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Meeting Title: Brief by Westinghouse on AP600 Design Certification

Meeting Date: 4/7/94 Open X Closed _____

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Title: BRIEFING BY WESTINGHOUSE ON AP600 DESIGN CERTIFICATION

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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BRIEFING BY WESTINGHOUSE ON AP600 DESIGN CERTIFICATION

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PUBLIC MEETING

Nuclear Regulatory Commission
One White Flint North
Rockville, Maryland

Thursday, April 7, 1994

The Commission met in open session, pursuant to notice, at 10:00 a.m., Ivan Selin, Chairman, presiding.

COMMISSIONERS PRESENT:

IVAN SELIN, Chairman of the Commission
KENNETH C. ROGERS, Commissioner
FORREST J. REMICK, Commissioner

STAFF AND PRESENTERS SEATED AT THE COMMISSION TABLE:

JOHN HOYLE, Assistant Secretary

MARTIN MALSCH, Office of the General Counsel

HOWARD J. BRUSCHI, General Manager, Advanced Technology, Westinghouse

DR. LARRY AOCHREITER, Consulting Engineering, Nuclear Technology Division, Westinghouse

ROBERT M. VIJUK, Project Manager, AP600 Design Certification, Westinghouse

BRIAN A. MCINTYRE, Manager, Advanced Plant Safety and Licensing, Westinghouse

RON P. VIJUK, Manager, Systems Engineering, Westinghouse

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

10:00 a.m.

CHAIRMAN SELIN: Good morning, ladies and gentlemen.

The Commission is pleased to welcome representatives from Westinghouse to brief us on the status of the AP600 design certification program. Our last briefing was two years ago, at which time Westinghouse described some enhancements that they were making in the testing program. So, I expect that the testing will be a major part of the discussion this morning.

The AP600 is the first advanced passive design submitted for design certification. It has occasioned quite a bit of interest around the world. Almost every place I go people ask me about the system. So, it poses both unique challenges and unique advantages. So, we're looking very much forward to hearing what you have to say both about the system substantively in the test program and from a programmatic point of view just how things are proceeding.

Commissioners?

COMMISSIONER REMICK: Just one comment. Scanning through the viewgraphs, I see you're going to

be talking about a lot of tests. If you could identify where those tests were conducted, I think it would be very helpful.

MR. BRUSCHI: We will.

CHAIRMAN SELIN: Mr. Bruschi?

MR. BRUSCHI: Yes. Good morning. I'm Howard Bruschi. I am General Manager of Advanced Technology for the Energy Systems Business Unit of Westinghouse. Today I have with me, to my far left, Brian McIntyre, Manager of Advanced Plant Safety and Licensing. To my immediate left, Bob Vijuk who is the Project Manager of the AP600 design certification program. To my right, Doctor Larry Hochreiter, Consulting Engineer for the Nuclear Technology Division of Westinghouse, and to his right, Ron Vijuk, Manager of Systems Engineering who is here to answer any detailed technical questions that may arise.

(Slide) May I have the first slide, please, or the second slide?

Since we last met, we've made significant progress towards design certification of the AP600. As you mentioned, Commissioner Selin, the purpose of today's meeting is to provide you with a status of that design certification program and, in particular, to provide you where we are and what are some of the

issues that are being discussed with the staff?

We submitted a safety analysis report in June of 1992. It was the most complete application submitted under Part 52. It contained over 12,000 pages of text, figures and analysis.

In December 1992, we followed up with the ITAAC submittal which incorporated industry lessons learned which made the application complete at that time.

The NRC review, of course, is well underway. I can say that I am very pleased to see the detailed interactions taking place between Westinghouse and the NRC staff and the membership of the NRC. It has progressed to the point that the staff is conducting audits of our work and visited the test facilities to witness testing. Response from the staff that have witnessed tests has been quite positive. We've received many RAIs from the branches. We, Westinghouse, need to receive the remaining RAIs now, at this time, in order to preserve the schedule that we've discussed with the NRC for both DSER application or submittal as well as the FDA. Through these RAIs, it's become evident that there are no show stopping technical issues which I think is significant.

Focus, of course, has been on testing. It is a key part of design certification and, as you've noted, we met two years ago to indicate the agreement that we had with the NRC on the testing program. We need assurance. We need assurance now that the testing matrix as we are executing it will provide the information necessary to verify and validate our computer codes.

The testing program closure with the staff I feel is near at hand. We have a meeting scheduled following this meeting to ensure agreement on the testing matrix. Doctor Hochreiter will discuss more details on the status of the major testing programs following my introduction.

Another subject is the AP600 regulatory treatment of non-safety systems. We've got a high level agreement between the NRC and industry which we think was a significant step forward in the AP600 review. It provided guidance for both Westinghouse for implementation and for the staff to use for their review. Now the challenge is to work out the details of the regulatory treatment of the non-safety systems. Brian McIntyre will discuss some of those details in his presentation.

(Slide) May I have slide 3, please?

Westinghouse is quite committed to the AP600. We believe strongly in the future of standardized plants the size of the AP600. An NPOC survey that was performed in late 1992 indicated that of those utilities that were considering nuclear energy as part of their portfolio for energy additions to the baseload capacity in the next decade, 74 percent of them preferred the mid-sized passive plant. Twenty-two percent had no preference between the mid-size passive plant or the larger evolutionary plants.

The AP600 complies with the Advanced Light Water Reactor Utility Requirements Document. This has been a key part of the AP600 program for Westinghouse since it clearly then would represent the desires of our customer base, the utilities.

Last year, we transitioned from a functional organization to a project organization. Now, this provided a focus group whose sole mission is to achieve design certification for the AP600. This was instituted in part because of the slippage in schedule we had at the Oregon State University test facility. We think with this team in place we have the necessary focus to ensure that schedules are met here and after.

With regard to schedule, we have developed

quite a detailed schedule and have discussed this with the NRC staff. It contains over 6,000 logic ties in the schedule. It's been formally submitted to the staff as requested in their March 7th letter. Bob Vijuk is going to discuss this schedule in more detail later in his presentation.

Key milestones about which Westinghouse and NRC have had recent discussions show that our respective schedules aren't consistent with respect to issuance of a draft SER in the fourth quarter of 1994 and the issuance of a final design approval in the June/July 1996 time frame.

The AP600, about a year ago, was awarded a first-of-a-kind engineering contract, which I think is quite significant. The purpose of first-of-a-kind engineering is to ensure that enough detail work is done on the plant to enable a plant designer such as Westinghouse to quote a firm price, firm schedule plan. Support for the AP600 was provided by all 16 utilities voting for this contract. Fifty percent of those utility voted all of their support for the AP600. This is yet another indication of the strong support that the AP600 has from the utility community here in the U.S.

With regard to international

participation, this has increased significantly over the last few years. At the time that the safety analysis report was submitted, there were approximately 50 engineers from ten organizations representing six countries working on the AP600. Now, during first-of-a-kind engineering, we have increased this number to over 80 engineers from 18 different organizations representing ten countries and there are two more countries that are interested in joining this program. So, again, this demonstrates support both in the domestic community as well as the international community for the AP600.

COMMISSIONER ROGERS: Could I ask just for a second?

DOCTOR HOCHREITER: Analysis as well.

COMMISSIONER ROGERS: Analysis?

MR. BRUSCHI: Yes.

COMMISSIONER ROGERS: As integrated into the team?

DOCTOR HOCHREITER: Yes. We team them up with Westinghouse engineers.

MR. BRUSCHI: There's three categories of participation. First is the category of engineers that actually reside in Pittsburgh. As Doctor Hochreiter indicated, they get assigned to our

management teams that become integrated within the management teams at the Westinghouse headquarters in Pittsburgh. There are engineers that are assigned to some of our subcontractors, again being assigned to the subcontractors with specific work assignments.

The second category are engineering groups that remain in their home countries, engineers that have worked with us in the past with whom we have a lot of confidence. So, we assign work packages to them, integral work packages that they work on. And the third category is the testing, which you'll hear more about with regard to international sites for testing.

As a final comment, our last briefing in March 1992, one of the key items we discussed was the integral systems test preformed at the SPES facility in Italy, full height, full pressure test. We have committed to run these tests. Let me say the NRC senior management has visited that facility and has indicated positive reaction to what they've seen both as a facility and with the first test that was successfully run on February 5th, 1994. The results from this first test was a small break LOCA test. The results were as expected, which I think is a good indication, good first indication of where we are.

Larry Hochreiter is going to give you some more details now about the test program, so let me turn the microphone over to him unless you have questions from me at this time.

CHAIRMAN SELIN: Never say that. If there are questions, you'll get them.

DOCTOR HOCHREITER: I'm Larry Hochreiter.

(Slide) Could I have the next slide, please?

When we structured our test program for the AP600, we considered many different elements. For instance: what systems are different; comparing the plant, the AP600 plant to current PWRs; what design information is needed; what phenomena in particular are important for this type of a design; which codes and models we should be using to represent the different passive systems in the AP600 design; and then what data we need for code and model verification. So, we purposely structured the tests from the point of view of validating safety analysis codes such that we could predict then with confidence the AP600 system behavior.

(Slide) Next slide, please.

This led us to generate a program that had a series of scaled and full-scale tests of critical

components such as the core make-up tank. This test is being performed at our Waltz Mills site south of Pittsburgh. The passive residual heat removal test, this test has already been performed at our Science and Technology Center in Pittsburgh. The automatic depressurization systems tests, these tests are being performed at the Vapore facility in Italy. The containment water distribution tests, these tests were performed at our Waltz Mill site just south of Pittsburgh. And wind tunnel tests for the containment, these tests were performed first at our R&D center to get a scoping behavior of the wind effect around the containment, and then we've run a series of test at the University of Western Ontario where they have a larger boundary layer wind tunnel.

Now, the objective of these tests are to provide a basis to develop particular component models which will go into the safety analysis codes to represent those particular phenomena that you'd expect to see for the core make-up tank, the passive residual heat removal system and so forth. We then also have the integral tests. The SPES full height, full pressure test is the test that's being run over in Italy at Piacenza. This is 97 heater rods, full height, full modeling of all the systems in the AP600.

The Oregon State University test is out of Corvallis. This is a reduced height, reduced pressure facility with the emphasis being to examine the small break LOCA and the transition into long-term cooling. So, we simulate the full complement of the AP600 systems, including the RWST and then into sump injection. So, these transients cover the long-term cooling behavior, starting with an initial depressurization.

The small-scale containment test has already been performed at our Westinghouse Science and Technology Center. This is a three foot diameter, 25 foot high vessel where we put steam on the inside and we simulate the water flow on the outside so that we get the integral effects of the condensation in the water distribution. Then we have a large-scale containment test also performed at our Science and Technology Center where now we've tried to maintain a better aspect ratio of the containment height to diameter. So, we have a 15 foot diameter vessel roughly 25 feet high. All these tests now provide a basis to validate our codes when they're applied in a system manner. So the component tests will give us the information to develop models, the integral tests give us a way of verifying the integral behavior of

the codes when we predict these types of transients.

Then the methods that we're using to try and predict these transients, we're trying to use the best estimate thermal hydraulic computer codes to do this primarily to get a more accurate prediction of the phenomena. Not necessarily to generate margin, but to understand better exactly what's happening.

(Slide) Next slide, please.

Well, we've had, as Howard Bruschi indicated, frequent and detailed interactions with the NRC staff. We've had specific meetings on every one of these tests. In fact, several meetings on each test where we've gone through and looked at the design of the facility, the instrumentation of the facility, the test matrix, pre-test and engineering analysis that we performed on the facility as well as the test results. We've gotten RAIs which we responded to on the test program and we have a weekly phone call with the staff to advise them of the status of each one of our test facilities and test programs.

We've submitted to the NRC numerous documents that describe the tests, W caps on completed programs with the data. We've submitted day of test reports and quick look reports on some of the data, as well as research reports where we've had contractors

do work for us, and the staff has visited all the facilities where we're running these tests.

(Slide) Next slide, please.

The interactions with the staff have been positive. We've gotten a lot of very good suggestions from the staff and their consultants and we've tried to integrate that into the test program. We have had actually the luxury of having a preoperational period where we shake down the test facility and so we look very carefully at the design, the instrumentation and so forth and we've gone back in many of the tests and have upgraded the instrumentation because of things that we've found out in these preoperational tests. At that time when we upgrade the instrumentation, we bring into the facility design any comments that we've gotten back from the NRC, particularly with regard to instrumentation. That's helped and it has made the test better.

We have had issues with the staff on the tests, primarily on the test matrices. There is a letter issued in November which listed what the staff considered as open items on the test program. We've been meeting on a very regular basis with the staff, trying to get closure on these items and we'll have a meeting this afternoon, hopefully to get closure.

We're very close, I think, to closure. They've looked at the program very well. I think there are just a few residual open items that we have to discuss with the staff.

(Slide) Next slide, please.

Now, we've also had the ACRS involved in the program, basically from the onset of the test program and the AP600 program. We've again had very specific meetings on a given test with the ACRS. This has been primarily the Thermal Hydraulic Subcommittee, Doctor Catton's committee. In fact, recently what we've been doing is we've been having back to back meetings, first with the staff one day, then with the ACRS the second day. We did that at Oregon State. We just did it last month on the core makeup tank test. We've had the staff and their consultants visit the facilities. We've already had a meeting out at Oregon State, so everybody got to see the facility out there. Doctor Catton has been at SPES. They visited the CMT and the containment tests last month. We made presentations both to the Thermal Hydraulic Subcommittee and the Advanced Plant Subcommittee and to the full Committee.

(Slide) Next slide, please.

Now, we do have a point of difference with

the ACRS, and it's been primarily on scaling. The discussion is not whether you should do scaling or not, but the degree in level and effort involved. What the subcommittee and the consultants would like would be a very detailed scaling analysis for the majority of the facilities which is consistent with the severe accident SASA methodology which was used for severe accident scaling. Now, we have applied that selectively on our facilities where we thought the issues, scaling issues were paramount. In particular, on the Oregon State facility, because this is a reduced height, reduced pressure facility, where we're looking at trying to model the entire range of phenomena that you'd expect to see in the AP600, we produced a three inch thick scaling report on that facility and used the scaling results directly in the design of the facility. We had three reviews with the ACRS and the NRC on that and they more or less concur with the effort. We got very good compliments from them for that effort.

On the SPES facility, the design of the facility and the scaling and basis for the facility is it's simpler because it's full height, full pressure and it's power to volume scaling. We have submitted a scaling report on that and I don't think there's any

issues with that right now. We have identified the atypicalities in the facility and shown how we've addressed those.

For the core makeup tank, we had originally done geometric scaling on the core makeup tank. At the request of the staff, we did produce a scaling report on the core makeup tank which is similar to the level of effort that we -- well, not the level of effort, but the detail that we did on the Oregon State test facility. We just had a review last month with both the staff and the ACRS and the ACRS would like us to have more detail in that report.

On the containment tests, we took a different tact. There we used geometric arguments to establish the facility, the design of the facility, and then concentrated primarily on the models that you would use to represent the heat transfer and fluid mechanics inside the containment where test versus facility. In the terminology of the PISM report or PASM report that the NRC generated, this is a bottom-up scaling approach. What the ACRS would like to see would be more of a top-down scaling approach. So, we're evaluating that right now. But we're using scaling basically to support the code validation. We believe that our computer codes can help us examine

these facilities and give us information that can help scale the facilities.

(Slide) Next slide, please.

Again the ACRS interactions have contributed to development of our test program. The meetings that we've had with the members and the consultants have given us good information, insight, things to look for, tips on better ways of instrumenting things, tips on ways of running some quick and dirty shakedown tests to verify some of our measurement systems and again things to look for. For instance, Doctor Catton had alerted us to the possibility of rapid condensation at the top of the CMT from his own experiences in the aerospace industry. We were aware of that and it was confirmed in the experiments that we did run.

So, the suggestions that we've gotten from the ACRS and their consultants, we have again tried to factor those back into the program to make it a better program.

(Slide) Next slide, please.

Now, we have been running experiments since 1988 and we have been able to integrate some of the early test results into the SSAR analysis. We had completed the small scale containment systems tests.

This is the three foot diameter vessel, 25 feet high, and we had completed some of the initial baseline large scale containment systems tests. Those were documented in the SSAR and we used those to support the W Gothic containment analysis computer code.

We had completed the residual heat removal systems tests. From those tests we developed heat transfer correlation for the outside of the PRHR heat exchanger and that went into our LOFTRAN system analysis code and into the SSAR. We had also completed the high-inertia rotor pump bearing test. That gave us the coast-down time for the RCPs for the AP600 which we again then factor into our transient analysis.

Using these test results --

COMMISSIONER REMICK: Excuse me. Are all those done in Pittsburgh, those four?

DOCTOR HOCHREITER: Yes, all four were done in Pittsburgh.

The results of those, along with our analysis again, confirm that we had plenty of margin in the AP600 design.

(Slide) Next slide, please.

Now, what I was going to do was to go through and give a status on each of the major tests

that we're examining for design certification. The first one is the SPES facility and again it's a full height, full pressure. This test is being run in Piacenza. The first test we ran was a two-inch cold leg break test. This is a break from full temperature, full pressure scaled power conditions. The test operated -- the facility operated very well. The tests met our expectations. All the systems functioned as they should function. The system depressurized as it should. We got into a stable IRWST injection. The core, the rod bundle in the core never came uncovered, so the test was very much a success.

COMMISSIONER REMICK: The data acquisition system worked?

DOCTOR HOCHREITER: Yes, it did. We got a lot of data, a lot of plots. There's about 600 channels of instrumentation on this facility.

COMMISSIONER REMICK: Elaborate system.

DOCTOR HOCHREITER: Yes, and the frequency is very rapid, just like one sample a second.

Now, that test was run on February 5th. Everybody was flushed with success, so they immediately started planning the next test for the next weekend. We run these tests on Saturdays and we

started to power up for the next test a week later and we found that we had leakage in some of the gaskets in the power channel. So, we had to take the facility down and we've repaired those gaskets. There are other repair items that we did at the same time. In fact, we also put in some rods, additional heater rods. Not additional heater rods, but rods to more thermocouples, particularly at the upper elevations to give us more coverage there. Our next matrix test is scheduled for this coming Saturday.

So, this facility is operating as we had planned and the results are as we had anticipated.

The Oregon State --

COMMISSIONER REMICK: What's the reason for Saturday? Is that because of your electricity consumption?

DOCTOR HOCHREITER: That's right, the cost of power.

COMMISSIONER REMICK: I see.

DOCTOR HOCHREITER: It's a significant difference between during the week and then on a weekend.

(Slide) Next slide, please, 14.

The Oregon State test facility, this is the low pressure reduced height, quarter scale height

integral system test facility out at Corvallis. The construction of that facility is complete, with the exception of some of the break valves and piping. That's being completed as we speak. We have completed the volume check tests and actually I think this slide is out of date. We have completed the code preoperational test where we measure the pressure drops around the system. We're starting to get ready to run the hot functional test with a hot shakedown test this weekend. These tests will put power to the bundle and will examine force flow conditions, PRHR heat transfer under force flow and natural circulation conditions and the PRHR heat transfer under natural circulation conditions. We'll then begin matrix tests at the end of June. So, this facility is just about ready to start our matrix testing.

COMMISSIONER REMICK: Are you and the staff in agreement on the matrix tests yet at OSU?

DOCTOR HOCHREITER: The tests that we have proposed the staff has agreed with, to my knowledge. What they're looking for are possibly additional types of tests and that's really one of the open items that remains. What we've been trying to present to the staff is that we should be looking at phenomena, not the particular nature of the test. When we look at

the types of tests that they're interested in for the particular types of transients, we can show that the phenomena that you see for those transients is the same as the phenomena that we see in the tests that we've already agreed to in the matrix.

So, that's the type of discussion we've been having with the staff.

COMMISSIONER REMICK: Will you have that discussion today?

DOCTOR HOCHREITER: Yes, this afternoon.

COMMISSIONER REMICK: I understand that you have a new way of measuring break flow.

DOCTOR HOCHREITER: Yes.

COMMISSIONER REMICK: How confident are you that that will work?

DOCTOR HOCHREITER: I've used this technique before on our reflood experiments that we ran in Pittsburgh for the Committee's purposes. What we do is we simulate the break basically with an orifice that's the flow area that we want to model. But then we expand the mixture, put it into a phase separator, separate out the liquid and the steam and then we measure individually the components, the liquid component and the steam component. Then we recombine the flows and put them into either the sump,

if it's truly the break. Or if it's the ADS, we do the same thing with the ADS flows, we recombine it, put it through the sparger into the IRWST.

When I've used these on these experiments, these other experiments, we get very good mass balances. So, as long as the flow has expanded out, which we've designed it to do, you should already be at near containment pressure. We've sized the separator for the peak flows that we would expect. So, I think we'll get good data.

COMMISSIONER REMICK: Will you still be using a gamma densitometer?

DOCTOR HOCHREITER: No.

COMMISSIONER REMICK: You will not?

DOCTOR HOCHREITER: That was the purpose for using this measurement technique, because the range of conditions is so large when you start from a liquid system and then you depressurize it and flash the mixture, you're basically coming out with steam at the end. I think we'll have more reliability making two more accurate single phase measurements than trying to make a two phase measurement.

As I said, the matrix test will begin in OSU at the end of June.

(Slide) Next slide, please.

The ADS systems test, these are again the tests at the Vapore facility in Italy. Here we're modeling the ADS piping, the first three stages of the ADS piping. We have a sparger, full-scale sparger and this goes into a quench tank. Then we have a large supply tank, 1300 cubic feet, which basically provides the mass and energy source which we then depressurized down through the piping system itself. The construction on that facility has started. We're going to begin commissioning tests toward the end of June and then matrix tests will be completed at the end of October.

(Slide) Next slide, please.

The core makeup tank tests, these tests are underway. The core makeup tank that we're using in this facility is roughly a two foot diameter tank ten feet high. In the plant, the tank is 12 feet diameter and 20 feet high.

We've done a very elaborate series of preoperational tests. When we ran some of the preoperational tests, what we saw was very rapid condensation when we had the tank initially full of water and we brought steam to the top of the tank. We would get a steam jetting effect, a large degree of mixing which would delay the injection of the water

out of the core makeup tank because you would have such rapid condensation at the top of the tank. So, what we did was design a steam distributor which distributes the steam, slows the velocity of the steam down and gives it a radial direction of flow rather than axial direction of flow. We looked at three different designs, trying to optimize the performance of these designs. We've chosen one and then scaled all the other facilities, SPES, OSU, with the same type of design. We've given that information to the NRC and they've then scaled ROSA to include this type of a sparger in the core makeup tank.

When we put that sparger into our tests and run the same type of test, what we find is a still rapid condensation, but the time period that that occurs is much shorter because you build up a hot layer of water and then the tank drains as you'd expect.

So, we spent a lot of time running those types of tests. We then went through a period where we modified the facility, we put in additional instrumentation, some of which had been suggested by the staff and by the ACRS and their consultants, and then we've started rerunning the matrix tests and we're in the process of running the matrix test right

now.

(Slide) Next transparency.

The passive containment cooling tests, basically all the testing is complete. We have completed the small scale systems test, we've completed three series now on the large-scale integral containment test, the 1/8th scale test. The third series of tests that we ran we ran specifically to look at addressing RAIs which we had already received from the staff. So, we felt the best way of addressing those was by running a particular test that addressed the issue that the staff had raised. We've also run two series of water distribution tests and we've run two series of wind tunnel tests. So, the testing for the containment is basically completed.

As part of the program, we did run a blind test and we have locked that data up. We are in the process of completing the documentation of the data. The Westinghouse analysis people do not see that data. We will be doing a blind prediction for that test, then the data will be released to the analysis people. We have been releasing to the staff quick look reports with the data from a number of the large-scale integral tests and the staff has started the analysis of the tests as well as us. So, that program is --

the testing portion of that program is basically completed.

COMMISSIONER REMICK: Do you know if the staff has benchmarked the NRC codes with the data?

DOCTOR HOCHREITER: They're doing that right now.

COMMISSIONER REMICK: They're doing it now?

DOCTOR HOCHREITER: Yes. I know that they've released -- we released more reports to the staff than they have released to their contractor doing the analysis. So, they're waiting to get some analysis back from their contractor before they release the rest of the reports. That particular program has worked out very well, I think. They're getting the data now and they're able to do their calculations on it.

COMMISSIONER REMICK: Is the contractor in this case INEL?

DOCTOR HOCHREITER: I believe the contractor is Los Alamos and Sandia is also involved.

(Slide) Next transparency.

We also ran some additional DNB critical heat flux experiments. The reason for this was that in the AP600 we have canned motor pumps. Now, we've

taken pains to increase the inertia of the pumps, but the pumps do coast down faster than pumps in existing Westinghouse reactors. So, the concern was that we would be at the low flow limit of our DNB correlation. So, we've specifically run tests to expand the database down into the lower flows that you would get for transients like steam line break or loss of flow or loss of power to the pumps and this type of thing.

The testing was completed at the end of February and they've started the analysis of that data. The intent will be to extend the correlation with the same confidence down into the lower flow range. That correlation will then go into our transient analysis codes and then when we run the other Chapter 15 transients we'll be using that correlation.

(Slide) Next slide, please.

So, in summary, we believe we've got a well thought out test program and it's been coupled to the analysis because we've allowed the analysis to indicate the areas where the data was needed for computer code validation. The purpose of the program is really to generate that kind of data so we can validate our computer codes and then use those codes with confidence to predict the AP600 system behavior.

The data that we do generate we'll be using for our codes, but the NRC will be also using to validate its own codes. We've come up with a method where we're trying to get them early release of the data so that they can start their work doing the code analysis.

We believe we've benefitted from the reviews that we've had with the staff and with the ACRS. I really think that we've been able to come up with a very good working relationship in this fashion because everybody is basically in the same boat because we're all going to use the same data. So, that, I think, has really helped us. We do have open issues and we will be working to close those issues with the staff.

CHAIRMAN SELIN: I have a couple questions. First, a generic question. How much, if at all, does your test program depend on anything coming out of the General Electric program?

DOCTOR HOCHREITER: Nothing that I'm aware of. Nothing.

CHAIRMAN SELIN: Okay. So, it's completely independent from --

DOCTOR HOCHREITER: Yes.

CHAIRMAN SELIN: Second is quite a different question. This set of tests, of course, is

more to validate the analytical methods and the codes. I have a question concerning a particularly important subsystem and that's the automatic depressurization system. Could you -- it's a system that has to operate in some ways in a very sensitive fashion based on small changes to, say, small break LOCAs and yet has to be able to be very robust if there are large changes where the compliance could be quite considerable, the challenge could be quite considerable. Could you describe in broad terms just how the components in the system are to be demonstrated?

MR. RON VIJUK: I can speak to that, I think.

DOCTOR HOCHREITER: Okay.

MR. RON VIJUK: We are in Vapore in Italy running the ADS tests. We are running as part of design certification to provide the information for the codes, what we have called systems tests. This is to get the overall thermal hydraulic performance of the system, that is the piping and components, from the pressurizer through the spargers in the large tank inside containment and the behavior of the sparger itself.

We ran in '92, I guess it was, single

phase steam tests in that system. We will be running this year two phased tests in that system. At this stage we will have modeled the piping and simulate the valves in the ADS package that sits on top of the pressurizer. In tests outside of certification, we will be qualifying specific valves and selecting specific valves as part of the first-of-a-kind engineering program and that will --

CHAIRMAN SELIN: I have a concern. It's not analytical concern, it's more of a gut engineering concern about the ability of the components, particularly the valves, to operate reliably with large challenges and still delicately with small challenges. Now, this is clearly not an analytical question, it's a question of qualifying the valves in a very large range of environmental questions. Could you talk a little bit more about how that --

MR. RON VIJUK: Sure. The main technical concern or engineering concern with these valves is that they see high delta p, high flow rate and they have to be able to stroke open.

CHAIRMAN SELIN: Right.

MR. RON VIJUK: There are a number of engineering things we're doing to make the valves reliable. They are slow operating valves, first of

all. They don't need to open fast. We can open them slowly so you can size the operator and gear the operator so that you can open the valve with some confidence that you can get the thrust on the --

CHAIRMAN SELIN: What do you mean gear the operator?

MR. RON VIJUK: Gear the operator?

CHAIRMAN SELIN: Yes.

MR. RON VIJUK: For a given size motor you can use gearing to put additional thrust on the opening mechanisms of the valve.

CHAIRMAN SELIN: I see.

MR. RON VIJUK: And when you open them more slowly, you can use a bigger gearing ratio. That plus we recognize that we have to qualify these valves and that's what we'll be doing in first-of-a-kind engineering and then it qualification tests as we go into the first procurement of these valves. This has been a significant issue with utilities and with the staff and we have discussed this in considerable detail the approach we are taking to qualify these valves. I think we have a sound engineering basis for proceeding as we go along.

CHAIRMAN SELIN: The slow opening, I gather, would also make them reasonably reliable when

you have small delta ps and small deltas when you need to be sensitive to, say, small breaks or slowly changing --

DOCTOR HOCHREITER: We have a large delta p with a small break.

MR. RON VIJUK: Yes. The biggest challenge on these valves is the small break, in fact. The small break LOCA, the system doesn't depressurize on its own and we're relying on these valves to more rapidly depressurize the system so the gravity injection systems can take over. It's the 2500 psi is what your initial delta P is across those valves and then you have critical flow basically going through the valve as you're stroking it open and subsequently. Verifying that the valves will stand up under that kind of flow condition is what we will have to do and is part of our plan to do.

CHAIRMAN SELIN: Thank you.

Commissioner Remick, did you have more questions?

COMMISSIONER REMICK: No.

CHAIRMAN SELIN: Okay. Mr. Bruschi?

MR. BRUSCHI: We'll continue.

CHAIRMAN SELIN: It's doesn't mean assent, but at least --

MR. BRUSCHI: Bob Vijuk is our next presenter and will discuss the AP600 design certification schedule.

MR. ROBERT VIJUK: Larry presented the test program as we know it today. What I'm going to discuss is the planning that went into the test program and in particular the scheduling of activities and associated activities such as code V and V. We have constructed an integrated schedule in considerable detail and we have shared that with the staff in considerable detail over the past six weeks. We believe we're in fair agreement on it too.

Let me start by pointing out that at the time of the last meeting two years ago, this program would have completed its tests by December of last year. That indeed has not occurred. Even though we've got substantial testing under our belt, there are these major ones that Larry talked about that are still ongoing and one yet to be started, the OSU test. We slipped for a number of reasons. We increased the scope of the program. The most dramatic change was the addition of SPES to the program and changes at OSU where we went from an originally planned 50 psi plexiglass model to an all stainless steel almost replica at quarter height of the AP600.

CHAIRMAN SELIN: My impression was that in spite of the fact that this was known at the time of your last presentation, you really hadn't had the chance to pour that back into your schedule. So there was a little bit of a disconnect between the guidance and the schedule that came out of the guidance in the 1992 presentation. Is that right?

MR. ROBERT VIJUK: That's correct. For example, on the OSU, the magnitude of the instrumentation and the system checks and the construction work that it would take to fit all of that equipment into that test bay they had out there was quite a challenge and we ended up applying multi-shift work where we had construction going on on day shift and cold flow and volume checks going on on second shift just to get to where we are. It took a huge effort. We're back on track now though and pretty confident that we will start testing as planned. Then the tests will play out.

CHAIRMAN SELIN: To say it differently, there was a slip, a one-time slip, but the relative dates have not shifted once you hit your first milestone. In other words, once you started testing, you don't expect the actual testing to take longer than you did.

MR. ROBERT VIJUK: We actually put some extensions into the testing time because another of the things that we factored in was the interactions with the staff. We added tests to the matrices to come to closure. We added blind tests which were not -- some independent blind tests, which adds to the test time and then adds to the analysis time. We went back and did scaling work and those things added to the overall schedule as we understood it two years ago. We believe it's been beneficial, even though we'd like to not have suffered that delay.

CHAIRMAN SELIN: Well, it's still a lot more streamlined than the original idea, which was to build a prototype.

MR. ROBERT VIJUK: That's correct.

CHAIRMAN SELIN: And to conform. Not that you're questioning this, but I do feel obligated to point out that the staff is called on to make a major judgment based on extrapolating a number of individual tests in quite an unfamiliar environment. It's obligatory for them and for the Commission that this be able to be made with a high degree of confidence.

MR. ROBERT VIJUK: Yes, we understand that.

As far as developing additional confidence

in our schedule, we put a lot of rigor in developing the schedules, including, for example, the schedule to complete OSU where we started really from scratch. We sent an assessment team in of experts from both within our company and from utilities and from the Department of Energy and walked down what was there and reviewed procedures and set the complete plant forward with 600 events in the logic train to get that facility ready to start testing.

We went all around the circuit with such assessments in developing the schedule that I'll ultimately show you today. We developed a very discrete logic and we have about 1,600 events in our total logic trains, and that's the detailed schedule that we've submitted to the staff and they are reviewing it.

Another thing we did as we faced the realities and the delays we were going to have in the actual execution of the test is we went back and reordered some of the tests to optimize the timing so that the staff could get key results at the earliest possible date from the tests, and tests that tended to be somewhat less important or somewhat redundant with early tests were moved to later in the series. This will appear later as what we call category 1s and

category 2s where we were aiming our category 1 tests to be all competed at the time the staff would write their draft safety evaluation report.

We factored in the code development activities that have to run in parallel with execution of the tests and lead to code V&V. And as I mentioned before and Larry mentioned, the blind tests add a serial piece to that because you get the code all ready and then you do a final check against the tests for which the data is locked up to see how well you do, and the proof of the pudding is in the eating.

We have planned for intermediate deliverables to the NRC staff as we go, rather than just waiting for a final bulky report at the end as a means of expediting the review process. Feedback from the staff is critical to us at this point. We've talked about the meeting this afternoon. We've talked about the test programs in detail and refined it in detail over the last two years.

We believe we're close to closure. We're running tests. We're about to start the last of our test programs. It's imperative to the program that we do reach an agreement on essentially the bounds of the test program so that we can get on with it with confidence and then take facilities off-line with

confidence when we've completed our test series.

We have selected for planning purposes a single draft safety evaluation report which, as our schedule logic would play out, it would be possible to be issued to us in December of 1994. This report would cover most of what's submitted in the safety evaluation report and it would have some holes because of the -- in the area primarily of safety evaluations that depend on test results to validate codes and understand phenomena.

The next event in the schedule would be an FDA in June of 1996 to get from the early part of the DSER part of the testing part to the FDA. We use the same sequence and timing that was used to develop SECY-93-097 and strung that out through time. We formally transmitted this schedule to the staff on March 29th and reviewed it several times with them prior to that and they have it in all of its detail.

(Slide) Next slide, please.

We had a meeting with the staff at the senior management level on March 14th and this viewgraph summarizes from our perception of what transpired at that meeting. Both parties seem to be working towards the single draft safety evaluation report in order to get that report out in the later

part of 1994. Cutoff dates were established for providing inputs to the staff. Those cutoff dates are June 30th, 1994, for non-testing results and July 31st for testing results that will affect that particular DSER.

COMMISSIONER REMICK: I could read that two ways, a single DSER or a single schedule. It's a single schedule, but two parts of the DSER?

MR. ROBERT VIJUK: No, one part to the DSER.

COMMISSIONER REMICK: And how do you handle the code development?

MR. ROBERT VIJUK: We would handle that in the FSER.

COMMISSIONER REMICK: FSER, I see. Okay.

MR. ROBERT VIJUK: And in DSER responses, because as we're preparing our responses our tests will be finishing up.

COMMISSIONER REMICK: So there will be open items that will be handled in the FSER?

MR. ROBERT VIJUK: That's correct, and they'll be large open items in the test area, in the safety analysis area, and a couple other small areas.

Statements were made at the meeting that we appear to be within one month of one another in

terms of our planning and schedule understandings.

(Slide) Next slide, please.

Moving on to the RAIs that we've received, this graph depicts the ones we've received and the ones we've answered. To date we've received 1,408 RAIs and we've responded to 1,240 of them. You see a recent step of 100 in mid-March of RAIs received. This was shortly after the senior management meeting where we discussed them. We anticipated them. The staff was working hard to get them out to us at that time. We now have --

COMMISSIONER REMICK: Are you communicating back and forth on paper or electronically?

MR. McINTYRE: Electronically.

COMMISSIONER REMICK: Good.

MR. ROBERT VIJUK: We also recognize that there are several other batches still being prepared and we would hope to receive them quite soon, because, when you take the 90 day response time that we shoot for and you look at the cutoff dates that I just mentioned, the time is now as far as the need to receive the last RAIs.

CHAIRMAN SELIN: I even noticed that in Mr. Bruschi's comments. It was very subtle, of

course, but it was there.

MR. ROBERT VIJUK: (Slide) Next slide, please.

COMMISSIONER REMICK: How does that compare with one of the last Westinghouse proposed -- other plants, how many questions, 1,408 compared to SP-90?

MR. McINTYRE: I think for SP-90 we were on the order of 2,000, but then we had the whole report in to you and so you were able to ask the questions on chapter 15 and chapter 6 in safety analysis areas.

COMMISSIONER REMICK: So probably comparable, then?

MR. McINTYRE: Yes.

MR. ROBERT VIJUK: One of the other vendors that just went through this process had about 2,000, so it's certainly in the right range.

(Slide) Slide 24, please.

This is a top level summary of the schedule that I've talked about. It shows the timing of the tests, the actual execution of the tests, and then it shows below that the analytical work that's associated with verifying and validating the computer codes, and then on down at the bottom the actual

licensing submittals that we make and the review processes that the staff goes through.

There are three key dates on this schedule that will drive us. The first one is the one at the end of March, 1994, saying we will reach closure on the testing, and that is what we've targeted for to occur yet this week. The second one is the DSER and it shows up right near the end of the year on our schedule, sometime in December. And the final one is the FDA in June of 1996. We would hope that we can reach an agreement on a schedule such as this in the very near term.

COMMISSIONER REMICK: This shows that the ITAAC review basically is not far along. Is that correct?

MR. McINTYRE: The schedule that's there? For ITAACs, we submitted the ITAACs in December of 1992.

COMMISSIONER REMICK: Right.

MR. McINTYRE: And we have found, learned from the industry experience, that it doesn't necessarily pay to try to resolve the ITAACs until we have resolved the outstanding design issues. So they are in -- if you look at the way that they're phased right now, the intent is that we have a couple of

policy issues with the staff. Because it's a passive plant, we took a little different approach than the evolutionary plants did. And the regulatory treatment of non-safety systems also needs to factor into that, because that's going to affect how you would write the ITAAC, so we have a couple of things that need to move along a little further before we really start an intense ITAAC review.

COMMISSIONER REMICK: Are you proposing DAC also?

MR. McINTYRE: Yes.

COMMISSIONER REMICK: How many?

MR. McINTYRE: Well, the two that quickly come to mind are going to be piping and the man-machine interface, the chapter 18 area.

COMMISSIONER REMICK: Okay.

CHAIRMAN SELIN: Are there any items in the critical path that are under neither your control nor the staff's control in this area and where you're depending on third parties?

MR. ROBERT VIJUK: No, we do not depend on any third parties. We do depend on success in the test program. And I should point out that when we talk about closure on the test program, that's barring any surprise where it might happen.

CHAIRMAN SELIN: Let me ask you a different question on the schedule. It's not really on this schedule. It's on the second schedule there. Is it your opinion that the first-of-a-kind engineering schedules are consistent with this schedule or do they continue to expect too much too soon? Have they been brought into compliance with --

MR. BRUSCHI: They are consistent. We have reviewed very carefully with the utilities, in fact, the deliverables for first-of-a-kind engineering. Those that we emphasize early on are those that are not dependent on the certification milestones. We've been very careful to do that, and by contract the first-of-a-kind engineering program will not end until the FDA and certification programs have completed.

MR. ROBERT VIJUK: (Slide) Slide 25, please.

This slide summarizes our recent and upcoming submittals. We updated the safety analysis report in January of 1994 to basically incorporate all the responses to the RAIs that we had processed through late 1993.

We are currently working on an update to the PRA. This will incorporate our responses to RAIs

in that area as well as a requantification of the level 2 PRA work. We expect to get that in to the staff by the end of this month and we will work sometime after that on level 1 updates. And the main reason we aren't working full-bore on level 1 at this point is we are waiting for additional interactions with the staff and with our consultants, and Brian will talk more about that subject in a few minutes.

We continue to meet the 90 day turnaround required on RAIs and that we proposed on RAIs, and, as I mentioned earlier, that means the time is now if we're to meet the schedules that we're shooting for.

Thank you.

COMMISSIONER REMICK: I will be visiting the OSU facility next week and so I had a briefing from the staff. I am impressed that that's a far different facility than I thought it was a few years ago or going to be a few years ago. It's really now quite a significant facility. I think from a schedular standpoint it's going to be tough to keep people from wanting to do lots of things on that facility because it really looks like a miniature AP600 to my mind. It's really a very, very valuable test facility. I can see that there will be a tendency to want to do more because it can be done

more. More can be done.

MR. BRUSCHI: Indeed it is quite an impressive facility. We're very pleased with the quality of the work that's gone into it. I think it is important that we distinguish between those tests required for design certification, and, if there are post-certification tests that ought to be done, by all means we ought to take advantage of that and perform them.

Our next speaker is Brian McIntyre, who's going to speak about some of the technical issues associated with the AP600.

Brian?

MR. McINTYRE: (Slide) May I have slide 27, please?

The first issue that I want to talk about is the use of PRA as a design tool for the AP600. We started this design back in 1985. We had our first EPRI contract to develop the conceptual design, and traditionally the way a vendor does a design is you go in and you do a lot of deterministic analysis. You try to get the peak clad temperature down. You try to get the DNBR up for the transients.

In this case we used PRA in conjunction with deterministic methods. It was an iterative

process. We'd go and we'd do deterministic calculations and analyses and we'd go back then and look at it from a PRA standpoint. What we used, we probed the design for areas where we felt improvements could be made at a fairly reasonable level and we found three areas of improvement.

We looked at things in the success criteria, and those are the things where -- what equipment do you really need to have necessary to mitigate a core damage event? We found things like, well, we can get by with one accumulatory for the large LOCA, but, by gosh, you really better have it, so that needs to be a very reliable system. For small LOCA, we found that, well, you need an accumulator of the core make-up tank in that case can help. So we used that basically to identify the components where we needed to do some work or we could do some work.

We also looked at it from an operational standpoint. And this doesn't necessarily come through in the design, but it's things like you need to have the passive core cooling features available during shutdown. You shouldn't just be running on simply the non-safety systems, the active non-safety system. You should have the passive safety systems also available.

We made a number of design changes.

CHAIRMAN SELIN: Say that again, Mr. McIntyre?

MR. McINTYRE: During shutdown while you are using the normal RHR system, you also have the passive heat removal systems available at that time.

CHAIRMAN SELIN: Is it a policy conclusion or is it a result of the analyses?

MR. McINTYRE: Well, it's the result of analyses. It's something that we went back and made happen. It gets us a much better core damage frequency.

We made a lot of design changes as a result of the PRA.

We added diversity to the four-stage valves. The first, second, and third stages are motor operated. The fourth stage is an air operated valve.

We expanded the capabilities of the non-safety diverse actuation system. At one point it was just trip the reactor and start the passive RHR system. It actuates now more of the safety features.

COMMISSIONER REMICK: Excuse me, Brian. You remind me of something I meant to ask earlier having to do with the ADS. You're talking about stages of ADS, I assume?

MR. McINTYRE: Yes.

COMMISSIONER REMICK: How many valves in each stage?

DOCTOR HOCHREITER: In the first three stages there's two valves each.

COMMISSIONER REMICK: Two valves.

DOCTOR HOCHREITER: In the fourth stage you have a train off of each hot leg. You'll have two valves in each hot leg, so there's a total of four for the fourth stage.

COMMISSIONER REMICK: So a total of how many valves?

MR. RON VIJUK: There's 20, actually. There's redundant paths, and that's what Larry was leaving out, so for each of the -- there's four first stage valves, four second stage valves, four third stage valves, and eight fourth stage valves.

COMMISSIONER REMICK: Thank you.

MR. McINTYRE: We made the core make-up check valves normally open. They're biased open, so we're not depending on the check valve. You don't have to worry about it getting sealed shut in any way. That helps the result, because it improves the reliability and availability of that check valve.

And we also added for the IRWST for injection. In the original design of the plant that

was two check valves in series and now it's parallel paths of two check valves in series. Again, going back, looking, we actually made design changes to the plant as a result of looking at the PRA.

We also looked at severe accident insights. And these are things that you won't necessarily find in the SAR but you'll see in the PRA report. It's things like adding the capability for the operator to flood the area under the vessel. There are motor operated valves that he can, if he needs to, open a valve and flood the area under the vessel for a severe accident if for some reason the check valves or some other features of the plant haven't worked.

We find that the AP600 has an extremely robust containment. We haven't found any event sequence yet that fails the containment, so what we find is we need to look very hard at the containment isolation. It must be very reliable. In a severe accident management strategy, we would look at things like maintaining the secondary side at a higher pressure and not depressurizing to make sure you don't have a thermally induced steam generator tube rupture, making sure that there's water in there. These are insights that will find their way into the severe

accident management type guidance.

(Slide) Can I have the next slide, please?

Regulatory treatment of non-safety systems. That is really --

COMMISSIONER REMICK: Brian, before you leave that, I'd just like to make a comment because I want to applaud that use of PRA. That was certainly the original intent, I think, of the Commission when they required the PRA at design stage. But I think some people didn't really get the message and do the design and then do a PRA afterwards. But it's much easier to do it in parallel and use the insights that you get from the probabilistic as well as the deterministic in making design decisions.

MR. McINTYRE: Absolutely.

COMMISSIONER REMICK: So, I really applaud that approach. I think it's a very, very valuable use of PRA.

MR. McINTYRE: Regulatory treatment of non-safety systems is really the big issue in the review right now. Basically, I look at it as the viability of being a passive plant depends on a successful conclusion for us. We have reached agreement with the staff. It was an industry staff

agreement. We started back in January of last year and in May we reached agreement on the approach that would be taken to look at -- it's both -- and again, it's a combination of probabilistic, deterministic to resolution. It's to do a PRA that looks at both at-power and shutdown conditions for both internal and external events and external events excludes seismic because we're not a seismic PRA, it's a seismic margins approach. We're going to show, we have shown, that the Commission safety goal of 10^{-4} for the core damage frequency, and at the time we wrote this it was 10^{-6} for a large release, but we understand that the ACRS letter on the RTNSS SECY encourages to not go to that and look at a conditional containment failure probability as an approach. We think that we still will be okay with that too.

Basically what this is is you do a PRA without the non-safety systems because when you do a PRA normally you've got everything in there and this is just with the non-safety systems and showed that yes, indeed, we can meet the requirements just for the safety systems, and this is called the focused PRA.

We also looked at initiating event frequencies for both the at-power and the shutdown events. You go back and you look and see for a given

initiating event is there some system that would be very important to that event. Then deterministically we went through and we looked at things like ATWS, station blackout, in our case beyond 72 hours and adverse systems interactions. Again, is there some place in there that a system is very important?

We reached that agreement with the staff on -- it was basically finalized on May 20th. On the 24th of September, Westinghouse was down here with our submittal. We'd actually started. Obviously we didn't within three months. We started back in January working on it. We had our submittal in September and that included also a review by the people on the ALWR utility steering committee to get some utility input because their input, as far as operation of the plant -- they know a lot of things and we try to take credit for that where we can and benefit for it.

The results of that were that through the PRA we captured no systems.

CHAIRMAN SELIN: What is that?

MR. McINTYRE: We ran the PRA without the non-safety systems and showed that we met the 10^{-4} criteria and at that time the 10^{-6} criteria. So, from a PRA standpoint, there were no systems captured.

From the deterministic events, the 72 hours and the ATWS and those things, we found parts of two systems that were important. They were captured through ATWS and those parts of the systems are the turbine trip and passive RHR actuation functions of the diverse actuation system. Once you have that system, you need some power to run it. So, the non-class 1EDC uninterruptible power supply that powers that DAS function needs to be available.

Looking at the shutdown initiating events, we found there were five systems that were important in that case because these are the systems that are providing the shutdown decay heat removal support during reduced RCS inventory conditions. This is where, I think, the help from the utilities came in very handy to us. We decided to include one system that wasn't captured, but we just decided it would be included to provide the utilities the operational flexibility and that was the diesels, the on-site standby power. So, they are in regulatory treatment of non-safety systems as a system that's important.

We also proposed to the staff what sort of regulatory oversight we thought was appropriate for this. This was the submittal that we made in September.

(Slide) Can we have the next slide, please?

We met with the senior staff on October 26th and it was a very positive reaction. It was a very high-level reaction. This is what they were looking for back when we thought about it, however you need to work out the details with the staff. It's another devil in the details situation. So, we met with the staff in November. We provided an overview, basically the same presentation that we had done to the senior management and they were much more concerned about the details. The big question that came up, clearly you need to have a lot more discussion because this is a significantly different approach than you find in the standard review plan. It's different, we're going to have to talk a lot about it.

The issue that really came up was, well, your focused PRA didn't capture any systems, but we haven't reviewed your PRA in detail yet. So, I wouldn't say it's on hold, but it's clearly the issue now. So, regulatory treatment is important to us, but the PRA needs to be done to really close that issue out.

So, our next action for RTNSS is we're

going to try to work out a system, pick a system and work through all the details. We had a meeting two weeks ago with the plant system branch and we found three systems that are candidates with the normal HVAC system, the service water or the component cooling water. We're going to take one of those systems and sit down and over the summer just beat out, assuming that what we've turned in passes muster, that the PRA results work out and that the initiating events and those items are fine. We're going to pick one system and work through it as a model.

COMMISSIONER REMICK: Brian, if I understand, you're saying that that was not identified through your focus PRA, but to take that and see --

MR. McINTYRE: No, the service water was.

COMMISSIONER REMICK: The service water. I see. Okay.

MR. McINTYRE: The service water was and the component cooling water were. HVAC wasn't.

COMMISSIONER REMICK: Okay. And why have you included HVAC then?

MR. McINTYRE: I wasn't at the meeting. I think they were surprised that it wasn't.

COMMISSIONER REMICK: I see.

MR. McINTYRE: Because I think they were

just surprised that it wasn't. That's the way I would describe it.

COMMISSIONER REMICK: So, in the case of HVAC it would be looking at why wasn't it identified?

MR. McINTYRE: Right.

COMMISSIONER REMICK: Otherwise, on the other systems and possibly that one, it's working through selecting this as a safety system, how you're going to handle it --

MR. McINTYRE: Well, not selecting it as a safety system. It's still a non-safety system.

COMMISSIONER REMICK: Non-safety system, but what you're going to do about a graded approach to it?

MR. McINTYRE: Yes, the proposed regulatory oversight, what would be appropriate. Given that it's this important, and if you're going to grade it, how it falls on the grading curve. We think the normal HVAC is not on the grading curve. These other two are at a lower level.

COMMISSIONER REMICK: Okay.

MR. McINTYRE: Not full safety grade.

COMMISSIONER REMICK: I understand, yes.

MR. McINTYRE: (Slide) May I have the next slide, please, which brings us to the PRA review.

It's very important to us, the regulatory treatment of non-safety systems. When Dennis Crutchfield briefed you at the end of January, that was the staff critical item. Ours was testing, the staff's was getting the PRA questions. We received at this point 271 questions. Fifty percent of them were questions on how do the systems work, how are these things connected, how do they interrelate. Twenty-five percent were on level 2 PRA and 25 percent were on level one.

We've pushed the staff to have a discussion, sit down and talk about the RAIs. In February we had what I thought was an excellent working level meeting with the staff. They brought the contractors in from INEL. Each person within their area of specialty went through, explained what his concerns were. We were able to dialogue on it. It's clear that the staff is interested in having a dialogue on the PRA. The good news to us is that we found no real show stopping issues. There were no, "Oh, my Gods," and we thought that was very positive. The requests were things, "We need more information on this system. We don't quite understand how this works, or we want to talk about how you applied this methodology to this particular situation."

During that meeting in February, the staff commented that they would get the RAIs in from INEL, they'd go through a review and they'd be prepared to meet with us in four to six weeks, which is about now or in the next couple of weeks. So, really for us, we think that the PRA review is the essential item for RTNSS and it's where we're going to be focusing an awful lot of activity in the next couple of months.

CHAIRMAN SELIN: You don't know that you have a problem and therefore you haven't spent a whole lot of time trying to figure out how you resolve an issue if you and the staff come up with different probabilities from doing --

MR. McINTYRE: We don't know that we have that problem, yes.

(Slide) Next slide, please.

COMMISSIONER REMICK: Before leaving the PRA, in modern PRAs or in your own case, are people attempting to identify a conditional probability of going from initiation of core damage to core-on-the-floor? Is there -- what's the current state-of-the-art and the probability of once you've initiated core damage, the probability that you'll go through the vessel? Is there any attempt to quantify that?

MR. McINTYRE: It's a number that will

fall out of the calculation because you'll have -- that just is working through those event trees.

COMMISSIONER REMICK: Do you know what kind of a number that's coming out to be these days?

MR. McINTYRE: I don't.

Ron?

DOCTOR HOCHREITER: I know we looked at that.

COMMISSIONER REMICK: I'd appreciate it if you'd provide that in follow-up.

CHAIRMAN SELIN: I have a question I'd like to ask you maybe at this point. It's not really a certification question, but it is a question that I'm concerned with once these plants become operational. There's a very strong economic incentive to try to use the active systems and not go to the passive systems, maybe to the point where the analysis in the PRA assumes the initiation of the passive systems, but the operating procedures might try to use the active systems first. At some point do you and have you yet tried to take a look at sequences where the assumptions on the early initiation of the passive systems might not happen in practice? Or more importantly, that using the active systems first might put some of these rock bottom passive safety systems

at risk because they might not initiate until too late in the cycle.

MR. McINTYRE: Yes. I don't think we've looked at that from a PRA standpoint, but those were the types of things that we're looking at in OSU. Of the things that we added on, we added on, I think basically, is that right, Larry, the whole suite of non-safety systems.

DOCTOR HOCHREITER: That's correct. There are tests in the text matrix for both OSU and SPES.

CHAIRMAN SELIN: So you would be looking at places where the resource of the past -- timing the resource of the past systems might be critical and people have only so much time to try to contain problems with active systems, or is that asking too much at this point? Do you understand what I'm asking?

MR. RON VIJUK: I'd make one comment. The passive systems are automatically actuated. So there won't be any decision to make.

CHAIRMAN SELIN: Early actuation of the active systems doesn't change the conditions under which the passive systems actuate?

MR. RON VIJUK: I'm sorry?

DOCTOR HOCHREITER: Not if you get an S

signal.

MR. RON VIJUK: Right.

DOCTOR HOCHREITER: But what can happen, what you worry about, is if you'd recover the active systems and the operator would try to turn on the active systems, what does it do to the passive system performance? Those are the types of things that we'll be looking at.

CHAIRMAN SELIN: That's a more sophisticated question. I was more concerned with operator actions in one way or another delaying the onset of the passive systems in order to try to do some economic salvage. That can't happen?

MR. RON VIJUK: It's very unlikely, I think.

MR. McINTYRE: And for those cases, those transients were having active systems operational makes the result worse. What we submitted on the SSAR was basically that active system operating, showing that it would make whatever non-LOCA transient got worse.

CHAIRMAN SELIN: Okay.

COMMISSIONER ROGERS: Just before you leave the regulatory treatment of non-safety systems, how does the approach that you're coming to together

with the staff compare with the EPRI requirements team's approach to regulatory treatment of non-safety systems?

MR. McINTYRE: They're identical.

COMMISSIONER ROGERS: They're identical?

MR. McINTYRE: They're identical.

COMMISSIONER ROGERS: They are identical.

MR. McINTYRE: Yes.

COMMISSIONER ROGERS: Okay.

MR. McINTYRE: (Slide) And the last slide, slide 31, please, is the quality assurance for our testing programs.

There's a lot of question right now as to these are testing programs, what sort of QA actually goes on on these things, and particularly the ones that are not being run in this country. I think it's a good question. Westinghouse looks at the testing as something safety-related. There's a little box you check on our procurement forms, "This is a safety-related component. Does Appendix B apply to it?" The answer is we look at this just like any other component that we're buying. We have -- it applies to all aspects of the test program. We have what I personally refer to as a very aggressive internal audit staff which keeps us right on the line. They go

out, they've done audits at SPES. They do audits at OSU and they make sure that the equipment is bought, procured to the right specifications. Everything has calc notes with independent reviews in accordance with Appendix B. As a result, we think we have a pretty high quality test program. I think the staff has gone around.

One of the things that they do when they visit a site is they look to make sure that you've got the right procedures in place, that the people are following them. So, they are doing some audits in that area.

When Howard talked earlier that we're to the point that the staff is doing audits, the staff is going out next week to audit some work we're doing at Bechtel on the piping area. So, they are now to the point that they're getting down into the lower levels, not just basically how are you executing it. So, we expect that the statements I'm making here is going to be backed up by the audits that the staff is making right now.

Mr. Bruschi?

MR. BRUSCHI: (Slide) To conclude our presentation, I'd just like to summarize four points. The first has to do with schedule. I think

significant progress has been made with regard to detailed discussions of our schedule with the staff. We appear to be very close with regard to our respective schedules. Our expectation is that what we've discussed here in the way of schedule and milestones is where the staff is with regard to their schedule.

The second has to do with a testing program. We've spent most of our time this morning on that because it clearly is the key aspect of the AP600 program. We fully recognize that. We also recognize that we, Westinghouse, must provide sufficient detail in the integral systems tests that are starting now to make that DSER substantive. We do recognize that and we anticipate that the SPES test, the OSU test will have enough of their initial tests run to provide the substance necessary for the DSER.

The third item has to do with the RAIs. We're quite prepared to put the resources necessary to resolve and answer questions that have been raised by RAIs. We trust that they'll be forthcoming soon so that we can meet the schedule with regard to the DSER late this year.

Fourthly, as Brian McIntyre discussed, the regulatory treatment of non-safety systems now needs

that detailed inspection, introspection into that arena. We have agreement in principle, but the details need to be worked on.

We sense we're on the brink of something very exciting with the passive plant program. We've obviously been scrutinized by both the NRC as well as our utility customers, steering committees, the Department of Energy, and through that scrutiny the technical aspects of this design have held up quite well. We're into integral systems testing now. Early prospects look very good and our expectation is that we'll be able to provide the industry with a simplified plant that is providing substantial safety and operational margins for our utility customers.

This concludes our presentation this morning.

CHAIRMAN SELIN: Thank you.

Commissioner Rogers?

COMMISSIONER ROGERS: Well, I don't have any additional questions. I think that the results so far are really very encouraging, that the process is coming to closure and the Part 52 seems to be workable. I think the attention that the staff and I think the Commission itself has given to seeing that these reviews are conducted with high priority is

beginning to show some very positive results. I was very pleased with what I heard today.

Thank you very much.

MR. BRUSCHI: You're welcome.

CHAIRMAN SELIN: Commissioner Remick?

COMMISSIONER REMICK: What do you foresee as the future of the SPES facility when your tests are completed? Once again, that's an extremely valuable facility too. I realize it belongs to somebody else, not the U.S.

DOCTOR HOCHREITER: Well, I don't know of any really long-term plans for the facility. We've got a very elaborate matrix to look at basically all the aspects that we expect to be important for this type of a design.

MR. BRUSCHI: I'll make a few comments, Larry, relative to our colleagues in Italy. They're eager to see nuclear revitalized in Italy, as with the U.S. I think unlike the U.S., however, they need to show a more dramatic change from the current operating plant. So, the passive plant is extremely important to them. Therefore, my expectation is that the facility will stay intact and will be used by our colleagues in Italy for further testing apart from design certification to continue to experiment, if you

will, with that facility. I would expect that we can continue a relationship with them as an industry.

COMMISSIONER REMICK: That would certainly be good and that's -- also, I think the OSU facility has become such a valuable facility that I hope there's wisdom in the U.S. that somehow we can maintain that facility for some time in the future. I'm sure that OSU could not do it. It's an expensive facility to operate, I'm sure. But I'm hoping that we can retain some of these in the U.S. for potential future needs, and I realize that's not just your responsibility. I'm speaking hopefully DOE, NRC, industry and so forth.

Some time ago, some months ago, I had heard some comments from vendors and others about some concern about NRC release of codes. Not so much to other countries' regulatory bodies, but the fact that they eventually got into the hands of international competitors of U.S. companies and therefore being used as if they were endorsed by the NRC and in direct competition with U.S. companies and U.S. taxpayers paid for the development of those codes.

I've asked the staff a question and I'm hoping that sometime in the near future they're going to come back with a response. But do you have a

concern along that line and particularly on the AP600, which of course is strictly a U.S. industry design? Well, I shouldn't say strictly, but it's certainly prioritary to you folks. Do you share in those concerns, and how about with the AP600?

MR. ROBERT VIJUK: Yes, we do. As a matter of fact, a letter was sent to the staff late in February expressing those concerns. We do compete in the international marketplace for services, engineering services that utilize these codes, with codes that we use as opposed to the ones that the Commission uses. It does take work away from us and we don't mind the regulatory bodies of other countries using U.S. codes, but we don't like them to fall into the hands of our competitors.

DOCTOR HOCHREITER: What we see is a pass through from the government agency straight to the industry. In the latest agreement on this CAMP program, the designated government has named its industry as the interface with the staff and they get direct access to the latest versions of the codes, Siemans, Framatome, Tractebel, and then we wind up competing for reload analysis, plant upgrade, safety analysis against basically U.S. developed technology that another vendor is using and has not had to pay

the cost to do the development of the code, whereas we pay the cost ourselves.

COMMISSIONER REMICK: Does that appear because we are not placing adequate restrictions or the restrictions are not being followed?

DOCTOR HOCHREITER: I think it's -- in my opinion, both.

COMMISSIONER REMICK: Both.

DOCTOR HOCHREITER: Certainly they're not being followed because I'm aware of the fact that the staff told these people that they can't use these codes for commercial purposes and they were very upset because that was the whole motivation for them being in this program, was to gain that technology for commercial purposes.

COMMISSIONER REMICK: Yes. It's a difficult one because we certainly -- I feel very strongly that our help to foreign regulatory bodies is in the best interest of the country and certainly nuclear safety.

DOCTOR HOCHREITER: We agree with that.

COMMISSIONER REMICK: But I was not aware of that until some months ago when I heard there was concern about this flowing through and being used commercially against the U.S. vendors and U.S.

taxpayers that paid for the code.

MR. McINTYRE: Also, I think, Howard had talked about internationally. I think a point that Larry was making, I don't think it came through, was that we're competing in the U.S. and that's the problem. When you're bidding with a domestic utility for fuel against a foreign competitor and they're using basically U.S. developed code as their technology and offering it to the utility, we have a hard time with that.

COMMISSIONER REMICK: I see.

CHAIRMAN SELIN: That sounds like an argument for tariffs.

COMMISSIONER REMICK: Yes. I'd like to join Commissioner Rogers. Certainly everything that I've heard from the staff has been complimentary about the interaction with you folks. And reading the ACRS letters, I think they've generally been complimentary also. So I think it's a credit to your attention to the management of the program that things have moved along to the point they have. That interaction certainly has changed from my impression of four years ago when I'd heard that your preliminary safety information document had been in-house for a year, what is now called a preliminary safety information

document, I guess called conceptual design at that time, but it was in-house for about a year and I was told unopened. I don't know if that's literally true or not.

Certainly it looks like you have a day to day interaction with the staff and I compliment you for your effort and also the staff for their efforts.

CHAIRMAN SELIN: I join these remarks. I'm particularly impressed with the test facilities and the test program. Clearly the QA is very good.

I would really put out just one caution, and that is that the statement that no show stoppers have come up is based on an assumption that the PRA itself holds up. And so, although we don't know that there are problems on those, as the Scotch like to say, that's an assertion that's just not proved yet.

So, we have to see how the PRAs hold up. I mean, you've done the analysis. Based on your analysis, you've convinced us that, if the probabilistic calculations are right, the engineering is right. And so a question of great faith, not to be determined on a policy level but on a detail level, is will the PRAs hold up to the scrutiny.

Clearly you have benefitted from what I'm sure is a mixed blessing of having two certifications

go before you. The staff got a chance to say, "Well, I missed this on the last one, but, by golly, I'm not going to miss it this time, and so get it right the first time, the first time through."

MR. BRUSCHI: We're fully prepared and expect a very thorough review.

CHAIRMAN SELIN: I don't think a system has ever gotten the thoroughness of a review so early -- I know it doesn't feel early, but, nevertheless, so early in the cycle as this system has come. That's really terrific.

Thank you very much.

MR. BRUSCHI: You're welcome.

(Whereupon, at 11:33 a.m., the above-entitled matter was adjourned.)

CERTIFICATE OF TRANSCRIBER

This is to certify that the attached events of a meeting of the United States Nuclear Regulatory Commission entitled:

TITLE OF MEETING: BRIEFING BY WESTINGHOUSE ON AP600 DESIGN CERTIFICATION

PLACE OF MEETING: ROCKVILLE, MARYLAND

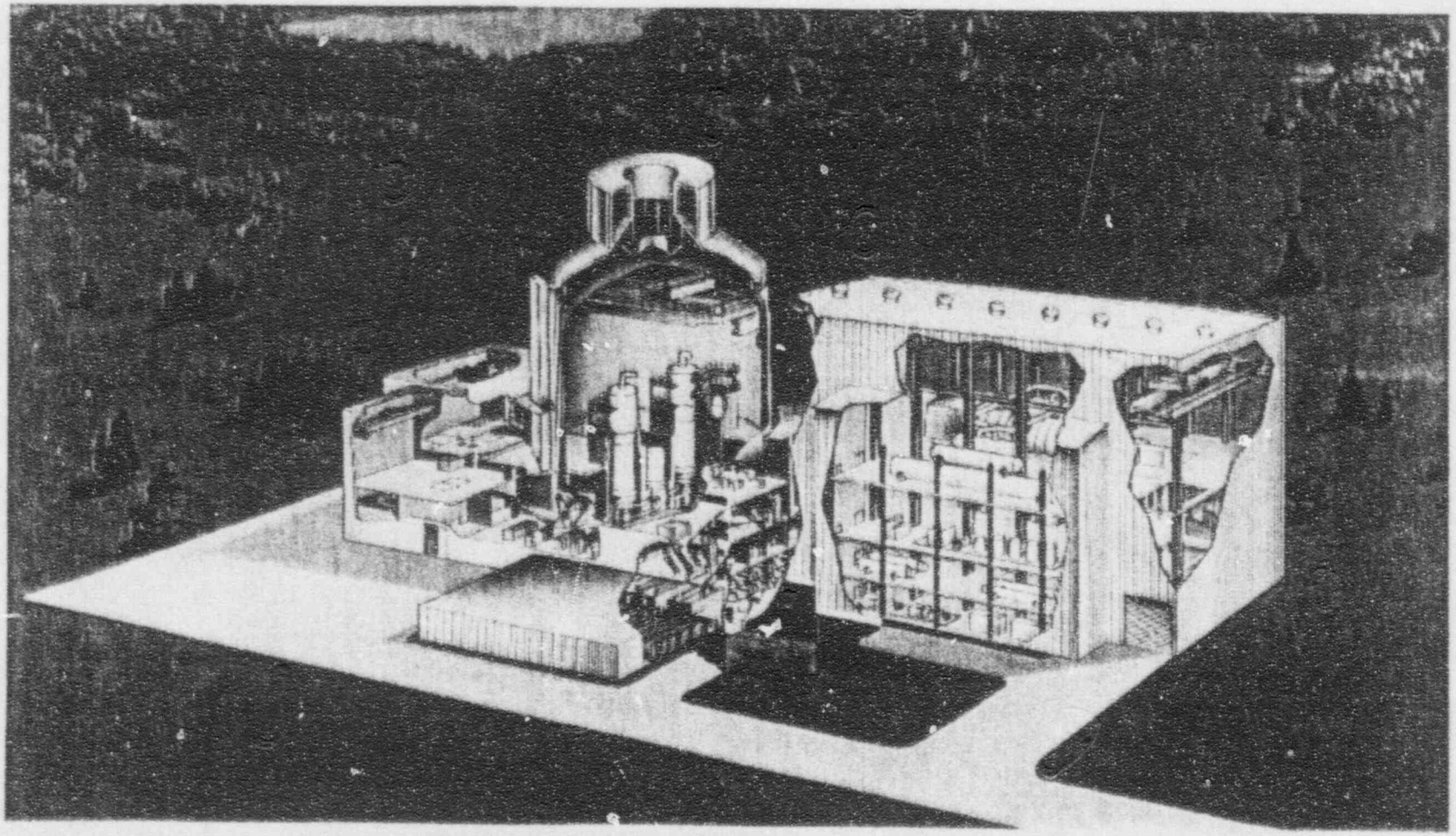
DATE OF MEETING: APRIL 7, 1994

were transcribed by me. I further certify that said transcription is accurate and complete, to the best of my ability, and that the transcript is a true and accurate record of the foregoing events.

Reporter's name: PETER LYNCH

Presentation to

U.S. Nuclear Regulatory Commission



AP600

AP600 Design Certification Status

Westinghouse Electric Corporation

April 7, 1994

AP600 DESIGN CERTIFICATION STATUS

INTRODUCTION

HOWARD J. BRUSCHI
GENERAL MANAGER, ADVANCED TECHNOLOGY
WESTINGHOUSE ELECTRIC CORPORATION

INTRODUCTION

Significant progress has been made towards AP600 Design Certification

- SSAR/PRA Submitted - June 1992
- ITAAC Submitted - December 1992
- NRC review well underway
- Focus has been on testing
  - Testing program closure with staff near
- AP600 RTNSS implementation submitted - September 1993

INTRODUCTION

Westinghouse is committed to the AP600

- AP600 Design certification project team assigned
- Detailed scheduling process implemented
- AP600 FOAKE contract awarded
- Foreign participation increased
- Last briefing March 1992
  - Committed to integral systems test in SPES
  - First test - February 5, 1994

AP600 DESIGN CERTIFICATION STATUS

AP600 TEST PROGRAMS

L. E. HOCHREITER
CONSULTING ENGINEER, NUCLEAR TECHNOLOGY DIVISION
WESTINGHOUSE ELECTRIC CORPORATION

AP600 TEST PROGRAMS

In structuring the AP600 test programs, Westinghouse considered:

- What systems are different?
- What design information is needed?
- What phenomena are important?
- Which codes or models should we use?
- What data are needed for code/model validation?

AP600 TEST PROGRAMS

This thought process led us to perform:

- Scaled and full-scale tests of critical components
  - Core Makeup Tank Tests
  - Passive RHR Heat Exchanger Tests
  - Automatic Depressurization System Tests
  - Containment Water Distribution Tests
  - Wind Tunnel Tests
- AP600 integral systems tests
  - SPES-2, full height, full pressure
  - OSU, 1/4 height, low pressure
  - SST, small scale integral containment
  - LST, 1/8 scale integral containment
- Best-estimate thermal-hydraulic analysis

AP600 TEST PROGRAMS

Frequent and Detailed Interactions with NRC staff

- Meetings have been held on each test program (facility design reviews, test matrix reviews, test results)
- Responses have been provided to Staff Requests for Additional Information (RAI's)
- Weekly phone calls on test program schedules and status
- Hundreds of test program documents forwarded to NRC staff
- NRC staff have visited test sites to witness test preparations and operations

AP600 TEST PROGRAMS

These interactions have been positive

- Suggestions of NRC staff and consultants have been integrated into the test program
- Issues are identified and actions are taken to reach resolution
- NRC letter dated 11/4/93 identified AP600 test program issues
  - Meeting on 12/10/93 to discuss and clarify issues
  - Issues further discussed at meetings on 1/25, 2/22, 2/23, 2/24, 3/14 and 3/17
  - Meeting scheduled for 4/7/94 to close out remaining items

AP600 TEST PROGRAMS

The ACRS has been involved from the onset of the test program

- Several meetings have been held on specific test programs
- ACRS staff and/or consultants have visited SPES-2, OSU, CMT, and containment test sites
- Presentations have been made to T/H Phenomena Subcommittee, Advanced Plant Subcommittee and Full Committee

AP600 TEST PROGRAMS

Point of difference with ACRS has been test facility scaling

- T/H Phenomena Subcommittee and consultants would like to see detailed scaling basis for most tests
- Westinghouse has performed such analyses for those tests for which scaling is judged to be important

OSU	-	very detailed effort, ACRS concurs
SPES-2	-	test design requires limited effort
CMT	-	effort similar to OSU; ACRS would like more detailed effort
Cont.	-	effort directed toward code models, ACRS would like more detailed effort

- Additional scaling efforts are underway, but only in areas where it will help with code validation

AP600 TEST PROGRAMS

ACRS interactions have contributed to the maturation of the test programs

- ACRS members and consultants have participated in meetings with NRC staff
- Comments during the meetings and written reports have provided valuable guidance
- Several suggestions have been incorporated into the test programs

AP600 TEST PROGRAMS

The AP600 test programs have been underway since 1988

- Results from completed tests were integrated into the SSAR analyses, e.g.,
  - Small scale containment system tests
  - Baseline large scale containment tests
  - Passive residual heat removal tests
  - High inertia reactor coolant pump bearing test

- These tests support SSAR conclusions and margin identified for passive safety system design

AP600 TEST PROGRAMS

SPES-2, Full Height Full Pressure Integral Systems Tests are underway

- First matrix test, a 2 inch cold leg break, was completed on 2/5/92
- Facility operated well and results met or exceeded expectations
- Repairs to two power-channel gaskets have delayed subsequent tests
- All repairs have been completed; the next matrix is scheduled for 4/9/94

AP600 TEST PROGRAMS

OSU, 1/4 Height Low Pressure Integral Systems Test Facility is undergoing pre-operational testing

- **Construction activities are complete with the exception of the break valves and associated break piping**
- **Cold pre-operational tests are underway; volume and resistance checks have been completed**
- **Hot functional tests are scheduled to begin on 4/10/94**
- **Matrix tests are scheduled to begin on 6/30/94**

AP600 TEST PROGRAMS

Automatic Depressurization System (Phase B) test facility construction underway

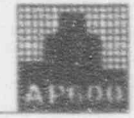
- **All valves have been delivered to the test site**
- **Construction activities are underway; fabrication of the valve piping package is nearing completion**
- **Facility commissioning tests are scheduled to begin 6/21/94**
- **Matrix testing to be completed by 10/28/94**

AP600 TEST PROGRAMS

Core Makeup Tank Tests are underway

- As a result of the hot pre-op testing, an inlet steam distributor was installed to reduce rapid steam/water condensation
- Facility modifications to improve operations were completed in January, 1994
- Additional instrumentation has been installed
- Three matrix tests have been completed

AP600 TEST PROGRAMS



Passive Containment Cooling System (PCCS) test data is being analyzed

- All PCCS tests have been completed
  - Large 1/8 Scale Heat Transfer Tests
  - Water Distribution Tests
  - Wind Tunnel Tests
- A blind Large Scale Heat Transfer test was performed at the request of the NRC staff
- Test data have been transmitted to NRC via "quick look" reports to facilitate test data review and analysis

AP600 TEST PROGRAMS

Departure from Nucleate Boiling (DNBR) Test are completed

- Tests performed to obtain DNB data at low flow conditions
- All DNBR tests were completed in 2/94
- Three rod bundle configurations were tested

AP600 TEST PROGRAMS

Summary

- The AP600 test program is a detailed, well developed program
- The test program is designed to provide Westinghouse and NRC with the information necessary to support code validation for design certification
- The program has benefitted from NRC and ACRS review
- The few remaining open issues are receiving close management attention to bring to full closure

AP600 DESIGN CERTIFICATION SCHEDULE

ROBERT M. VIJUK
MANAGER, AP600 DESIGN CERTIFICATION PROJECT

AP600 DESIGN CERTIFICATION SCHEDULE

Original intent was to complete all tests by December 1993

- Testing schedules slipped
  - Increased scope of program
  - Addressed points raised during staff review

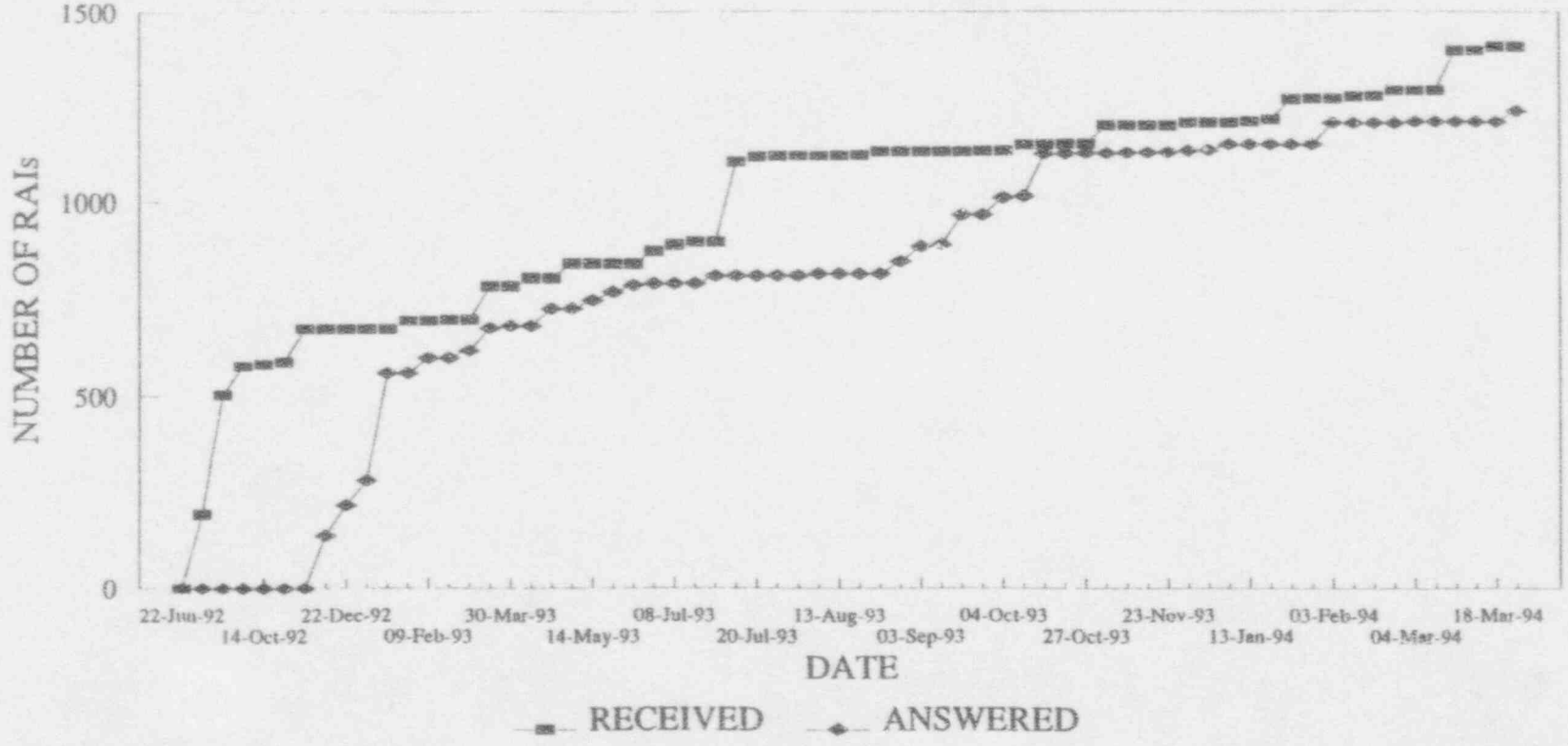
- Detailed schedules developed that include:
  - Results of test facility readiness assessments
  - Discrete logic between related activities
  - Results optimized testing order
  - Code development activities
  - Intermediate deliverables to NRC
  - Timing of staff feedback
  - Single DSER - December 1994
  - FDA - June 1996

- Formally transmitted to NRC March 29, 1994

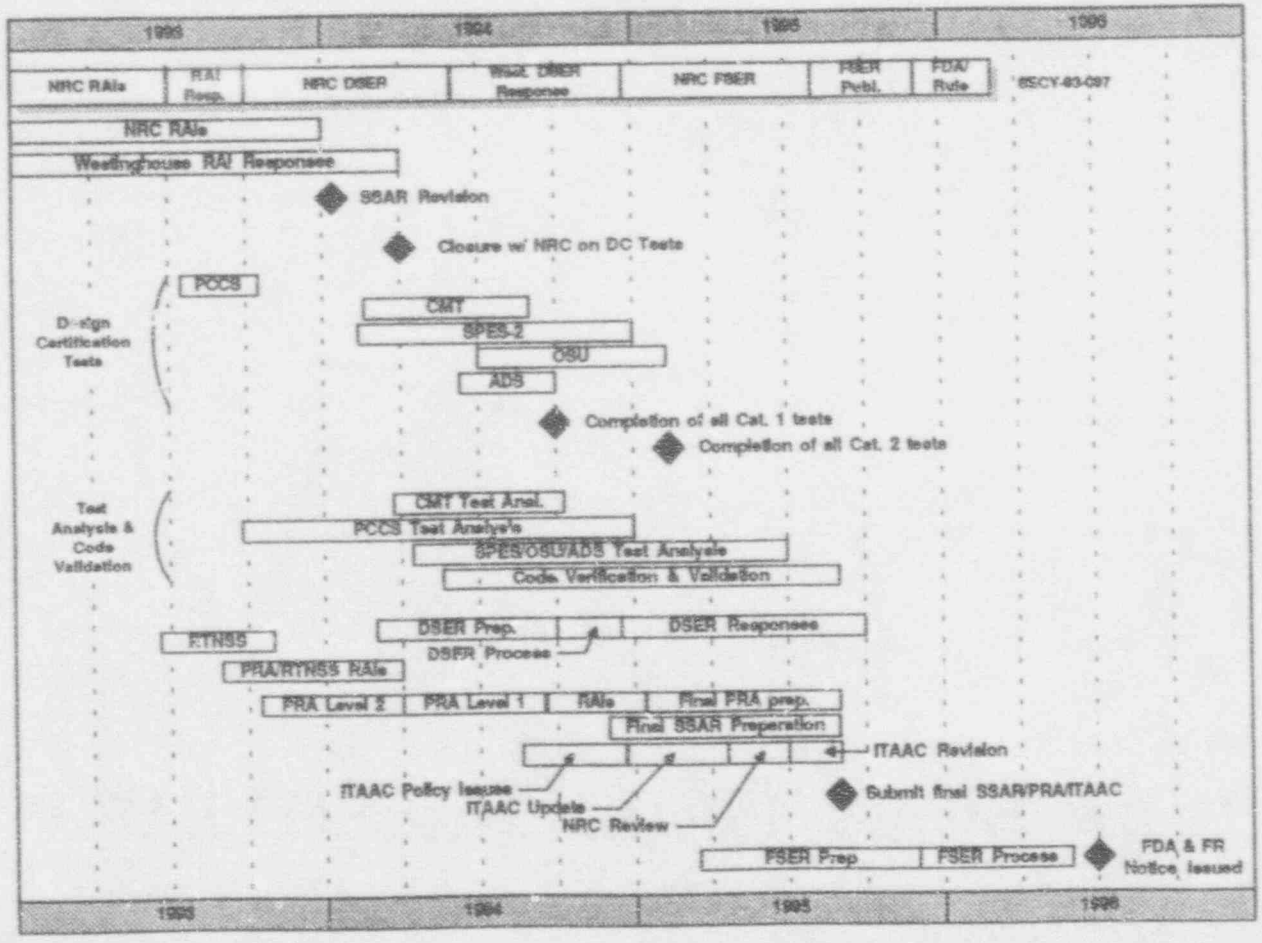
3/14/94 SENIOR MANAGEMENT MTG

- Working to single DSER schedule
- Cutoff dates for DSER input established
  - June 30, 1994 - Nontesting DSER input cutoff
  - July 31, 1994 - Testing DSER input cutoff
- NRC AP600 Review schedule looks to be "within a month" of the Westinghouse schedule

REQUESTS FOR ADDITIONAL INFORMATION



AP600 DESIGN CERTIFICATION SCHEDULE



AP600 DESIGN CERTIFICATION SUBMITTALS

- SSAR Update - January 13, 1994
  - RAI response incorporation
- PRA Update
  - RAI response incorporation
  - Level 2 requantification
- RAI Responses
  - Meeting 90 day turnaround

AP600 TECHNICAL AREAS

BRIAN A. McINTYRE

ADVANCED PLANT SAFETY AND LICENSING

USE OF PRA IN DESIGN

AP600

PRA has been an integral part of design process

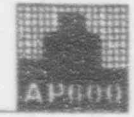
- Identification of areas of improvement
  - Success criteria changes
  - Operation changes
  - Design changes
- Severe accident insights

RTNSS

Regulatory Treatment of Non-Safety Systems is the most important AP600 issue

- NRC/Industry agreement reached May 20, 1993
- AP600 implementation submitted September 24, 1993
  - No systems captured through PRA
  - 2 systems from deterministic events
  - 5 systems from shutdown initiating events
  - 1 system included to provide operational flexibility
- Regulatory oversight proposed

RTNSS



- NRC Senior management presentation - October 26, 1993
- NRC staff presentation - November 8, 1993
- Level 1 PRA review
- Next action to work out details on a specific system

AP600 PRA REVIEW

- 271 RAIs received
- Excellent working meeting with staff - February 15, 1994
- No show stopping issues identified
- Meeting to discuss INEL RAIs - April 1994
- Review essential to support RTNSS resolution

TEST PROGRAM QUALITY ASSURANCE

- The Quality Assurance program applied to the AP600 tests meets applicable requirements
  - 10 CFR Part 50, Appendix B
  - NQA-1
- Applied to all parts of program
  - Test Design
  - Test Procedures
  - Test Operations
  - Data Reduction and Reports
  - Data Analysis
- The result is high quality data for computer code validation

CONCLUSIONS

- Significant progress made in schedule development
  - NRC "within a month" of Westinghouse
- Testing program
  - Well underway
  - Near closure with NRC
- Continued management attention essential to assure success