission product release from the molten cool?	MR. SCHAPEROW: I believe the fission products, the volatiles devices will be released before it gets to that stage. I don't know.	Unconfirmed
DR. KRESS July 2007	It was my impression, though, that the experimental data indicated – I can't remember the name of the experiment -- but the experiment indicated that, by the very fact you leave it in there longer, you're actually releasing stuff during the pool process, I would expect.	MR. SCHAPEROW: Lower volatiles, you would. I think the volatiles would pretty much be released by the time he got to a pool state. The modeling should reflect that.	Answered
CHAIRMAN SHACK July 2007	For example, I mean, you would then get credit for depressurization from failure of the hot leg from those analyses? Is that the sort of thing that happens with that kind of model?	MR. SCHAPEROW: That's right. Through the recirculation of steam through the system, we can either get a relief valve sticking open, we can get the creep rupture of the hot leg and the hot leg nozzle. We could get failure of the tube, assuming again it stays at high pressure, which I'll talk about a little alter.	Answered

DR. CORRADINI July 2007	I see. And these techniques [release simulation of effluents] are similar to what EPA is doing [for chemical plants]?	MS. MITCHELL: Yes and no. I think that EPA is looking at something that is going on on a constant kind of basis. I think that they tend to consider changes in the chemical. I release a certain chemical, and then, if the sun is shining, it may change to another chemical, and so they may model a lot of chemical changes in the atmosphere which we don't model at all.	Answered
DR. KRESS July 2007	There's a difference in my mind between a code like MACCS2, to predict the sort of risk profile, as opposed to what you'd use in an actual accident. You want to track a plume and have some sort of emergency plan that relates to what was ongoing at the time. So you might use a different kind of -- for that.	MS. MITCHELL: For emergency decision, the NRC would use a code called RASCAL -- which calculates the EPA guideline, which is a four day groundshine, in order to avoid a dose that you would get with a four day groundshine, you would recommend an emergency response. So that code is a different code. If you really had an accident and you wanted to evaluate after the fact, what is the consequence from that particular accident, you have other considerations. You will have data, you will actually have measurements off site of deposition of radionuclides and you would have to have a process that would ingest that data.	Suggestion
CHAIRMAN SHACK July 2007	You have MACCS models like this for different sites as a standard package?	MS. MITCHELL: It would certainly be site-specific, and for the sites that we evaluate, we will have such a thing. But it is definitely site-specific. The way the roads are is massively site-specific.	Answered
CHAIRMAN SHACK July 2007	Okay, but then you don't have -- that's something that you have to develop.	MS. MITCHELL: For all the sites that we do, it will be developed.	Answered
DR. APOSTOLAKIS July 2007	I see, because the disagreement was on how to process the expert opinions [on six parameters for off-site importance of consequences -- atmospheric science, radioecology, metabolism, dosimetry, radiobiology, and economics].	MS. MITCHELL: Oh, we processed them, assuming that each one is equally likely.	Answered
DR. KRESS July 2007	What economic parameters are non-site specific? Things like the cost of a death or cost of an injury, or something like that?	MS. MITCHELL: We probably will not be using most of them [as site-specific]. This is exactly what the study was.	Answered

DR. CORRADINI July 2007	So most of these [off-site parameters] aren't used [to calculate consequence]?	MS. MITCHELL: No; no. The atmospheric science we will be using [as site specific] in addition to --	Answered
CHAIRMAN RYAN Nov. 2007	Could you mention just a couple of what those [MACCS2] improvements were?	MR. PRATO: Annual resolution, we went from sixteen to sixty four. -- MR. SULLIVAN: Well, Jocelyn has a list of them behind you there, but the long and the short of it is, we increased the number of sectors that we calculate in to try to model wind meander a little bit better. We used the latest dose conversion factors from ICRP, I guess. We improved vastly how we can model emergency response. We can now have multiple cohorts, and we can change their speed and time and space. So this was a great opportunity for me to more 13 realistically model offsite emergency response, ie, how people are notified, how they're evacuated, what speeds they move in, and what directions they move in. So MACCS will -- there's a lot of things MACCS won't do. But what it will do is move the population at risk, and estimate consequences to that population.	Answered
DR. WEINER Nov. 2007	Is your modeling of the accident conditional probabilities and severities and so on, is that still the same as it has been in MACCS2? Did you make any improvements in -- Maybe if we could -- if we could know -- you didn't make any changes in the basic way that MACCS models the release.	MS. MITCHELL: We did. In that we have sixty four compass directions, as he mentioned. We can have shorter release of segments. -- So instead of having a relatively short one and then a very long tail where you accumulate hours and hours of release, we have the ability to break it up. The other things I wanted to mention, we have put in a KI model. That's exercise both for Pennsylvania and for Virginia. And we put in the ability to model parameter uncertainties, which we will exercise in the future in the SOARCA project. -- And the alternative models for latent cancer dose response, you'll hear more about later.	Answered

Issue:

Distance Threshold

Members	Comments/Questions	Remarks	Action/Resolution

DR. KRESS Sept. 2006	When you do the consequence analysis, let's talk about latent effects. Are you going to truncate somewhere like 50 miles or 100 miles or 150 miles and are you going to use the linear no-threshold? (pg. 221)	Mr. Schaperow: Yes, our initial thinking was to present both results with a linear no-threshold going out to great distances and also to present results with a series of different threshold doses up to 5 rem per year. Now we had an expert review meeting two weeks ago out in Albuquerque to go over the modeling and the MACCS code and some of the main assumptions we're going to use in it and this issue of course came up and we had different views from different people on the panel as to what might be an appropriate distance for truncating. So I guess it's fair to say you're right. That's a tough issue.	Answered
DR. CORRADINI Dec. 2006	Even though the probability of containment failure is one, the probability is still a small percentage. But that hasn't answered the second part of your question, which is even though the probability is less than something or other, it still may have a very large consequence -- Okay? So there's a tail. There's a tail in this, whatever the --	MR. PRATO: And again, we're using the guidance of the Commission to initially start with one -- to the minus six, and this is more conservative because it is CDF, not release frequency.	Answered
DR. KRESS Dec. 2006	Question. When you make the MACCS calculations for the cancers, you stop at some distance?	MR. PRATO: When you use LNT, it goes all the way out to 1,000 months. Okay. Go ahead. MR. SULLIVAN: Randy Sullivan. Distance is an input parameter. It's a decision we have to make, what distance to choose.	Answered
DR. KRESS Dec. 2006	Isn't that [distance threshold] equivalent to using a [dose] threshold?	MR. SULLIVAN: It is, but really we want to address the threshold issue as the threshold issue and the distance issue as the distance issue.	Answered
DR. KRESS Dec. 2006	So you can make the [dose] threshold determine your distance [threshold]. Is that the way you plan on doing it?	MR. HUNTER: But they don't have to be internally consistent though. -- MR. SULLIVAN: There's several reasons to choose a distance, the accuracy of models, what you're attempting to do, et cetera, et cetera. One byproduct of choosing a distance is that you reduce the number of tiny doses that are given to a lot of people, but really we're attempting to address the threshold issue as the threshold issue and the distance issue as the distance issue rather than use one as a surrogate for the other. I don't know that we're prepared to go all the way into that, but we can discuss it as much as --	Answered

DR. CORRADINI Dec. 2006	So if I could just get to say it differently. So these [distance and dose thresholds] will be sensitivities. The distance will be a sensitivity and the threshold will be a sensitivity on certain select cases.	MR. SULLIVAN: That's not quite our intent. We will choose a distance. It will be based on judgment and arguments, and we haven't done that yet, but we're on it, and we're --	Answered
CHAIRMAN WALLIS Dec. 2006	What sort of distances are you likely to pick?	MR. SULLIVAN: Fifty-two, fifty or 1,000 [miles].	Answered
DR. CORRADINI Dec. 2006	So if I can go back to distance, since we're doing things that are useful, I'm very curious. So have you talked out what are the benefits from a small distance, middle distance, and clearly a large distance? Because it seems to me if you're going to do this sensitivity -- that would be a sensitivity. I would think you would be open for criticism if you did not do.	MR. SULLIVAN: I think that's exactly right. You know, there are staff members who believe 1,000 is correct. There are those who believe 50 are correct. We're going to --	Answered
CHAIRMAN WALLIS Dec. 2006	But you can't just pick numbers of miles. I mean, if you're still killing all of the people at 1,000 miles, you should go to 2,000 miles. You go on until you stop killing people.		Suggestion
DR. CORRADINI, DR. BANERJEE Dec. 2006	No, and that's what I -- you misunderstand my point. My point is what Sanjoy is getting at or what Graham is getting at is there are cruder calculational methods that would give you some insight as to whether 50, 250 or 1,000 [miles] is reasonable. -- If you take a very simple decay law or whatever, you know, you can do much of this by hand.		Suggestion

Issue:

Dose Estimate

Members	Comments/Questions	Remarks	Action/Resolution

DR. APOSTOLAKIS Dec. 2006	Is there any evidence that would say that, say, five rem is a likely threshold? I mean, you're treating it completely as a sensitivity parameter.	MR. SULLIVAN: It's almost a matter of conviction. The major international groups have decided that there is not enough evidence to do away with linear, no threshold. However, there are many people and societies, the Health Physics Society, in America, the French that feel that some threshold is appropriate. -- But the evidence for regulatory purposes, linear no threshold is used. You know, is this a regulatory purposes document? You know, we're going to have to struggle with what to use, and we've come up with some preliminary ideas yesterday.	Answered
CHAIRMAN WALLIS Dec. 2006	But then what do you tell the public [about thresholds]? Do you say it's more likely to --	MR. SULLIVAN: What we're going to tell the public is the NRC's judgment of what the likely consequences are from these kinds of accidents. That's what the document is going to do. Now, we're going to have to back that up.	Answered
CHAIRMAN WALLIS Dec. 2006	I'll bet you can find someone who says you should pick zero [threshold].	MR. SULLIVAN: You can find plenty of people who say you should pick zero, but usually they're from ICRP or NCRP as opposed to somebody who actually does this for a living, but nevertheless --	Answered
DR. KRESS July 2007	Are you still using the linear no-threshold?	MS. MITCHELL: We'll discuss that this afternoon.	Deferred
DR. ARMIJO July 2007	These 50 dose commitment files, are these done for different cohorts or are they done -- for the population at large?	MS. MITCHELL: This is Sieverts per Becherel, for a particular organ, or a particular radionuclide.	Answered
DR. CORRADINI July 2007	So one of these [dose calculations] is not a whole body calculation.	MS. MITCHELL: It's an organ [dose calculation]. By organ, by adionuclide, in this case by year, so if you ingest it, it will express itself by this many Sieverts per Becherel in year 27.	Answered
CHAIRMAN RYAN Nov. 2007	The committee is on record to tell you that there's not very many good uses of collective dose.		Comment

CHAIRMAN RYAN Nov. 2007	So the result in the multiple threshold cases, you'll get number of doses and fatal cancers with a threshold of one, two, three, four, five, or whatever numbers you pick between zero and five?	MR. SULLIVAN: Exactly. In the multiple threshold case, I guess MACCS would run its thousand weather trials with threshold A. It would do the same thing with threshold B and threshold C.	Answered
CHAIRMAN RYAN Nov. 2007	So [the dose received by the populous are catagorized into] bin. But I mean, roughly, in each bin, if you go up from one to two, two to three, three to four, are you adding the same number each time you capture the additional rem?	MS. MITCHELL: No, no. It's a threshold. -- And depending if the doses are falling off with one over R squared as a function of distance, then you're not going to, as you add, you're not going to just double it if --	Answered

Issue:

Evacuation

Members	Comments/Questions	Remarks	Action/Resolution
DR. BANERJEE Dec. 2006	To get the consequences, you're multiplying things by probabilities, but when you're trying to model, say, now more realistically evacuation routes and stuff like that, that you can actually compare to some real data because that's deterministic. The probabilities are coming through the wind direction.	MR. SULLIVAN: Actually the ETEs, especially the modern ETEs for large population sites, are really quite sophisticated, and since I'm going to be working out of them, you know, when I have these, you know, that's what you would compare to the historical experience. What I'm doing here is an agglomeration of time of year, time of day, and wind direction and coming up with a--	Answered
CHAIRMAN WALLIS Dec. 2006	Then the close up ten miles or something, this is -- But if you go beyond that, then it's not clear there are any evacuation routes.	MR. SULLIVAN: Yeah, that's exactly right. There's no ETE for the distance beyond that. We're going to have to model it as best we can should it be necessary.	Answered
DR. ARMIJO Dec. 2006	Will you make assumptions on people who just can't leave, hospital people --	MR. SULLIVAN: We get that out of the ETE. I'm sorry. Yes. The ETE treats that as special needs populations, and once again, in the case of Duane Arnold, just because we used it as an example to learn this stuff better, they have a 22 hour estimate for special needs.	Answered

CHAIRMAN WALLIS Dec. 2006	But the effective weather on evacuation ability is not taken into account?	MS. MITCHELL: You could. You could, indeed, take into account an uncertainty in the delay time before somebody starts to move and/or the speed with which they move when they start by putting in a range of values and degrees of belief in those values, and then running MACCS in a sampling mode, which would require then running multiple MACCS runs.	Answered
DR. CORRADINI Dec. 2006	Now, for this one, would you do the estimate for a bad weather? Would you do the average result or you'd do a bad weather case?	MS. MITCHELL: We normally use for a single MACCS run, we normally sample the weather with several hundred of the 8,760 possibilities. So when you get an answer, it's an answer over the weather, weighted average over the weather.	Answered
CHAIRMAN WALLIS Dec. 2006	But see, they are evacuated from, let's say, ten miles. How far do they have to go before they stop their car?	MR. SULLIVAN: They are told to get out of the EPZ, either go to a congregate care center. The data shows that ten, 12 percent go to a congregate care center. We're rigged for 20 --	Answered
CHAIRMAN WALLIS Dec. 2006	You were talking earlier about modeling hazards to health out to 1,000 miles. Does that mean that people should try to go 1,000 miles?	MR. SULLIVAN: Certainly not.	Answered
DR. CORRADINI Dec. 2006	How far away are the care centers typically?	MEMBER SIEBER: Twenty-five miles. -- MR. SULLIVAN: Twenty-ish, at least 15.	Answered
DR. CORRADINI Dec. 2006	Yeah, it was before you were there. I apologize. but the doctoral student at the time indicated that sheltering was by far the most reasonable thing to do beyond a very few miles out. So I would be very curious to see if you change your evacuation strategy within this context what interesting results you'd get relative to that. I think there's a lot of interesting stuff that can come out.		Suggestion
DR. APOSTOLAKIS July 2007	Is there any evidence of that?	MR. JONES: Yes, there is.	Answered
DR. APOSTOLAKIS July 2007	So in Katrina, the officials implemented emergency plans?	MR. JONES: Yes, and their plans were failed. They had very poor plans. In New Orleans, for instance, they had no bussing plan to bus people that did not have vehicles out of the city. People	Answered

DR. APOSTOLAKIS July 2007	I don't understand this. I mean, why can't I use the same argument [that evacuation didn't help people in the wake of Katrina] and say during the level 1 PRA, our operators are well- trained, they have emergency procedures, they [the public] will do the right thing? We were saying that before TMI, until we realized that we have to include the probability of error. So why can't I say that in level 1 PRA and I can say it here? I mean, it seems that the assumptions are to optimistic.	MR. JONES: Well, we're not stating that a 100 percent of the public -- and I'm sure we'll discuss this this afternoon -- will evacuate. But they generally follow the rules -- the orders of public officials.	Deferred
DR. MAYNARD July 2007	I think they're saying the same thing in emergency evacuation. That in general, the public's going to obey the officials but not in all cases.	MR. JONES: Not in all cases, and we will account for that and you'll see that this afternoon.	Deferred
DR. CORRADINI July 2007	It's a matter of course. But I guess I want to get back to the scale. You answered my question and I guess I've got to read the report now, because it kind a surprised me. So you're saying the percentage of those that say, ah, the hell with it, I'll do what I want – that percentage is not a function of scale?	MR. JONES: With the exception of hurricanes.	Answered
DR. CORRADINI July 2007	Well, now I'll get to my second -- my second attribute is manmade events versus natural events, and I'm very curious about how behavior of obeying one, two and three are, whether I have manmade versus natural.	MR. JONES: When you look at manmade -- and you can also include wildfires as well as floods -- people will typically follow -- you'll still have noncompliance. Even in Apex, North Carolina, last year, a huge chemical fire, a huge plume, evacuated 17,000 people. There were still some people that said I'm not leaving; not a large percentage but some. So real hazard, people staying behind. A small percentage. And those will be accounted for. Hurricanes, you have the mindset of -- until Katrina -- you had the mindset of -- and this is why many elderly people died in Mississippi and in Louisiana. I lived through Camille, I lived through Betsy. Can't be that bad. Well, in reality, it wasn't. It was the levees breaching and the flooding, and post – you know -- not being able to get them out, that caused many of the casualties. But that's one mindset associated with hurricanes that you do not typically get with other natural disasters or manmade disasters.	Answered
DR. KRESS July 2007	Do any of the sites considering sheltering in place as part of their EP?	MR. JONES: Most all of the sites consider it and have it in EP as an option.	Answered

DR. KRESS July 2007	That's where I would think the second bullet might break down because, you know, you tell me there's going to be a nuclear power accident, and I want you to stay home, and say I'm going to get the hell outta there. So is a lotta people. So is that part of the modeling?	MR. JONES: Well, you'll hear a lot more on that on Thursday. That really was looked at in the protective action recommendations project. But it's definitely an element. I doubt that it's something we'll be using with this project because of the source term.	Deferred
DR. CORRADINI July 2007	But just to repeat. So you said manmade and natural are about the same if you take hurricanes out of the mix -- in terms of following directions? -- And the amounts are small, and the noncompliance is figured into the calculation?	MR. JONES: Yes.	Answered
DR. BONACA July 2007	You said you will talk about it more this afternoon and Thursday. Forgetting the first study, I mean you still believe, or you argue that people will, in general, follow direction, even though sheltering, locally?	MR. JONES: We do argue that. I mean, there will always be a small percentage of the public that is just not going to do what you tell them to do. Some of the people that are not complying are people that are evacuating when they're told to shelter. Other people are people that staying behind when they're told to evacuate. There's always a small percentage, so --	Answered
DR. KRESS July 2007	You have to specify the percentage of the population of each of these cohorts [groups of people which act in a distinct manner] -- that you input?	MR. JONES: Correct.	Answered
DR. APOSTOLAKIS July 2007	What's the time scale here? How many hours are you looking at?	MR. JONES: That will be dependent on the source term and we'll be getting into that this afternoon.	Deferred
DR. KRESS July 2007	In the event of an external event, earthquake, does that change your modeling assumptions?	MR. JONES: No, it doesn't change our assumptions, and I don't know if we want to discuss that this morning or this afternoon.	Deferred
DR. CORRADINI July 2007	Let me ask a different questions along that line. So if I had a chemical release at my local dioxin plant, or if I had any sort of chemical release, so they have the same sort of predictive capabilities? Or is this far and away different than any other sort of industry in sort of off-site predictive capabilities? In other words, if I took away the source term part and I said his question about meteorological approaches to an effluent that could harm me, is this typical of what we'd see or is this very atypical to the level of precision?	MS. MITCHELL: I don't know what chemical factories do. A lot of times they haven't had emergency plans. If you look at Waterford, for instance, was built where it's built because there's a whole bunch of chemical factories, and they had no emergency plans, no emergency preparedness at all, and when they had a release, they actually blew the dust off Waterford's emergency plans and executed them. So I'm not sure that chemical factories do this kind of thing.	Answered

DR. KRESS July 2007	So you would have time for the evacuation of the folks in a grid location, and roads, and the population in that grid? Or is there some --	MS. MITCHELL: The sites, all sites have an evacuation time estimate, which they have prepared for their own site, based on road conditions, numbers of people, anything else, the time of the day, Sundays may be different from weekdays, precipitation may make a different time estimate. So all sites have those, and the folks who are putting these numbers in are actually using those estimates.	Answered
CHAIRMAN RYAN Nov. 2007	Can you also address sheltering in place, doctor [in addition to evacuating]?	MR. SULLIVAN: Yes. And we do that for some of the cohorts. For instance, schools. The two sites we analyzed, this is not an important factor. But some sites that we studied and then didn't analyze, take two runs of buses to move their school population. We're analyzing the case of school days, because we think it's a more important case. I suppose that's not the majority of the time, but we thought that was the right analysis to do. In the case where there's two trips of school buses, well the children are sheltered in a substantial structure while that's going on. And we would model that.	Answered

Issue:

External Events

Members	Comments/Questions	Remarks	Action/Resolution
CHAIRMAN WALLIS Dec. 2006	Does FAR fit into this at all?	MR. PRATO: It will. I'll show you in just a moment.	Deferred/Answered
DR. APOSTOLAKIS Dec. 2006	Considerations, but why not external events CDF? There are some plants --	MR. HUNTER: The reason why we're being a little bit vague about that is because right now we won't have core damage frequencies assigned for all external events, including seismic. So we're going to have to do that in a slightly different manner than our internal event core damage frequency estimates.	Answered
DR. APOSTOLAKIS Dec. 2006	But there are estimates for some plants of the seismic and fire contribution.	MR. HUNTER: Correct. There's essentially 33 sites have submitted size of PRAs.	Answered

VICE CHAIR SHACK Dec. 2006	I mean, when you have the seismic PRA in the file you'll use it. For the others you'll have to take an estimate of whether a seismic CDF from this plant is okay to use for the plant that I don't have a seismic on.	MR. HUNTER: Correct. What we're wrestling with is can we apply essentially plant class or industry-wide data from the limited sources of quantified data that we have, especially seismic.	Answered
CHAIRMAN WALLIS Dec. 2006	Fires are not internal events; is that right?	MR. HUNTER: No, fires are considered external events.	Answered
CHAIRMAN WALLIS Dec. 2006	Ah, thank you very much. But are they just considered? You don't look at the FAR CDF?	MEMBER APOSTOLAKIS: Well, they said that if they have it they will.	Answered
DR. BANERJEE Dec. 2006	I know, but I'm just trying to figure out why you have a list of options that doesn't put down fire when fire is often bigger than internal events. That's what puzzled me. Okay.	MR. PRATO: I'm going to refer you to these two slides back in your package. I'm going to try to put them up on the screen here.	Deferred/Answered

Issue:

Fire

Members	Comments/Questions	Remarks	Action/Resolution
CHAIRMAN WALLIS Sept. 2006	Now does fire come into this? (pg. 252) -- We know that fire apparently with the assumptions that go into it can be as significant as the internal event. (pg. 252)	Mr. Hunter: Yes, and that's what we're trying to deal with is we have some plants with internal events overall core damage frequency in the EMIS6 but fire is in the EMIS5 range. So we're just trying to determine whether the EMIS5 number is really accurate because they weren't originally designed to do this. It was a screening methodology that they did that and you're talking about old data and there's been plant improvement since then. So the numbers are probably not accurate as of now.	Answered

Issue:

Meetings

Members	Comments/Questions	Remarks	Action/Resolution

DR. APOSTOLAKIS Dec. 2006	Is there going to be a time when we will actually see some of these results at the subcommittee level?	MR. TINKLER: Absolutely.	Answered

Issue:

Mitigation measure

Members	Comments/Questions	Remarks	Action/Resolution
VICE CHAIR SHACK Dec. 2006	How did the SAMGs work into this now? You're getting to a core damage state and then MELCOR takes over.	MR. TINKLER: Well, this tells us our going in plant damage state. That plant damage state will be modified by SAMGs or EDMGs. Operators may bring in other systems. Operators may use cross-connects.	Answered
VICE CHAIR SHACK Dec. 2006	So you'll end up doing multiple calculations for these [SAMGs and EDMGs] then.	MR. TINKLER: There could very well be iterations on some of these [calculations].	Answered
DR. CORRADINI July 2007	But active or available based on the plant state from the 10 to the minus whatever. From the state of the plant at that time. In other words, they were operational. Now what can they do to mitigate the accident?	MR. SHERRY: Well, there are additional mitigative systems. -- You know, fire water pumps, things like that, which may not have been considered in the PRA, but which are available.	Answered
DR. CORRADINI July 2007	So I've got it approximately right for an internal event. So let's take an external event. Let's take an earthquake that's beyond the design, base earthquake for building the plant but is possible around in that area, and is not really a superturbulent earthquake, I don't decimate the whole landscape, but just good enough to take out certain safety systems, and that comes in with a frequency in that range again. Same thing, even though it's external, but same procedure. That is, look at the landscape, what the plant damage state is, find out what things are working, what things aren't working, and then proceed just as you said.	MR. SHERRY: Right, but in this case, with respect to mitigative measure, we would look at their potential to use them in the context of having a large or medium earthquake.	Answered

DR. APOSTOLAKIS July 2007	Now the human actions, the CDF sequences already contain recovery actions, so -- there is some probability that they will not be effective. And after the CDF, you said that there are no more possibilities for human error; is that correct?	MR. SHERRY: What I said was when we were considering systems that were not considered in a determination of core damage -- okay – for example, if containment spray was not important for determining whether or not core damage has occurred, it was not modeled in the level 1, not considered.	Answered
DR. CORRADINI July 2007	But you don't account for the fact the operator may forget to turn it on or send it the wrong place [after core damage] or --	MR. SHERRY: That's right.	Answered
DR. APOSTOLAKIS July 2007	Additional human errors after [core damage] are not considered.	MR. SHERRY: Additional human errors or random failures in performance; no. Frontline system.	Answered
DR. APOSTOLAKIS July 2007	Ah. And why is that [you assume the mitigation measure, if available, is perfect], Rick?	MR. SHERRY: The main answer to that is that we believe that the conditional probability that you would fail the system from random failures or human errors, is sufficiently low, that multiply them by the, essentially the frequency coming in, that to have that sequence with loss of the containment system due to random failures, or human errors, would push the frequency well below our screening threshold. What we're saying is that it's much more likely that the sequence, that core damage sequence would have that system available.	Answered
DR. APOSTOLAKIS July 2007	But I mean, I'm still puzzled why you have to make that assumption [of perfect mitigation measures]. I mean, if you look at the level, they didn't do that.	MR. SHIU: Yes. I think we would have reconsidered this assumption a little more if the sequences we're looking at -- for the sequences we're looking at, this matters. But as we'll discuss this afternoon, for the sequences that we'll be looking at, these assumptions does not play that much of a role in it. It's an initial assumption we made, that we would have revisited, if it had made a difference.	Answered
DR. APOSTOLAKIS July 2007	You say protective. No; [the mitigation measures are considered] perfect. So it's underestimation.	MR. SHERRY: Correct.	Answered

DR. CORRADINI July 2007	Is this [considering the mitigation measures as perfect] -- are we talking about -- a really thin slice of the whole pie here? Or is this potentially a large slice?	MR. SHERRY: It's a thin slice, but to answer the question why don't we analyze this out to essentially release, we, NRC does not -- do not have models that consider containment systems right now, nor containment phenomenon.	Answered

Issue:

Objective

Members	Comments/Questions	Remarks	Action/Resolution
DR. KRESS Dec. 2006	That would be responsive to the SRM.	MR. PRATO: That's correct.	Answered
DR. APOSTOLAKIS Dec. 2006	What is the ultimate goal of this? You calculate the consequences and then?	MR. PRATO: The ultimate goal is to find a source term for each plant, for each applicable scenario, and run that source term to max for each plant to insure that -- to get a consequence.	Answered
DR. APOSTOLAKIS Dec. 2006	My question was not answered. So, okay, you calculate the consequences. Now what? Is somebody going to make a decision of some sort or are we just calculating this?	MR. PRATO: It is [replicating the siting study], but we're considering other things. -- First of all, I believe the siting study only used LNT. We're going to include other thresholds. -- And we're going to get to that in just a minute. And then we're considering other ways of presenting the information. We don't want a range of consequences. We would like to try to combine that and come up with a single consequence, and we have been directed by the steering committee to try and figure out a way to do that, and we're not ready to present anything on that approach.	Answered

DR. APOSTOLAKIS Dec. 2006	No, but my question is -- maybe you mentioned it at the beginning. I wasn't here. After the study is completed -- who is going to us -- it for what purpose?	MR. TINKLER: Well, other than, you know, the important aspect of providing an updated picture of the consequences, it is believed that this kind of work could provide new insights into those aspects of behavior that dominate consequences by inference, by inference risk, although this is not strictly speaking a risk study. -- So to the extent we want to improve our understanding of what now dominates the consequences, it provides the technical basis for prioritization of future activities to examine where you might want to achieve improvements. -- Improvements in both performance and understanding.	Answered
DR. APOSTOLAKIS Dec. 2006	But there is no specific goal at this time. It's just do it, gain the inside, see what you have.	MR. TINKLER: Well, we think -- we think we're providing a realistic picture of the consequences from the important scenarios is an important outcome in itself. But we would also see this as an opportunity to improve our risk communication with the public, with all our stakeholders, and like I said, to the extent it provides a vehicle for examining where additional improvements in analysis could take place, while this is state of the art, it will still probably identify areas where some improvement may be warranted to further understand.	Answered

Issue:

Plant Selection/Grouping

Members	Comments/Questions	Remarks	Action/Resolution
DR. CORRADINI Dec. 2006	So there's ten plants? There's eight groupings, but one Westinghouse dry ambient, one dry atmospheric, and one dry atmospheric four-loop and three-loop. Do I have this right?	PARTICIPANT: That's all the same group. It's just different containment designs.	Answered
DR. CORRADINI Dec. 2006	Okay. All right. So I have another question, and I apologize for this since we're still on plant grouping. Is it thermal power that makes me worry about differentiating between a Westinghouse two and three-loop and a four-loop? I don't understand that differentiation. I mean, there's --	MR. TINKLER: Charles Tinkler from the Office of Research. Oftentimes the three-loop subatmospheric plants have been grouped separately in past PRA and various studies of this nature. So we made the distinction for the three-loop, but rather than create yet another group for two-loop plants, we elected to combine those with the three look because of the greater proximity to the same thermal rating than from the four-loop.	Answered

DR. CORRADINI Dec. 2006	So it is a thermal power differentiation between Category 7 and 8.	MR. TINKLER: It is a thermal power consideration with the two loops to group them with the three loops as opposed to combining them with the four loops.	Answered
DR. CORRADINI July 2007	Okay. And similarities between sequences -- I guess I'd ask it differently. If I had path one -- I don't know about SPAR or any of this, but just if I had various paths, and then at the very plants I branch to a different path, are they combined so that you're not, by subdividing, driving down the individual sequence number?	MR. SHERRY: Yes; that's the main purpose of the grouping.	Answered
DR. HINZE Nov. 2007	And I assume that those are eight classes of reactors. And my question is, have you considered population demographics, weather conditions, meteorological conditions, etcetera, in selecting these eight so that you have covered really the breadth of conditions.	MR. PRATO: Meteorological distribution, I don't think we've really considered that. -- MR. SULLIVAN: We have not looked at the weather question, as you proposed, but if the Commission directs us to expand this study out to all sites, we would use site specific weather at those specific sites. So we would encompass that if we get that far. I mean, we may -- it's up to the Commission.	Answered

Issue:

Presentation

Members	Comments/Questions	Remarks	Action/Resolution
CHAIRMAN WALLIS Sept. 2006	I think it would help -- If you make this presentation again, it would help to give us a sketch of the kind of outputs you expect to get out of this thing and how you would present them. It would be very helpful. (pg. 232)		Suggestion
DR. APOSTOLAKIS Sept. 2006	I would rather have a detailed subcommittee meeting where you guys will tell what you plan to do and you hear from us what we think you should be doing and come up to some sort of understanding. (pg. 234)	Mr. Eltawila: That's very high – This meeting is intended to be at a very high level just to introduce the subject. We are planning to have frequent and more-than-you-need meetings to discuss all the aspects of the program at a subcommittee meeting. We want everybody to go out with us that we are all in it together.	Suggestion
DR. APOSTOLAKIS Dec. 2006	So why isn't there a third bullet, internal events and external events CDF [in the presentation]?	MR. PRATO: We do have one. Internal events CDF with uncertainty and external event considerations.	Answered

CHAIRMAN WALLIS Dec. 2006	Does that [black coloring] mean that they're not important or it just means you can't do them?	MR. HUNTER: [Black means] not applicable.	Answered

Issue:

Previous Studies

Members	Comments/Questions	Remarks	Action/Resolution
DR. BONACA Dec. 2006	I really would like to know about the issue of 1982 study [and the comparison to this analysis], you know, the comment I made. I think you were responding to that. I would like to know what you think about that.	MR. TINKLER: Well, we do expect that as part of this study that we will, as part of the report, explicitly discuss the connection between this study and the 1982 study, and without prejudging I don't reasonably think we'll see anything that resembles the SST-1 release from the 1982 study. So we will explicitly describe for the reader why that scenario, why that release is no longer feasible or applicable to nuclear power plant sites.	Answered
DR. APOSTOLAKIS July 2007	What's the date of [the NUREG/CR-2239] report?	MR. PRATO: 1982, George. That's the Sandia 1982 siting study.	Answered

Dr. APOSTOLAKIS Dec. 2007	Now NUREG-1150 and some other studies that are done by the industry, they did go all the way to Level 3 Have you compared what you have found with the findings of those studies?	MR. YEROKUN: Let me try to -- a direct response to the question of do you plan to compare your results with NUREG-1150, I mean, yes, whatever comes out from SOARCA, we definitely will see what insights we can derive compared to all the previous studies. Obviously, the Siting Studies, but also NUREG-1150 to see what knowledge we gain from the approach we've used for SOARCA, and what that really means for the risk approach that was used for NUREG-1150. -- MR. ELTAWILA: I'm going to jump here and say I don't know what benefit we will gain out of comparing the SOARCA study with NUREG-1150 study. I think we believe that these previous studies are very conservatively done, and did not represent the plants as operated, and design, and improvement that have been to the plants, so we will not be comparing apples with apples. I think that -- I appreciate your question, but I will prefer to do a Level 3 for a plant and compare it to a SOARCA study, but to try to compare the SOARCA with the NUREG-1150, it's not going to be a viable comparison.	Answered

Issue:

Procedure

Members	Comments/Questions	Remarks	Action/Resolution
DR. KRESS Sept. 2006	...PRA analysis, Level 3, we add up the endpoints. Which includes basically all of the sequences that we stick in there that have 21 endpoints that are important. Now what you're saying is that you're going to somehow curtail those endpoints and pick out only certain ones and not add in the others? (pg. 212)	Ms. Laur – We are going to address that in a slide and if we could hold that question until then.	(Probably answered)
CHAIRMAN WALLIS Sept. 2006	My question is risk informed usually applies to regulation. You make risk informed regulation And the evaluation of an action of progression is a technical analysis. It has nothing to do with risk informed or not. And as my colleague points out, you only bring in risk when you perhaps exclude certain things that you decide not to look at (pg. 213)	Ms. Laur: We will step through the process we're using and discuss it in greater detail for you.	Deferred/Answered

CHAIRMAN WALLIS Sept. 2006	Are you going to provide a tool for doing it [plant-specific emergency preparedness plans] or are you going to do it for each plant? (pg. 217)	Ms. Laur: What we plan to do is that the Melcor part of the analysis which will give us the actual source terms we don't actually have a plant deck for every plant. So we will be using the plant decks we have and making some changes to them as necessary, also doing some sensitivity analysis to see which of the parameters are more important to more accurately model. When we get to the consequence analysis which is the MACCS analysis, that will be done on a plant specific basis for every plant.	Answered
CHAIRMAN WALLIS Sept. 2006	Are you going to publish a document which gives the results for every plant? (pg. 218)	Ms. Laur: We will be publishing a document to cover the entire analysis. There could be the potential that some insights gained through this would not be something that would be put out publicly	Answered
DR. CORRADINI Sept. 2006	So it's essentially an update to the Sandia Study of `82? (pg. 219)	Mr. Schaperow - Actually the Sandia Siting Study had only one source term, well it had five source terms, but one was really the severe accident source term with early containment failure.	Answered
DR. APOSTOLAKIS Sept. 2006	So is it possible then at some point in the future your results will be part of the SPAR models if you are doing it on a site specific basis? (pg. 220)	Ms. Laur- We're actually using the SPAR models that we have in-house right now to help us determine which scenarios to select and as we move beyond looking at internal events to inform us in our scenario selection we will be trying to use the external event SPAR models that have been developed here to help inform us on that decision.	Answered
DR. APOSTOLAKIS Sept. 2006	Are you going to feed back into the SPAR model your Level 3 results? (pg. 220)	Mr. Eltawila: Professor Farouk Eltawila from the staff. We are developing a model from the SPAR right now, a simplified model that can be used the resident inspector. Where this type of analysis that Michele is talking about and using the Melcor code and things like that might be a very complicated analysis. We are going to decide on whether we are going to incorporate the insight that's coming from that study into the SPAR model. But right now, there is a plan to develop a Level 4 SPAR model.	Answered
DR. KRESS Sept. 2006	When you get around to doing the site specific evaluations, what are you going to about sites that have three plants on it, three different units? Or two? Multiple sites? Multiple units? (pg. 227)	Mr. Schaperow: We'll have to consider those separate consequence calculations.	Answered

CHAIRMAN WALLIS, DR. Sept. 2006	The whole point of the study is to look at the consequences to the public. (pg. 247) -- And this is conceptual, so you should really be doing it on LERF. (pg. 247)	Mr. Hunter: Right. Our original guidance was actually to look at all releases, to not base the actual frequency on LERF. Now we're trying to lower the thresholds of where we screen at.	Criticism
DR. APOSTOLAKIS Sept. 2006	So when you are discussing all this you are planning to do things here, do you have other groups within the agency participate? Like the HRA people, are they aware you are doing this? (pg. 253)	Mr. Hunter: Yes. The HRA, we have HR people with Sandia and inside the NRC are aiding us. So they're actually starting to get involved into our scenario section. We're not exactly right there yet, but we're almost there for our first group of plants. so they are heavily involved now and we're going to move forward working together to determine these type of things because it's going to affect both the Melcor calculations and the actual, because we're going to have to eventually calculate the release frequency of these scenarios because we only have the core damage frequency.	Answered
DR. APOSTOLAKIS Sept. 2006	...You are revisiting the PRA, Level 3 PRA, and you're saying in three years not only are we going to implement the new tools but we're going to apply it to every unit and I think that's just not realistic. (pg. 254)	Mr. Schaperow: The source term estimates are going to be made -- I guess first of all, from the Level 1 work we're going to end up with a couple of scenarios for each plant design which we've identified about seven or eight plant designs. For each of those plant designs, we're going to be doing a source term estimate for those designs.	Criticism
DR. APOSTOLAKIS Sept. 2006	Are you going to use 1150 at all? Why not? (pg. 255)	Mr. Hunter: What we plan to do as part of 1150 is we're actually going to look at the scenarios that 1150 analyzed and determine why aren't those scenarios above our threshold and we would either determine if we should be including them or we have a solid basis for not including them. For example, ATWS is not really showing up as a high dominant contributor in the SPAR models. So that would be one example of a scenario where we'd either determine that it wasn't -- the frequency of the ATWS event is a lot lower since NUREG 1150 or we would determine that maybe our calculations are off or something to go back or maybe our modeling of those type of events are wrong. And we're going to use NUREG 1150 as a guide for our scenarios, but it's also for the reporting to justify why we don't analyze certain scenarios.	Answered

DR. BONACA Sept. 2006	Now NUREG CR 2239, the Siting Study, used a different approach and goal just to certain scenarios. You know one of the clear objectives is the one of encouraging the use of this new information for the public rather than the Sandia Site Study. But if the results are comparable, how you may state your case, I mean, these are just individual scenarios you're addressing. You're saying they are dominant. (pg. 256)	Mr. Eltawila: I think that part of our job and we would like your help in that about how to communicate this information to the public. One of our jobs is to try to, as Chris indicated, look at NUREG 1150 and we are going to look at the Sandia Siting Study and we have excluded any scenario. We have to provide the basis why we exclude that scenario, scientific basis, improvement in plant performance, improvement in emergency management, improvement of the tools and data and so on. So we will have to provide this information and that will be part of our deliverable to the Commission.	Answered
DR. SIEBER Sept. 2006	Are you going to do anything with shutdown operations? (pg. 257)	Mr. Hunter: Currently, no. They are being created as we speak. We don't have a lot of information on it. Right now, we are just looking at at-power conditions.	Answered
MR. CANAVAN, EPRI Sept. 2006	...A lot of this information for example from the Level 1 current PRAs of the existing units have plant damage dates which are binned accident classes. So a lot of this screening work that you're talking already sort of exists, at least at the sites...But the other part, scenario grouping, so much of this is probably already available from a willing site if they are willing to donate it and the second part, so boxes on the left-hand side of your diagram are probably complete at many sites and then the next part was on the containment of failure modes and characteristic size and locations. A lot of sites, almost all, have a Level 2 or at least a LERF analysis which would indicate for those plant damage dates what failure modes and locations were analyzed. So that information is available as well again from a willing site. So maybe it can be done in three years if you [the staff] doesn't redo it independently. (pg. 267-268)	Ms. Laur: As I indicated in the beginning, we are very interested in engaging in work together and get the information that's necessary so that we can move this project successfully forward.	Suggestion
CHAIRMAN WALLIS Sept. 2006	This is one of the biggest public concerns you hear at public meetings is that the emergency response plan isn't very reflective of what will actually happen. I think that if you're going to respond to public concerns you may need to put some effort into making emergency response evaluation realistic. I don't know how you're going to do it but it is a public concern that we hear about. (pg. 272)	Ms. Laur: We recognize this is a very important part of this analysis and that's why we do have an expert both on our side of the house and on the Sandia side so that we try to accurately model evacuation.	Suggestion

DR. APOSTOLAKIS Sept. 2006	How will you be getting industry input throughout the meetings? (pg. 276)	Ms. Laur: The industry input will be through public meetings and workshops as well. So there's going to be a lot of interaction both internally and externally to get the information we need. -- Mr. Schaperow: We've already had a little bit of initial input as we've had some meetings to look at the code modeling. We've had both laboratory and industry experts there to go through the modeling.	Answered
DR. APOSTOLAKIS Sept. 2006	...As you progress and you derive results for individual units, are you going to go back to the licensee and see whether they agree or disagree or whatever? That's what the SPAR models did. They went back and they said "Okay, here is the model we have for your unit. What do you guys think?" And they pulled out their PRA and there was some give and take and there was some consensus at the end. (pg. 276) -- ...What I'm talking about is a much more serious interaction where you tell the guy "Look. This is what we're getting for your plant. What do you think?" And you give those people some time to review what you have done so that they will pass judgment. (pg. 277)	Ms. Laur: You know we haven't really thought through exactly what point in the project we're going to engage all the stakeholders. But we do plan through the process to engage all the stakeholders, not just industry, but any public that's interested in this project. -- I mean we envision that we will have that level of interaction. It's always better to include people up front.	Suggestion
DR. APOSTOLAKIS Dec. 2006	No, but this is just a frequency. I mean, so you have a sequence that ends of core damage or you take it all the way to the release?	MR. PRATO: We take it all the way through it.	Answered
DR. APOSTOLAKIS Dec. 2006	But you say you don't have a full Level 2 PRA.	MR. PRATO: We plug in -- we plug in the scenario into MELCOR, and we end up with a source term.	Answered
DR. CORRADINI Dec. 2006	I'm trying to get to the filtering, which is thou shalt not consider sequences below a certain frequency. By using the frequency measure, you're assuming all releases are essentially probability one; that something is going to be released that will be significant enough to compute. Do I have this right?	MR. TINKLER: That is correct.	Answered
CHAIRMAN WALLIS Dec. 2006	Well, that's what I'm trying to get at. We should be going beyond this screen. I'm trying to figure out what I'm being told by what's on this screen. Is the only thing you're saying that you're going to use CDF frequency as a cutoff?	MEMBER KRESS: Correct.	Answered

DR. APOSTOLAKIS Dec. 2006	The sequence that leads you to core damage, do you add the extra events then in the actual calculation to account for containment functions?	MR. HUNTER: Yes.	Answered
DR. KRESS Dec. 2006	I still have a question about this frequency selection on CDF. Suppose you run your Level I and find two sequences that have five times ten to the minus seven. Will you add those in as one of the --	MR. HUNTER: If they're similar. It depends. You know, looking at our Level 1, the SPAR models, you're going to have similar type sequences that give you essentially -- you have the same system unavailabilities and similar paths to core damage.	Answered
DR. KRESS Dec. 2006	So ten to the minus six is not a firm [threshold of CDF]--	MEMBER SIEBER: No.	Answered
DR. APOSTOLAKIS Dec. 2006	You said that you don't want to go into the accident progression event trees; is that correct?	MR. TINKLER: Well, I said for addressing accident progression uncertainty to determine the multiple end states that we weren't planning on using the accident progression event tree methodology, you know, the logic structure of an event tree. We have a code. We have a mechanistic code that we can use to examine those rather than arbitrarily assigning a split fraction and then arguing about split fractions and the effect of the split fraction. To a large extent, we think we can parameterize that uncertainty.	Answered
DR. APOSTOLAKIS Dec. 2006	Why do you say arbitrarily? I mean, why should it be arbitrary? Is that what 1150 did? It was arbitrary? You don't have NUREG 1150 [in your scenario selection]?	MR. HUNTER: We do, but since we're trying to look at all 103 sites, you're looking at a very limited scope with essentially four plant left.	Answered
DR. APOSTOLAKIS Dec. 2006	But are you implying here that margin analysis is useful to you?	MR. HUNTER: It's not going to be applying a screening threshold because there's no quantified data. The sole purpose of this slide was just to show you what we have currently in house.	Answered
DR. BANERJEE Dec. 2006	Let me ask you a question which some of us are puzzled by. Why did you pick these classes rather than doing at least initially a pilot project for a specific plant? Was there a reason for that, plants about which you have a lot of information?	MR. PRATO: And basically that's what we're going to be doing. We have a reference plant, and then we're going to have a group of -- right now we're thinking about the first initial group of three or four plants from each of the first two, the Westinghouse four-loop and the BWR --	Answered

DR. BANERJEE Dec. 2006	You are going to speak specific plants and do it [the analysis]?	MR. PRATO: Yes.	Answered
CHAIRMAN WALLIS Dec. 2006	Could I get this from some member of the public point of view? I mean, you want to consider anything that's important in evaluating the consequences, don't you? And all of these technologies of how you're going to choose this and the next thing, really the only thing that's important is that you have really picked out what matters. That's the only thing that's important to the public. You have analyzed what matters. Is that what you've done here?	MR. PRATO: With the limitations that we have.	Answered
CHAIRMAN WALLIS Dec. 2006	How much of the picture are you covering doing it this way? Are you omitting 50 percent of what matters? Are you omitting five percent of what might matter or what?	MR. HUNTER: This is the entire internal events modeling. So, I mean, this includes LOCAs, ATWS, station blackouts.	Answered
VICE CHAIR SHACK Dec. 2006	But you're still debating over whether to compute source terms for classes of plants and then do the MACCS calc. on an individual basis or to do -- source terms for each plant.	MR. PRATO: We got kind of limited for that. We're limited in the plants we can do because of the time it takes to run them. MR. HUNTER: It complicates things because as we showed, we have limited information on external events for every plant. So it does simplify it if we can look at it on a class-by-class basis for external events.	Answered
DR. APOSTOLAKIS Dec. 2006	But, for example, would you say that maybe the SAMGs need some changes or is that out of the question? Would the emergency planning need some?	MR. TINKLER: If practical and feasible changes were identified that could alter the path of some of these calculations, if these analyses point to such opportunities, then they would be a subject for more discussion, but you know --	Answered
CHAIRMAN WALLIS Dec. 2006	You're going to take these fire scenarios and put them through MELCOR and all of that kind of stuff?	MR. HUNTER: It might be a sensitivity case. If it turns out to be where the MELCOR run for those type of scenarios are different than the internal event scenarios, we'll look at what's dominating. You know, if we have essentially low E to the minus six but the external event scenario is actually going to have a higher core damage frequency, but also be more limiting in the cases of recovery and equipment available. So we'll take in those factors.	Answered

DR. APOSTOLAKIS Dec. 2006	But you are not updating [the '82 study] all the way [to a level 3 PRA]. That's the question. Why don't you go all the way? I agree with you.	MR. TINKLER: Now, we've touched on this. We talked about what fraction of the core damage events we think we're capturing here. You heard numbers like 90, 95 percent of the core damage frequency. We didn't make similar statements about percent of the risk. I think we will be able to say more about that in the future. -- MR. TINKLER: But that's the focus here. The idea is that we have this '82 study where we're talking about alpha mode failure and things of that nature. Now, that may be a good example for some people, may not be for others, but we think there are many instances where those past studies were by today's standards extraordinarily, extremely conservative because they identified LERF states that we don't think exist.	Answered
CHAIRMAN SHACK July 2007	Are you getting active participation from Peach Bottom and Surry, or you're just sort of grabbing information because it's available from them?	MR. YEROKUN: Yes. We are.	Answered
CHAIRMAN SHACK July 2007	But it means you're not doing deliberately conservative analysis, is what it really means.	MR. TINKLER: Absolutely correct.	Answered
DR. CORRADINI July 2007	So can I ask another question just for clarification? So let's take the interfacing LOCA with Surry. So let's say the interfacing LOCA with Surry, after all these years, still falls above 10 to the minus 6. So it stays, as a set of states, that one would then consider. And then you essentially freeze, that is, no human actions that could create more errors, you freeze essentially the plant state and then ask the question, if I continue down this path, with station LOCA, interfacing LOCA, what would be the release? Have I got it approximately right?	MR. SHERRY: Well, there's an additional step. The sequences, as we pass them on for further analysis down the line, prior even to the MELCOR analysis, the sequences will be looked at from the standard of can they be mitigated by using additional systems not considered in the PRA.	Answered

DR. APOSTOLAKIS July 2007	How was 1150 done? 1150 was sponsored by the NRC, wasn't it?	MS. SHIU: George, I think to answer your question, we could actually have done the fault trees and extended our event trees, which is what we are actually doing to our SPAR models but we're not doing them at this stage. We made the initial assumption that we will not consider equipment failures and had that assumption turned out to be important, we did consider them. If the assumption had turned out to be important in our results we would have reconsidered them, if the models we did -- but I think --	Answered
DR. ABDEL-KHALIK July 2007	You know, a big part of the outcome of this project is essentially public information, and therefore, anything that sort of casts down on, you know, the validity of the results, or that the results may be biased, one way or the other, really defeats the ultimate purpose of the project.	MR. TINKLER: I feel obliged to say again that we understand these issues, and in the preparation of the public report, we will lay out the arguments for why we have taken the approach we have taken. We're basically having the same argument again over the threshold. We now are folding in containment systems as part of the threshold. We meant to make clear that that was always the case. It's just for what we call screening purposes, we opt for the CDF because it was a metric that was available to us. But if you look at the pies, as in NUREG 1150 -- those additional random failures, coupled on top of other random failures for core cooling, would never show up large, and as Mike has said, most of this discussion -- and we'll make that more clear in the afternoon -- because of where we end up on sequences.	Answered
CHAIRMAN SHACK July 2007	: Just to come back to -- it sort of came out of Jocelyn's thing there. The uncertainty analysis in MELCOR are -- you're going to get this state of initial conditions that Rick is going to hand you. Are you then going to do uncertainty analysis on all the parameters involved in the severe accident uncertainties? Is that what comes -- I mean, you'll obviously first do a single point calculation. But how are you going to generate the uncertainties associated with that progression?	MR. SCHAPEROW: Yes, as you point out, we are going to do a single point estimate calculation for the sequence. We will do sensitivities along the way, to look at what we think are the more important parameters and more important uncertainties and variables, and out of that we hope to be able to identify what are the most important uncertain parameters, and then later, let's say in the fall, after we have the initial calculations done, we hope to develop distributions for the more important parameters, and sample from those distributions, and develop a set of MELCOR input files for that one scenario, not just one input file but a set of them, and run MELCOR repeatedly in more of a Monte Carlo fashion.	Answered

DR. CORRADINI July 2007	So you are eventually intending -- I guess I just assumed it when Jocelyn put her thing up for source term -- you are intending to do Monte Carlo sampling, a series of -- you're going to develop a series of initial conditions for a MELCOR calculation that would be gotten by some sort of thing like a Latin Hypercube sampling approach?	MR. SCHAPEROW: Yes, that is our intention. As you may guess, it's very – the actual calculations with such an approach is going to be very intensive.	Answered
DR. CORRADINI July 2007	So my second question there is you said a step in there that I don't understand how you're going to do, which is you're going to do a point calculation, you're going to find out the things that are most important, take a stab at that, and then you're going to, with the sensitivities doing that, you're going to develop a distribution function. That's the one, you know, kind a like when you go on the board and say, "It can be shown." -- I'm curious how you're going to get that shape.	MR. SCHAPEROW: Well, we're going to have to use all of our experience that we have in this analysis.	Answered
DR. CORRADINI July 2007	What did they do in 1150 at this point, though, in difference? Did they not just --	MR. SCHAPEROW: 1150, when they came to hard questions they went out to an expert committee and they asked the experts --	Answered
DR. CORRADINI July 2007	I remember end points but I don't remember a shape [distribution of inputs to the calculation]. I remember, there was a lot of discussion about [the distributions] can't be lower than this and it can't be higher than that, and there was a lot of argument with those --	DR. APOSTOLAKIS: No. They had histograms. MR. SCHAPEROW: Yes. They had, they listed for each issue, they listed each expert's distribution, and they combined them. Said expert A said this, expert B said this, expert C said this, and here's an amount, here's a composite of the three.	Answered

DR. WEINER Nov. 2007	Now, does that binning [of radio nuclides in physical chemical groups]-- is that a -- how does that binning and the selection of those physical chemical groups affect your dose and your threshold? -- What I'm trying to get at is, and it's a fairly simple answer, does that introduce a conservatism? In other words, with each bin you have associated a deposition velocity, you have associated a particle size distribution --	The deposition velocity is a function of particle size, and it isn't a function, necessarily, of the chemical bin. In MACCS, each chemical bin can have a particle size distribution associated with it. -- By each one of these little plumes. So the first plume has one distribution, and the second plume, which comes from core concrete interaction as opposed to in vessel release, has another set. But the MELCOR is where the masses of the fission products, radioactive plus non-radioactive products are carried throughout the plant. The binning in MACCS is the exact same binning. So if the chemical element group in MELCOR included the following three chemical elements, the same chemical elements are in the same bin in MACCS. Okay? So the whole thing is at least self consistent. It's not knowingly conservative.	Answered
MR. LYMAN Nov. 2007	...I appreciate that you're planning external peer reviews, and I might suggest that you might seek actually submitting a summary of your methodology to a journal like Science Policy Forum or something. That, I think -- going through a peer reviewed process like that would add enormous credibility in the eyes of the public to what you're doing. But I don't agree with the approach of trying to couch the results in a way so that you don't frighten the public. You should be honest about what you're providing.		Suggestion
Mr. Flack Nov. 2007	This is John Flack with ACNW staff. I realize this is not a risk assessment but a consequence analysis, but I'm trying to understand how much risk you're actually capturing. Because you are screening at ten to the minus six and ten to the minus seven. Thank you.	MR. SHERRY: Richard Sherry, research. It's true that directions in the SRNs for performing this project did not direct us to capture some fraction of risk associated with operation at any of the subject plants. We did as sort of a site calculation have a recent level two analysis results from one of the plants, and we looked at the sequences we selected. And we believe we captured, for at least that plant, the risk significant sequences, okay? We didn't have that information for the second plant, so we can't make that statement, okay? And that's sort of the best information I can give you about whether we captured the risk dominant sequences using the frequency threshold that we were directed to use.	Answered

DR. APOSTOLAKIS Dec. 2007	I guess we have discussed this ad nauseam, but why aren't you doing a Level 3 PRA? Is there a short answer for that?	Okay? The key points, and I'll cover the key points first. We believe that the Level 1 PRA has done an outstanding job at this point of identifying what is important with regards to sequences, both from a CDF perspective, and from a LERF perspective. Second, and one of the underlying premises of the project is that the Level 2 and Level 3 deserve more attention, and more rigorous quantification. It is also our view that the use of an integrated method, such as MELCOR and MACCS, together with an uncertainty analysis, was a better approach for this application, versus trying to quantify thousands of sequences, and it would help to shed some insights on risk. The other thing is, is that with MACCS and MELCOR, if there is a problem with the analysis, we can attack the particular model in a more direct manner. And in Charlie's words, the information is no buried in a sea of numbers for which it is difficult to extract this kind of information." So why are we using CDF as our screening criteria? Well, from the start, there is a historical emphasis at the NRC on CDF, as well as an abundance of information on CDF. We have our updated benchmark SPAR models as an internal source for CDF information. And, remember, we have a high confidence in the Level 1 PRAs, as well, so -- In addition, the NRC uses CDF as its criteria for risk-significance in Reg Guide 1.174. This Reg Guide uses a CDF of 10 to the minus 6, and a LERF of 10 to the minus 7 We use the same Reg Guide 1.174 criteria for CDF, and if you believe that the conditional containment failure probability is approximately 0.1, then we meet the criteria for LERF, as well. And, therefore, we captured the risk significance based on that criteria. The only other question remaining is, are we capturing all the significant contributors to LERF by using CDF, as opposed to using LERF. Again, for PWRs, there really shouldn't be any significant dispute that early conditional containment failure probabilities are less than or equal to .01. As for BWRs, in other studies initial results for station blackout events indicated that vessel failure does not occur for more than eight hours into the event. And the customary definition for early is four hours, so we believe that we're on the right track for BWRs, as well. And although it's site-specific and sequence-specific, we are paying very close attention to the timing of the release, and we are making sure that it is beyond the early criteria.	Answered

Dr. CORRADINI Dec. 2007	: Just to expand, I guess, what George is saying, make sure I understand the staff's position. So I think my way of saying it in some sense coming up with the same result that George is, if you took, and I'm going to pick Peach Bottom and Surry because they have an interesting historical, you can essentially take that and explain the differences. And I think that's kind of what I get from George is after, is explain the evolution of your insights, both in terms of modeling, in terms of additional measures that have been taken care of, and you can go all the way from WASH-1400 through 1150, through - and I was going to ask something about that, through a current, if they had, or if they do have a Level 3, and really then show what you've done, both in terms of methodology, models, and improvements. And that, I think, would help drive home the improvements that you have with SOARCA. I guess that's the way I view --		Suggestion

Issue:

Purpose

Members	Comments/Questions	Remarks	Action/Resolution
DR. APOSTOLAKIS July 2007	So these are results then, I mean judging from what you said, but just updating the results. Is there any actions that are going to be taken using those results, any regulatory action, or decision, or are we just producing results and communicating to the public? What's the purpose of this, to replace an old study by another study?	MR. YEROKUN: I can try that. The sole purpose is to replace the old outdated studies. That's clearly -- That's all. It's not intended for any regulatory problems.	Answered
DR. APOSTOLAKIS July 2007	And the reason [for these new studies] is that these old studies are misused?	MR. YEROKUN: That's true. MR. PRATO: Misused and outdated. Misinterpreted. MR. YEROKUN: We have better knowledge, we have better means to develop more accurate information. That's it.	Answered
DR. APOSTOLAKIS July 2007	But I think tomorrow, or the day after, we will review another project on protective actions, and it would seem to me that the results of this study would be very relevant to deciding what protective actions to take.	MR. PRATO: I think that's right.	Answered

Issue:

Release

Members	Comments/Questions	Remarks	Action/Resolution
DR. KRESS Sept. 2006	When you do this assessment, have you got up-to-date data on the meteorological conditions and the population around these areas and the changes in the general types of land that are around there? Do you have up-to-date data on that? (pg. 215)	Ms. Laur: We are going to be using the most up-to-date data we can get. In fact, we're holding a public meeting tomorrow where we're going to focus primarily on the data needs for this particular project, met data, precipitation data, emergency preparedness information, evacuation, sheltering. All of these are important bits of information that we want to incorporate that really makes this the state of-the-art type project because we hope to wrap that information in as well as the information that's been gained over the last years on how cores actually melt. So that's really where the state-of-the-art part comes into this analysis.	Answered
CHAIRMAN WALLIS Sept. 2006	If you're screening out everything based on CDF, CDF has nothing to do with release to the public and it's LERF (PH) that releases to the public. So it may be that the biggest things are the biggest influence on release from containment, things screened out. (pg. 243)	Mr. Hunter: Right. We are basing this off of frequency and that was the guidance provided by the Commission. However, in saying that, we are an order of magnitude below the actual threshold based on core damage frequency instead of release frequency.	Answered
CHAIRMAN WALLIS Dec. 2006	I think we understand this. It does not have core damage with no release at all if the containment is intact.	MR. PRATO: No, there is release.	Answered
DR. APOSTOLAKIS Dec. 2006	But I don't understand this slide though. It says we don't have a Level 2 PRA, which is correct. We don't. We have estimates of the frequency of large early release. So that limits the staff's ability to select scenarios. I thought you didn't know what was being released. Do you? Because you don't have a Level 2 PRA.	MR. PRATO: We don't have a Level 2 PRA.	Answered
DR. APOSTOLAKIS Dec. 2006	Right. Therefore, we don't know what?	MR. PRATO: We don't have release frequencies.	Answered

DR. APOSTOLAKIS Dec. 2006	The materials. So now the conclusion is that the staff is evaluating scenarios using the core damage frequency. You still don't have, you know, information regarding what has been released.	MR. PRATO: That's correct.	Answered
DR. APOSTOLAKIS Dec. 2006	So I don't understand. I mean, let's say that the current PRAs give you a Level 2 minus, which is just the frequency of release. They don't give you the Level 2 result. By backing off that, and you're going back to the core damage frequency, somehow things become better?	MR. HUNTER: This is Chris Hunter, Office of Research. No core is going to be used to calculate actually what is released. Basically this slide, what we're just trying to say is in house we don't have Level 2 PRAs for the plants, and this all has to do with the screening threshold on the scenarios that was given in the SRM and the Commission paper, the one in a million per year release frequency, which was given as initial focus. So this slide, basically what we're trying to say is we can't realistically calculate in house release frequencies for scenarios. So we're going to use core damage frequency as a surrogate, and then we'll feed the scenarios into MELCOR, and that will produce actually what is released.	Answered
DR. CORRADINI Dec. 2006	But what you're going to be missing is early versus late.	MR. TINKLER: We will consider that.	Answered
DR. BANERJEE Dec. 2006	But people have tried to model [the radioactive release from] Chernobyl. So presumably it can be done.	MS. MITCHELL: People usually don't model the first day's very explosive release, and there were probably about four major wind shifts that occurred during the next eight days, and they take the measured values of Cesium-137, and they back calculate to determine what the source term was on that day. So the fact that you can now take the source term and use the met. models and find that you can get the answer to me seems incestuous.	Answered
DR. BANERJEE Dec. 2006	Because things are changing in real time, right?	MR. SULLIVAN: yes, it's perfect. I'm going to get to that in just a slide or two. So bear with me.	Deferred/closed

CHAIRMAN WALLIS Dec. 2006	You tell them which way to go depending on the wind?	MR. SULLIVAN: See, as I said, I can only model this site once. I can't model it 16 times. MACCS, when it does a calculation, it picks a weather sequence of ten or 12 hours, and it runs it. It then points that weather sequence in each of 16 sectors. It then creates a very rich -- and multiplies consequences times the wind rows' probabilities. But the population is the population. Have I lost you yet? Because I have lost myself several times.	Answered
DR. BANERJEE Dec. 2006	Direction and weather class, I take it.	MR. SULLIVAN: No. One weather, one weather sequence is then moved around in 16 directions.	Answered
CHAIRMAN WALLIS Dec. 2006	No, but it seems to me, you know, it's wonderful. It [the release model] may be very good, but it maybe somewhat of a fantasy. How do you relate it to reality?	MR. SULLIVAN: Once again, this is a probabilistic representation of consequences. It's not really meant to be a real case. There is no real case.	Answered
DR. HINZE Nov. 2007	And in the in meteorological conditions, have you considered severe climatic conditions? Tornadoes -- what happens if one of these accidents during a tornado? Extreme conditions? Is your probability analysis including those tails?	MR. SULLIVAN: Likely not. We're using real weather from a given year.	Answered
DR. CLARKE Nov. 2007	I was kind of going to go there to, wondering if each of those eight classes had sub-classes for different site specific conditions. Your more realistic offsite dispersion model, is this a model that you built? Or is this a better model that somebody else has?	MR. SULLIVAN: No. We now have -- we can dissect the plume more. We have more sectors to account for. Wind variation. And of course we're using site specific meteorology.	Answered

Issue:

Results

Members	Comments/Questions	Remarks	Action/Resolution
DR. APOSTOLAKIS Sept. 2006	Are you producing risk curves? What will your result look like? (pg. 229)	Mr. Eltawila: We are not going to produce frequency consequence curves. We are going to produce results for the dominant scenario. We're going to identify the number of early fatalities and the number of cancer fatalities. So this RD will be the product our work.	Answered

DR. APOSTOLAKIS Sept. 2006	What do you mean by the number of early fatalities? I mean there will be a distribution for those. Right? You can't just say it's five. (pg. 230)	Mr. Eltawila: You're going to have to add for all the scenarios. Yes.	Answered
VICE CHAIR SHACK Sept. 2006	Why not a mean output if you're going to put out a number? (pg. 232)	Yes. A mean, if you look at the 1982 study, one of the companion documents had a compilation of tables where they list the mean value. Now the summary document also had CCDF curves. So we would reasonably expect that we would report mean values and those mean values will be influenced by the tails of the distributions. But the extent to which we attach significance to the tail and out far out on the tail the distribution that remains to be seen and how far we are confident that that number deserves that sort of attention.	Answered
DR. CORRADINI Sept. 2006	So do you have any indication that if you carried this out as an experiment on one type of reactor containment location set compared to what was done 25 years there is a significant difference? Do you have any empirical data that you would actually find a difference? (pg. 260)	Mr. Eltawila: The answer is yes. We have information. We have done analysis which shows that for the type of plants that you are talking about and the containment there have been significant improvement in the consequences of some of the severe accidents. To give you an example, you know that we took advantage for the work that was done about steam explosion. You don't have alpha mode (PH) explosion which was a major contributor to the early fatalities in the 1980s. Right now, we can take advantage of that and say containment will not fail as a result of alpha mode failure of containment. So you can see a difference and we can quantify that difference.	Answered
DR. CORRADINI Dec. 2006	If you were able to build 100 plants with 10 CFR 100 and [TIS] 14844, it would seem to me you could do a hand calculation to see what the global parameters might be. I'm curious if you did that.		Suggestion
DR. KRESS July 2007	Are your consequences going to be limited to prompt and latent fatalities, or are you going to do the economic impacts, which can be done at MACCS?	MR. PRATO: Right now, it's going to be limited to the prompt and latent fatalities.	Answered

DR. KRESS July 2007	As long as you're doing this, why not do the economics also? I mean, is that much of an increment in effort? It gets kicked out of MACCS.	MR. PRATO: Right now, that's where we're limiting the scope. It may be expanded. We may be asked to go forward. The staff may make that recommendation. But right now, it's our scope is limited just to latent and immediate fatalities. This a flow diagram of the overall project. I'm going to cover each one of these boxes as an overview, later on. Each subject matter expert is going to get up and get into the specifies. So my initial objective is to just familiarize you with the project and then each of the technical area experts are going to go into detail.	Answered
VICE CHAIR CROFF Nov. 2007	I guess I'd like to come back to a couple of fundamental things. First, is there any requirement for you to calculate latent cancer fatalities or collective dose?	MR. SULLIVAN: Only the staff -- no, to the best of my knowledge.	Answered
VICE CHAIR CROFF Nov. 2007	My suggestion is, if you don't have to do collective dose and latent cancer fatalities, don't. In other words, communicate in terms of individual dose and distribution of individual dose, and doses across the population as a function of geography. And that avoids an awful lot of complications. I think if you feel -- if staff feel compelled to go to latent cancer fatalities or collective dose, given that for many of the exposed population, you're below observable effects, and it's unknowable in that region. -- And you're not likely to know at any reasonable time in the future. I think you would have to look at the range of thresholds. In other words, you don't know what the right answer is, you can't defend, as far as I can tell, any particular threshold. I mean, you've got an HPS opinion, but okay, it's their opinion. I think you're going to have to look at the range and portray the range out there. And basically say, "We do not know in this range. It could possibly be zero, which is LNT. It may be something else, but for these set of assumptions, here's what it looks like, and that's that." That's just one person's opinion at this point. But that's what I come to after hearing what you've said so far.		Suggestion

VICE CHAIR CROFF Nov. 2007	I don't see how any particular threshold, any singular threshold value can be defended in an unobservable region. That's where you are. You can't observe these effects. -- Up to the point where you calculate radio nuclide releases and the distribution to the population and even doses, I can see going that far as a best estimate. But then when you start talking about converting into latent cancer fatalities, I don't see where there's a best estimate in there, because we don't know what the answer is.	Criticism
CHAIRMAN RYAN Nov. 2007	I think you're on two different paths here. Let me try to offer a -- I appreciate Allen's point that if you calculate a dose, that's a fairly straightforward thing where you can exercise lots of parameters in how you had the exposure and how you calculate a dose. But the latent fatal cancer is an extrapolation. And there's no way to test that extrapolation for its validity. Now the dose, there is. There's lot of cases. We have metabolic models, we have exposures on which those metabolic models are based, we have physiology, we have physics, and we have all that to calculate the dose. So the difficulty is is that it's an extrapolation from high dose regions, typically.	Comment
CHAIRMAN RYAN Nov. 2007	And I think what we're telling you is taking the dose and multiplying it by a cancer risk estimator is not a best estimate. You don't account for background, you don't account for variability of background, you don't account for age dependence. Potassium, for example, age dependence is critical to thyroid cancer induction and so forth.-- So I think what we're doing is, we're not arguing the best estimate approach all the way through. I think just using that simple multiplier of dose times risk factor for latent cancer gives you a number you can now examine. How do you account for all that? And if you don't account for it, it's not a best estimate. So those are things you know you can account for. So I think what we're doing is, we're not arguing the best estimate approach all the way through. I think just using that simple multiplier of dose times risk factor for latent cancer gives you a number you can now examine.	Comment

CHAIRMAN RYAN Nov. 2007	How about this as an idea. This is maybe out of the box thinking, but if you reported a stratified table of doses, this percentage of the exposed population in these sectors by miles out or however you want to do it, received -- 500 millirem to a rem, and 100 to 500, or less than 100. Aren't you accomplishing that single picture? -- You don't have to answer that this minute, but that's an alternate view that takes out all this complexity of trying to turn that very clear dose calculation into a stratified estimate of fatal cancer risks.	Suggestion
CHAIRMAN RYAN Nov. 2007	What are the technical calculations you're doing, where do we think we agree with you on your using the best estimates, and your using risk-informed techniques to get those estimates, and where do we think they may not be so risk-informed? I think Allen and I are expressing the view that when you use these cancer risk calculation numbers, we're raising a question mark at this point of how those are risk-informed, and where they come from.	Comment
DR. WEINER Nov. 2007	I wanted to, first of all, say that I think the committee -- Allen has made my point very well. But I'd like to add to it, and respond to what you said about risk communication. When you report latent fatal cancers, no matter how small the number is, in comparison with any other number, what the non -- relatively less-informed public takes away from this is, NRC says that this accident is going to give you cancer. That's what they take away. That's what you're communicating. And one of the problems with communicating in terms of latent cancer fatalities is that that is what the public hears. And you're sending -- the public does not say, "Oh yes, but I'm way more likely to get cancer from smoking cigarettes, or from, you know, getting my teeth x-rayed, or whatever." The public says, "Yes, this accident, which is a horrible accident, Chernobyl, is going to give me cancer. And how do I know that my Aunt Susie's cancer did not come from this accident?" There is a real risk in reporting that way, and I would second, whole-heartedly, what the Chairman just said. Doses are reported everyday in the popular media. Rem is defined in Webster's Collegiate Dictionary. People are used to seeing dose. You're not talking an arcane language here. I think the Chairman made an excellent point. If you reported a table of doses --	Suggestion

MR. LYMAN Nov. 2007	...I'd like to address the risk communication issue. And in our view, the best way to communicate with the public is to present an honest assessment of the scientific data and uncertainties including different approaches to discussing the concept of the consequences of a severe accident.		Suggestion
MR. LYMAN Nov. 2007	We don't believe that there is peer reviewed documentation to support at this point using thresholds for radiation protection purposes. We have the outcome of the BEIR VII study, and people had the opportunity to convince the panel otherwise, but they were unsuccessful, so right now you are faced with an international radiation protection community and the recommendations of agencies that there should be no threshold. So if you are going to run calculations with thresholds, you need to either document why that number would be appropriate with peer reviewed scientific evidence, or explain why that isn't available.		Suggestion

Issue:

Schedule

Members	Comments/Questions	Remarks	Action/Resolution
DR. APOSTOLAKIS Dec. 2006	Why isn't there a subcommittee meeting on this? I mean, we can't keep doing this, have the full committee.	MR. SULLIVAN: Well, part of it was we simply thought that this was of interest to the whole committee. -- MR. SULLIVAN: Yes. I mean, we will proceed with subcommittees as appropriate.	Answered
DR. APOSTOLAKIS July 2007	Really? So you're back to the committee in the fall?	PRATO: Yes, sir.	Answered

Issue:

Seauences (general)

Members	Comments/Questions	Remarks	Action/Resolution

CHAIRMAN WALLIS, DR. Sept. 2006	Do you mean events with a probability of less than 10-7? (pg. 238) -- Do you mean sequences? (pg. 238)	Mr. Hunter: No, that would be the cumulative sum of initiating sequences, the sum. So for example, say a medium loca, all the medium loca sequences, have a core damage frequency...So for the lower frequency initiating events a lot of them scream out and it depends on the type of plant we're looking what scenarios we're going to see.	Answered
CHAIRMAN WALLIS Sept. 2006	Are you matching the dominant sequences success rate as you go along? (pg. 241)	Mr. Dube: Yes, as we enhance the models we are comparing cut set by cut set level and we have criteria if the cut sets differ by a certain amount then we kind of flag them out.	Answered
DR. APOSTOLAKIS Sept. 2006	Now the scenario evaluation you say equipment, recovery and other mitigation measures. Aren't these inherently time dependent events? (pg. 249)	Mr. Hunter: Correct. We're going to have to look at each scenario differently.	Answered
DR. APOSTOLAKIS Dec. 2006	But the sequences that dominate core damage, are they the same as the ones that dominate releases?	MR. HUNTER: Basically what we're seeing is if we apply a threshold, we're going to see similar sequences. However, if we applied a release frequency, those numbers would drop and in some cases we might have very little or even no scenarios based on the plant class. If we use a strict ten E to the minus six release frequency.	Answered
CHAIRMAN WALLIS Dec. 2006	So you have picked seven scenarios which matter.	MR. HUNTER: No, we're not trying to say we're picking seven scenarios.	Answered
CHAIRMAN WALLIS Dec. 2006	Well, where did these seven scenarios come from? Why did you choose them and how much of the total -- And they cover 95 percent of the likely releases or what?	MR. HUNTER: That's basically the dominant scenarios that are coming up, the -- What we're basically trying to show is per scenario, per plant, the core damage frequency estimated per plant, and from that we're trying to essentially get an overall plant group look to see what really the dominant scenario is per the class.	Answered

CHAIRMAN WALLIS Dec. 2006	Now, just talk right into plain English. You've looked at seven possible accidents, which cover -- a certain percent of the possible hazard to the public. □	MR. HUNTER: No, we looked at -- We looked at the entire internal events model. Basically what we're saying is if there's -- there's probably more scenarios than this. Well, there are more scenarios. However, they are a lot lower and pretty much off the map. These are essentially -- they were either a dominant scenario for multiple plants or just one or two plants. All we are trying to show is in some cases you see essentially reds for every plant, and in some cases you see a mixture, and there's plant specific differences for the mixture.	Answered
DR. APOSTOLAKIS Dec. 2006	No, I think the question is you list seven scenarios. If I add the frequencies of these scenarios, is it 95 percent of --	MR. HUNTER: It's about 95 percent of the core damage frequency.	Answered
CHAIRMAN WALLIS Dec. 2006	And is that 95 percent of the situations where you actually release significant radioactivity?	MR. PRATO: Those that exceed one in a million per year, one to the tenth to the minus sixth. It includes them, yes, sir.	Answered
DR. KRESS July 2007	Your goal talks about doing this predominant accident sequences. Do you mean dominant with respect to CDF or dominant with respect to prompt fatalities, dominant with respect to latent fatalities? Or what do you mean by dominant?	MR. PRATO: It's with respect to CDF, initially.	Answered
DR. APOSTOLAKIS July 2007	Now these are the frequencies of the sequences, not just the initiating event; correct?	MR. PRATO: That's sequences.	Answered
DR. CORRADINI July 2007	Okay. So what are some of the notable ones between 10 to the minus 8 and 10 to minus 6 that we'll be eliminating? Are there an notable ones?	MS. SHIU: I think we need to discuss those results in this afternoon's session.	Deferred

Issue:

Sequences (specific)

Members	Comments/Questions	Remarks	Action/Resolution

CHAIRMAN WALLIS Sept. 2006	Does this tend to screen out large break locas? (pg. 242)	Mr. Hunter: Yes, it does. For all 4 plants, large break locas. we're also grouping sequences together to form a scenario because sometimes you get similar sequences. Maybe they're different initiators because they break transients a little bit differently, whether it's a loss of main feed water or just a general transient or a small loca. Sometimes you get similar sequences that essentially would provide essentially the same accident scenario. So we're grouping those together essentially just summing up the core damage frequencies after we look into the cut sets to figure out exactly what's actually unavailable and the times of core damage.	Answered
CHAIRMAN WALLIS Sept. 2006	Haven't they improved seals to the point where this [accident progression issue] is much less likely now? (pg.258)	Mr Schaperow: My understanding is that the Westinghouse plants basically all have the newer seal packages in them maybe with the exception of one pump at one plant. But this issue involves very high temperatures. I mean during core melt you get extremely high gas temperatures in the RCS. So I think there still is an open issue on that and we're going to have to look into that. And again the issue deals with very high temperatures, maybe a high seal leak rate at some point on the order of 100/200 GMP type of leak rates. This is important because if you were in a boil off scenario you're now at a loca and you're starting to lose inventory quickly. It can also affect the timing of lower head failure and as well as the challenge to the hot leg, the high temperature challenge to the hot leg, surge line and steam generator tubes. For the BWR scenarios that don't have DC power so that the relief valve is basically operating on the spring, the relief valves will open and close to relieve pressure. If the relief valve does stick open at some point possibly due to very high temperatures during the core melt, very high temperature gases, then it can seize in the open position and depressurize the RCS. And this would turn high pressure scenario again into a low pressure scenario. The problem with this is though is the low pressure in the RCS you basically would lose a lot of your convective heat transfer away from the core, the melting core. So you would make a quicker lower head failure. It may speed it up by a couple of hours.	Answered

VICE CHAIR SHACK Sept. 2006	Wouldn't the BWR always be depressurized unless the depressurization system fails? (pg. 259)	Mr. Schaperow: Yes. The idea here is you don't have DC power. In some of the sequences we've examined, we don't have power. We don't have DC power. So we don't have – We can't operate that valve. It just opens when the pressure gets high and the spring opens it.	Answered
DR. BANERJEE Dec. 2006	Do you take seismic into account?	MR. PRATO: We're going to be talking about that as well, sir. We've got a number of options.	Deferred/Answered
CHAIRMAN WALLIS Dec. 2006	So it's very interesting that the failure of the core CP seals LOCA (phonetic) is more significant than al these other LOCAs?	MR. PRATO: That's the latest information according to SPAR.--- MR. HUNTER: Yes, large CP seal LOCAs will dominate because it can be generated from blackouts and, you know, losses of service water. You see it in many different --	Answered
CHAIRMAN WALLIS Dec. 2006	All these other LOCAs we've been fascinated with for years are irrelevant?	MR. HUNTER: Pretty much. (Laughter.) -- From a risk standpoint, pretty much.	Answered
DR. APOSTOLAKIS Dec. 2006	So this [accident RCP seal failure/LOCA] sequence will be supplemented by additional event if they're into containment before you do your calculations?	MR. HUNTER: Right. We'll have to factor in the -- yes. This won't work because essentially you might be without containment spray, but you'd have coolers and other such mitigation factors.	Answered
DR. APOSTOLAKIS Dec. 2006	So this [accident sequence] is not verbatim the scenario you're analyzing.	MR. HUNTER: No, this is just explaining up until core damage, all of these --	Answered
CHAIRMAN WALLIS Dec. 2006	[You will have] the various scenarios produced by fires?	MR. HUNTER: What we'll have is we'll have preliminary looks. Fires are going to give you very similar scenarios to what we already have. They're going to -- the dominant fire scenarios are typically going to give a similar trend as to what we're seeing in internal events. In regards to seismic, because of essentially the 33 plants that essentially had IPEEE center PRA submittals, we're going to have to look at those a little bit differently.	Answered

DR. KRESS July 2007	Will the study include shutdown sequences?	MR. PRATO: No, sir; just operating.	Answered

Issue:
Significance

Members	Comments/Questions	Remarks	Action/Resolution
DR. BONACA July 2007	I mean, this is the issue of whether another scenario in the PAR study is credible. Is it?	MR. TINKLER: There -- because -- I don't want to speak for Randy Sullivan, in detail here, but there is the tradeoff of issues associated with EB being a defense-in-depth sort of consideration, but also being mindful of the fact that while it is a defense in depth, it should be focused on realistic scenarios. So we are seeing exchange of information between the two. One project was head of the other for a while, or has been ahead of the other, but to the extent, like I said, to the extent insights from one project will be integrated into the other. So we're very keenly aware of two projects and how they relate to one another.	Answered

Issue:
Stakeholder Opinion

Members	Comments/Questions	Remarks	Action/Resolution

DR. APOSTOLAKIS Sept. 2006	Is the industry doing anything? Are they helping you? Opposing you? Don't care? (pg. 225)	Ms Laur: I've had some conversations with industry. We will have a public meeting tomorrow where we will have members of industry attending. We hope to engage them on a frequent basis throughout this project. So far in the conversations I've had they are very interested in being a part of this project. We hope that they will help us to get some of the information that we need that we don't have in house. We've already kind of talked about some of that information already. The MET data, we have some of that already. Some of that data is available to us because of license renewals, but data such as the precipitation data is not something that is required by the NRC. So we hope that we will get assistance from the industry to get that kind of information. There are some recent procedures that are being developed by EPRI and others to help deal with post accident activity and we hope to tie into that source as well to get that kind of information so that we can update our HRA to the extent necessary on this project. So, yes, we are engaging industry.	Answered
DR. ABDEL-KHALIK Dec. 2006	Let's say you're going to do this for Waterford 3 and assume in your analysis like you explained that everyone will do his or her job, and all of the evacuation will be done as planned. Do you think the public in that area and they meet in the vicinity of that plant, who are really the customers of this analysis, will believe is result?	MR. SULLIVAN: Yes. -- MR. SULLIVAN: I think there will be those who don't believe it, those who don't listen, but my job, our job on this project is to do the best job we can to present the NRC's judgment of the potential consequences.	Answered
DR. ABDEL-KHALIK Dec. 2006	Right. And I'm just wondering that given the recent history with evacuation in a certain vicinity, in a certain area, that if you go through this process, that your customers will really believe what you're telling them.	MR. SULLIVAN: Okay. I have a data point for you. As we discussed the Katrina incident with emergency responders around the country, we find that they take great umbrage with the idea that they would not implement their plans. We think that the plans around nuclear power plants will be implemented. They are tested regularly. They are drilled regularly, and they're inspected. They are certified annually as being adequate. So we think there's a higher level of assurance that these plans will be implemented and will protect public health and safety than, for instance, there was -- I wouldn't have had so much confidence if we're talking about a major city.	Answered

Issue:

Uncertainty

Members	Comments/Questions	Remarks	Action/Resolution
DR. APOSTOLAKIS Sept. 2006	So you will not deal with uncertainty at all? (pg. 230)	Mr. Tankler: Yes. A different kind of risk. The current thinking is that the complimentary cumulative distribution function curves don't really add a lot to this portrayal because we end up then focusing on 99.9th percentile for 10^-6 events. So we end on focusing all our energy and attention on what then becomes a 10^-9 outcome....So the focus of the study is to focus on the more probable but dominant events. So we generate lots of numbers and the only number that gets a lot of attention is the 99.9th percentile for a 10^-6 or so event and there's a serious concern how well we examine the tales of some of those distributions was not clear. Now we are proposing to look at the uncertainty in the predictions of consequences.	Answered
DR. CORRADINI Dec. 2006	[How do uncertainties] fit into the computation?	MR. TINKLER: Well, the preliminary plan was not to go down the traditional road of event trees, accident progression event trees to determine multiple end states -- with branch points and split fractions.	Answered
DR. APOSTOLAKIS Dec. 2006	Okay. Now, the slide before said use SPAR or whatever, factoring in uncertainties. So how would you factor in uncertainty here?	MR. HUNTER: Basically what we're trying to say here typically you're looking at uncertainty factors of possibly two or three in natural parameter uncertainty if you're calculating it, and how we're saying this is essentially if we factor in uncertainty, we're going to assume that the yellows are essentially reds. That's how we're kind of using it. -- So essentially, scenarios that are close to the threshold but are below, factoring in uncertainty, they're going to be essentially we're going to consider them above the threshold.	Answered
CHAIRMAN WALLIS Dec. 2006	Well, there's a huge amount of uncertainty about how closely your model represents reality, isn't there?	MR. SULLIVAN: There's certainly some uncertainty.	Answered

CHAIRMAN WALLIS Dec. 2006	Well, I'm just wondering when you ask if people believe it, I mean, the question is when you present these results, how are you going to present them in terms of the sort of range of the uncertainty around what you're presenting and all of that? That seems to be a rather awkward, but essential thing you have to do.	MR. SULLIVAN: Well, we're certainly open to guidance. I mean, we don't know how the results of the study are going to be presented yet. That has really not been decided. We're still looking.	Open
DR. APOSTOLAKIS July 2007	Now "best estimate (of radiological consequences)" means what? Does it include uncertainties, in other words?	MR. YEROKUN: We are going to do some uncertainty analysis.	Answered
DR. APOSTOLAKIS July 2007	No, but I mean, the uncertainties at the end are very large, so – and especially if you want to have effective risk communication. I mean, you have to worry about the uncertainties, don't you?	MR. TINKLER: Charles Tinkler from the NRC Office of Research staff. Yes, indeed. The initial focus will be on using our best modeling, our best practices within that modeling, but the longer-term effort is to include an integrated uncertainty analysis for both the Level 2 and Level 3 issues. We will do work to determine what appear to be the principal parameters that pose the greatest uncertainty, but then to propagate them through in a consistent way as opposed to single selected sensitivities, cascaded on top of one another.	Answered

Issue:

Verification

Members	Comments/Questions	Remarks	Action/Resolution
DR. CORRADINI Sept. 2006	Have they done the equivalent of a Level 3 on one of these sorts of plants that you could actually do a one-to one comparison based on tool as well as assumptions? (pg. 226)	Ms. Laur - I don't think so. That's certainly something that we can investigate.	Open

DR. CORRADINI Sept. 2006	So Kewanee has a SPAR model. And they probably have their own internal PRA too for internal events. So how do these things compare? That's what would be my first question about before I start throwing things out and keeping things in. How does the one calculation compare to the other calculation? (pg. 239)	Mr. Hunter: Right now, we're actually going through a secondary enhancement of the SPAR models where we're actually comparing the top, the dominant, cuts between a licensee PRA and the SPAR model. Now are we finished with that? No, but the licensees' PRAs have been benchmarked before previous. As the SPAR models have matured over the past decade, there have been comparisons because that's how initially started up the SPAR models. So are they matched identically? Absolutely not. However they are in order of magnitude and they definitely are similar and just to remind you this is for internal events only.	Answered
CHAIRMAN WALLIS Sept. 2006	What do you do about how well the emergency response actually works? Do you have any good idea about how well it's going to work? (pg. 271)	Mr. Schaperow: Yes. One of the members of our team is an emergency preparedness specialist. He's probably better to address that than I can and unfortunately he's not here today. So I would like to punt on that for now.	Deferred
DR. KRESS Dec. 2006	Is there some systematic way you can demonstrate that that [our calculations for the consequences] will do the job for you?	MR. PRATO: I think the point is though the Commission give us an initial starting point often to the minus six. If we use core damage frequency, we're going to capture everything that has a consequence, a release frequency equal to greater than E to the minus six.	Answered
DR. APOSTOLAKIS Dec. 2006	But if I look at the ultimate result of this study, I will be able to find a sequence that says the initiating event, such as, a system fails. The core is damaged. Then the containment spray system doesn't work. Something else in the containment doesn't work, and you have these consequences. I will be able to find it.	MR. HUNTER: Yes.	Answered
CHAIRMAN WALLIS Dec. 2006	You have actually looked at things and you've covered the things that matter.	MR. PRATO: We certainly are, sir.	Answered

DR. CORRADINI Dec. 2006	So this leads me to the obvious question, which I'm sure you do this because you don't really want to spend a lot of money for the sake of it. Somebody can come up with a hand calculation. It was in 10 CFR 100 in the '50s, that you could do it forever and it's a closed form solution relative to a dispersion calculation. Have you done these hand calculations to know the sensitivity of the number you'd expect? TID 14844 tells you how to do it with a closed form formula. Has anybody in the staff started doing those calculations to, shall I say, bound a computer calculation?	MR. SULLIVAN: Heavens, no. We don't even have a scenario to get a source term to get to MACCS. You know, it's a --	Answered
Dr. APOSTOLAKIS Dec. 2007	It would be nice to know why there are differences. If you find different -- if I go to the Peach Bottom evaluation in 1150, they give me -- well, all five plants, actually. They give me fatality curves, latent cancer curves, and so on, and they give me the dominant contributors. I mean, even if it's not part of your objective, wouldn't you be curious to know whether your results are different? And if they are different, why they are different? You may come back and say because we did a better job, but to say I'm not even going to look at it, it's kind of -- doesn't make sense to me.	MR. PRATO: Well, there was one other point Charlie wanted to make, or Charlie made at our last meeting. And he said, With MELCOR, we do believe that additional large benefit is derived in looking at mitigating measures that has not yet been addressed in PRA, such as SAMGs, and other severe accident mitigation guidelines. -- MR. CHEOP: This is Mike Cheop. Let me try to address that. I think as part of the peer review process, as we are looking at accident sequences, we do ask ourselves why are we different from, let's say, 1150 And if you're different, what the reasons are. And we will convince ourselves what the differences are. And as we go forth into the Level 2 and Level 3 space, again, we do introduce a lot more, as Bob said, mitigative equipment. And we can't explain a lot of the differences through the different strategies that we're using, and the differences. We may not make a formal comparison, but we do, as part of the peer review, and our internal review process, try to convince ourselves as to what the differences are, and what's causing the differences.	Suggestion

SOARCA ACRS Q&A: Report of "Not Answered" Statuses

Sessions: Sept. 2006, Dec. 2006, July 2007

Status

Members	Questions/Comments	Remarks	Issues
Comment			
CHAIRMAN RYAN Nov. 2007	The committee is on record to tell you that there's not very many good uses of collective dose.		Dose Estimate
CHAIRMAN RYAN Nov. 2007	I think you're on two different paths here. Let me try to offer a -- I appreciate Allen's point that if you calculate a dose, that's a fairly straightforward thing where you can exercise lots of parameters in how you had the exposure and how you calculate a dose. But the latent fatal cancer is an extrapolation. And there's no way to test that extrapolation for its validity. Now the dose, there is. There's lot of cases. We have metabolic models, we have exposures on which those metabolic models are based, we have physiology, we have physics, and we have all that to calculate the dose. So the difficulty is is that it's an extrapolation from high dose regions, typically.		Results
CHAIRMAN RYAN Nov. 2007	And I think what we're telling you is taking the dose and multiplying it by a cancer risk estimator is not a best estimate. You don't account for background, you don't account for variability of background, you don't account for age dependence. Potassium, for example, age dependence is critical to thyroid cancer induction and so forth.-- So I think what we're doing is, we're not arguing the best estimate approach all the way through. I think just using that simple multiplier of dose times risk factor for latent cancer gives you a number you can now examine. How do you account for all that? And if you don't account for it, it's not a best estimate. So those are things you know you can account for. So I think what we're doing is, we're not arguing the best estimate approach all the way through. I think just using that simple multiplier of dose times risk factor for latent cancer gives you a number you can now examine.		Results

Status

Members	Questions/Comments	Remarks	Issues
CHAIRMAN RYAN Nov. 2007	What are the technical calculations you're doing, where do we think we agree with you on your using the best estimates, and your using risk-informed techniques to get those estimates, and where do we think they may not be so risk-informed? I think Allen and I are expressing the view that when you use these cancer risk calculation numbers, we're raising a question mark at this point of how those are risk-informed, and where they come from.		Results

Criticism

CHAIRMAN WALLIS, DR. APOSTOLAKIS Sept. 2006	The whole point of the study is to look at the consequences to the public. (pg. 247) -- And this is conceptual, so you should really be doing it on LERF. (pg. 247)	Mr. Hunter: Right. Our original guidance was actually to look at all releases, to not base the actual frequency on LERF. Now we're trying to lower the thresholds of where we screen at.	Procedure
DR. APOSTOLAKIS, CHAIRMAN SHACK Sept. 2006	...The agency HRA's model does not consider time explicitly. You're in trouble. You will have to switch to the EPRI HCR ORE which you don't have. (pg. 249) -- We are trying to review it and nobody comes here to talk to us about it [SPAR HRA model]. You will have a big problem there because the available model to the agency does not consider time explicitly.... (pg. 250) -- ATHENA does not. SPAR HRA does not. (pg. 250) -- That's a take-away for you. (pg. 250)	Mr. Hunter: I will communicate that to the folks that need to know that. We have HRA tasked to look at how we're going to go about this. We're actually going into a couple pilot plants and actually look at their SAMGs and EDMGs to look at what's proceduralized to try to determine what kind of credit is appropriate for these type of actions.	CDF
DR. APOSTOLAKIS Sept. 2006	...You are revisiting the PRA, Level 3 PRA, and you're saying in three years not only are we going to implement the new tools but we're going to apply it to every unit and I think that's just not realistic. (pg. 254)	Mr. Schaperow: The source term estimates are going to be made -- I guess first of all, from the Level 1 work we're going to end up with a couple of scenarios for each plant design which we've identified about seven or eight plant designs. For each of those plant designs, we're going to be doing a source term estimate for those designs.	Procedure
DR. APOSTOLAKIS, CHAIRMAN SHACK July 2007	But in terms of communication, it seems to me if the public finds out that you're communicating extremely low or ext to zero deaths, because of the cutoff frequency, I mean, that would be a public disaster, actually. -- Yes, but I mean, it comes back to what Charlie says. What's the consequences of an accident that happens once a billion years?		CDF

Status

Members	Questions/Comments	Remarks	Issues
DR. APOSTOLAKIS July 2007	If you have to go to deaths, you have to say something about that. If it's a billion years, it's a billion years. I mean, that's what the best technology right now tells us. But to say that you get zero, or something, you know, insignificant, because you cut off the frequency of the sequences, that doesn't make sense to me.	MR. TINKLER: Well, I understand that. It's just that the other argument is of course someone can do the calculation and the multiplication. But if you started looking really hard at the quantification of 10 to the minus 10 and 10 to the minus 12 sequences, and in a consistent, fully consistent way, what might be the initiator of such a thing, it's not clear to me that much is gained in your overall knowledge of risk, if anything.	CDF
VICE CHAIR CROFF Nov. 2007	I don't see how any particular threshold, any singular threshold value can be defended in an unobservable region. That's where you are. You can't observe these effects. -- Up to the point where you calculate radio nuclide releases and the distribution to the population and even doses, I can see going that far as a best estimate. But then when you start talking about converting into latent cancer fatalities, I don't see where there's a best estimate in there, because we don't know what the answer is.		Results

Deferred

CHAIRMAN WALLIS Sept. 2006	What do you do about how well the emergency response actually works? Do you have any good idea about how well it's going to work? (pg. 271)	Mr. Schaperow: Yes. One of the members of our team is an emergency preparedness specialist. He's probably better to address that than I can and unfortunately he's not here today. So I would like to punt on that for now.	Verification
DR. CORRADINI July 2007	Okay. So what are some of the notable ones between 10 to the minus 8 and 10 to minus 6 that we'll be eliminating? Are there an notable ones?	MS. SHIU: I think we need to discuss those results in this afternoon's session.	Sequences (general)
DR. KRESS July 2007	Does [the model for release of fission products from the fuel] include a consideration of burn-off or is it just sort of an average? Because some of the MERCORS tests went to high burn.	MR. SCHAPEROW: Yes. I think it's meant to cover that, the higher burn-offs; but I'm not sure. I can get back to you on it.	Code
DR. APOSTOLAKIS July 2007	I don't understand this. I mean, why can't I use the same argument [that evacuation didn't help people in the wake of Katrina] and say during the level 1 PRA, our operators are well- trained, they have emergency procedures, they [the public] will do the right thing? We were saying that before TMI, until we realized that we have to include the probability of error. So why can't I say that in level 1 PRA and I can say it here? I mean, it seems that the assumptions are to optimistic.	MR. JONES: Well, we're not stating that a 100 percent of the public -- and I'm sure we'll discuss this this afternoon -- will evacuate. But they generally follow the rules -- the orders of public officials.	Evacuation

Status

Members	Questions/Comments	Remarks	Issues
DR. MAYNARD July 2007	I think they're saying the same thing in emergency evacuation. That in general, the public's going to obey the officials but not in all cases.	MR. JONES: Not in all cases, and we will account for that and you'll see that this afternoon.	Evacuation
DR. KRESS July 2007	That's where I would think the second bullet might break down because, you know, you tell me there's going to be a nuclear power accident, and I want you to stay home, and say I'm going to get the hell outta there. So is a lotta people. So is that part of the modeling?	MR. JONES: Well, you'll hear a lot more on that on Thursday. That really was looked at in the protective action recommendations project. But it's definitely an element. I doubt that it's something we'll be using with this project because of the source term.	Evacuation
DR. APOSTOLAKIS July 2007	What's the time scale here? How many hours are you looking at?	MR. JONES: That will be dependent on the source term and we'll be getting into that this afternoon.	Evacuation
DR. KRESS July 2007	In the event of an external event, earthquake, does that change your modeling assumptions?	MR. JONES: No, it doesn't change our assumptions, and I don't know if we want to discuss that this morning or this afternoon.	Evacuation
DR. KRESS July 2007	Are you still using the linear no-threshold?	MS. MITCHELL: We'll discuss that this afternoon.	Dose Estimate

Deferred (Probably answered)

DR. KRESS Sept. 2006	...PRA analysis, Level 3, we add up the endpoints. Which includes basically all of the sequences that we stick in there that have 21 endpoints that are important. Now what you're saying is that you're going to somehow curtail those endpoints and pick out only certain ones and not add in the others? (pg. 212)	Ms. Laur – We are going to address that in a slide and if we could hold that question until then.	Procedure

Deferred/closed

DR. BANERJEE Dec. 2006	Because things are changing in real time, right?	MR. SULLIVAN: yes, it's perfect. I'm going to get to that in just a slide or two. So bear with me.	Release

Disagreement

Status

Members	Questions/Comments	Remarks	Issues
DR. APOSTOLAKIS July 2007	We should have more frequent meetings before things are cast in stone and the staff is defending what they have done [with the cutoff frequency], to death. I don't know. But if I see this in the fall, I'm going to write additional comments, if the committee doesn't agree with me. Because this is not acceptable and I think Commissioner Jaczko, in his dissenting comments, talked about a complete picture of risk and that he disagree with the cutoff.		CDF

Open

DR. CORRADINI Sept. 2006	Have they done the equivalent of a Level 3 on one of these sorts of plants that you could actually do a one-to one comparison based on tool as well as assumptions? (pg. 226)	Ms. Laur - I don't think so. That's certainly something that we can investigate.	Verification
CHAIRMAN WALLIS Dec. 2006	Well, I'm just wondering when you ask if people believe it, I mean, the question is when you present these results, how are you going to present them in terms of the sort of range of the uncertainty around what you're presenting and all of that? That seems to be a rather awkward, but essential thing you have to do.	MR. SULLIVAN: Well, we're certainly open to guidance. I mean, we don't know how the results of the study are going to be presented yet. That has really not been decided. We're still looking.	Uncertainty

Suggestion

CHAIRMAN WALLIS Sept. 2006	I think it would help -- If you make this presentation again, it would help to give us a sketch of the kind of outputs you expect to get out of this thing and how you would present them. It would be very helpful. (pg. 232)		Presentation
DR. APOSTOLAKIS Sept. 2006	I would rather have a detailed subcommittee meeting where you guys will tell what you plan to do and you hear from us what we think you should be doing and come up to some sort of understanding. (pg. 234)	Mr. Eltawila: That's very high – This meeting is intended to be at a very high level just to introduce the subject. We are planning to have frequent and more-than-you-need meetings to discuss all the aspects of the program at a subcommittee meeting. We want everybody to go out with us that we are all in it together.	Presentation

Status

Members	Questions/Comments	Remarks	Issues
MR. CANAVAN, EPRI Sept. 2006	...A lot of this information for example from the Level 1 current PRAs of the existing units have plant damage dates which are binned accident classes. So a lot of this screening work that you're talking already sort of exists, at least at the sites...But the other part, scenario grouping, so much of this is probably already available from a willing site if they are willing to donate it and the second part, so boxes on the left-hand side of your diagram are probably complete at many sites and then the next part was on the containment of failure modes and characteristic size and locations. A lot of sites, almost all, have a Level 2 or at least a LERF analysis which would indicate for those plant damage dates what failure modes and locations were analyzed. So that information is available as well again from a willing site. So maybe it can be done in three years if you [the staff] doesn't redo it independently. (pg. 267-268)	Ms. Laur: As I indicated in the beginning, we are very interested in engaging in work together and get the information that's necessary so that we can move this project successfully forward.	Procedure
CHAIRMAN WALLIS Sept. 2006	This is one of the biggest public concerns you hear at public meetings is that the emergency response plan isn't very reflective of what will actually happen. I think that if you're going to respond to public concerns you may need to put some effort into making emergency response evaluation realistic. I don't know how you're going to do it but it is a public concern that we hear about. (pg. 272)	Ms. Laur: We recognize this is a very important part of this analysis and that's why we do have an expert both on our side of the house and on the Sandia side so that we try to accurately model evacuation.	Procedure
DR. APOSTOLAKIS Sept. 2006	...As you progress and you derive results for individual units, are you going to go back to the licensee and see whether they agree or disagree or whatever? That's what the SPAR models did. They went back and they said "Okay, here is the model we have for your unit. What do you guys think?" And they pulled out their PRA and there was some give and take and there was some consensus at the end. (pg. 276) -- ...What I'm talking about is a much more serious interaction where you tell the guy "Look. This is what we're getting for your plant. What do you think?" And you give those people some time to review what you have done so that they will pass judgment. (pg. 277)	Ms. Laur: You know we haven't really thought through exactly what point in the project we're going to engage all the stakeholders. But we do plan through the process to engage all the stakeholders, not just industry, but any public that's interested in this project. -- I mean we envision that we will have that level of interaction. It's always better to include people up front.	Procedure
CHAIRMAN WALLIS Dec. 2006	But you can't just pick numbers of miles. I mean, if you're still killing all of the people at 1,000 miles, you should go to 2,000 miles. You go on until you stop killing people.		Distance Threshold

Status

Members	Questions/Comments	Remarks	Issues
DR. CORRADINI, DR. BANERJEE Dec. 2006	No, and that's what I -- you misunderstand my point. My point is what Sanjoy is getting at or what Graham is getting at is there are cruder calculational methods that would give you some insight as to whether 50, 250 or 1,000 [miles] is reasonable. -- If you take a very simple decay law or whatever, you know, you can do much of this by hand.		Distance Threshold
DR. CORRADINI Dec. 2006	If you were able to build 100 plants with 10 CFR 100 and [TIS] 14844, it would seem to me you could do a hand calculation to see what the global parameters might be. I'm curious if you did that.		Results
DR. CORRADINI Dec. 2006	Yeah, it was before you were there. I apologize. but the doctoral student at the time indicated that sheltering was by far the most reasonable thing to do beyond a very few miles out. So I would be very curious to see if you change your evacuation strategy within this context what interesting results you'd get relative to that. I think there's a lot of interesting stuff that can come out.		Evacuation
DR. APOSTOLAKIS July 2007	I would change the argument and argue the complete opposite, precisely because this is done because the previous studies have been misused. You have to be very careful, to make sure that what you present is real, in the sense that it is consistent with what the state of the art is. It would be a disaster, I think, if you come out with very low numbers of current depths, say, and then somebody points out that it's because of the analytical method you use. Then why are we doing this? And I don't know that the 10 to the minus 6 sequence is more real than a 10 to the minus 9. Both of them are incredible to me.		CDF

Status

Members	Questions/Comments	Remarks	Issues
DR. BONACA July 2007	I think the point that George is making has merit, so I think that as you review, once you do this, you have to evaluate what it means to go beyond 10 to the minus 6, and see what the effect is.	MR. TINKLER: I have not read the [EPRI] study you refer to, but again, I believe that the thrust of that additional consideration by EPRI was to show that that residual risk, if you will, was very, very low, and so in order to buttress their arguments on the issue of completeness, they opted to do that additional calculation. But to the extent they demonstrated that residual risk is quite low, there would be no reason for us to believe that we would generate results that would be, in any way, different from that general concept. I mean, the use of a cutoff, of a threshold we believe is supported by such a conclusion, and as a last proffer on this, I would say that using values we are, we're selecting, are already a very small fraction of the safety goal. We're not excluding anything that would be, by definition, quite large. I mean, we're --	CDF
DR. KRESS July 2007	There's a difference in my mind between a code like MACCS2, to predict the sort of risk profile, as opposed to what you'd use in an actual accident. You want to track a plume and have some sort of emergency plan that relates to what was ongoing at the time. So you might use a different kind of -- for that.	MS. MITCHELL: For emergency decision, the NRC would use a code called RASCAL -- which calculates the EPA guideline, which is a four day groundshine, in order to avoid a dose that you would get with a four day groundshine, you would recommend an emergency response. So that code is a different code. If you really had an accident and you wanted to evaluate after the fact, what is the consequence from that particular accident, you have other considerations. You will have data, you will actually have measurements off site of deposition of radionuclides and you would have to have a process that would ingest that data.	Code

Status

Members	Questions/Comments	Remarks	Issues
VICE CHAIR CROFF Nov. 2007	My suggestion is, if you don't have to do collective dose and latent cancer fatalities, don't. In other words, communicate in terms of individual dose and distribution of individual dose, and doses across the population as a function of geography. And that avoids an awful lot of complications. I think if you feel -- if staff feel compelled to go to latent cancer fatalities or collective dose, given that for many of the exposed population, you're below observable effects, and it's unknowable in that region. -- And you're not likely to know at any reasonable time in the future. I think you would have to look at the range of thresholds. In other words, you don't know what the right answer is, you can't defend, as far as I can tell, any particular threshold. I mean, you've got an HPS opinion, but okay, it's their opinion. I think you're going to have to look at the range and portray the range out there. And basically say, "We do not know in this range. It could possibly be zero, which is LNT. It may be something else, but for these set of assumptions, here's what it looks like, and that's that." That's just one person's opinion at this point. But that's what I come to after hearing what you've said so far.		Results
CHAIRMAN RYAN Nov. 2007	How about this as an idea. This is maybe out of the box thinking, but if you reported a stratified table of doses, this percentage of the exposed population in these sectors by miles out or however you want to do it, received -- 500 millirem to a rem, and 100 to 500, or less than 100. Aren't you accomplishing that single picture? -- You don't have to answer that this minute, but that's an alternate view that takes out all this complexity of trying to turn that very clear dose calculation into a stratified estimate of fatal cancer risks.		Results

Status

Members	Questions/Comments	Remarks	Issues
DR. WEINER Nov. 2007	I wanted to, first of all, say that I think the committee -- Allen has made my point very well. But I'd like to add to it, and respond to what you said about risk communication. When you report latent fatal cancers, no matter how small the number is, in comparison with any other number, what the non -- relatively less-informed public takes away from this is, NRC says that this accident is going to give you cancer. That's what they take away. That's what you're communicating. And one of the problems with communicating in terms of latent cancer fatalities is that that is what the public hears. And you're sending -- the public does not say, "Oh yes, but I'm way more likely to get cancer from smoking cigarettes, or from, you know, getting my teeth x-rayed, or whatever." The public says, "Yes, this accident, which is a horrible accident, Chernobyl, is going to give me cancer. And how do I know that my Aunt Susie's cancer did not come from this accident?" There is a real risk in reporting that way, and I would second, whole-heartedly, what the Chairman just said. Doses are reported everyday in the popular media. Rem is defined in Webster's Collegiate Dictionary. People are used to seeing dose. You're not talking an arcane language here. I think the Chairman made an excellent point. If you reported a table of doses --		Results
MR. LYMAN Nov. 2007	...I'd like to address the risk communication issue. And in our view, the best way to communicate with the public is to present an honest assessment of the scientific data and uncertainties including different approaches to discussing the concept of the consequences of a severe accident.		Results
MR. LYMAN Nov. 2007	We don't believe that there is peer reviewed documentation to support at this point using thresholds for radiation protection purposes. We have the outcome of the BEIR VII study, and people had the opportunity to convince the panel otherwise, but they were unsuccessful, so right now you are faced with an international radiation protection community and the recommendations of agencies that there should be no threshold. So if you are going to run calculations with thresholds, you need to either document why that number would be appropriate with peer reviewed scientific evidence, or explain why that isn't available.		Results

Status

Members	Questions/Comments	Remarks	Issues
MR. LYMAN Nov. 2007	...I appreciate that you're planning external peer reviews, and I might suggest that you might seek actually submitting a summary of your methodology to a journal like Science Policy Forum or something. That, I think -- going through a peer reviewed process like that would add enormous credibility in the eyes of the public to what you're doing. But I don't agree with the approach of trying to couch the results in a way so that you don't frighten the public. You should be honest about what you're providing.		Procedure
Dr. APOSTOLAKIS Dec. 2007	It would be nice to know why there are differences. If you find different -- if I go to the Peach Bottom evaluation in 1150, they give me -- well, all five plants, actually. They give me fatality curves, latent cancer curves, and so on, and they give me the dominant contributors. I mean, even if it's not part of your objective, wouldn't you be curious to know whether your results are different? And if they are different, why they are different? You may come back and say because we did a better job, but to say I'm not even going to look at it, it's kind of -- doesn't make sense to me.	MR. PRATO: Well, there was one other point Charlie wanted to make, or Charlie made at our last meeting. And he said, With MELCOR, we do believe that additional large benefit is derived in looking at mitigating measures that has not yet been addressed in PRA, such as SAMGs, and other severe accident mitigation guidelines. -- MR. CHEOP: This is Mike Cheop. Let me try to address that. I think as part of the peer review process, as we are looking at accident sequences, we do ask ourselves why are we different from, let's say, 1150 And if you're different, what the reasons are. And we will convince ourselves what the differences are. And as we go forth into the Level 2 and Level 3 space, again, we do introduce a lot more, as Bob said, mitigative equipment. And we can't explain a lot of the differences through the different strategies that we're using, and the differences. We may not make a formal comparison, but we do, as part of the peer review, and our internal review process, try to convince ourselves as to what the differences are, and what's causing the differences.	Verification

Status

Members	Questions/Comments	Remarks	Issues
Dr. CORRADINI Dec. 2007	: Just to expand, I guess, what George is saying, make sure I understand the staff's position. So I think my way of saying it in some sense coming up with the same result that George is, if you took, and I'm going to pick Peach Bottom and Surry because they have an interesting historical, you can essentially take that and explain the differences. And I think that's kind of what I get from George is after, is explain the evolution of your insights, both in terms of modeling, in terms of additional measures that have been taken care of, and you can go all the way from WASH-1400 through 1150, through - and I was going to ask something about that, through a current, if they had, or if they do have a Level 3, and really then show what you've done, both in terms of methodology, models, and improvements. And that, I think, would help drive home the improvements that you have with SOARCA. I guess that's the way I view --		Procedure

Unconfirmed

DR. KRESS July 2007	Does that molten cool modeling include fission product release from the molten cool?	MR. SCHAPEROW: I believe the fission products, the volatiles devices will be released before it gets to that stage. I don't know.	Code