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ORIGINAL

OFFICIAL TRANSCRIPT OF PROCEEDINGS

Agency: Nuclear Regulatory Commission
Advisory Committee on Reactor Safeguards

Title: 394th ACRS Meeting

Docket No.

LOCATION: Bethesda, Maryland

DATE: Thursday, February 11, 1993 **PAGES:** 1 - 278

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UNITED STATES NUCLEAR REGULATORY COMMISSION

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

DATE: February 11, 1993

The contents of this transcript of the proceedings of the United States Nuclear Regulatory Commission's Advisory Committee on Reactor Safeguards, (date) February 11, 1993, as Reported herein, are a record of the discussions recorded at the meeting held on the above date.

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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394TH ACRS MEETING

Nuclear Regulatory Commission
Conference Room P-110
7920 Norfolk Avenue
Bethesda, Maryland

Thursday, February 11, 1993

The above-entitled proceedings commenced at 8:30 o'clock a.m., pursuant to notice, P. Shewmon, Committee Chairman, presiding.

ACRS MEMBERS PRESENT:

P. SHEWMON, Chairman
E. WILKINS. JR., Vice Chairman of the ACRS
J. LARKINS, Acting Executive Director

ACRS MEMBERS PRESENT (Continued):

C. MICHELSON
C. WYLIE
H. LEWIS
I. CATTON
J. CARROLL
T. KRESS
W. LINDBLAD
P. DAVIS
R. SEALE

PRESENT FROM NRC/NRR:

R. PIERSON, NRC/NRR
T. MURLEY, NRC/NRR
R. BEEDLE, NYPA
C. COWGILL, NRC/REGION I
F. GILLESPIE, NRC/NRR
T. COX, NRC/NRR

PRESENT FROM DOE:

J. GRIFFITH
P. WILLIAMS

PRESENT FROM AECL TECHNOLOGIES:

A. HINK

L. RIB

D. WRIGHT

W. FERGUSON

PRESENT FROM GENERAL ATOMICS:

F. SILADY

PRESENT FROM GENERAL ELECTRIC NUCLEAR ENERGY:

R. HARDY

P R O C E E D I N G S

[8:30 a.m.]

MR. SHEWMON: Good morning. This is the first day of the 394th meeting of the Advisory Committee on Reactor Safeguards. During today's meeting, the Committee will discuss or hear reports on the following: Key policy issue for advanced reactor designs; schedules for NRC review of advanced reactor designs; restart of the Fitzpatrick Nuclear Power Plant; NRC Regulatory Review Group Charters and activities, going back to school; appointment of new members; proposed ACRS reports.

Portions of today's meetings will be closed as necessary to discuss information, the release of which would represent a clearly unwarranted invasion of personal privacy.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act, and Mr. Sam Duraiswamy is the designated Federal Official for the initial portions of the meeting.

We have received no written statements or requests for time to make oral statements from members of the public regarding today's sessions.

A transcript of portions of the meeting is being kept. And it is requested that each speaker use one of the microphones, identifying himself or herself, and speak with

sufficient clarity and volume so that he or she can be readily heard.

By way of things of current interest, you will notice that we didn't get less work, it is just that we have now changed over to printing on both sides. So, if you can't find something, maybe it is on the backside of the sheet of paper you have got.

We have got free movies for lunch, which used to be a big event in the village I was raised in. The one at noon today will be on Turkey Point and Hurricane Andrew. The one tomorrow is one that ANL has put out on the 50th Anniversary of CP-1.

There is, at their place, or in the handout, some change in the frequent flier certificates. Where is that, Sam?

MR. DURAISWAMY: Mable, I believe you passed it out.

MR. SHEWMON: Okay. Well, it has changed a little bit.

There was a group of awards given to ACRS staff members. It was felt by the powers that be it would be too much of an interruption to bring them all down here apparently. So, the special achievement awards went to Donna Anderson, Paul Boehnert, Sam Duraiswamy, Rich Major, Gary Quittschreiber, Carol Ann Rowe, and Mark Stella.

High-quality certificates went to Georgio of the ACNW, Al Igne -- thank you -- Mable Lee, Stu Long, and Steve Mays. Our congratulations to each of them.

MR. CARROLL: Did they leave anybody out? Is that the whole staff?

MR. SHEWMON: No. Not even a majority of them.

There is an announcement we will get to, under planning and procedures, about a British Nuclear Energy Society meeting in May of the coming year, and a request for papers. And we can talk more about that later.

Any other items of current business, or of particular interest? There is the party for Ray. This is this evening at 6:30 it starts. We will break up a little after 6:00, and go over from here. Transportation will be arranged one way or another. There will be no vans, so if you can catch a ride with somebody, why do it.

MR. CATTON: Where is it going to be?

MR. SHEWMON: The Officer's Club, over at Bethesda Hospital.

MR. WILKINS: Is that a reasonable walk?

MR. SHEWMON: It is a long walk. A couple of miles.

MR. CARROLL: And it also is supposed to rain tonight.

MR. SHEWMON: Ernest, the next item is yours, key

policy issues for advanced --

MR. DURAISWAMY: Mr. Chairman?

MR. SHEWMON: Oh. Sam wants to have us all look at the letters. The list we have got -- the first one is a letter on the item we are about to hear about. Ernest has a draft it says. So, we will talk about that.

MR. WILKINS: It does not say he has it.

MR. SHEWMON: I see. Okay. Well, Ernest will soon have a draft.

MR. WILKINS: Will soon have. I will buy that.

MR. SHEWMON: Organization factors we hear about maybe even tomorrow.

MR. CARROLL: Yes. Late tomorrow, unfortunately.

MR. SHEWMON: Yes. Well, we will try to -- well, we will see that happens. And there is a draft on that.

The third letter is on computers let's call it. And Dr. Lewis has been working on a draft on that, and hopefully we'll have a discussion of the contents, and maybe a reading of a draft tomorrow.

MR. LEWIS: I would hope that the people who were at the Subcommittee meeting and, indeed, those who were not, can give me any inputs that they would like, included, which may or may not be joint. But, that will hope.

MR. SHEWMON: Okay. Fine. Now?

MR. WILKINS: Mr. Chairman, the purpose of this

session is to continue our review of the key policy issues identified by the staff for the so-called advanced reactors. And we agreed last time that what was meant by that phrase was the MHTGR, the PIUS, the PRISM and the CANDU reactors. The staff has been distinguishing between the CANDU and the other three. The CANDU is advanced in the sense that the NRC has not had occasion to license it before. So, that some of the issues involved in licensing the CANDU are quite similar to those issues involved in licensing these NUREG type reactors for which there is not a significant history. Although, there is certainly a significant manufacturing history for CANDU.

We had a Subcommittee meeting in January, and we reported on that to the Full Committee in January. You heard a presentation from the NRC staff in January, and also some additional remarks from Dr. Murley, who has been taking a personal interest in these key policy issues. These issues are related, of course, to key policy issues that have been previously identified for the evolutionary plants, and going back still further, the key policy issues that have been identified in 90-016.

Today's session is devoted to presentations from the pre-applicants. I don't know whether I should call them vendors or not, because, in particular, the presentations for the MHTGR and the PRISM, those programs are being, to a

considerable extent, supported by the Department of Energy. So, we also have the Department of Energy representatives here today to introduce and discuss those -- those issues. So, let me just call them pre-applicants. We will here from AECL Technologies. We will hear from the Department of Energy, and its contractors who are involved in the PRISM, that's General Electric, and the MHTGR, that's General Atomics. We will not have a presentation from anybody on behalf of PIUS. And then we will have some more comments from the staff, after they will have had an opportunity to hear the presentations of the pre-applicants.

Dr. Murley has requested time to make a statement to us on the implications of the safety goal policy for these policy issues. And then we will have time to discuss, at least in a general sense, what the Committee feels should be in a letter -- well, more basically decide whether they want to write a letter at all. And, if we decide we want to write a letter, what its contents should be.

And, with that, Mr. Chairman, I would like to introduce Mr. Rib, who will kick off the CANDU 3 presentation.

MR. RIB: Mr. Chairman, I am only going to be up here for just a few minutes. Since we haven't been to the Committee before, we thought we would like to introduce the CANDU to you and a little background. My name is Lewis Rib.

And the purpose of my brief presentation is to introduce Mr. Doug Hink. Mr. Hink is Vice President and General Manager of Atomic Energy of Canada, Limited, U.S. Subsidiary, AECL Technologies. A one-page summary of Mr. Hink's background is available in a hand-out package.

Prior to his appointment to AECL technologies, Mr. Hink was the General Manager of AECL CANDU's CANDU 3 program in Canada. He joined AECL in 1973, and held a variety of posts, which included NSSS engineering manager for the Wolsong 2 project which, as you may know, is going on in Korea today; the General Manager of AECL Advanced Systems; Engineering Manager of AECL Nuclear Power Plant Project in Romania; Executive Assistant to the President and CEO of AECL in Ottawa, AECL's head office; and Assistant Department Manager, CANDU Control Engineering and Materials.

I am pleased to present Mr. Doug Hink.

MR. HINK: Thank you, Louis. I am very pleased to accept the ACRS's invitation to attend this meeting on the NRC staff's draft paper on policy issues, related to advanced reactors, and the CANDU 3. With me is Louis Rib, who just spoke. And he is AECL Technologies Supervisor for CANDU 3 licensing activities in the United States. And also here with me today is Mr. Dave Wright of AECL CANDU Safety and Licensing Group for the CANDU 3 standard product.

Well, I am new here. I am familiar with the CANDU

3 product and program since, prior to this appointment, I was responsible for AECL's CANDU 3 program. And, as part of this role, I have become familiar with the regulatory issues and processes as they are applied to the CANDU 3 in Canada. And while there are some differences in philosophy here in the United States, I expect that many of the procedures and practices are similar.

And so, today, I would like to give an overview of the AECL Technologies organization and current status of our interaction with the NRC staff on the pre-application review of the CANDU 3, and address any questions that the ACRS may have concerning our comments.

I have a few viewgraphs that I will go over to introduce the subject.

[Slide.]

MR. HINK: Very briefly, just to introduce AECL, for those of you who are unfamiliar with our organization --

MR. WILKINS: Excuse me, Mr. Hink, could you rotate that --

MR. HINK: Oh, I'm sorry.

MR. WILKINS: -- to my right.

MR. HINK: How is that?

MR. LINDBLAD: An improvement.

MR. MICHELSON: Pull the slide.

MR. HINK: Oh, I see. Okay.

MR. HINK: Just to give an overview of Atomic Energy of Canada and its organization. Atomic Energy of Canada, Limited, is what we call in Canada a crown corporation, that means it is owned by the Government of Canada. It operates as a corporate entity, according to all of the business laws and business acts in the Government, but the shares are held by the Government of Canada, through the Ministry of Energy, Mines, and Resources. Marnie Paikin is the Chairman of the Board of Directors, and Bruce Howe, at the moment, is Acting Chief Executive Officer and President.

The organization has three divisions basically. It has AECL Research, where the Chalk River Labs and so on are operated. And they are responsible for the research and development, waste management, reactor development, radiation applications and isotopes, and health physics. We also have the AECL CANDU Division, which is the division of Atomic Energy of Canada, that is responsible for the CANDU reactor design, and the engineering and project implementation. And this group also does engineering services activities for the CANDU community of customers and for others incidentally.

We have, in the United States, an incorporated wholly-owned subsidiary of Atomic Energy of Canada, Limited,

and that is the AECL Technologies. I will just explain now our purpose at AECL Technologies.

[Slide.]

MR. HINK: AECL Technologies is basically organized into two pieces. We have the CANDU 3 Licensing Group, which consists of a number of individuals. Mr. Rib is the supervisor, who just spoke. And we also have what we will call an operations group, which looks after other business that AECL has here in the United States. There is an administrative function, and also, as a key point here, we have linkages from AECL Technologies back into the AECL CANDU portion of AECL in Canada. So, in effect, I report to the President of AECL CANDU, and then, within the Technical Division in AECL CANDU, there is a support team for the U.S. Licensing activities. This team supports Mr. Rib and his group for the technical back-up and details and so on that are specific to the CANDU.

MR. WILKINS: Is Mr. Durante an employee of AECL Technologies, or a consultant to them?

MR. HINK: Mr. Durante is a consultant to AECL Technologies. He is more or less on a dedicated basis. In fact, I should clarify that point, just to make it crystal clear. The individuals in this group, Mr. Durante, and these individuals, are basically a team of consultants. And the reason we chose to go that way is that we felt it was

important to have involved in our program here in the United States, individuals who are U.S.-based individuals, who have experience in the, you know, licensing and regulatory process in the U.S. We thought that complemented and supported by a team from Canada would be the most appropriate way to go about initiating the CANDU pre-application and licensing process here in the United States. So, that's why we chose to do that.

[Slide.]

MR. HINK: I am not going to go through all of this in detail. But, just a brief history lesson, I guess. The CANDU reactor evolved out of the early research work that was done back as early as the mid-1940s in Canada, and evolved up through a whole series of research reactors, MPD, Douglas Point, and Pickering A, and then Pickering B, and then the family of CANDU 6 power plants. And I just wanted to make the point that the CANDU 3 design has evolved out of this whole process, and basically out of the CANDU 6 design. It has a lot f the CANDU 6 features, and the Pickering B features in the design.

There are, of course, larger CANDU stations, the multi-unit Bruce A, Bruce B, and Darlington Stations, and, in the future, there may be a CANDU 9 and even larger sizes.

[Slide.]

MR. HINK: I guess, in terms of performance, as of

June last year, this is the way the -- I guess top 10 lifetime reactor performance came out. And you will notice there are three Canadian flags there. We are very proud of the fact that the CANDU do have excellent performance records.

[Slide.]

MR. HINK: Now, with regard to the CANDU 3, our basic strategy is that we have evolved from the earlier successful CANDU designs, and we have conceived of a new product that uses a lot of the specific features of the earlier designs. And we are now positioning this product so that it can be developed and built wherever it may be, hopefully in the United States sometime, but certainly in other cases.

Of course, one of the key things that we have to do is go through the licensing process with the AECB. And we have had ongoing for sometime a licensing program with the Atomic Energy Control Board, where we have been interacting with them.

MR SHEWMON: Is there a prototype operating for CANDU 3? Or what is the newest CANDU reactor that is online now?

MR. HINK: Okay. Well, we have -- the newest one, the newest -- well, we have Wolsong 2 plants which are under construction in Korea. Those are CANDU 6's. There is no

CANDU 3 built or under construction at this time.

MR. SHEWMON: Okay. So, the answer to my question must be a CANDU 2 of some kind? Can you answer the question then as to --

MR. WILKINS: How about six?

MR. SHEWMON: What is the newest CANDU plant that is online?

MR. HINK: The newest one would be the Darlington plants that Ontario Hydro have built.

MR. SHEWMON: And what's their designation then?

MR. HINK: You mean in terms of size?

MR. SHEWMON: No, in terms of number. What do you call it generically? CANDU 16? CANDU 2?

MR. HINK: Oh, I'm sorry It doesn't have a specific designation. It is referred to as the Darlington Plant, because its design is a four-unit multi-unit station, with shared systems. So, it is referred to as the Darlington Station. But, in terms of the plant with the most modern, up-to-date features, and so on, that would be the most modern CANDU plant.

MR. SHEWMON: Okay. And that is the one with the highest velocity where there has been some resonance?

MR. HINK: That's true. There had been some problems. Those problems I believe are in the process of being resolved.

MR. SHEWMON: We all hope so. Fine.

MR. HINK: Okay? So, there is the licensing program for the CANDU 3.

There is some activity going on with regard to building a reference plant in Canada. And the two primary prospects for that are the Province of New Brunswick, where the Point LePreau Nuclear Station is operating, and the Province of Saskatchewan. And we have just recently concluded an agreement with the Province of Saskatchewan to invest in completing the CANDU 3 design, because they have indicated an interest in doing that. I might just comment that the utilities in Canada are, generally speaking, provincially owned. In other words, they are owned by the provincial governments.

Also, there have been some efforts started internationally, and there is some interest that has been expressed in the CANDU 3 product.

[Slide.]

MR. HINK: With regard to CANDU 3 in the USA, I guess two key things are -- one is that we clearly need to go through the licensing process, and that is one of our main goals. And that is why we are involved in the pre-application review process. And we want to complete that process. And we are also optimistic that there will be a reference plant committed elsewhere prior to completing this

process, although that is not a certainty. But, we are optimistic that will happen.

So, we want to go through that process. We need then to proceed through the pre-application phase to the NRC certification. It is our intent to do so, whether there is a reference plant committed elsewhere or not.

We are reviewing participation with EPRI in the requirements definition program that they had, and with an aim to establishing a requirements definition program applicable to pressurized heavy water reactors.

MR. WILKINS: Excuse me. Do you contemplate something like the ALWR requirements document that EPRI is already working on? This would be a parallel document to that?

MR. HINK: It would be a parallel document or a supplementary document. We are at the very early phases of discussion. But, we have had some discussion with them, and there is indication that there would be interest to proceed with developing such a document. But, the precise format hasn't sorted itself out yet. But, the goal is clearly to establish and equivalent sort of requirement set for the pressurized heavy water reactor type

There have been some major studies done about the CANDU and its role. These are studies that we had commissioned to just look at what might be involved in

launching the CANDU in the United States. And one of our key aspects of our involvement here is that we are seeking is strong U.S. partners, utility partners, architect/engineering partners, and partners in the supply area for the sole -- our goal is to sort of put together this whole package, of which the NRC licensing process is a key element to put together this -- to introduce the CANDU to the United States.

[Slide.]

MR. HINK: With regard to some of the specific activities that we have undertaken, we have sent in a letter of intent to apply for a standard design certification. That was in May of 1989. I produced a guidance document for AECLL-CANDU support activities, identified some high-priority licensing issues that have evolved into equivalent safety issues. And these issues are kind of developed in the documents -- developed around these -- are a joint activity of AECL technologies and AECL CANDU. We have proposed a draft licensing review basis document in 1991, and made also some recommendations for a pre-application review plan for the CANDU 3.

And there have been a number of CANDU 3 general technology and related reports that have been submitted.

[Slide.]

MR. HINK: Just to give you a kind of an

indication of some of the major ones, basically, the package of information was divided into two pieces. The ones above this item here which was CANDU 3 technical outline, were information of a generic CANDU technology nature. The ones below the line are specific to CANDU 3. And these have been submitted and are -- have been discussed -- are in the evaluation.

MR. DAVIS: Excuse me. I don't see a PRA document in this list. Have you done any PRA on this plant? A risk assessment?

MR. HINK: Maybe Lewis could --

MR. RIB: If I can answer that? It doesn't show up here, but, following the letter of intent, the NRC staff asked for certain documents. And we supplied conceptual PRA, which we call PSA, Probabilistic Safety Assessment; we supplied a Conceptual Safety Analysis Report; we supplied, in addition, some Canadian standards and backgrounds under which the CANDU was developed. So, there is a body of information, and technical description.

MR. DAVIS: I think that the staff has taken the position that the next generation of reactors should be safer than the current generation. And I am not sure how you demonstrate that without a comprehensive PRA.

MR. RIB: I think, in the conceptual PRA, we start to make our case. I think, when you look at the system, you

will note our solution to the ATWS, which we have two independent verse redundant shutdown systems. And I think the design detail will be the basis on which we established the lower risk basis.

MR. DAVIS: Good luck.

MR. RIB: And the detailed PRA will be part of the application.

MR. DAVIS: Thank you.

MR. HINK: That was the conclusion of my introductory remarks. Our group here today would be prepared to respond to questions that you may have on our comments on the polity issues and draft paper from the NRC staff, or any other questions that you may have that relate to our program.

MR. WYLIE: Let me ask a question. How do you handle procurement and manufacturing in this organization?

MR. HINK: The way the procurement and manufacturing is done -- maybe it would be easier just to illustrate.

[Slide.]

MR. HINK: In this organization the CANDU projects that are implemented are usually implemented through the AECL CANDU organization, or at least they have been up to this time. And, within this -- the mandate of this organization is the overall project management of the CANDU

programs. As part of that, there is a procurement function that is managed. So, what we do when we deliver a nuclear power plant, is we, the AECL, CANDU has engaged all the suppliers and the subcontractors for various elements of the program, and managed them all as an entity. So, we have a fully-integrated delivery system here, including the supply. The specifications are also written by this group. So if, for example, we need to procure some heat transport pumps, we will write the specifications for those, and manage the delivery of that.

MR. WYLIE: So, there is no manufacturing arm in the CANDU organization?

MR. HINK: That's correct. We go with -- we work through a network of suppliers and pick the best one for the given approach.

MR. WYLIE: Do you have one principal contractor for say reactors?

MR. HINK: Yes. What has happened is the supply industry for CANDU has evolved down for the major components, to frequently two or three -- in a few special cases, one even, supplier for particular components. Steam generators, for example, tend to -- they have not always been, but they tend to always be supplied by one supplier, similar to reactor vessels.

MR. WILKINS: How about the fuel elements?

MR. HINK: Fuel elements is one of the cases where they are supplied by -- there have been two suppliers. I think it has sort of settled down into one supplier now, who is doing the assembly of the fuel elements. The fuel elements, compared to PWR fuel elements are simpler to assemble and handle, and so on.

MR. LINDBLAD: Do these suppliers work to NQA-1 standards, or the ISO 9000?

MR. HINK: They work to the CSA Z-299 series of standards, Canadian Standards Association, Z-299. And there is a fair bit of equivalence between those and standards that are typically used here. We don't anticipate that would be a major problem to adapt. There would be some adaptation, but we don't anticipate it would be a major problem.

MR. RIB: Doug, if I could add to that. What was described as the organization in Canada -- the intent is to set up a separate organization of suppliers in the United States. And that is under development. We haven't obtained partners yet, but that is in our near future activities.

MR. WYLIE: Who provides the oversight for quality control and quality assurance?

MR. HINK: Okay. You mean, in terms of the -- there are standards that are a part of the Atomic Energy Control Board regulations.

MR. WYLIE: Yes. But, who has the responsibility of oversight of that program? Where does it fall in your organization?

MR. HINK: Oh. Okay. The quality assurance function for the manufacturers, we operate that through the CANDU organization.

MR. WYLIE: Design and control?

MR. HINK: Each supplier has their QA program, which is evaluated by AECL, accepted by us, tested against the standards, through the regulatory process. And then that is how it is all applied.

MR. WYLIE: And you audit their progress?

MR. HINK: Yes. Yes, sir.

MR. SHEWMON: The fuel is all natural uranium, or do you have slight enrichment?

MR. HINK: It is all natural uranium at the present time.

MR. SHEWMON: Is there a negative temperature coefficient in any part of the regime?

MR. WRIGHT: Dave Wright. Yes. There is a negative temperature coefficient. In other words, if the temperature goes up, the reactivity reduces.

MR. SHEWMON: Okay. So, it's positive -- it is not positive at any time?

MR. WRIGHT: I am not aware of it, no.

MR. SHEWMON: Okay. Wasn't it the positive temperature coefficient that the Chernobyl people got into and that they actually had to then raise their enrichment to get out of --

MR. CARROLL: A positive void coefficient.

MR. SHEWMON: Okay. How is your void coefficient?

MR. WRIGHT: The void coefficient is positive. But, the overall power coefficient is negative.

MR. SHEWMON: What does that mean?

MR. WRIGHT: That means there is a lot more influencing the reactivity besides voids, like temperature, and moderator.

MR. SHEWMON: Yes, but whether or not it is overall depends on how much void you have got, doesn't it?

MR. LINDBLAD: No. I don't think they ever have a void positive --

MR. SHEWMON: Well, I am sure they don't plan on one.

MR. LINDBLAD: Yes. I don't think any of the regimes have a positive.

MR. RIB: During normal operation it is negative. When we get into accident scenarios, then when the normal liquid phase goes into the vapor phase, then we can get a positive reactivity component. And that is counteracted by the other coefficients and the scram systems.

MR. SHEWMON: Okay.

MR. LINDBLAD: Fine.

MR. WILKINS: I want to remind the members of the Committee that there is a letter from Mr. Hink to Dennis Crutchfield addressing the policy issues, and given AECL Technologies' views on these policy issues. And I should -- I think I can say safely, and Mr. Hink can contradict me if I am wrong -- taking issue with some of the NRC stand on some of these policy issues. That letter is in your package. It starts on page 73 of tab two.

Mr. Hink, you didn't specifically mention any of those. Would you care to pick out one or two things that you think are of the greatest importance in your letter

MR. HINK: There are --

MR. WILKINS: Of course, I recognize everything you said was important.

MR. HINK: Yes. There were I guess two items in there that were of importance to us. One was our comment on the severe accident policy and approach. And, on that particular item, I think some clarification is required in terms of defining what precisely needs to be evaluated. My colleague, Louis could perhaps comment on that. And then maybe I will identify the other item in a moment.

MR. RIB: A key statement that we have in here is that the staff thought we didn't go into the severe accident

regime. And, for the CANDU 3 design evaluation, event sequences and their end states are determined by a systematic review, without regard to end state frequencies. The conceptual probabilistic safety assessment considers end state frequencies as low as 10 to the minus 11 per year. That doesn't say we have analyzed that, but that we have looked at the even sequences and determined that we are looking at a full spectrum of event sequences that go not only through the operational phase, but into the design basis accident area, and then into the severe accident area.

MR. WILKINS: Your point there is that the draft paper uses a number that's 10 to the minus six per year.

MR. RIB: That's right.

MR. WILKINS: And asserts that the CANDU 3 pre-applicants and their current safety analyses has excluded analyses of events with smaller frequencies. And you are saying that may well be true for the current safety analyses, but the conceptual safety analyses, which describes what you have proposed to do, will consider end state frequencies as low as 10 to the minus 11? Is that the point?

MR. RIB: That's correct. Also, one of our design basis accidents, if you look at the frequency associated with that, can put it at or below 10 to the minus six. And that is the LOCA, with loss of ECC. We have used that

analysis as one of our design-basis accidents. So, the point being then, there was a whole spectrum of accidents that we look at.

MR. HINK: The other issue worthy of comment is that the draft staff paper on the policy issues comment sort of described the control center concept and design as a Class II item -- that is that there were potentially some major problems with the design. I guess the comment that we have on that is that we have over 20 years of experience with digital control technology and control center design applied in the CANDU plants.

MR. CARROLL: Not all good though, right?

MR. HINK: We have 20 years of experience. And there have been -- I think, generally, it has been a reasonably good experience overall. But, perhaps there have been some items from time to time that have been issues. In any case, my comment is that I feel that, you know, it is appropriate to, as technology evolves, and as the industry evolves, to look at new concepts and evaluate them for their merit. And I guess our view was that we just had the feeling that perhaps positions were hardening up before we got fully into the full sort of evaluation of the control center designs and concepts.

Louis, did you want to add something?

MR. RIB: That is a good succinct statement of the

position. We have two control areas. The second -- the control area, the normal one, and then we have the secondary control area. The secondary control area is almost as large, and contains the following monitors that we can safety shut down. And the point being that we would like the staff to evaluate before they stay no it is not acceptable, based on the previous requirements. This is a part of the innovation in technology. And we would like the chance to demonstrate the equivalent safety for this innovation. Those are the two major points that we made in the comments.

MR. WILKINS: I would like to call your attention, Mr. Rib, to the sentence on page nine of that letter, it is on page 85 in the notebook that says that the draft paper contains an inaccurate statement dealing with the design of the main control room. Well, it is short enough I can read it. "The draft paper states the main control room is not designed to be operable following an earthquake, tornado, fire, or loss of group one, non-essential electric power. The operator must remain available to proceed to the secondary control area."

And the letter asserts, following that quote: "This statemen. is inaccurate."

I read what you said, and what you have said supports the position that you have just stated, namely that

you believe that the NRC should remain open to consider alternative, imaginative, innovative, and so on designs. But, you didn't say in what respect it was inaccurate, at least I didn't find it easily. Is the main control room designed to be operable following an earthquake?

MR. RIB: No.

MR. WILKINS: All right. So, that statement is correct.

Does the operator have to remain available to proceed to the secondary control area?

MR. RIB: Yes.

MR. WILKINS: Well, then what is the inaccuracy?

MR. LINDBLAD: Why don't you get that out of whatever response is coming. Don't settle for what Carl says.

MR. WILKINS: I did not hear the response from Mr. Rib. In what regard is the three-line statement inaccurate?

MR. RIB: Well, I would agree that that first statement should be related, because the statement, as it is written, I would say now -- I would agree is accurate, rather than inaccurate. However, the point I wanted to make is that, for all conditions of operations, all accident scenarios, the operator remains in the control room. The only time that he is to proceed from that is the low probability seismic event, or tornado event. And, in that

case, the design of the control room is such as to protect the operators, so that he can proceed to the secondary shutdown area -- the secondary control area.

MR. WILKINS: All right. Well, then, if I understand your answer, you want to withdraw that sentence that says this statement is inaccurate?

MR. RIB: Yes.

MR. WILKINS: I am sure Mrs. Crutchfield will be pleased to hear that.

MR. RIB: But, the additional description I think is important.

MR. WILKINS: Yes. I was not criticizing that at all.

MR. RIB: Thank you.

MR. WILKINS: The additional description supports your position that, in your opinion, the NRC should not parenterally, or arbitrarily cut off review of new and innovative and so on --

MR. RIB: That's the main point.

MR. WILKINS: -- design concepts.

MR. HINK: That's our basic comment on that item.

MR. WILKINS: Are there any other questions for Mr. Hink or Mr. Rib?

MR. CARROLL: I guess, in skimming through this, I want to go back to Paul's question about positive void

coefficient. I am looking at page seven, page 83 on our -- and this says CANDU 3 has a total void worth between two and three dollars. And that is a lot of reactivity. And you go on and say that you do have shutdown systems that reduce the frequency of reactivity insertions to a very low value. But, you are relying on shutdown systems to overcome potential void coefficient reactivity insertions?

MR. RIB: Yes. We --

MR. CARROLL: I don't think that was the answer we got before.

MR. WRIGHT: Well, in a sort of limiting void reactivity insertion, like a large LOCA, we are relying on the shutdown systems to mitigate that event.

MR. CARROLL: To mitigate the reactivity insertion that is resulting from the LOCA?

MR. WRIGHT: In order to meet the sort of design basis accident criteria that we set for a large LOCA we require those shutdown systems.

MR. CARROLL: All right.

MR. WILKINS: The policy issue which the staff posed in its letter, should a design that has a positive reactivity coefficient be automatically excluded from consideration?

MR. CARROLL: That's correct.

MR. WILKINS: And the staff's position was no, it

shouldn't automatically be excluded --

MR. CARROLL: That's correct.

MR. WILKINS: -- but that one should look at the details, and figure out what's going on. And, from that point of view, I am not sure that AECL Technology disagrees with the staff.

MR. CARROLL: No. I have no problem with that.

MR. RIB: We do agree with the staff. And that is our first comment.

MR. CARROLL: Yes. I have no problem with any of that. I think there was a misunderstanding though about how the positive void coefficient is dealt with in this design, at least for certain kinds of accidents.

MR. WILKINS: Any further questions?

MR. MICHELSON: Yes.

MR. WILKINS: Carl?

MR. MICHELSON: Back on your remote shutdown area. In reading the response on the bottom of page nine, it is not clear as to what extent you can handle the fire in the control room case.

MR. RIB: Bob Ferguson will address that question.

MR. FERGUSON: Bob Ferson. As far as a fire is concerned, if there was a fire in the main control room that burned out the whole main control room, the secondary control area is separated from the main control room by a

fire barrier. And there is enough instrumentation and controls in tne main control room to -- in the secondary control room to shut down, handle all accidents, and maintain cold shutdown conditions.

MR. MICHELSON: And to what extent can you handle unwanted actions derived from the fire in the main control room?

MR. FERGUSON: I haven't seen enough details of it to go through a detailed analysis, because they haven't been done. But, in going through this separation criteria for the plant -- the separation between group one and group two systems, there should be no interactions that way.

MR. MICHELSON: Well, aren't both groups in the main control room?

MR. FERGUSON: No. Both groups are inside the containment. Once they come outside the containment, group one systems are kept separate from group two systems by a fire barrier.

MR. MICHELSON: Nc. But, in the main control room, you --

MR. FERGUSON: In the main control room, the group two systems, again, which would be, let's say, the ECCS and shutdown systems, go mainly to the secondary controlled system, or to the secondary control area, and then the controls through those systems are fed over to the main

control room, with -- I am not sure wither it is -- or not, but it is -- the control and the monitoring for that is the only thing, not the actuation of the circuits. So, if they are destroyed in the main control room, they should have no effect on the same components in this secondary control room.

MR. MICHELSON: You have two groups then, one of which you loop through the remote control area, and one of which goes directly to the main control room, if I understood what you said?

MR. FERGUSON: That's right. Except, keep in mind that the only thing that comes from the group two to the group one are control and monitoring circuits for those groups, not anything concerned with actuating the systems.

MR. CARROLL: I am having trouble when you say control, and then saying it has nothing to do with actuation. To me, a control system is what causes actuation.

MR. FERGUSON: Okay. What I mean is, if I have a button here, and I push this button, and it s ends a signal somewhere to a relay, that relay connects the power supply to some motor, and the motor starts, okay. I am saying everything from that button on then is affecting the actuation. And, if you interrupt any of that stuff, something may happen.

Now, in the connection -- if I have this in the secondary control, then over here in the main control room, I have some way to communicate with this. Let's say I have a light signal that goes through somehow and operates this button, but, if I interrupt this path, I don't interrupt anything from this button to everything else.

MR. CARROLL: I understand that. But, now my button in the main control room.

MR. MICHELSON: He doesn't have one.

MR. CARROLL: He has got some control there.

MR. FERGUSON: What I do is -- let's say I have a button here. If I shine a light to that button it goes, or if I push that that button it goes.

MR. CARROLL: Okay.

MR. FERGUSON: From the control room to the --

MR. CARROLL: How do I shine the light? I push a button?

MR. FERGUSON: From the main control room. But, if that circuit is interrupted by the fire in the main control room, then nothing happens to the secondary.

MR. CARROLL: Sure. Interrupt it. But, suppose it shorted?

MR. FERGUSON: Well, they are digital signals, so it has to short it in a way so it sends the proper digital signal to the thing.

MR. CARROLL: We will be interested in that subject.

MR. FERGUSON: You are getting down into the details of the design, which we don't -- in concept, that is where it is.

MR. MICHELSON: The only reason we are raising the question was that the statement said the NRC requirement is that you take care of fire, and we didn't quite find it addressed in the response anywhere. Maybe I missed it.

MR. WILKINS: There is something at the top of the next page.

MR. MICHELSON: Okay. Maybe it is there. I am sorry. I was looking at the one as being responsive.

MR. FERGUSON: The one thing I would like to mention is the Class I power. Again, in this system, there is a Class I, or Group I diesels, and Group II diesels. In the main control room, if you lose the two Group I diesels, then obviously Group I systems aren't operable; but, from the secondary control room, you still have Group II diesels which you can do.

Now, if you are in a plant that only has two diesels in the control room, and you lose all of those, you are in a station blackout condition. So, that is one of the kinds of subtle differences between what we have and what may have been seen on other plants that we think requires or

which deserves a detailed evaluation, before you decide whether it is good or bad.

MR. WILKINS: Gentlemen, I am just realizing what time it is. Unless there is some extremely urgent question that you wish to raise, I think we better go on to the next topic.

I want to thank Mr. Hink and Mr. Rib, and the other speakers from AECL Technologies.

And now we will move to the Department of Energy presentation. You are aware, I am sure, that the Department of Energy has been supporting the development of the MHTGR and the PRISM concepts. The presentation for the Department of Energy will be kicked off by Mr. Jerry Griffith.

[Slide.]

MR. GRIFFITH: I Jerry Griffith, and I am the Director of the Office of Advanced Reactor Programs, in the Department of Energy. I am pleased to have the opportunity to be here this morning to discuss with the Committee our positions on the policy issues statement, and our program plans and schedules for the advanced liquid metal-cooled reactor, and the modular high-temperature gas-cooled reactor.

I want to say a few general words about the evolution of the safety policy, and about our overall schedules for these programs in the department, and then

turn the presentations over to the representatives of the vendors who are preparing these designs, General Electric, and General Atomic.

We are encouraged by the progress that is being made by the NRC in the development of their safety policy for advanced reactors. We see a few wrinkles that we believe requires additional discussion and evolution. And we will talk about a couple of these with each of the design presentations. However, we think that what is evolving is very workable and useful.

[Slide.]

MR. GRIFFITH: In terms of our general schedules, I want to indicate that our schedules for these programs are driven by the Energy Policy Act of 1992, which requires three very important top-level dates that the Department meet. And the first one, September 30th, 1996, we must submit application to the NRC for preliminary design approval of the standard plant. That is specified in the law. And to do that, we need a standard plant PSAR and a safety test plan for the prototype. And we have schedules to obtain them.

The second date is September 30th, 1998, which the secretary must submit to Congress a recommendation to build a prototype demonstration of a plant for one or more of these technologies. And for that we need a preliminary

design approval to support that recommendation. And that also is in the schedules.

And, finally, by December 31st, 2010, to complete the R&D and demonstration to support the design of an advance reactor that can be put on an electric utility grid.

MR. DAVIS: Excuse me, Jerry. That second obligation, is that a recommendation as to whether or not to build one, or which one to build? Or both?

MR. GRIFFITH: I think the language says one or more cf the technologies -- one or both. So, the law specifies they submit a recommendation whether to do one or more. But, I think that can be read to do neither also, because it is a recommendation of whether to do it or not.

MR. DAVIS: Thank you.

[Slide.]

MR. GRIFFITH: Now, for each of the plants then, the advanced liquid metal reactor program plan can be seen here then. In December of this year, we must complete the advanced conceptual design, and get the preliminary safety evaluation report from the NRC, in order to support the September 30th, 1995 standard plant preliminary safety analysis report that must be submitted to the NRC.

MR. MICHELSON: Excuse me. You are doing this under Part 50?

MR. GRIFFITH: Part 50?

MR. MICHELSON· You are going to Part 52?

MR. WILLIAMS: Let me say, for the MHTGR, we really haven't committed yet to either Part 50 or Part 52. However --

MR. CARROLL: This is the ALMR.

MR. WILLIAMS: Oh, I'm sorry.

MR. HARDY: I will speak to that. This is Dick Hardy, from GE. We do ultimately intend to apply for standard design certification under Part 52.

MR. MICHELSON: These terminations -- these terminologies were all Part 50.

MR. HARDY: I believe this request for a preliminary design approval is under Part 50. This will not constitute an application for certification at this time.

MR. MICHELSON: Right. That was all I was really shooting for -- were you shooting for a certificate, or were you just shooting to get enough to build a prototype?

MR. HARDY: Well, the way we are laying the program out, the way this will work is that we would like the NRC approval of the preliminary design to support the DOE recommendation to Congress in 1998.

MR. MICHELSON: Okay.

MR. WILLIAMS: Similar for the HTGR. Yet, I believe preliminary design approval is stated in Part 50, and perhaps it is also in Part 52.

MR. MICHELSON: It just doesn't lead to certification --

MR. WILLIAMS: We certainly intend to go to certification. There is no question about that.

MR. MICHELSON: You have to review it again for certification.

MR. SHEWMON: Would you give your name?

MR. WILLIAMS: I am Pete Williams, and I am from DOE.

MR. GRIFFITH: So, the second important interaction with NRC is in March of '98 then to get the preliminary design approval, which would support the Secretary's recommendation to Congress. Now, the longer term --

MR. WILKINS: Jerry, do you have a commitment from NRC that says that the intervals -- that was an 18-month interval, for example, between september 30th, '96 and March 31st -- has the NRC agreed to that?

MR. HARDY: This is Dick Hardy again from GE. Not explicitly. We haven't bounced these off of them. It's just based on our experience of their normal turnaround.

MR. WILKINS: All right. Thank you.

MR. GRIFFITH: I would like to point out that we have discussed with NRC, the Acting Assistant Secretary, and Tom Murley have discussed these schedules and dates. At

least we feel we have agreement that the December 31st date will be met by NRC. It is very important that that be met, because this schedule is very tight. And, if we delay on that schedule, we will delay in commitments that are required to the Department by law.

[Slide.]

MR. GRIFFITH: In the longer term, just briefly, the other schedules that lead to the ultimate certification of a standard plant in 2009, and the plant delivering electricity to the grid in 2010.

[Slide.]

MR. GRIFFITH: Now, the MHTGR basic schedule is similar. The requirements, by law, of course are the same. The major difference is that receiving the final PSER from NRC is June '94, instead of December '93, as it was for the ALMR, and, again, it is very important that this date be met, because things that follow that are very tight through the September '96 submission of the PDA approval of the standard plant.

[Slide.]

MR. GRIFFITH: And, finally, shown here also, is the '98 date for receiving the PDA from NRC to support the Secretary's recommendation. And, again, just very quickly, the rest of long-term schedule that leads to the certification of the standard plant. So, those are our top-

level schedules, and their tie to the National Energy Policy Act. And, as I indicated in the early parts of this, are very tight, and it is very important that we work closely with NRC to be able to meet those schedules.

And, unless there are questions then, I would turn the presentations over to Dick.

MR. HARDY: Do you want GE first?

MR. GRIFFITH: GE first, yes.

MR. HARDY: Okay. Dick Hardy from General Electric.

MR. WILKINS: I should have asked you the question while you were up there. While Mr. Hardy is getting set. Does the policy act to which you referred, give the Secretary of the Department of Energy the privilege of recommending that nothing be done?

MR. GRIFFITH: I believe it does. But, again, the words in the law say that he would recommend one or more of these technologies for further development. And I think that we are not sure.

MR. WILKINS: That means just what it says? One or more?

MR. GRIFFITH: One or more.

MR. WILKINS: That does not include none.

MR. GRIFFITH: I think that's probably true.

MR. SEALE: What is probably true?

MR. WILKINS: That the Secretary does not have the option of saying to Congress, in my judgment, neither of these technologies is worthy of further development.

MR. HARDY: I would be very surprised if he said that.

MR. GRIFFITH: I agree with that.

MR. WILKINS: None of us is smart enough to know what is going to happen in 1996 and 1998 gentlemen. I would be disappointed, but I would not be surprised.

MR. SHEWMON: Please proceed.

[Slide.]

MR. HARDY: Okay. My name is Dick Hardy from GE Nuclear Energy. I am going to address the ALMR, which is based on the PRISM concept. I think we use these terms interchangeably. And most of you are familiar with the PRISM term.

[Slide.]

MR. HARDY: We have interacted, in the recent past with the ACRS. Last May we had a meeting in San Francisco with the Subcommittee on Advanced Reactors, as well as the Subcommittee on Materials and Metallurgy. So, some of you are still here from that meeting and are familiar with our reactor. And then we met with you in August of '91, which was a year and a half ago, with the Advanced Reactor Committee, and gave you an update at that time. But, I

believe there are some new faces in the Committee. So, what I thought I would do was give you just a brief overview of our design concept before I address the policy issues.

MR. CARROLL: Even more basic than that. What does PRISM stand for today?

MR. HARDY: Power Reactor Innovative Small Module.

MR. CARROLL: No inherently safe?

MR. HARDY: That's a no-no.

MR. CARROLL: That's a no-no. Very good.

MR. HARDY: Okay. Well, liquid metal reactor, fast reactor, compact. We have got nine reactor modules to make up a power plant. Each reactor module is located in an underground silo. Because of its modularity, we are able to fabricate in the factory, under factory-controlled conditions, and ship to the site, either by rail or by barge, depending on the size of the modules.

We use metal fuel, as opposed to oxide. And it has some favorable characteristics. Argonne is developing it for us. We call the fuel cycle interval, it can be right on the power plant site using a pyro process, as opposed to an aqueous process for reprocessing. Pyro processing lends itself to batch processing for small quantities.

Metal fuel has very strong inherent safety characteristics for reactivity coefficient control. It has high internal breeding, so we can have a small reactivity

swing over the fuel cycle. That means that, at any point in time, our current design is no more than 40 cents of positive reactivity, and one control rod can shut you down. There are six control rods, but one control rod can shut you down at any point in the cycle.

And the concept it recycles its own actinides, and fission products in the pyro process integral fuel cycle, but it can also take, as feed stock, the actinides from light water reactor waste. And this is one of the applications that is being considered for this reactor to help alleviate the light water reactor waste problem.

We use natural circulation for air, for decay heat removal. And I will show you a picture of that later. There are no pumps, no louvers in this decay heat removal system. It is completely passive. We have passive response to transients without scram, because of a strong inherent reactivity coefficient of the metal fuel.

We have a simple system -- simple reactor system, many passive features. So, we have limited safety grade active systems. We have limited requirements for 1-E power. Our 1-E power can be supplied strictly from batteries.

We use seismic isolation to increase our seismic margin. And we intend to demonstrate all of this in a prototype on one reactor module which would simulate the behavior of the old nine module plant.

[Slide.]

MR. HARDY: This is a conceptual layout of what the plant might look like. The high security boundary is shown in this green fence. And inside that are the reactor modules. And they are underground. This circle here is the footprint of the reactor. It is underground. That would be where the refueling cask would come in to refuel. There are three of these side by side. Each reactor module feeds a steam generator. These three steam generators are headed together to feed one turbine generator.

This three reactor complement is called a power block. And, for a plant -- this one is for a 1400 megawatts -- its three power blacks would make a complete power plant.

Also, inside the high security boundary, are the control building, the remote shutdown facility, the fuel facility, and we leave a footprint here for a reprocessing facility, if it was desirable on that plant. The other option would be to have a central reprocessing facility to service several plants.

MR. SHEWMON: Will you get into how those reactors are gained or controlled?

MR. HARDY: In the control building would be the control room. And there are three control consoles, one for each power block. One control console controls the three reactors in that power block.

MR. SHEWMON: And what if, for some reason, they don't remain all identical?

MR. HARDY: They are designed that they can be in all different operating states at any one time, and they can still be operated from that one console.

We use state-of-the-art digital-based control systems. And our task analysis shows that it certainly ought to be possible to do this, and that it will be demonstrated in a control room simulation.

MR. SHEWMON: Okay.

[Slide.]

MR. HARDY: This table just shows some of the key numbers. I won't go through it in any detail. You can read it.

[Slide.]

MR. HARDY: The power block consists of the reactor module, which is underground. And that circular footprint that you saw was right over this reactor module. On either side of it are stacks for this natural decay heat removal system for the air to go down and around the reactor vessel to remove decay heat.

This is the steam generator building. It is about half underground and half above ground. Three of these headed together to feed one turbine generator.

The prototype that we are planning to build will

consist of this one reactor module, this steam generator, and then one turbine, but it will be a smaller turbine, one-third the size of the power block turbine.

MR. DAVIS: Does that prototype require -- in order to build that, does it require that DOE select that one as their prototype for demonstration?

MR. HARDY: Well, they are looking at two technologies. And, if they pick our technology, we are committed to build a prototype, which I believe is required to get design certification.

MR. DAVIS: But, if they don't?

MR. HARDY: If they don't build a prototype?

MR. DAVIS: Yes?

MR. HARDY: If we thought we could succeed, we could try to get a standard design certification the way say the ABWR is, with just design information. But, with a new technology like this, I think the consensus in the industry is that we would need a prototype. We don't have that operating base that the light water people do to convince the NRC that we should have design certification unless we do demonstrate it.

MR. DAVIS: Thank you.

[Slide.]

MR. HARDY: This is a larger view of the reactor module. This is a pool-type reactor. The reactor vessel

hangs at this location. There are no penetrations in that vessel. It is just a straight cylindrical vessel, with a bottom head. All the pipes, tubes, electrical leads, everything come out th . So, we don't have a LOCA in the normal sense of the word. There is no pipe that can break that can give you a LOCA.

Surrounding the reactor vessel, this arrow points to one of these vessels here. Surrounding that is the containment vessel. And that containment vessel ties into this containment dome. So, there is a containment boundary that completely surrounds the primary system boundary.

MR. SHEWMON: How do you make your head seal when you open it up for fuel changing?

MR. HARDY: We use seal welds. They are completely hermetically sealed at all of the penetrations going through the top head during operation. We break the seals when we want to refuel, or remove components, and then we hermetically seal before going back up in operation.

Our seismic isolators are located at this elevation, and the whole system then rides on it. This structure here is what supports the reactor vessel, and all of the electrical systems that are in the reactor vault. It all floats on these seismic isolators, including these stacks for the air circulation for decay heat. This is grade level.

[Slide.]

MR. HARDY: We call our decay heat removal system RVACS, Reactor Vessel Auxiliary Cooling System. There is an air intake on the side of the stack. The air passes down along the inside of the silo wall, and there is a vessel here that is open on the bottom that we call the collector cylinder. So, the cold air passes down the outside of that collector cylinder, turns around, and then passes along side the containment vessel, and on out.

Now, there is a gap between the containment vessel, and the reactor vessel that's filled with argon. Normally, during operation in the reactor vessel, we have cooled sodium flowing down the surface of the reactor vessel, and so our heat losses from the system are quite low. They are about two-tenths of one percent. However, if we lost our normal heat removal system, and we were relying on RVACS as our safety grade decay heat removal, the temperatures would start to rise inside the reactor, and the sodium would expand, and overflow a wier wall, so the hot sodium would then flow down alongside the inside surface of the reactor vessel. That would increase the temperatures nere. The heat is transferred by heat radiation across here, and it follows the temperature of the fourth law. So, as the temperature goes up, the amount of heat that goes across that gap goes up dramatically. And then the hot air

that goes along the outside can remove whatever the heat load is that is given to it. So, the decay heat removal then goes up to several megawatts when we need it during emergency decay heat removal.

This system has no pumps, it has no louvers. It is always in operation. there are four of these stacks. We have shown that we can lose three of them and still remove the decay heat.

MR. SHEWMON: While you have got that picture, show me this hermetic seal which you make and re-weld a dozen times, and do --

MR. HARDY: Well, it is not shown here. But, every gap here would have a -- it is a metal plate, if you will, which jumpers the gap, and it is welded to this structure in the --

MR. SHEWMON: I think welds are wonderful. I am just intrigued at how you can make and break one a dozen times over the life of the plant and still have it easily inspectable and done. But, then --

MR. HARDY: Well, you would replace the seal once in a while. But, this is a common technique with sodium reactors, because, of course you don't --

MR. SHEWMON: No, it is not particularly common with sodium reactors.

MR. HARDY: Well, it has been done. Let's put it

that way. But, you certainly don't want air getting in there.

MR. SHEWMON: Yes. That has been a problem a lot of them have had. And I know a good deal about what EBR-IIs had with them.

[Slide.]

MR. HARDY: Seismic isolators are fabricated from a stack of steel shim plates interspersed with natural rubber. They are about four feet in diameter, and three-feet high, I believe. The purpose of them is to reduce the natural frequency on the isolated structure to about three-quarters of a hertz. The natural frequency of most of the equipment that we are trying to protect is in the several hertz range. So, if we get down to less than one hertz, we have essentially isolated it. We get a load reduction then on those components over a factor of three.

And this is very desirable for this particular design, since the vessel hangs from here. There is a long moment arm there, and we don't want to be shaking it so the whole structure will just move back and forth like that. It will not rotate.

MR. CARROLL: How do you inspect the levers over a 40-year plant life?

MR. HARDY: Well, these can be removed. Workers can get down in here. And we have plans to, first of all,

have sample material there that we can remove anytime, monthly, yearly, to investigate material degradation. But, our ISI program calls for removing a complete snubber at a certain interval, and testing it and seeing whether it has retained its characteristics.

[Slide.]

MR. HARDY: This is our reference metal core. It is about -- a little over four and a half feet tall, about four feet across. We have both driver fuel and blanket fuel.

We have six control rods, these dark hexagons. As I mentioned, any one control rod can shut the reactor down at any point in a cycle.

If we get into an ATWS event, and we can't get at least one rod in in the center position, we have what we call the ultimate shutdown device, and that releases boron balls into a thimble in the center of the core.

We have what are called gas expansion modules. There are three of these. These are like an inverted test tube. And you insert them into three of these lattice locations. Sodium will come up to some level in that module as you put it in, but it will be below the -- it will be below the level of the core. Then when the pumps come on and drive the sodium, which is upflow, through the core, it will -- the pressure in the lower plenum will push the

sodium up into the module, and reduce the leakage. The purpose of these is, if you have a loss of flow event, you want to insert negative reactivity. So, if you have a loss of flow event, the pumps stop, the sodium drops out of these modules, the neutron leakage increases, and we get negative reactivity insertion very quickly.

MR. CARROLL: As long as they haven't developed a hole in the top.

MR. HARDY: Right.

MR. CARROLL: How do you monitor that?

MR. HARDY: We intend to check these at every shutdown.

MR. CARROLL: But, no continuous monitoring?

MR. HARDY: I guess not. Do you want to comment on that, Pat?

MR. MAGEE: Pat Magee of General Electric.

We have looked into the situation. And our analysis shows that we could lose certainly two of the three GEMS completely and still survive the loss of flow -- unprotected loss of flow transient. So, it is our feeling that checking these at the 18-month shutdown interval is quite sufficient.

MR. CARROLL: You qualified it with unprotected loss of flow.

MR. MAGEE: That is a loss of flow without scram.

MR. CARROLL: Okay. But, normally, you would have the scram?

MR. MAGEE: Normally you would expect -- you would scram. That's what you want to do for investment protection, and for keeping the transients very mild on the system.

MR. CARROLL: All right.

MR. SHEWMON: Sir, could we back up for a minute? You don't have to go back. You talked about a peak fuel burn-up. Can you convert 135 megawatt days per kilogram to percent heavy metal? Is that 13 and a half about, or what in the fuel?

MR. HARDY: This number here?

MR. SHEWMON: Yes.

MR. MAGEE: Yes, it is. It works out to just about 13 and a half burned up on the peak fuel.

MR. SHEWMON: Okay. And the breeding ratio in the fuel is what? I take it that's for the whole core -- the one --

MR. MAGEE: That's for the whole core with the blanket. That is a compound system doubling.

MR. HARDY: We show a range. You can have what you call a break even core. But, if you want to breed, we can increase --

MR. SHEWMON: But, in the fuel, it is about one?

MR. HARDY: It's a little over -- you mean in the fuel itself?

MR. SHEWMON: Yes?

MR. HARDY: I don't know what it is in the fuel. this is a site composite, with the blanket.

MR. SHEWMON: I know. But, part of your argument earlier was that it was -- something was close to one, that's why there were very small reactivity swings.

MR. MAGEE: If you look down below, the burn-up reactivity -- this is Pat Magee again. The burn-up reactivity swing number are normally 43 cents. And this -- the system is adjusted, and the plutonium enrichment is adjusted so that there's very little change over the 18 month cycle. We try to hold that very small, for safety reasons.

MR. SHEWMON: Well, does that -- if the burn-up reactivity swing was zero, would that correspond to a breeding ratio of one in the fuel I guess is my question?

MR. MAGEE: No. I think what we are doing -- we are really using the internal blankets to balance that all off.

MR. SHEWMON: Okay. Thank you.

[Slide.]

MR. HARDY: This slide shows the containment system. We have a low-leakage, high-pressure containment

dome. And then, what is essentially a zero leakage, phased up to 60 psig containment vessel around the reactor vessel, to complete the boundary. There are no penetrations in either the containment vessel or the reactor vessel. There are penetrations in the containment dome, and we have isolation valves on those.

MR. CARROLL: In light water reactors today, we are worried about shutdown risk, and releases of radioactivity when the vessel is open and that sort of thing during refueling. How do you deal with that?

MR. HARDY: Well, in our system, we never open up the vessel, because we have sodium, and we don't want it to interact with air. So, we do all of our refueling in an enclosed system. So, a cask would come over the top, and we would run a tube from the cask down through the dome, to the refueling port here, and then you pull a plug out, and you can pull in the fuel element out through this tube up into the cask, and it is never exposed to air.

MR. SHEWMON: Where is the welded joint you were talking about that was your top seal?

MR. HARDY: These figures don't show that detail.

MR. SHEWMON: Yes. But you just told me earlier that, when you change fuel, you had to make and break a welded joint, yet you said you just kept coming through plugs when you answered his questions.

MR. HARDY: If there is a plug in here that has a gap, you would have a seal between the plug and the circumference of the penetration here. You would have to break that seal, and then there is a whole sequence of events you go through, but then you have got to bring your tube down and make a new seal before you pull the plug out.

MR. SHEWMON: So, you are making and breaking the welded seals at that point, and that is your sodium interface, so there is no sodium vapor in your containment dome; is that right?

MR. HARDY: That's correct, yes. We don't pull out the plug that's in here until we have re-made the seal with this tube that comes down.

MR. CARROLL: Do you look at accidents that can happen during refueling?

MR. HARDY: Yes, sir. We look at refueling accidents.

MR. SHEWMON: Your procedure -- you showed the taking the fuel in and out of that separate basket on the side. Is that where you put it to cool before you bring it out, so there is something internal that takes it out of the core --

MR. HARDY: Right.

MR. SHEWMON: -- and puts it there?

MR. HARDY: There are racks inside. A fuel

element will sit there from one refueling cycle to decay before we pull it down.

MR. SHEWMON: So, there is another arm inside that reshuffles fuel from the core up to that, is that right?

MR. HARDY: Yes, sir.

MR. SHEWMON: And that is all sealed -- hermetically sealed at all times, so that can be done while all of these other seals are made on top; is that right?

MR. HARDY: Yes.

MR. CARROLL: Do you really mean zero leakage rate, or is there a --

MR. HARDY: Well, one of the purposes of this containment vessel is to contain any sodium that would leak from a reactor vessel leak. So, we don't want that sodium then to get out and cause a fire, so we -- I guess nothing can be zero, but it sure is very small.

MR. SHEWMON: If these welds are good, it's zero.

MR. HARDY: Remember, there are no penetrations. There's no pipe nipples, penetrations, or anything like that.

MR. SHEWMON: He claims he can inspect them.

[Slide.]

MR. HARDY: The staff identified 10 policy issues related to the advanced reactors. And then they went on to say that eight of these apply to the ALMR/PRISM. And then

they broke these eight into two groups, and they said seven of them, and that's these seven, are such that perhaps departure from current regulations would be considered. Then they picked one issue, and they said they are not sure that departure is warranted at this time. So, I would like to address both of those groups.

MR. WILKINS: I think tney made a stronger statement.

MR. HARDY: What was that?

MR. WILKINS: They said they don't believe it should be considered.

[Slide.]

MR. HARDY: If we look at the seven policy issues -- I could go through these one by one, but I am not sure it is necessary, unless you want to. We feel that the staff's position is similar to what we have been reposing all along. And the characterization of that position is that departure from current regulation should be considered. And when you do that, you should do it from a performance-based viewpoint, rather than a prescription-based viewpoint. So, we should have some goal we are trying to achieve. And, if we can achieve that, and show that performance, even though it departs from current regulations, then perhaps that is acceptable.

And, of course, a lot of work is required to

generate the data to provide the information required to make the judgment. And I think this is where the interesting discussions are going to occur. At some point in time, when we ask for deviation from a current regulation, have we generated sufficient data to convince the staff that they should deviate? But, the whole approach is compatible with our approach. And we are pleased to see that they have adopted it for these seven positions -- or seven issues. Excuse me.

[Slide.]

MR. HARDY: For the eighth policy issue, it happens to be the control room. That differs from our position. And specifically, they recommend that until they perhaps do something with the passive LWR's, it's different concurrent regulations, that we should all follow the current LWR regulations. And what that means to us is a 1E control room in a building designed to category one seismic standards, and it would have both 1E instrumentation controls and HVAC.

Now, our current control room is not 1E. When we started out in this design, we observed that for both Three Mile Island and Chernobyl, one of the major factors in those accidents was operator error -- either omission, or commission. And we said gee, with our reactor, maybe we can do something about that, because we have a simple concept,

it has a high-degree of passive safety features. We have long time constants before an operator has to make a decision to do anything. So, let's separate the safety system from the plant control system. Let's not allow the operator to interfere with that safety system. It will either be the passive systems that are automatically, by nature, going to occur, or it can be simple active systems that we have designed to be fully automatic and no operator actions required.

So, we separated the safety systems from the plant control system, and put the safety systems in the remote shutdown facility, and then in the reactor vaults in each reactor. And we left the control room strictly as a plant control system, without 1E instrumentation or 1E power. Now, you can still scram from the control room, either through the computer system, or through a hard-wired scram button, but there is no 1E power, or 1E quad redundancy in that design.

The control room and building are designed to what we call category two seismic, and it is tornado-hardened. And the purpose there is to protect the operator -- to make sure that, if worse came to worse, he would have time to evacuate the control room, and move over to the remote shutdown facility, which is about 50-feet away. It is a separate building. He has to go down one flight of stairs,

through a tunnel and up a flight of stairs. So, that was our philosophy, and that was why we ended up with a non-1E control room. And we believe it meets the general design criteria, and it takes into account our particular safety and enhanced -- passive and safety -- inherent safety features.

And so our position is that we would like to see the staff approach this like they did the other seven, and do it from a performance-based point of view, and let us demonstrate that our concept will meet the requirements, rather than just prescribing that we have to follow what the LWR design has followed.

[Slide.]

MR. HARDY: We put that in the letter back to the staff, with our comment.

I have kind of a general comment I would like to make on the treatment of conservatism.

MR. CARROLL: Do we have that letter?

MR. WILKINS: I was about to ask. I don't believe we have seen that letter.

MR. HARDY: It went from DOE to NRC, and I think it went to Stephen Sands. Bob Pierson, have you --

MR. PIERSON: We have the letter. We could give you a copy of the letter for that.

MR. WILKINS: We would certainly appreciate it.

Would you give it to Mr. Igne.

MR. HARDY: The staff has said that because, at least our plant, and some of the others are in the conceptual design phase, there is a large degree of uncertainty associated with the design and the analyses. So, they want to make sure that they put enough conservatism into their review to account for these uncertainties.

We are concerned about the manner in which they might apply that conservatism. If they don't do it right, they may end up with an alternative regulation that is so strict that it serves as a surrogate de facto new policy. These are kind of in ACRS words in one of your letters, which is more conservative than a safety goal. In other words, if they say because our plant is conceptual and the uncertainties are so big, if we really want a 25 rem limit at this point, we better tell them to calculate five rem so that we have a factor of five margin. Well, if they tell us the limit is five rem for us now, it is going to be hard to back off and say five years from now that it is 10 rem or 25 rem.

So, what we would like to see them do is set the criteria where they really want it. It is 25 rem, it is always 25 rem, and then allow for uncertainties when they do the evaluation. If 25 rem is the goal, tell us today that we better calculate five rem, and then in a few years from

now, we can calculate 10 or 15 as the uncertainties decrease, but keep the goal, the criterion constant, where you really want it.

So, that's the end of my presentation.

MR. CARROLL: Have you had a reaction from the staff on that?

MR. HARDY: No. I have not heard anything back yet.

MR. WILKINS: Questions? Pete?

MR. DAVIS: I have a question for clarification. On one of the slides you said that the safe shutdown earthquake design requirement is .3 g, and the design capability is .5 g. I am a little confused what those two numbers really mean. You are going to design for .3 and expect to get .5?

[Slide.]

MR. HARDY: No. We are going to design for .5, but get a license at .3, and have margin in this country. And, if we were to go to a high seismic country, we would probably license it at .5 in that country. But, in this country, we believe we don't need to go above .3's.

MR. DAVIS: Okay. But, the vendor design requirement will be .5 when you --

MR. HARDY: Correct. Yes. We tell our engineers you design it with this seismic isolation system to take a

.5 g peak ground motion earthquake as your design basis. But, when we go to the NRC, we ask them to license us only to .3. And because we design it to .5, we have got so much margin, we should have no problem getting a license.

MR. DAVIS: Okay. So, the design requirement is really .5?

MR. HARDY: Correct.

MR. DAVIS: Not .3? Okay. Thank you.

MR. LINDBLAD: I have a question. I am not familiar with the hazards during refueling, but does the refueling carriage, or a machine that go over it, does that have to be seismically isolated as well?

MR. HARDY: Well, it is seismically isolated because it is on a seismically isolated platform.

MR. LINDBLAD: So, the seismic protection is afforded during refueling as well?

[Slide.]

MR. HARDY: The seismic platform, I guess, is about this level. And this whole structure is supported off of that seismically isolated platform. So, during refueling, we bring in this refueling enclosure, which is seismic one, tornado hardened, sealed, at the base. And then we bring in our casks, and make all of our seals. Everything is on the isolated platform.

MR. LINDBLAD: Thank you.

MR. SEALE: I have a question. Are you prepared to talk about the possible in core instrumentation you might have in the fuel?

MR. HARDY: No. Not today. We didn't bring our expert on that one.

MR. SEALE: Thank you.

MR. WILKINS: All right gentlemen. Thank you very much, Mr. Hardy.

Let's see, where do we go? Mr. Silady? Am I pronouncing your name correctly?

MR. SILADY: Yes, you are.

MR. WILKINS: Thank you.

Oh, wait a minute. Maybe we better take a break, yes.

MR. MICHELSON: Till when?

[Brief recess.]

MR. WILKINS: Gentlemen. We have a forum of the Committee. So, let us proceed. And may I request, although it is a little unfair, I am going to request it anyway, that you talk fast.

MR. SILADY: I will talk fast, as fast as I can.

MR. WILKINS: But, don't skip any of the salient points you want to make.

MR. SILADY: Very good.

[Slide.]

MR. SILADY: I assume that the microphone and everything is working correctly?

MR. WILKINS: Very well.

MR. SILADY: My name if Fred Silady. I work at General Atomics. In addition to General Atomics, there are a number of companies that are working on the design of the MHTGR since about 1985. Those include Combustion Engineering, Bechtel, and Stone & Webster. In addition, Oak Ridge is the lab that provides the bulk of our technology support. And we have utility guidance and input through the Gas Cooled Reactor Associates. I don't believe I left anyone out. I wanted to recognize the entire team.

I am here to talk about the designer's perspective on the eight issues. I didn't come prepared to talk about the design, but I really would like to. And so I would like to invite myself maybe back another day, or others of the team, and talk more about our design. But, my purpose here this morning is very very focused. I am going to go through each of the eight issues that were applicable to the MHTGR. I am going to have a page on each one.

There are a couple of introductory statements at the beginning, and then there's a wrap-up at the end. So, I hope this format helps in your job of deciding whether or not you want to write a letter, and what kind of guidance you wish to give to the NRC on our key policy draft paper.

[Slide.]

MR. SILADY: We believe the MHTGR has been responsive to the advanced reactor policy. Those of you that were instrumental in providing input to the commissioners when they developed that policy, know that, back in '86, that it gave us sort of a road map of how we should go about, for a second generation reactors, meeting the safety goals, to increase the assurance to safety, and with the expectation of enhanced safety, and to promote more effective regulation in several ways. And one of those could be through early interactions. And we have been having those over these years, and also through less prescriptive design criteria.

Now, these key issues have been under review, particularly four of them, since 1985, when we started the pre-application review. There was a first version of these key issues that was developed by NRC in SECY 88-203. It was a draft. It was largely incorporated into our draft preapplication safety evaluation report that came out in that same timeframe. So, we got some guidance at that point. We are still, of course, working, as Jerry Griffith of DOE indicated, to get that draft preapplication safety evaluation report out as a final issue. But, in the first version of it, there was a basis for specific criteria that were based on the safety goals, severe accident policy, 10

CFR standardization. And so four of the eight issues have already -- in the '88 timeframe, we got some guidance, in draft form, for accident selection, source terms, containment and emergency planning.

[Slide.]

MR. SILADY: We believe that the advanced reactor policy, together with the safety goals, should provide the guidance for the key issues. It is a challenging document, the advanced reactor policy. It challenged us to go about looking at safety in a different way, and design a reactor with intrinsic natural characteristics. But, it also challenged the regulator. And the applicant, or the designers were asked come in with innovative regulatory approaches, in addition to innovative designs.

We know that the safety goals define the acceptable level of safety. We believe that the policy should then, from this top level, that's independent of reactor, and design, and site and everything, should get us regulatory performance criteria that are specific to each individual reactor technology. So, as you work down some of the criteria, just because the reactors are different, may have variations, and we will talk more about that as we go through the issues.

Of course, the regulatory process, itself, should focus on what is risk significant, and we do need the

quantitative criteria to allow us to know that we are meeting the right criteria.

So, now I am going to go through each of the eight issues. And the format that I am going to use is -- I am going to try to paraphrase what the NRC has said in their letter, in the top half, and then I am going to take how we think the MHTGR design responds to that, or how the approach is similar, or isn't, and then any concerns that we have.

[Slide.]

MR. SILADY: So, let's go through the first one, accident evaluation. The staff has indicated they are going to develop a single approach for accident evaluation to be applied to all of the advanced reactor designs. Events are to be grouped and categorized, based on frequency of occurrence. Consequence acceptance limits are to be established for each category. Methodologies and evaluation assumptions consistent with existing LWR practices is recommended.

We believe our approach responds to this guidance. We have used a blend of deterministic and probabilistic, with engineering judgment, considering the uncertainties. And, this group had a letter back in '88 that reached this conclusion -- that we had covered enough of a spectrum, so as to be able to say, at this point, we hadn't identified any accident scenarios that had high risk to the public.

So, in this area, our concern is the following. We find less guidance here than we had in 88-203. In that document, we had specific criteria. This is going to be the design basis region. This is going to be beyond the design basis. In this region, this criteria applies, and meets such a percentage of 10 CFR.100, and evaluated in this way. In this region, meet the safety goals. Here we see an intent, but we don't see specifics.

The second concern are the methodologies here may not be applicable, the LWR ones.

The second point I wanted to give an example for. And there are many examples. This may not be the best one. It is the one I came up with as I sat thinking about it. You may want to know what I mean with regard to this last point. And an example of that might be the whether that is specified in the Reg Guides -- that, for the first eight hours it shall be this, more severe than the next eight hours. That sort of LWR evaluation assumption and methodology may not be appropriate for a reactor. The releases come out over a long period of time of a hundred hours. So, we would like to see more specifics here, and we want to always be conscious and aware that we may not fit perfectly into the LWR mold.

[Slide.]

MR. SILADY: The second issue is source term. The

staff here recognizes a mechanistic source term, best estimate, phenomenological -- requires from the applicant's research, development, testing, to provide the confidence. It requires understanding of the transport models, and a set of bounding events. We believe we are responsive to this guidance as well. We do a 95 percent confidence evaluation of the events in the design basis region, we have a best-estimate assessment of events beyond the design basis. We haven't identified any core damage anywhere within a licensing basis region that extends to very low frequencies, below 10 to the minus six.

And we certainly have a technology program planned to provide the required data for both our prompt source term, that which comes out of the coolant, if there is a primary coolant leak, and our delayed source term, that which comes out of the core and takes time because of the heat capacity of the MHTGR.

With regards to this last item, this subcommittee of the ACRS met down at Oak Ridge in the last year, probably December of '91, and reviewed some of the work that we are doing down there.

What is our concern in this area? We need a little more guidance on the treatment of uncertainty in these bounding events. This is still open ended to us. And, again, in this whole process, we are trying to get a

reading, early interaction, on the very fundamental key issues. And so the more closure we can get at this point, the more responsive we can be in our design.

Yes, sir?

MR. SHEWMON: I am looking at the line that says "no core damage identified within licensing basis."

MR. SILADY: Yes, sir.

MR. SHEWMON: Now, is that a design basis event? And when you went through those, there is no core damage? Is that not a good paraphrase of it?

MR. SILADY: I would like to modify that paraphrase a little bit.

MR. SHEWMON: Okay.

MR. SILADY: In our view, there is a design basis region in which you very specifically meet codes and standards, and conservatively meet, for example, a fraction of 10 CFR 100. There is a range beyond it that is sometimes referred to as severe accident, that we don't use that term, because we haven't found anything that is severe about it, other than its frequency is lower. And --

MR. SHEWMON: The probability safety analysis, and not a probability -- PRA?

MR. SILADY: Perhaps. It may be not invented here -- a flavor to it perhaps. But it is a lower frequency range, where the design should have the capability. We call

both f them licensing basis. And we have looked down at 10 to the minus eight. And anybody, the staff, other parties that want to come and ask us about a specific event, take this failure, this failure, and this failure. We are going to answer the question two ways. First, with regards to what its consequences are, but, second, what's its frequency range? Should we be paying attention to it?

[Slide.]

MR. SILADY: Let me go to the third issue, which is containment. And this is one that has been with the MHTGR for a number of years, of course, as you are all familiar. In this area, we are heartened to see that the NRC does not mandate an essentially leak-tight containment, like an LWR high-pressure, low-leakage containment building. The staff proposes to postulate a containment challenge event, and there are some other requirements here, in terms of not exceeding the leak rate for the first 24 hours, and after that point, that you maintain the integrity.

Our response to this is that we believe the fact that we have a prompt source term, that isn't coupled with the delayed source term -- the circulating activity in a played-out, in any of the activity around the circuit, in the helium that gets released at the beginning, that's the high-energy part that goes out a vented, low-pressure containment. It's not -- we haven't found any scenario that

-- the release that comes from defective particles, the small fraction that are defective from the manufacturer, or that fail during normal operation -- that that is, at the same time as a high-energy blowdown. So, that decoupling is very very crucial in our approach to a vented low-pressure containment, as an independent barrier.

Now, note that this is a little different perhaps than when we were here in the '88 timeframe, when we had not developed the design to the same extent we have now. Since that time, we have been working, through questions that NRC has given us, and through just the normal, natural design progression and evolution, to look at do we have the right amount of mitigation on that below-grade silo? And we have made an adjustment here, and we will be turning in a report to the NRC. In looking at the relief line on the primary system, we found that, in the early conceptual design, we just had it going out into the silo. And, our largest consequence event, which was generally caused by a generator tube leak, water coming into the primary system, and going out that relief line, we found that, for a number of reasons, we want to put a filter on that line.

In addition, the containment -- the below-grade silo, we are going to use the term containment for that vented, low-pressure containment, and we are going to be looking at the specifics of any other additional mitigation

that that might need. For example, when the louvers open, there is going to be a means that they close naturally, after it relieves the pressure. They will open on Delta P. So, those are the sorts of things that we have been working on to respond to the need for an independent barrier to radionuclide release.

So, what is our concern in this area? Well, again, we are a little worried about what containment challenge event is. It is a new term. Again, in harkening back to 88-203, we had there a specific criteria. In that document it showed to this frequency that the doses meet this level -- showed that you meet large release criteria and so on. Here, we don't know what this means. And that is a concern. We don't know what the basis would be for it and so on.

MR. SHEWMON: Let me bring up a question for which the answer might be none of the above. But, the ACRS wrote a letter a year or two ago, and had words about light containment challenge events. In fact, they had someplace between six and 12 different criteria which they suggested might be proposed or postulated. Were any of those helpful, or were they of this sort? Or would they have brought up other kinds of -- have you looked at that?

MR. SILADY: I haven't looked at it in detail. But, we did -- a number of us from the MHTGR side

participate in the ACRS meetings, like the one in San Francisco, on the development of that containment criteria. And my impression of it, and I need to go back and review it, is that it was pretty much oriented towards light water reactor. It contains additional containment probabilities.

MR. SHEWMON: But, it had to do with different kinds of challenges that would come. One might be heat, another might be gas pressure, and another might be explosion.

MR. SILADY: An analogous thing, I am sure, could be done, and a criteria needs to be developed like that. But, the energetics, and the challenges will be much different for an MHTGR than for an LWR.

[Slide.]

MR. SILADY: Let me go to the fourth issue. Again, tell me to talk faster, if I am taking a little too much time here.

MR. WILKINS: Talk faster.

MR. SILADY: Emergency planning. Staff will require advanced reactor designs to establish offsite emergency plans. There will be plans -- will require provisions for periodic off-site drills. Well, this one here, we have got a problem, in that our safety design approach results in doses that are far less than the protective action guides specified by the EPA, and we can do

that at the plant boundary, again, over this spectrum of events down to five times 10 to the minus seven. So, we intentionally did not include offsite drills in our plants. We have a plan, it covers the onsite, it covers notification in a timely fashion, the correct authorities offsite. But, we didn't want to disturb the public. It was an approach to be a good neighbor. And now this implies that we are going to have drills regardless of the design. And exactly what kind of relaxation, because of this capability, we are unsure about. Again, in this case, in 88-203, we had more criteria, more guidance.

[Slide.]

MR. SILADY: Operating, staffing and function I am just going to skim over this because of time. We have four modules. We have one central control room. We note what the staff would like us to do in the future. We will do it. We will, based on the detailed design, task analysis, include both normal and accident response. We will have a simulator. We don't have a concern in this area. We think that we can show that we meet the staff guidance.

MR. SHEWMON: When you say one operator short, what is the normal complement for a control room?

MR. SILADY: For the MHTGR, for the four modules, there is one senior reactor operator, and two operators that are licensed, and then there are five others that are

unlicensed. There are eight; but three licensed for the four reactors in one central control room.

MR. SHEWMON: And the five that are unlicensed may be any place in the plant?

MR. SILADY: They may be roving.

[Slide.]

MR. SILADY: Residual heat removal. This is another one, where we are in general agreement. Because, similar to the design discussion that PRISM just had, we have a completely passive, and it is safety-related, and it is normally operating, no valves, no initiation required, and we are constantly monitoring that during normal operation. And it has a large degree of redundancy with multiple panels, and we can take up to 90 percent blockage and so on. The only concern here is we note that they say will assure consistency with passive LWRs. And, again, we are not sure. That precedent has yet to be developed. And their passive heat removal may not be the same as our passive. There have been -- inherent has gotten a bad name over the years. I think passive is heading that way too.

[Slide.]

MR. SILADY: Control room and remote shutdown area design.

MR. WILKINS: I realized I asked you to talk fast, but I will interrupt you just the same. Your concern is,

and, on the previous issue, that when the passive policy issue is settled, it may be settled in a way that is perfectly appropriate for those reactors, but is inappropriate for the MHTGR.

MR. SILADY: That's correct.

MR. WILKINS: And until you see it, you won't know.

MR. SILADY: That's right.

MR. WILKINS: All right. It doesn't have to be, but you don't know?

MR. SILADY: No. It may be all right. Yes.

Control room and remote shutdown area, staffed to apply current LWR regulations and guidance to the review of the advanced reactor designs. Let me just make sure that we are all on board here in terms of what our capability is in the design.

We consciously, again, didn't want to rely on the operator. We haven't found an event that the operator has to come in in order for the public to be protected. However, the operator has capability for plant recovery, to get back to his business of making power, for instance, and he has, in addition, manual scram capability from these three places: The control room, the remote shutdown area, and at the plant protection instrumentation cabinets that are with each module. And they are safety-related.

Our concern here is, again, similar. It is more of a generic issue. If we have this capability, and we don't need the operator, what kinds of costs, and complications that may be adverse to safety are going to be imposed as a result of following that prescription.

[Slide.]

MR. SILADY: Safety classification. Here is one where we stood out. We were the only concept of the four in the document that was found unacceptable in the area of safety classification.

Not in compliance with current requirements. Staff intends to apply current LWR regulations to classifications of the system, structures and components. Well, our approach has been to simplify the extent and the reliance on safety systems, in order to meet the safety goals. We identified, through a classification system that we proposed, risk-significant SSC's that are functionally required to meet the off-site dose requirements. We wanted fewer safety-related systems to put the emphasis on the ones that are really risk-significant. What's our concern here? Well, the current classification is very LWR-specific. If you go in and you read the 10 CFR, it says, in essence, protect that primary coolant boundary, with the implication, because, if you don't, you are going to have trouble with heat removal from the core. The safety functions in the

MHTGR are not one to one. We are the only gas reactor. We are the only one that's having a problem with this liquid-oriented emphasis on heat removal, with the primary coolant boundary.

LWR-type severe accident core melt scenarios are just not applicable. Our core isn't going to melt. It is normally designed to not have full pressure during refueling, and all three of the heat removal systems can work even if it doesn't have all of the helium. It is depressurized. So, the emphasis on the primary coolant boundary, we believe, is misplaced, perhaps at the expense of some other things. We know we have to pay attention to shutting the reactor down with a negative temperature coefficient, removing the heat with our passive heat removal, and controlling chemical attack. We don't want any large amount of oxidants getting into the core. So, we classified things that -- parts of the primary coolant boundary that could be large ingresses in -- where we are worried about oxidants coming this way. We weren't worried about small leaks in very very close precisians on helium going that way. We know we have to take care of that, just for the economics of helium inventory. The safety of the public isn't as affected by primary coolant boundary leaks, and MHTGR as in an LWR.

[Slide.]

MR. SILADY: Summary. The design is responsive to the advanced reactor policy. We meet the safety goals of margin. There have been a number of consultants and NRC contractors, and other parties that have reviewed the MHTGR safety, in terms of the spectrum of accidents. We believe the framework, and basis for the key issue policy should be linked to those two things -- the safety goals, and to the advanced reactor policy. We need, in the key issue policy, quantitative guidance and acceptance criteria. We don't think it should be prescriptive or rely on LWR precedent. We need to ask the question, is this right for the safety of this reactor? Every LWR regulation has to be asked that question. We are not trying to duck those regulations, but we have to ask is it fundamental to the functions for this reactor?

And there are some situations in the key policy document where we are being told we are going to follow the advanced LWR precedent that isn't yet developed. We need guidance now, not to be developed.

And, finally, we feel this key issue policy should support the development of regulation, based on risk importance. And that has been our approach all along -- to make the features that are passive be the ones that are important ones to protecting the public.

I thank you for your time. I have hoped I have

helped answer specifically the question here, with regard to the document on key issues. And, once again, for those of you that, over the years, since '85 may not have had a chance to hear about the design detail to MHTGR, we would always welcome a chance to come back and talk.

MR. WILKINS: Are there any questions?

MR. CARROLL: Among the independent groups that have reviewed the design, as it exists today, have any of them gone in on the question of the integrity of the core support plate? That seems to me to be very key in concluding that the core can't be disruptive?

MR. SILADY: No. I haven't found a group that thought that our present core design, core support posts, and blocks that support the graphite core has a particular weakness. I might mention though that, again, in our attempts to make sure that there is no achilles heal, we have looked at failures of that, and see, does that affect the ability to shut the plant down, and it can still be shut down with a negative temperature coefficient, or with the rods that either/or -- or with rods that are on the core in the regions that don't slump.

And the second function, of course, on heat removal -- the heat still conducts and radiates out the uninsulated vessel, and there is no problem in that regard. So, no one has identified something.

MR. CARROLL: If I couple this with air getting into the system, you potentially have a problem, don't you?

MR. SILADY: Well the tolerances, within that vessel are so tight, there isn't really a way that you can spread the core out that makes the air graphite reaction significant. In the limit, of course, if it all drops, if it shuts off, if you have some of it drop, there will be air coming -- you know, if you postulate failures, large amounts of air coming in, it still has to go through the coolant holes of the core. And it is a very large L over D, something like 700. And it is mass transfer limited. So, one of the thing we looked was just supplying continuous air to the bottom, and look a the oxidation of the graphite up through the core. And I didn't identify a problem there either, in terms of getting the fission products out of the fuel particles.

So, it is always an area we need to look further at. And I am sure there will be other discussions on the core support. No one has really honed in on that.

MR. CARROLL: Okay. Thank you.

MR. WILKINS: I might mention, for the benefit of the Committee members, that you should have at your desks a copy of the letter from the Department of Energy to the NRC, giving its opinions on these various policy issues as well. And you should also have the letter from Consumers -- I'm

sorry, it is not from Consumers Power, it is from the GCRA, the Gas Cooled Reactor Associates, which is a group of utilities, of which Consumers Power is one. All right. Are we passing them both out?

MR. SEALE: For some of us neophytes, could we get a letter or a copy of something that would tell us what the difference in the staff position was, or the SECY 88 whatever it was position on these key elements, and how that is different from what the situation is today?

MR. WILKINS: Yes. I would like to see it, because I wasn't here in '88 either, Bob. What is this 88-203 -- was that the number that you cited? 88-203?

MR. SEALE: Yes, sir.

MR. WILKINS: And the title of that deals with -- that's the advanced reactor policy?

MR. SILADY: Fred Silady. It was a draft document that applied to the two DOE reactors that were being reviewed at that time, the LMR and the MHTGR, on four of these key issues, specifically, accident selection, source term containment, emergency planning. And it was largely embraced and included in our draft pre-application safety evaluation report, SECY 88-203.

MR. SEALE: It would be interesting to be able to compare that, not only for this design, but if there are any substantial differences in the liquid metal case as well.

MR. CRUTCHFIELD: I am Denny Crutchfield with the NRC. 88-203 was a proposed SECY document that was ultimately withdrawn by the staff, so it is no longer a valid document for us to evaluate these advanced designs against.

MR. WILKINS: That explains why there was no reference to it in this document.

MR. CRUTCHFIELD: Yes.

MR. WILKINS: Do you want to withdraw your request? I thin he is saying that you can't comply with it.

MR. CATTON: It is inoperative.

MR. SEALE: I could still learn something.

MR. SILADY: Our draft preapplication safety evaluation report is a draft, but it references that document.

MR. WILKINS: Well, why don't you see what you can do. If you can find this -- I think all of us recognize what Mr. Crutchfield has said. And, of course, the staff does have the right to withdraw documents when they change their mind, or even if they don't change their mind, they still have the right to withdraw the document.

Are there any further questions for Mr. Silady on this concept?

[No response.]

MR. WILKINS: We are running way behind schedule. The next item on our agenda was supposed to be a presentation by the NRC staff. Is Mr. Pierson here?

MR. PIERSON: Yes, sir.

MR. WILKINS: You are Mr. Pierson.

MR. PIERSON: I wasn't under the impression that I needed to make a presentation.

MR. WILKINS: Excellent.

[Laughter.]

MR. WILKINS: That takes care of that.

All right. The item following yours -- on the other hand, I did not want to shut you off if, in fact, you have some comments you would like to make?

MR. PIERSON: Our intention is to, following receipt of your comments on this letter, would be to look at your comments, and then also discuss the comments that we have received from the pre-applicants, and possibly an addendum or an appendices to the paper, and then issue the paper.

MR. WILKINS: All right. Thank you very much. Then, the next topic is a very valued opportunity to hear a presentation from the Office Director of NRR, Dr. Murley, entitled, Some Thoughts on Using Safety Goals. And I presume, Tom, you will tie those into this advanced reactor review of policy issues that we are concerning ourselves

with.

How long do you think you wold like to have?

MR. MURLEY: I am trying to keep it to 30 minutes.

MR. WILKINS: If, by more, you will permit me to give you a negative number as an answer, yes.

[Slide.]

MR. MURLEY: I do want to talk a bit about safety goals and where they fit into this review process. And some of the presentations that we heard this morning, I think, are important background for my thoughts on this subject.

I just say, Mr. Chairman, as I was preparing for this talk on safety goals, I went back and reread some of the history, and there have been many many pieces of correspondence from the Committee, from the Commission, from the staff, and it makes me wonder why I volunteered to even enter back into this swamp.

But, what I will try to do is perhaps advance the discussion a little further today, and give you some of my personal thoughts. And I hasten to say that these are my own personal thoughts. I think I am within the Commission's policy, or at least within the penumbra of the Commission's policy here. But, nonetheless, it is not totally clear just where we stand with the use of safety goals in this agency.

With regard to the advanced designs that you heard this morning, much of the thinking behind the staff

proposals was based on the defense in depth principal. And, by that I mean, we simply think you have got to postulate that severe accidents can happen, for example, and see what that does to the design. Here we are being presented with virtually a brand new design, with no operating experience, certainly not the 13 or 14 or 1,500 years of operating experience that we had with water reactors, and present it with some very broad assertions on the safety of these plants. And we don't think the burden should be on the staff to prove that serious accidents can happen, rather, we think the burden is on the designers and the applicants to show that the design can meet these defense in depth principles.

And so, with that, we -- it makes me turn to safety goals now. We think that the assertion that safety goals are met with a wide margin is -- it's fine as an indication of design features, but we don't believe that that, in and of itself, is adequate to make a finding that we have to make that the plant is as safe as we think it has to be.

[Slide.]

MR. MURLEY: Now I will get into safety goals, in particular. And the first few charts will just be a reminder. This is from an ACRS letter of May the 13th, 1987, where the Committee talked about a hierarchical

arrangement of the goals. Level one are the qualitative goals; level two, the quantitative health objectives; level three, the large release guideline; and then you propose a level four, which is performance objectives below that. That is a partitioning of the large release guideline. And I think the one -- and some work has been done on all of this, except, we really are not very far along on putting down a goal for operational performance.

I think one can specify a target goal. But, how we would measure that is really -- we are no where near being able to do that.

MR. CARROLL: What do you mean by that, Tom? This is the impact of --

MR. MURLEY: Operations.

MR. CARROLL: -- management, and safety culture --

MR. MURLEY: Yes.

MR. CARROLL: -- and all of these things on risk?

MR. MURLEY: Right. I think, if we struggle long enough, we could come up with an aspirational target, but I don't think we would be anywhere near being able to measure how well we are doing toward that target.

MR. CARROLL: Do you think --

MR. MURLEY: I only mention that -- I mean, it is not a bad idea. I think it is a good idea. We spend a lot

of our inspection resources, and so forth, aimed at that, but we haven't gotten very far along.

Oh, one other thing the Committee said was that each subordinate level should be consistent with the level above, and that a surrogate for these safety goals should not create a de facto new policy. And we have been struggling with that concept -- the Commission has told us the same thing by the way, in guidance memoranda. And I am going to show today, I don't think that's possible to do. And I think that's why we have struggled so long. That is, by the time you get down to these level four subsidiary goals, we are way out of whack with the health goals.

[Slide.]

MR. MURLEY: Just to remind you what the NRC safety goals are, they are the quantitative health objectives. And it is not the goal, but the Commission has given us a design guideline, a large release guideline. These quantitative health objectives are based on the concept of -- that anyone living near a plant should have only a small additional risk, due to the fact that he is living near that plant. I think that is a good solid common sense goal. And I do think the quantitative health objectives, which officially are the only goals the Commission has, safety goals, I think they are useful for discussing risks with the public. They are not really

useful in staff's every day review, and regulatory activities.

A large release guideline comes close to that. And I will talk about that in a minute., But, I am also going to show that there is a gap between these two.

[Slide.]

MR. MURLEY: In order to show that, we have to put them on the same kind of a basis. The health objectives, prompt, and latent, both talked about individual risk. And here I am rounding off to factors of 10. And they show that the individual risk, for an individual living near the plant, is about one in a million pre year from living near that plant. Whereas, the design guidelines don't talk about individual risk, they talk about something that is core damage frequency.

[Slide.]

MR. MURLEY: So, I am going to here assert, and you will have to trust me for a minute -- I will get back to the calculation -- I am going to assert that there is a large difference, when you really put them on the same basis. So, when you work from the health objectives, which are the safety goals, from individual risk, backwards, to core damage frequency, you get a value that is in the range of 10 to the minus two for reactor year, which is not at all consistent. I mean, it's -- and, depending on how you do

the calculations, you may even come up with 10 to the minus one, depending on what you assume for protective -- emergency protective actions, for example.

But, if you bear with me for a moment, this is the nub of the problem, and this is why we haven't -- in the last 10 years, I don't think we have made any serious progress toward using, implementing safety goals in our regulatory process. And it is because of this large gap. And the ACRS has said "on November 20th, 1989, the ACRS believes that the safety goal sets a standard of what is 'safe enough' for the population of plants or a class of plants."

And then on June 12th of last year, 1992, the safety goal policy statement defines an acceptable level of safety for the nuclear enterprise. The Commission has also said that. So, that is policy, that statement. But, it depends -- it kind of depends on what we mean now. If, in fact, that statement means that we can accept a 10 to the minus two per reactor year core damage frequency, that sets my teeth on edge. And when I hear people say it, I am -- that safety goals are what is safe enough, I get nervous, because we have 110 reactors operating. This says, in effect, that, on the mean, we can have a core damage accident once a year without violating the health goals. And believe me, we can't. I mean, the containments are good

enough, the vessels are rugged enough that this can't happen. But, I don't think anyone really seriously thinks that that is a possible regulatory posture to be in. So, that is the dichotomy.

I am not going to tell you I have an answer.

MR. SHEWMON: Tom, since you are setting up a straw man here with this 10 to the four difference, I can see 10 to --

MR. MURLEY: No. It is the difference here that you have to compare.

MR. SHEWMON: Well, I am looking horizontally, and that is what gives me mild heartburn at this point. Are you going to get into it.

MR. MURLEY: I'll give you a calculation. It will be a plausibility argument.

MR. SHEWMON: It will define core damage for openers or something?

MR. MURLEY: Yes.

[Slide.]

MR. MURLEY: But, before I get bogged in that, I am going to suggest, or at least mention what I have found useful, and what I carry around in my head, and that is really two sets, or a -- the qualitative goals, which are the official safety goals of the agency, and then the partitioning in the large release guideline. It doesn't

particularly bother me that there is this gap. I mean, I find this set of goals to be quite useful for a particular goal, and that is to explain to the public what we think the risks are. And we think we are well below that, as a matter of fact. But, then to make these consistent with that, I am convinced it cannot be done.

So, here is the kind of partitioning that I carry around with me. And that is the core damage frequency, less than 10 to the minus fourth per reactor year; a conditional vessel failure probability. Core damage I mean, Paul, is the onset of fuel damage. It is a thing that can be calculated through a PRA, that is the loss of adequate --

MR. CATTON: Assured cooling.

MR. MURLEY: -- of assured cooling. It is the only real thing that you can calculate meaningfully with PRA. So, that, plus -- given the onset of core damage, what is the probability that you will contain it within the vessel? I think a reasonable goal is .1. And then, given that you fail the vessel, and have core on the floor, what is the probability that the containment then fails? That is about .1 These are a consistent set of goals, and they are consistent with the guidelines.

MR. SHEWMON: We have several questions at this point.

MR. WILKINS: Hal?

MR. LEWIS: I have got to interrupt at this point. This is an ogre that we have helped you create, and it is not a real ogre. It was not an ogre at the very beginning, and it has come about through the gradual drift of the system into conservatism in the definition of core damage. I have complained about this for years in every ACRS letter. Because what used to be core melt turned into core damage. Then, what used to be core damage turned into what you just said, which is loss of assured core cooling, which turned into the onset of core damage, which turned into some chip falling off somewhere. And, gradually, as the definition of what used to be called core melt, which I always felt meant a molten core which was consistent between these two things; as the definition changed from a molten core, what used to be called core on the floor, into these things which you say are easy to calculate, that's not a criteria for reactor safety, incidentally. You know that perfectly well. But, it is that gradual change of definition, driven by conservatism, in which the Committee has been -- has shared the complicity, which has created this gap. It is a fake gap. That is my personal view obviously. If we went back to what was originally intended, what was the term that was used in the Rasmussen Report, was core melt, it wasn't core damage. If we went back to the original definition, all of the numbers fall into place, and there is no problem. So,

why did we create a problem, and then we are struggling to get out of it?

MR. MURLEY: I don't think that is the problem. I mean, I understand that we have changed over the years our terminology and our thinking, but it's because --

MR. LEWIS: But, without any consideration of internal consistency.

MR. MURLEY: Yes. It's because of the two events that I am aware of on licensed reactors, namely Fermi-1 and TMI-2. Core melt did not result in breaching the vessel, and so there is some benefit. Furthermore, this gives some goal toward our accident management program that the industry is thinking about implementing. And so it serves a useful purpose. In a sense, I think what you are saying is that, in the old days, we used to take these together and assume they were 10 to the minus four per reactor year. And, in effect, you could say we have kind of ratcheted the goal down. I don't think so.

All I am saying is this is the real guideline that the Commission has given us. This is a sensible way to partition it. If someone wants to partition it in another way, that is fine.

MR. LEWIS: Except, that when the Commission issued the safety goals, and suggested that the large release guideline might be something worthy of a discussion

by the staff, as I recall their terminology, was something like that. What they said was so consistent, because they knew these numbers. They knew that the actual probability of core melt, combined with the failure probability -- I don't know whether .1 should be considered conservative or not. That is another subject we can fight about, but it is a number -- since we have 10 thinkers, people use that number. But, at the time the Commission issued the safety goals, I believe that there was no inconsistency. These all would have hung together in a perfectly reasonable way. I, personally, was in favor of scratching the first two and just using the large release guideline. I thought that was much simpler. But, the one argument against it was that it was harder to calculate.

MR. MURLEY: I think, if your point is that it is this core damage, core melt phraseology that is the problem between these two levels, that is not the case. It is the 10 to the minus six that is at odds with the health objectives, I think.

MR. KRESS: Tom, one other question on that slide. Hal, are you finished?

MR. LEWIS: I am now.

MR. KRESS: Your core damage frequency is made up of summing the frequencies over a large number of accidents.

MR. MURLEY: Yes.

MR. KRESS: The conditional failure probabilities for both the vessel and the containment are values that are different for each one of those frequencies. It is certainly not appropriate just to add those up.

MR. MURLEY: No. I know.

MR. KRESS: My question is what do you mean by those numbers?

MR. MURLEY: Okay. This really means that, given a core melt in an intact vessel, what are the chances that you can contain it, or that you would fail to contain it within the vessel? Now, I grant you, there are some sequences where you've basically bypassed the vessel, and there are some sequences where you have bypassed containment. And I would rather kind of duck those. I grant you that it is a good question, and I grant you I haven't answered it, but I would rather duck it, for the purpose of this discussion, and just tell you that these are things that I -- these are not staff goals, they are not commission goals, they are just what Tom Murley carries around in his head as kind of guidelines on how to partition, which is, I think, a sensible guideline.

MR. CARROLL: May I suggest a modification to what Tom Murley carries around in his head?

MR. MURLEY: Yes.

MR. CARROLL: It bothers me to see vessel failure.

What you are talking about is primary system integrity, or loss of primary system --

MR. MURLEY: No. I meant vessel here -- I mean, melt through the vessel. Because you can have primary system failure and not get the large mass of fission products out in the core concrete interaction that you are going to get with vessel failure. Vessel failure is a particular phenomena that is worth attention to itself.

MR. CARROLL: So, you would not include in this sequences, for example, that result in -- where things stay in the vessel, but there is an enormous fission product release because the steam generator tubes have failed, or the pressurizer surge line has failed?

MR. MURLEY: That is allied to this other point. There can be bypass sequences that have to be dealt with outside of this breakdown. And they should fall within 10 to the minus six as well. Yes. I agree.

MR. DAVIS: Excuse me, Tom. On that issue, are you suggesting by this that some recovery has to be taken to avoid vessel failure after core damage starts? Because most PRAs that I have seen assume that vessel fails after the core starts to melt.

MR. MURLEY: I know. And they don't take credit for accident management.

MR. DAVIS: Well, that is very difficult to do.

MR. MURLEY: I know.

MR. DAVIS: And I am not sure how you are going to impose this kind of a guideline.

MR. MURLEY: I am not saying it is easy. I have not seen any really detailed fault trees and event trees on how you deal with this --

MR. DAVIS: No. And we may never be able to.

MR. MURLEY: We may never be able to. But, nonetheless, I think it is a good goal to have in mind. What is the purpose of accident management.

MR. SHEWMON: You aren't recommending, Pete, that that is your reason for setting it equal to one, because it is hard to do, are you?

MR. DAVIS: No. I am just saying that it may never be possible to do.

MR. CATTON: On the other hand, that core damage frequency defined as the onset of damage, that is the -- you can do a good job of calculating that. It is the rest you can't do. I feel much more comfortable seeing the number that I know is good, as well as the other numbers.

MR. DAVIS: I agree.

MR. CATTON: Then, you -- what you have done is you have cut what you have to argue over by a factor of three.

MR. MURLEY: Yes. In a sense, this is prevention,

this is mitigation, accident management, excuse me, and this is mitigation --

MR. CATTON: That's right.

MR. MURLEY: -- once you have got the core on the floor.

MR. KRESS: But, does it bother you that this particular definition or criteria will probably be at least an order of magnitude below the present safety goals?

MR. MURLEY: I don't think so. I don't think so. Because the present safety goal. We don't have 10 to the minus four core melt as a safety goal really. What we have is this one -- the large release guideline. And the Commission has said you may think of ways to partition it. And they may have said they don't object to 10 to the minus four core melt.

MR. KRESS: I meant the quantitative health objectives. This is probably an order of magnitude lower than those.

MR. MURLEY: Oh, it's two orders of magnitude lower.

MR. KRESS: Yes. At least one, probably two?

MR. MURLEY: No. It's at least two and maybe three.

MR. KRESS: Okay. But, that doesn't bother you then?

MR. MURLEY: It bothered me because people talk about the safety goals being safe enough. And if that means 10 to the minus two core melt, and that we can accept that, that bothers me. It ought to bother the Committee, I think.

[Slide.]

MR. MURLEY: Let me, a line down here, by showing you how I did some of the rough calculations. And I really cannot mount a great defense with them, other than they are reasonable. This is how one would get from the prompt fatality goal. What I did is let's say -- let's work backwards from the prompt fatality goal to say what must be the core damage frequency that satisfies that. And I put in some reasonable numbers here. Keep in mind, this is just my own doodling at night. Core damage frequency, times the conditional vessel failure, times the conditional containment failure probability, times -- this should be fatalities -- the conditional fatalities given at --

MR. CATTON: That helps.

MR. MURLEY: Excuse me. I didn't catch that typo.

Given containment failure. It has to be less than five times 10 to the minus seven, which is an individual goal, times the population at risk. Well, then you put in some reasonable numbers here. What I have done on fatalities is assume there is a meteorological factor, and then, taken some reasonable numbers out of the strip report,

which is Sandia Report, CR 2723, 1982, Estimates of the Financial Consequences of Nuclear Power Reactor Accidents, where they looked at different classes of core damage and core melt accidents at each site in the country. And .08 is very high. It is assuming that, of those people exposed downwind, eight percent of them are fatalities. It is very high, and assumes essentially no protective action. And you can put your own numbers in. But, if you work backwards, what you get then is this one times 10 to the minus two core damage frequency satisfies that health goal. That is my point.

MR. WILKINS: What was that 16 factor I thought you said -- meteorological?

MR. MURLEY: Yes. It's the wind direction.

MR. WILKINS: Oh. All right. So, you say really only those people who are within one-16th of two pi get exposed?

MR. MURLEY: Yes.

MR. DAVIS: But, Tom, the worst site would be different than that, would it not?

MR. MURLEY: Yes.

MR. DAVIS: And so you can't make the blanket statement that they are inconsistent from all --

MR. MURLEY: All I am doing is putting up some rough mean -- not even mean -- but, you know, just

calculations which I -- I actually took about 20 sites from the strip report, averaged them up, but that is not meant to be weighed with everything like that. These are -- most likely, if you were to do your own calculation, you would come down on this .08, even by a factor of 10. And, if you did that, that would allow the core damage frequency to be 10 to the minus one. That is all I am saying is there can be at least two or maybe three orders of magnitude difference.

MR. WILKINS: Hal?

MR. MURLEY: Let me finish my latent goal, and then you can get them both.

MR. LEWIS: Can't I challenge your formula?

MR. MURLEY: Yes.

MR. LEWIS: Let me challenge your formula.

MR. MURLEY: Let me finish this, Hal. Because, even if you challenge that formula successfully, this one is a different way to approach it.

[Slide.]

MR. MURLEY: The core damage frequency, times the conditional vessel, time the conditional containment, times the conditional population dose, times the risk factor from BEIR V, most be less than two times 10 to the minus six, times the population at risk. Here, again, I have gone to the strip report, and found typically three million pierson

rem is a reasonable does for core damage accident where you have breached the vessel. Five times 10 to the minus fourth cancers per person rem is the risk factor. And then that has to be less than two times 10 to the minus six, which is a goal, times the maximum population in a miles from -- in 10 miles from the plant. And this is using our new proposed siting rule. And here, again, you get two times 10 to the minus two. And I have done many, many, man variations on this. You can get a 10 to the minus three, but you can equally well get a 10 to the minus one, depending on what kind of numbers you put in here.

And, okay, I don't -- and this is why I had trepidation coming down and even talking about this, because you can challenge these. But, I think my basic point was really what you ought to focus on, and that is there is a chasm between the safety goals, and the large release guideline, that I don't think can be breached, or can be broached.

MR. LEWIS: Could I just put one sentence into the theorem without fighting with you?

MR. MURLEY: Yes.

MR. LEWIS: There may be a theorem -- and all of these things have uncertainties, of course, associated with them. There may exist a theorem which says that the mean of a product is equal to the product of the means, but I don't

know such a theorem.

MR. KRESS: No. I think that is a problem. But, if you did it absolutely rigorously, the working backwards through all of the accidents, and getting a mean core melt frequency out of it, I think his conclusion would be right. I think his basic conclusion is correct, in spite of some problems with the convoluting means.

MR. LEWIS: Someone once told me a good theory is one in which the answer is correct regardless of the incorrect procedures and assumptions.

MR. KRESS: He has arrived at the right conclusions.

MR. WILKINS: This is what is known as robust.

MR. MURLEY: The Office of Research has done many, many, many calculations rigorously using computer codes. How about that?

[Laughter.]

MR. MURLEY: The results of those would come out to be the same.

MR. KRESS: I think you are right.

MR. MURLEY: I am convinced of it. I think I am going to exit from this discussion, and --

MR. WILKINS: I would just comment, Tom, that, as you started there was a gap, and then it became a chasm. I think the next time we see you, it may be an abyss.

MR. MURLEY: Yes. Two to three order or magnitude, I think, is very difficult. And, please, you know, take my message for what it is -- that the staff has been struggling, at the direction of the Commission, for many years now, to come up with a meaningful way to implement the safety goals. And they have been under the guidance that don't come up with something that is a de facto new goal, and make it consistent with the safety goals. And I am saying I think those instructions -- we probably cannot do it. And it has led to a lot of problems.

MR. CATTON: I remember Bob Bernero, a number of years ago, saying just that to David Okrent. And I think he was right.

MR. WILKINS: Tom, if the core damage frequency were, in fact, set to be 10 to the minus two, and if you permitted the vendors to manufacture their reactors to that, you say that they would be, on the average of one reactor -- core damage accident per year?

MR. MURLEY: Well, if you assume that that is their --

MR. WILKINS: I understand. There are a lot of --

MR. MURLEY: -- statistics and all of that business. Right.

MR. WILKINS: That there was in all of the rest of

them. All right. What's wrong with that? And I think the answer is that it has nothing to do with technical stuff or safety. It has to do with public reaction.

MR. MURLEY: Yes.

MR. WILKINS: The public would not tolerate it?

MR. LINDBLAD: It would also be --

MR. MURLEY: Yes.

MR. LINDBLAD: -- unacceptable for investment protection by any operator.

MR. MURLEY: Right.

MR. WILKINS: But airplanes crash.

MR. SEALE: But that's not the same thing.

MR. LEWIS: Well, you know, Ernest has an interesting point. We don't know that it is not the same thing. Because, in fact, if there was a -- and I am not advocating core melt accidents just for the fun of it. But, if there were a dozen core melt accidents in which nobody got hurt, which is what we are talking about here, it might have some impact on reasonable people.

MR. SEALE: You are right.

MR. MURLEY: If you were to go out -- this conversation I can see -- you have to ask though, what is the world we are protecting when we are regulating to 10 to the minus four, versus 10 to the minus two? And you could say that we are protecting the investment of the facility.

We are protecting the public health by two orders of magnitude more than we need to, in effect. But, also, you know, you are protecting the people that have to go in and clean up such a mess. You are protecting leaving these mausoleums all around the country to clean up for a future generation.

MR. WILKINS: Those exposures are not in your calculations at all?

MR. CATTON: That's right.

MR. MURLEY: No.

MR. WILKINS: All right.

MR. CARROLL: But you are also --

MR. WILKINS: They ought to be.

MR. CARROLL: -- hedging against uncertainty. I think that's important.

MR. MURLEY: Well, yes, in the sense that you would like to be far away from any effect -- really any serious health effects.

I will give you an idea of what the Europeans are thinking about in a safety goal. They are thinking about not just health effects, but way back from that. They are proposing that there be essentially no significant land contamination. They are setting their goal, that they lose no more than one growing season for example. And that gets you to an offsite release of a hundred terabequerels off

cesium 137. And, when you look at it that way, that's far from any health effects. That is based on what people really think, and what their society demands.

MR. KRESS: Tom, let me say, first, I completely agree with you on this subject. But, your comment that you really can't make these kind of things consistent is not exactly true, because one fault in the safety goals -- the quantitative safety goals, as they now exist, is they are point values. And they have no level of assurance associated with them. And the implications of that is that they are perhaps the 50 percent level of assurance at the time they were promulgated is probably a way to interpret it. If you interpreted the level of assurance associated with those probability numbers as the 95 percentile level of assurance, then you would probably get back to this -- if you are back to your calculation on that basis, you might end up with a 10 to the minus four.

MR. CARROLL: Yes. And you also have to recognize that we are not considering all risk when we end up with a number like 10 to the minus four. We are not taking into account organizational factor, to pick an example. We are not taking into account a lot of things in our present PRA's.

MR. MURLEY: That is true. In that sense, it reflects a margin, because we are not taking all of those

things into account.

MR. DAVIS: Replacement power risks?

MR. SHEWMON: Let me bring a different topic up before you came, with advanced reactors. But, yesterday we were hearing about the system 80 plus.

MR. MURLEY: Yes.

MR. SHEWMON: And one of the other safety goals that the staff was invoking was that well, new reactors, the next generation of reactors have to be safer than the last one, and safer sort of ended up an order of magnitude, is my remembrance. But, anyway, is there another safety goal on that?

MR. MURLEY: No.

MR. SHEWMON: Tell me about this moving target.

MR. MURLEY: I didn't hear exactly what the staff said. But, let me say it in my words. The Commission gave us pretty explicit guidance on this, I think, in 1989, that we are not -- they think, in the normal course of the design process, that the new plants will be substantially safer than the current generation. And, in fact, the EPRI guidelines have core damage frequency of -- core damage or core melt -- but it is 10 to the minus five. And that is an order of magnitude less than what we had, and they said, nonetheless, we, the staff, should not enforce that through the regulatory process. And so that is where it stands.

So, we are not to impose goals tighter than the 10 to the minus fourth core damage frequency, for example.

MR. SHEWMON: Okay.

MR. MURLEY: But, they expect, and I do to --

MR. SHEWMON: Yes.

MR. MURLEY: -- that the designs will be much less than that.

MR. SHEWMON: And they are coming in that way.

MR. MURLEY: Yes.

MR. LEWIS: Could I just -- you know -- I hate to be pushy, but I had to see applied loss. I don't really agree with Tom. I think that, on the issue of whether if you do it right you will get the same answer. Because the probabilities you are using here are conditional probabilities. Conditional probabilities depend on the prior event as well as the later event. Therefore, averaging procedure are not transited through these things. You cannot multiply the mean conditional probability by the mean instant probability and get a mean that will be valid over the entire space. These are not 10 percent effects, these are large effects we are talking about, because the uncertainties in these things are large uncertainties. And, therefore, I think it is, for a simplistic presentation to a dumb crowd like us, Tom, it is okay to do this kind of thing, but don't do it to professional statisticians.

MR. MURLEY: No. And I presented it as really a plausibility argument. But, the staff is on the hook to get back to the Commission on a definition of a large release. And they ar going through this analysis, as I said, using computer codes, and doing all the right profligations of things and so forth, presumably. And I am convinced it is going to turn out the same way, but we will wait and see.

MR. LINDBLAD: Another word in my defense. One quick one.

MR. WILKINS: Tom has to respond.

MR. KRESS: We will talk about it.

MR. WILKINS: Thank you very much, Dr. Murley.

Mr. Chairman, there was an item on the agenda where the Committee was supposed to discuss among itself what it wanted to do, and perhaps give some instructions to the subcommittee chairman as to what should be in this letter, or even if there should be a letter. I don't know whether you want to do that right now, or want to go on to the next agenda item.

MR. SHEWMON: Why don't we? We have got no other topic except lunch. And I hate to give these guys an hour and a half for lunch.

MR. WILKINS: Oh, there wasn't another topic? We have the schedule for the NRC, review of proposed reactors, item three.

MR. SHEWMON: I see. I thought that was Murley's talk. Pardon me.

MR. WILKINS: No.

MR. SHEWMON: I was misinformed.

MR. WILKINS: Murley was part of item two.

MR. SHEWMON: Okay.

MR. WILKINS: Murley was 2.3.

MR. SHEWMON: Well, then we are well behind schedule. Why don't we go on to the next item.

MR. MICHELSON: I think I am nominally in charge of this one. The staff is here this morning, I believe, to tell us what they think the schedules might be for the advanced reactors, mainly the ABWR, and the SP System 80, and the AP 600. And anything they want to tell us would be appreciated as well.

So, I believe Mr. Crutchfield is going to field the discussion.

[Slide]

MR. CRUTCHFIELD: I guess I would like to take us now from something that was somewhat inscrutable to something that is really inscrutable, and that's the advanced reactor schedules. We're in the process of re-evaluating the schedules. There's been substantially additional resources applied to the General Electric ABWR that has caused us to step back and try and establish what

they will be. It's understood that the schedule will be whatever it will be. It will take whatever it takes for us and for you and for the Commission to get through these reviews.

We have proposed an option, if you will, or a straw man for the consideration by the ACRS as to how we think we can get to the end point. We have been working with you over the years, and we have been briefing you on the various issues, the DAC, the ITAAC, various technical features, and we think we're coming to conclusion with General Electric Company and with this entire review process.

GE owes us a submittal, and that submittal should characterize and complete their safety evaluation, their SSAR where they address all of the open issues and resolve all of the open issues, we hope to our satisfaction. It should also provide a final ITAAC for us. We spent substantial amount of resources and time out at General Electric Company in January, working with them to resolve ten final ITAAC, as well as a number of generic ITAAC. The concept of generic ITAAC is now more melded into the individual ITAAC.

So, we think once General Electric gets that information to us, we have developed a schedule process that has various durations in it. We're proposing it to the

Commission. There is a paper heading up toward them. It will address an aggressive schedule for the staff. It will lay out milestones that history has told us we haven't quite met. It will also lay out milestones for General Electric Company, as well as for the ACRS and various internal review pieces. Part of this is under the direct control of the staff, but at a certain point, it expands beyond staff control. It gets to the Commission, it gets to the ACRS, et cetera.

MR. MICHELSON: Could you give us some idea of what the GE target is for the completion of the SSAR and all the ITAACs, et cetera?

MR. CRUTCHFIELD: GE went away from the meeting we had in January and was going to go back and assess their own schedule. We understand they're meeting with the Department of Energy today to go over that schedule with DOE. We expect to get input from GE tomorrow. We're hoping for that. Once that is set up, then we can go establish specific date milestones, month and day.

MR. MICHELSON: Keeping in mind, of course, that much of what we want to see has never come in yet.

MR. CRUTCHFIELD: Yes.

MR. MICHELSON: It's promised in this next final amendment and final everything else, but we haven't seen it, and our job doesn't start, even though we've been looking at

this for years, we've been just getting promises and speculations, and we haven't got to the hard information yet.

MR. CRUTCHFIELD: That's correct. Maybe the concepts that you've seen the ITAAC concept and the DAC concept have been laid out and laid before, you --

MR. MICHELSON: Oh, yes.

MR. CRUTCHFIELD: And so you have an understanding of that, but many of the details, I agree with you, you haven't been presented with, and in reality, the staff still has roughly 350 open items with General Electric we're trying to close.

MR. MICHELSON: Those details we kind of have to see before we write our final report.

MR. CRUTCHFIELD: The approach we're taking is that once General Electric gives us that final submittal with the closed/open items and with the complete ITAAC, we'll give it to you, we'll give it to the Commission. We then go away and do our thing, our preparing our SCR, and that will take three months, four months, five months, whatever it takes. In the interim, there will be opportunity to interact with the ACRS on those issues.

MR. MICHELSON: But really, the finalization of all of this starts when GE gives us that package.

MR. CRUTCHFIELD: The schedule starts when they

give us that final package. That's correct, Dr. Michelson.

MR. MICHELSON: And that's the key date that I'm not aware of, and I guess you won't be yet for awhile.

MR. CRUTCHFIELD: In probably another 24 hours, we'll find out. I hope it's that soon.

MR. MICHELSON: Could you let the Committee know what that date is

MR. CRUTCHFIELD: Yes, sir.

MR. MICHELSON: We don't necessarily have to have your promises of when you're going to be done, but at least we can get some idea of when we can get serious with the final review.

MR. CRUTCHFIELD: When we talked about a complete submittal from General Electric in the March timeframe, we targeted an SCR around the summertime. So, further delays on the part of GE will also further delay that schedule.

MR. MICHELSON: Well, clearly, it's not coming in in the March timeframe.

MR. CRUTCHFIELD: General Electric hasn't told us that yet. I would suspect that it's not going to come in in that time frame. What we are trying to do, however, is demonstrate that there is a process out there that can work, that we can push something through the Part 52 process and demonstrate to the industry and to the world that it does work. As we've indicated, the ABWR is the more mature

review right now. They have gone farther, and they have pioneered a number of issues and items and resolution of potential problems, level of detail, the ITAAC and things like that.

Combustion Engineering has been very aggressive in resolving open issues with us. I have to say, if about a year-and-a-half ago or two years ago, Combustion was probably a year behind General Electric. I think they've closed the gap, but as Tom has indicated, it's like riding behind a tractor trailer at 70 miles an hour, and if you're in a Volkswagen bug and pull around to try and pass it, it's a lot tougher to do. So, we haven't made any plans or anything like that to pull that Volkswagen around, but it certainly may be an option if General Electric falters substantially.

MR. WILKINS: I guess you have to pull that tractor off to the side.

MR. MICHELSON: If the road's wide enough. Again, we feel we are at the point where there is no need for further major policy discussions. We are putting those issues behind us. We think we've developed those issues with you, with the Commission. We have a paper going up that talks about the 90-016 issues, and the follow-on issues for the evolutionary designs. We think those major policy

and major technical issues are behind us now. It's a question of the implementation. Can GE tell us what it needs to tell us to satisfy the open issue that we have, to close that open issue, to resolve the ITAAC questions? So, we think those things are out of the way and behind us.

The other major project we have before us is the EPRI passive requirements document. The Commission has directed the staff to resolve the major policy issues on that document, so that necessarily will stack the AP-600 and the SBWR reviews behind it. We think they are not going to be far away. We are still working with both of those vendors to talk about other issues we can talk about. Major policy issues will be in line there.

[Slide.]

MR. CRUTCHFIELD: There are some specific considerations. As indicated previously, we are awaiting GE's discussion. We have resolved what we think are 10 ITAAC and the number of generic ITAAC with them. We continue to work with them to resolve and close open items, and as indicated, we expect to get GE's schedule to us, we hope, tomorrow, and then we can go forward.

MR. CARROLL: Are the seven generic ITAAC's the whole enchilada?

MR. MICHELSON: We think that's the whole enchilada. We don't think there will be anymore what we

consider to be those "generic" ITAAC's, things like welding and set points and those things. We think we've managed the technique to get them specifically in there and not have to worry about a generic ITAAC finding at the end of the process.

MR. MICHELSON: Are there still DACs in this explanation?

MR. CRUTCHFIELD: The DAC process is still in place for those areas that we've identified before, yes.

MR. MICHELSON: Okay, and what are those -- maybe I missed it or something, but I didn't hear it being mentioned. So, what's your plan on the DACs, are they coming in --

MR. CRUTCHFIELD: The DAC will be described in the final SSAR and the DAC process and the staff's evaluation of it will be discussed in the staff's SER.

MR. MICHELSON: But the DAC will be a part of that ITAAC package that you said GE promised?

MR. CRUTCHFIELD: Yes.

MR. MICHELSON: Okay.

MR. CRUTCHFIELD: System 80 Plus, combustion has responded to a number of the open issues, just about all of them in their eyes. They've given us a schedule in some cases when they're going to finalize the final schedule in a final submittal to us, so they're still a little quifty in

that area.

We expect to get an ITAAC submittal in late March from Combustion Engineering. However, within the past couple of days, I've asked Combustion, why don't you guys set aside -- they're having an industry working group right now working on their ITAAC. Why don't you then come in to the staff with those sample ITAAC, get our examination, get our feedback on it before you go waste a lot of resources and we waste a lot of resources looking at some 70 or 80 ITAAC that may have major flaws. Take advantage of the GE experience and your own experience, finalize a dozen of them, get to us, and we hope by the end of March to have results back to Combustion Engineering so they then can go forward and give us a solid ITAAC we feel comfortable with.

The EPRI evolutionary document, I think we've agreed on how we're going to solve all the problems there, and we've published the SER for passive issues. One of the key passive issues that we had was the regulatory treatment of non-safety issues. Dr. Burley, Bill Russell were out at Palo Alto, discussing with EPRI an approach for that. We think we have a process in place now that will take care of that.

EPRI still owes us some information on the detailed implementation of that process, so we think we have a philosophical approach to it. It's now needed that they

provide some details as to how it's specifically going to be done. We hope to see those in February.

[Slide.]

MR. CRUTCHFIELD: The AP600 application is before us. We docketed it in the December/January time frame. We have begun the review process. We sent down roughly 700 questions to them. They've answered a number of those questions, and we will be developing a schedule for the specific detailed review within the next couple of months or so.

The same is true with the SBWR. The SBWR is due to give us what is necessary in their eyes and in our eyes to complete their application in the February time frame. I expect we may see some delay there because some of the people that are working on the SBWR are probably now working on the ABWR. So, there may be some delay on the part of General Electric for that submittal.

[Slide.]

MR. CRUTCHFIELD: What we'd like to ask for the ACRS is to continue to support, as you have, the parallel review activities that we've had ongoing. Continue to work with us, work on the individual issues. I know we owe you Chapter 19 on the ABWR, which is PRA discussions. We owe you a number of meetings on the GE DSER or the CE-DSER, and those meetings have been scheduled. We'd like you to

continue to work with us.

As the schedule uncertainties become more certain, as we get detailed information from General Electric when they're going to come in, as we examine the resources that we have available for us over the next year, 18 months, two years, we will come back to you and try and work with you to develop a schedule that's mutually beneficial to both of us, gives you sufficient time to make the necessary safety findings, and gives us the time that we need to make our findings and present the information to you, to the Commission, provide it in an FDA that goes publicly available, et cetera.

So, we'd like to get your support. Our anticipation is that we will have an ABWR review schedule available from the Commission and approved by the Commission sometime in the March timeframe.

[Slide.]

MR. CRUTCHFIELD: We also hope to get to the Commission the remaining schedules as we see it, what they're going to look like, how they're going to fit up, which one's going to be first and the type of sequence that's there. We hope to have their approval on that in the late spring time frame also, April/May time. So, we will be getting back to you with some additional dates, et cetera.

Our intent is to try and do the ABWR as rapidly as

possible from here on, but we don't want to constrain what you need to look at to make your safety conclusions also. Are there any questions?

.. WILKINS: Mr. Crutchfield, we're using advanceu reactors. In this context, do you mean the SBWR?

MR. CRUTCHFIELD: Yes, sir.

MR. WILKINS: You do not mean PIUS and PRISM and MHTGR?

MR. CRUTCHFIELD: We have put a paper forward to the Commission on those schedules already that talked about the pre-application dates. As you heard earlier, the Energy Policy Act has caused ·1 to take a re-examination of those to see whether we can move the MHTGR up to satisfy those requirements. So, that Commission paper is sitting up there awaiting Commission guidance. This specifically deals with the light water reactor designs.

MR. WILKINS: Okay.

MR. MICHELSON: Dennis, we have a letter before us of February 9, 1993, from yourself to Paul Shulman, concerning the new schedule for ABWR. Would you care to make any comments?

MR. CRUTCHFIELD: The intent of that was to try and put out a straw man for the ACRS consideration as to how we could get from point A to point B. I recognize it's relatively aggressive and provides some changes to what we

previously had talked about under 161 for timing. We feel we have had a lot of interactions with the ACRS. We also feel that once General Electric gives us their final product, there will be sufficient time in there for the ACRS to examine it so when the staff SCR comes out, we can work closely together and get quick turn-around and a quick letter from the ACRS.

MR. MICHELSON: That certainly is always a possibility, but it's quite speculative at this time as to what the package will finally consist of, when we will get it, how soon thereafter your SCR comes out and so forth.

MR. CRUTCHFIELD: Yes.

MR. MICHELSON: And I think it is the sort of thing that you kind of have to negotiate later after we got a better understanding of what we're even dealing with. This straw man was probably not well timed under the circumstances, when you don't know yourself what you're dealing with yet.

MR. CRUTCHFIELD: Yes.

MR. MURLEY: Tom, one thing that was not meant, it was not meant in any way to inhibit the Committee from taking the time that it feels it needs, but we did send, and our sending to the Commission -- I guess we haven't actually sent it yet, but we are sending to the Commission a very aggressive schedule of getting to an FDA, and in there,

we've cut ourselves back, we've cut our general counsel's review time back, and we are assuming an aggressive ACRS schedule, and we just wanted to make sure that you knew what was imbedded in there.

MR. MICHELSON: Not being full-time employees, of course, is a little more difficult for us to be as aggressive as you can, where you can put all your time on it every day. We have to schedule meetings and spend a lot of time just traveling to and from the meetings, and it's just not as easy for us to get aggressive as it is for people who can work on it full time.

MR. MURLEY: I appreciate that.

MR. WILKINS: In fact, I note that you're calling for a special full committee meeting during the fourth week of some month.

MR. CRUTCHFIELD: Of some month.

MR. WILKINS: Now, if you tell us now that that month is October, that's easier than if you tell us September 15th to do it in October.

MR. CRUTCHFIELD: Agreed, and once we get the GE schedule, we have specific durations that we've laid out and proposed to the Commission. Once we get GE's schedule, we'll be able to work from there, and within the new few weeks, give you an idea of whether it's October, September, May or whatever.

MR. MICHELSON: Well, I think once we have the package in front of us, I think it will be easy enough for the Committee to lay out what pieces of work it thinks that remain, and there are quite a few pieces.

MR. CRUTCHFIELD: Yes, there are.

MR. MICHELSON: Most of which we haven't really -- don't even want to take the ti to discuss here today.

MR. SHEWMON: We'll be pleased to work with you.

MR. CRUTCHFIELD: Thank you.

MR. MICHELSON: I don't think we can work to everybody's schedule at this time.

MR. SHEWMON: That's true. It's up in the air until we hear from GE and back from you, then.

MR. WYLIE: Do you have an estimate target date for SCR on the EPRI passive document?

MR. CRUTCHFIELD: The EPRI passive document is currently scheduled for May of '93, the passive FSER, the end of May.

MR. WYLIE: May?

MR. CRUTCHFIELD: Yes. That's the 161 schedule. Part of that is going to be subject to this reassessment/re-evaluation. We can't slip that too long because that also impacts the AP600 SBWR reviews.

MR. WYLIE: Do you have a date when you resolve all of your open items?

MR. CRUTCHFIELD: For EPRI?

MR. WYLIE: Yes.

MR. CRUTCHFIELD: EPRI has provided answers to all of the open items in September, and we have given those out to the staff, and the staff is now working with EPRI. As I indicated, Tom was out there and we closed treatment and on safety systems, we think. Philosophically we've closed it, and now we've got to make sure the implementation is closed.

MR. MURLEY: But the intent is that the May FSER will have all of the open items closed.

MR. CRUTCHFIELD: Correct.

MR. WYLIE: I thought maybe you'd have some date prior to that when you would have closed it.

MR. MURLEY: Well, I'm sure we're closing many of them now.

MR. CRUTCHFIELD: Yeah, we're working to close now, but it's a slower process.

MR. WYLIE: So, it would be between now and May.

MR. MURLEY: There's the one big one, and that is how to treat active systems in a regulatory way, and we'll be down -- I'm sure we'll be talking to the Committee before May on that one.

MR. CRUTCHFIELD: Yes.

MR. CARROLL: Dennis, in a letter we wrote some months ago, I think it was on ABWR. I can't even remember

the context exactly, but we did comment that we sensed that a lot of the reviewers seemed to be creating confirmatory action items for the COL holder to deal with. It looked to us like things that ought to be resolved at this time, and we've suggested that senior staff management really look into this, if I recall right.

MR. CRUTCHFIELD: We are indeed looking into this, and one of the things we're seeing is an attempt to close from an open issue to a confirmatory issue so that we then can just make sure and verify that the SAR has been updated, and that goes away for the certification.

MR. CARROLL: Yes.

MR. CRUTCHFIELD: There are, indeed, a number of what we consider to be COL specific items.

MR. CARROLL: Oh, sure.

MR. CRUTCHFIELD: We're trying not to shift too many of those design certification items into the COL bucket there. We don't want to do that.

MR. CARROLL: Yeah, okay.

MR. CRUTCHFIELD: Jerry?

MR. WILSON: This is Jerry Wilson. We committed to the Committee that we will review all of those items to be sure that we weren't deferring issues that should be taken care of now, and we're going to do that.

MR. CARROLL: Okay. You're going to do it?

MR. CRUTCHFIELD: We are doing it.

MR. CARROLL: All right.

MR. SHEWMON: Okay. Any other questions?

[No response.]

MR. SHEWMON: Fine. We adjourn for lunch, then, and we'll be back here. The movie will start, or the Turkey Point tape will start in 12 minutes or 15. That's in here.

MR. CRUTCHFIELD: We did say we were going to come back at 12:45.

MR. SHEWMON: That may slip a little.

[Whereupon, at 11:53 a.m., the meeting was adjourned, to reconvene after lunch.]

AFTERNOON SESSION

[12:53]

MR. SHEWMON: Let's reconvene.

MR. CARROLL: The presentation we're going to have this afternoon is on the restart of the Fitzpatrick Plant. As the members will recall, we established something of a policy awhile back to the effect that when a plant had been shut down for a lengthy period of time which we said was like a year, we thought, at least on a case by case basis, that we'd at least consider whether we wanted to hear a presentation on what lead to the shutdown and what work was done during the outage and why the licensee and the staff think restart is appropriate. So, that's why we're here this afternoon. Who's going to lead off here? Ralph?

[Slide.]

MR. BEEDLE: Mr. Chairman, I appreciate the opportunity on behalf of the Power Authority to discuss the Fitzpatrick restart. I would offer an observation that the plant is currently operating at 100% reactor power, and performance is exceeding our expectations at this point. The material condition is, I think, finer than it has been since the commissioning of the plant for commercial operation in 1975.

I am Ralph Beedle, Executive Vice President of Nuclear Generation for the Power Authority. I'm the Senior

Nuclear Officer for the company. I've held this position since April of 1991.

MR. CARROLL: What did you do for a living before that?

MR. BEEDLE: I beg your pardon, sir?

MR. CARROLL: What did you do for a living before that?

MR. BEEDLE: Before that, I worked for the Power Authority as the Vice President of Nuclear Support. Prior to that, I spent two years with the Institute of Nuclear Power Operation, and prior to that, 21 years in the U.S. Navy.

This afternoon I have with me Jack Gray, Director of Nuclear Licensing; Rad Converse, the Vice President of Nuclear Support; Mike Culomb, General Manger of Support Services, and Harry Salmon, the Resident Manager for the Fitzpatrick Plant. He is equivalent to the plant manager or site vice president in many organizations.

[Slide.]

MR. BEEDLE: The Power Authority was created in 1931 by the State of New York to generate power for the benefit of the citizens of the state of New York. It is a non-profit public benefit corporation. We derive no tax revenue. We finance the operation of the facility through the sale of bonds for capital projects, and the sale of

electricity is our basic revenue stream.

The Power Authority in 1982, for purposes of public identity, changed the name for public consumption to the New York Power Authority. I think in large part because our president at the time, Roy Sinclair, was frustrated because they thought we were part of the Port Authority of the State of New York, and so he wanted to make that differentiation and called us the Power Authority. That has created some measure of consternation because all legal documentation referred to us as the Power Authority of the State of New York.

We are in the same category as the state's Dormitory Authority, although we operate as a business. We're totally independent of any tax revenue. We are not a burden on the citizens of the state of New York. We account for about 25% of the sale of electricity consumed in the state. Our total system capacity is about 6,800 megawatts, generated by two nuclear plants, one fossil, and it's a combination oil-gas fired plant down in Astoria, New York in Long Island, and then 11 hydro facilities distributed throughout the state. The most significant of that is the 2400 megawatt plant at Niagara Falls.

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MR. BEEDLE: In addition to the generating capability that the Power Authority has, we also operate

distribution lines, both 345 and 765 that stretch across the state of New York, and is a major contributor to the New York power pool stability within the state.

The Fitzpatrick Plant, the subject of our discussion this afternoon, is located on Lake Ontario in Oswego, New York. It's a --

MR. SHEWMON: Sir, before you --

MR. BEEDLE: Yes, sir?

MR. SHEWMON: One more general thing. What do you do for distribution? Do you run your own lines or do you sell right at the plant?

MR. BEEDLE: In some cases, we run our own lines. We generally sell bulk sale to commercial operations or, and in that case, we may distribute that energy across the lines of one of the investor-owned utilities and then pay the wheeling charge. A good example would be the Terrytown General Motors plant down in Terrytown, New York, just north of New York City. We would generate electricity from Fitzpatrick, bring it down on our Marcy South line, and then go to the ConEd distribution system, and then pay Consolidated Edison the wheeling charges to get that energy to the Terrytown plant.

MR. SHEWMON: Fine, thank you.

MR. BEEDLE: We also sell a great deal of our energy to the investor-owned utilities for then resale to

their local customers.

The Fitzpatrick Plant is an 820 megawatt facility, boiling water reactor, licensed in 1974. When the plant was licensed, it was licensed and operated by the Niagara Mohawk Power Company, and then in 1977, as owners, we then became the operators, and the license was transferred to the Power Authority.

The output of this plant is responsible for the economic development in the state, and is responsible for maintaining roughly 60,000 jobs in the state. The energy is allocated through a state condoned and operated allocation board that determines the suitability for the customer, and then in return for the use of a low cost energy, the companies are then compelled to maintain jobs or lose that energy allocation. So, it's a fairly significant economic tool for the citizens of the state of New York.

[Slide.]

MR. BEEDLE: We have a board of trustees that is appointed by the governor and confirmed by our legislature. We have a chairman, Richard Flynn, and three acting trustees at this point. Chairman Flynn is a full-time CEO and functions in that capacity, a very aggressive and active participant in the energy distribution scene within the state of New York. Our president and chief operating officer, Jack Brons, has considerable nuclear experience,

and he has reporting to him, in addition to the nuclear operation, our QA organization, and then the other administrative and the system operations group that's responsible for operation of the non-nuclear and the transmission systems.

[Slide.]

MR. BEEDLE: In 1991, the combination of performance indicators, SALP reports, INPO evaluations, it was clear that the Fitzpatrick Plant was not performing as we had expected. The capacity factor, for example, in 1989 was about 92%. By 1991, it was down to 48%. We had regular occurrence of radiological problems. We had a general lack of confidence on the part of the staff in our ability to deal with our technical problems, and as a result of that, we started a series of management changes and a series of organizational changes that we will describe later on.

[Slide.]

MR. BEEDLE: One of the fundamental things that we did was to create an issues team at the Fitzpatrick Plant to review all of our past inspection and evaluation reports to capitalize on the employee feedback and determine exactly what the causes for the poor performance of the plant were.

As it turns out, as we looked at the performance of the plant, the NRC looks at the performance of the plant and issues this in the form of a SALP report. The INPO

operation, the Institute of Nuclear Power Operation, looks at the plant, and they issue it in the form of a plant evaluation report. We're all looking at the same date. You would be surprised if we came up with different answers, and the answer was that we didn't. Everybody came to the same conclusion, that there was indeed a significant performance problem at the plant.

MR. CARROLL: Now, in this same time frame, how was IP-3 doing, Indian Point 3?

MR. BEEDLE: IP-3 was doing reasonably well. Their capacity factor was up, they had good performance in the radiological controls area, and their performance in the SALP was mediocre. It wasn't exactly great, but I think the biggest difference we saw between our Indian Point facility and the Fitzpatrick facility was the general attitude in how we dealt with problems. So, we took a good hard look at the Fitzpatrick plant as a result of that. I would say that the relationship between the Fitzpatrick staff and the regulator would have to be categorized as adversarial, at best. There were very few things that the regulator could tell the plant that they took to heart. It was a result of the plant, I think, living for a long period of time in relative isolation and thinking that they had captured the very best way of dealing with problems, and nobody could tell them anything.

MR. CARROLL: You left INPO out of your answer about IP-3. INPO thought they were doing pretty well?

MR. BEEDLE: INPO's assessment of Indian Point was kind of middle of the road. They were neither a particularly poor performer or a particularly good performer.

MR. CARROLL: But their assessment of Fitzpatrick was that they were --

MR. BEEDLE: They were a Category 3, pretty close to a 4. Yeah, there was no question that the picture that INPO had, the picture that the NRC had and the picture that I had were all consistent.

We went through this process of assessment to try and determine the root causes, establish a program for corrective action, and at the same time, the Commission established the need for a diagnostic evaluation so that they could also identify root causes, and in the fall of 1991, then we experienced a diagnostic evaluation inspection by the Commission that covered roughly a period of six weeks. We used that DET report then to gauge whether or not our assessment was truly on target. So, we used that as another method of confirmation of the root cause and to bolster our confidence that we had, indeed, determined the necessary steps to correct the performance at the plant.

MR. CARROLL: What was your view of the DET? Did

you think they had an appropriate mix of people that understood operations and maintenance and management?

MR. BEEDLE: I thought that the DET team was reasonably well balanced. I didn't take issue with any particular functional area that they had. I thought that it was a rather comprehensive look at the facility. I was somewhat heartened by the fact that when they finished their evaluation, that they didn't find anything that I didn't already know about, or had plans to correct. I thought, in large measure, it was a fairly well balanced team.

Now, the inspection report itself, I thought that where one nail would do, I think five probably was too many, but it's one of those things where I probably do the same thing in the management of the facility. When there's a problem and we want to get their attention, then we bring up six things. Maybe they're all -- five of them are really on target and the sixth one's off a little bit, but nonetheless, it drives home the point that some action needs to be taken.

So, when I took a look at the DET, and it was a pretty weighty product. There is no doubt about that. I mean, we went down and catalogued every nit that the plant had ever suffered. I think we categorized things as problems today which were indeed problems of 15 years ago, and I told the staff that it was not my intent to try and

challenged the DET report. The sum and substance of the report was on target, and that was our objective, was to fix the problems that were defined by that DET evaluation report.

MR. CARROLL: Let me ask you about one issue that jumped out of that DET report, in the context of whether the plant has the resources to really do a good job. The thing that jumped out at me was lower and mid-level plant management were somewhat reluctant to request additional resources. Since Fitzpatrick was operating at a net loss, I couldn't quite figure that out, and it also leads to the question, has anything changed or are you going to continue to operate at a net loss and still be resource constrained?

MR. BEEDLE: We still -- we will probably operate at a net loss. Now, when you talk about a net loss, you're talking about the overall cost of doing business. It's the capital cost debt service, the O&M cost, and then whether or not you indeed recover all that cost through the sale of the electricity, and the answer is no, we don't, and that is a conscious decision on the part of the chairman to do that.

One of the contributors to the general attitude that is expressed in that statement by the DET was the way the budgeting process was handled at the Fitzpatrick Plant, and a general reaction on the part of plant management when monies were not provided to do whatever they thought was

necessary, then the reaction was to go back and beat up on the department managers and cram down their throat this notion that we're a losing plant. That was not something that was intended by the chairman nor the president of the company. It is a fact of life that the power authority, in trying to carry out their mission for the Fitzpatrick Plant, sells that energy at less than the total cost to operate the facility. We do recover our variable cost in O&M, but we don't necessarily recover the fixed costs, and our financial people are well aware it's part of the strategy in providing that low cost energy to the state.

Now, overall, the company has never had a red line year until 1992, and in trying to deal with the problems at the Fitzpatrick Plant, I spent over $200 million above the O&M budget for 1992. This year, the company will record a $60 million loss as a result, principally, but not entirely, due to the operation or lack of operation of the Fitzpatrick Plant. This gave rise to, and you may well have encountered this, I'm sure, with other utilities where they've done economic studies to determine whether or not they should continue operation of their facilities. We've done an economic study of Fitzpatrick. The answer is that it is an economically viable facility for the state if I can operate it greater than a 75% capacity factor.

MR. CARROLL: Okay, so what you're saying is that

you believe that the problem that existed prior to the shutdown, although it still exists, so that people understand what it means and the plant people are not going to fell constrained to do everything on the cheap but to do what's needed and right?

MR. BEEDLE: Well, I think that the -- it's one of those mental conditions that you get yourself into if you can't do something, then you want to blame somebody for something, so you use this as the reason for never being able to accomplish your job. You know, I charge my managers with doing a job, and he's got a fixed budget to deal with it. If he comes back and says, I failed because you didn't give me enough money, I say no, you failed bocause you didn't manage what I gave you effectively, and that really was the issue that we were dealing w h at Fitzpatrick.

MR. CARROLL: And you think you've got that under better control at this time?

MR. BEEDLE: No doubt about that, yes, sir.

MR. CARROLL: did Indian Point have the same problem?

MR. BEEDLE: Indian Point is not in quite the same position, so this argument about being a losing facility was not something that ever came to the minds of the operations staff at Indian Point. That plant, at Indian Point, we merged the rates of Indian Point 3 and our Poletti Plant or

fossil plant. So, if one is up and the other is down, then, you know, the revenue stream is still there. So, it's not a matter of being able to carve out and segregate Indian Point as a single financial element of the company.

MR. LINDBLAD: Excuse me, Ralph. As I understood, as you were describing the Power Authority, I understood you to say it was funded with revenue bonds, as distinguished from being a general obligation on the state of New York. Is that right?

MR. BEEDLE: That's correct. Our bonds, or the bonds we sell are sold for the purpose of doing capital projects or capital improvements for our facilities.

MR. LINDBLAD: And is guaranteed by the revenues from the Power Authority?

MR. BEEDLE: That's correct, right.

MR. LINDBLAD: And so sooner or later, the Power Authority has to be in a balanced financial position to pay off those bonds?

MR. BEEDLE: Well, that's true. That's true.

MR. LINDBLAD: The State of New York doesn't underwrite the Power Authority's expenses.

MR. BEEDLE: That is correct. It doesn't underwrite it, and I think the -- if we should find ourselves in a position where the management of the Authority was such that it's obvious that our bond reserves

were decreasing, that would be reflected in our bond ratings, and our bond ratings are better than the State of New York. So, if you were looking for somebody to back somebody, you'd go to the Power Authority to back the state.

We have enjoyed, I think, a very healthy financial position until we encountered this difficulty with Fitzpatrick, and clearly, when the plant doesn't run and you terminate the revenue stream, you've got to look hard at how you're dealing with the facility in order to get things back on track. People frequently ask me what sort of support do you get out of the trustees, and the answer is that I have one of the most supportive trustees that I could ever ask for, and that's Chairman Flynn. He has given me every dollar that I've asked for.

I have gone in to trustee meeting after trustee meeting and asked for -- and I don't ask for $10,000 at a pop. I'm going $10 million at a crack, and they keep giving it to me. Now, they keep asking, is this really the right thing to do, Ralph, and I said yes, it is. Fitzpatrick is an economically viable facility, but we've got to get it fixed so that it runs right. That was our objective throughout 1992. So, the trustees have been extremely supportive, and the rest of the company has had to curtail some of the things that they wanted to do, but I think by and large, we've managed to provide the necessary funds to

correct the problems at the Fitzpatrick Plant.

[Slide.]

MR. BEEDLE: In examining the causes for the problems at Fitzpatrick, we narrowed it down to essentially three. One was management oversight direction and support. This is management from me, the resident manager, the senior managers of the plant, all the way down to the first line supervisors. We found that that entire stream in there was in need of overhaul.

Effective planning and resource allocation. It's ineffective if you tell the people that you are a losing plant and then you don't give them the money to do routine maintenance. The net result is that the staff, after awhile, gets to the point where they don't even bother identifying problems, and I think that was one of the key ingredients in the diagnostic report. They said, your operation staff has become numb, and they no longer identify problems that need to be corrected because they don't see any hope of them being fixed.

I'm here to assure you today that that has turned around. We are identifying problems right and left. Our threshold is considerably lower than it has ever been, and we are fixing problems. The staff has got confidence that we will correct the problems that are identified through their efforts.

MR. CARROLL: How do you know that?

MR. BEEDLE: We have a --

MR. CARROLL: What measurement tools have you used?

MR. BEEDLE: I beg your pardon, sir?

MR. CARROLL: What measurement tools have you used?

MR. BEEDLE: We have an AQCR system, adverse quality reporting system. We've had probably twice as many AQCR's written in this last calendar year than we did in the previous calendar year.

MR. CARROLL: How do you know that it shouldn't have been four times as many?

MR. BEEDLE: Well, we've had a significant effort on the part of our managers to go out and look and inspect the plant. We've got pretty good confidence that the things that people are reporting as deficiencies are things that a year ago they would have overlooked. These are reports that are being contributed by operation staff, by maintenance staff, by people other than just our QA or management staff. So, we've got a lot of people involved in this looking for deficiencies, and I think it's a clear indication that there's an effort to try and improve every aspect of operation of the facility.

The third item was a lack of policies to promote

and enforce standards of performance of the plant. We heard from many of our staff members that they did not know what was expected of them, and we've taken considerable effort to improve the performance standards to issue standards to guide the staff in the conduct of their day to day operations.

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MR. BEEDLE: Contributing causes to the problems at the plant are a lack of communications and teamwork. We had difficulty in communicating from one department to another, as well as facility to the corporate office. Industry operating experience. We had generally taken the view that industry operating experience was something that was arrived at the doorstep of the plant, and if you thought you ought to do something with it, you did it, and if you didn't, you didn't need to worry about it.

We took literally the Commission statement that says no action is required on this. We said, if the Commission doesn't want any action on that, far be it from me to do anything, so we put it in the PUCA and didn't bother with it anymore.

Long standing problems. We had a number of problems at the facility that had been there from, you know, that had existed for years, and we managed to figure out how to accommodate and work around those things.

Management leadership. I think one of the big problems we had was that the plant sitting up at Oswego, New York was distant and remote. DET -- I'm not particularly fond of this statement, but the DET relished making the observation that the plant staff thought the best thing about Fitzpatrick was that it was 300 miles away from the corporate office. I think that that sentiment reflected the general behavior of the plant in the way they did their business. They took the view that they were isolated, that nobody worried about them, just leave me alone, I'll generate electricity. It was something that we had to do. It was an attitudinal issue that we had to turn around.

Attention to detail and planning were also contributors to the problems that we had at the plant. In developing action plans, we embarked on two programs. One was a results improvement program specifically for Fitzpatrick, and the second one was an integrated nuclear generation business plan that would encompass the operation at Indian Point, Fitzpatrick and the White Plains office.

MR. CATTON: What do you do to change the attitude? Does that mean replacing a few people hear and there?

MR. BEEDLE: Yes, sir. We'll get to how we addressed some of these issues here in a few moments.

[Slide.]

MR. BEEDLE: The results improvement program at Fitzpatrick, the objective was to build a program that would give us an opportunity to provide continuous improvement at the facility. We were looking for more than just fix the problem today, have this thing done in six months, get off of the watch list, and go about our business of running the plant like we had been in the past. Our objective was to put in place a structure that would make this plant operate for the long haul as one of the top performers in the industry.

[Slide.]

MR. BEEDLE: One of the first individuals that I hired after taking the job as the executive VP was to hire somebody to take my job, and I hired Rad Converse, who at the time was working with the Institute of Nuclear Power Operation. Rad, if you would, discuss briefly the results in the improvement program.

MR. CONVERSE: First, I want to share Ralph's sentiment about giving us the opportunity to come down here. We do appreciate that.

Ralph, I went back to the Power Authority in May of '91, and as I walked in the door, Ralph greeted me with, we have problems at Fitzpatrick, and I want you to get involved in them and see what you can do about them. That was the charge he gave to most of his staff there in the

White Plains office. As it worked out, I ended up going up to Fitzpatrick in July of '91 as the resident manager for an interim period while Mr. Salmon was being trained relative to BWR operations.

During the time frame that I was at Fitzpatrick, one of the first things we did was to start developing departmental improvement programs. We couldn't wait for a whole -- the development of what the root causes and issues were associated with the problems in that time frame. We wanted to start getting some immediate improvement, so we charged each of the department heads to go off and do departmental improvement plans. It went on from there, got involved, as I mentioned earlier, with teams put together in different areas, engineering maintenance, for example, and operations would be another example, to come up with more people involved, and therefore more experience involved, come up with improvement or the problems, the issues that existed in each of those areas.

We then went from there to kind of binning those issues and coming up with root causes for each of those issues. In addition to that, in the same time frame, we asked from all of the employees a suggestion program. Our concern was that unless the employees felt that it was their program, their improvement program, they had input into it, that ultimately the program would not be successful. So, we

went about receiving feedback in several fashions -- through the plant newsletter, and we had a box where they could do it anonymously. We kept track of all of the feedback that was given, and insured that each employee that gave some feedback to us got feedback on what he felt his problems were.

At any rate, as a result of all that, now we have the issues, we have the root causes. The same teams went in and developed action plans to offset those root causes, and after some filtering and some integrating of the plan, we came up with an overall action plan to offset the issues, and the issues in turn would offset the root causes. We formalized it by developing a procedure, an AP of how something gets put on the results improvement program, how something gets taken off the results improvement program, and more importantly, how we were going to assess the effectiveness of the results improvement program.

We ended up with roughly 600 action items. Each of those were assigned individual responsibilities. We put those items on action tracking lists. We developed performance indicators relative to the progress on the action tracking list, and then we have a periodic assessment of the progress. Periodic assessment was done in a couple of forms. One form was the QA with some -- during some time frame, takes a look at different action items, looks to see

if they feel the action item is closed on the basis of what has been provided, but I guess more importantly, the nuclear leadership team, which is the team which consists of the three vice presidents and the resident manager, on a semi-annual basis, sponsors an assessment of the results impr ement program. The assessment consists of a broad based people within the authority. They go into Fitzpatrick and they do a lot of soft things such as interviewing different personnel in the plant, and in addition to that, they look at the harder things where hardware fixes were required and modifications, how many jumpers exists, things of that nature.

That's pretty much the extent of it. The improvement program has been up and functioning now for about a year. We chose a very aggressive pace in the front end. To some extent, we have problems keeping up with it, but so far we've done pretty darn well keeping up with it. The assessments have been effective. The first assessment pointed out that we were paying too much attention to specific tasks and getting them done, not enough to issues. So, we rethought how we were going about it and made some changes to the program. Quite frankly, the results improvement program is doing the job we hoped we would do when we developed it.

Questions, comments?

MR. CARROLL: I guess I always have to ask everybody, what's your background? What did you do before you had your present job?

MR. CONVERSE: I was in the Navy for 7 years. I was an engineering watch supervisor in the Navy. After leaving the Navy, I worked for Niagara Mohawk. I was a licensed reactor operator, licensed senior reactor operator with Niagara Mohawk. I've been in the nuclear business for about 30 years.

MR. CARROLL: And that includes a stint with INPO?

MR. CONVERSE: That includes a stint with INPO.

[Slide.]

MR. BEEDLE: The second effort that we embarked on was the development of the nuclear generation business plan, and it was my intent that this would be a department-wide plan that would encompass the operation of not only my White Plains staff but also Indian Point 3 and the Fitzpatrick plant. I also included in the development of this plan people from the budgeting, people from human resources, training, finance and admin, system operations, management information system. I went to everybody that had anything to do with the nuclear operation and co-opted them in the process of trying to develop a business plan where we established goals and set targets in order to improve the performance of the facilities.

We had five functional areas, nuclear safety, industrial safety, professionalism, performance regulatory compliance, and cost management. For each one of these areas, we had a defined set of goals and performance objectives. We have just recently issued our second annual business plan. I expect that this plan will continue as a living element in the operation of the facility and give us a framework for measuring and gauging our performance, something that can be used as establishing goals and improving the way we do our business.

[Slide.]

MR. BEEDLE: As I mentioned earlier, the improvements in safety culture is one of the underlying objective in this entire process, and there are four essential elements that we've taken a look at in trying to deal with this: management standards expectations; employee involvement; our work practices; and the quality culture and its effectiveness in operation of the facilities. All of that was leading toward this demonstration for ourselves as well as the Commission that we, in fact, could operate this plant effectively.

[Slide.]

MR. BEEDLE: In management expectations, the nuclear leadership team has embraced the following: that safety and quality are more important than the production of

the facility; that management wants problems identified; that a questioning attitude is an important part of safety; that if you're in doubt that you must proceed conservatively; that procedures and safety practices must be followed; that resources will be provided to do the job right; you need to do the job right the first time; you need to pay attention to detail. If you follow through on these, you will find that that will result in effective production.

This was not the way the Power Authority had been doing business at Fitzpatrick, in any event. So, this represented a significant departure from the way the business had been done, and was, in fact, a starting point for a change in the cultural attitude for the operation of the facility.

MR. DAVIS: Excuse me. In the first item there, could you explain what you mean by quality? Is this quality of people, of the equipment?

MR. BEEDLE: Safety of quality, the quality that you employ in doing your job. It's the quality of your decision making. It's the quality that you build into the evaluation that you do. It's the quality that you build into the work that you perform, whether you're a mechanic or an electrician. You know in your heart that you didn't do the job right. You have failed to achieve quality in the performance of that task.

MR. DAVIS: Thank you.

MR. BEEDLE: And that is more important than getting the machine to run. You may get the pump to pump, but if you know that you didn't put the right bearing in it, or you didn't do the job correctly, then it doesn't really serve you well to have the pump pump for three months and then die on you and you have to go back and work on it again. That's the kind of quality we're trying to push hard into building this plant.

We could go through hundreds of examples over the course of the last year where these elements in changing the way people are looking have been evidenced and demonstrated. Safety and quality is more important than production. Harry Salmon was trying to start the plant up. We ended up with a service water system leak, relatively small pinhole leak in the service water system. We stopped, we said this isn't right, but to do the job right, and we ended up delaying the startup of the plant by a good three weeks as a result of that. That is not the way we would have operated that plant two years ago.

MR. CARROLL: What was so significant about the pinhole that kept you down three weeks?

MR. BEEDLE: Because it wasn't right, and it turns out that we had replaced all of those transition flanges except this one, and why we didn't replace that one two

years ago, don't know, but we didn't, and now we end up finding that this thing's leaking, and we said we're going to fix it and fix it right.

MR. CARROLL: Okay.

[Slide.]

MR. BEEDLE: Employee involvement. We've established a significant employee involvement process, and I'd like Mike Culomb to discuss that briefly with you. Mike is the general manager of support services at the Fitzpatrick Plant.

MR. CARROLL: And what did Mike do before he became general manager of support services?

MR. CULOMB: Before I was general manager of support services at Fitzpatrick, I worked for Niagara Mohawk Power Corporation for 21 years. My first nuclear involvement was at the Fitzpatrick Plant. Niagara Mohawk actually started up Fitzpatrick and ran it for a few years. I was an aux operator and a licensed reactor operator at Fitzpatrick, and then we returned to Niagara Mohawk and started up Nine Mile Point Unit 2. I was senior reactor operation -- I obtained a senior reactor operator license at Nine Mile Point Unit 1, and then at Nine Mile Point Unit 2. When I left Niagara Mohawk, I was the operations manager at Nine Mile Point Unit 2. I left Niagara Mohawk January 1, 1992.

MR. SEALE: And he's now an involved employee.

MR. CULOMB: A very involved employee.

MR. CARROLL: And a counter balance to all of this nuclear Navy background.

MR. CULOMB: Just about. We have several employee feedback processes. Rad, I think, mentioned earlier, we use this for the input, and we're still using it. We perform at the plant worker observations. We have an administrative procedure that provides guidance in this area. We assign key managers and supervisors to go out in the plant and watch in progress work activities and provide those as a guide as to what to look at, including industry safety, rad worker habits, procedure adherence. We use those observations as feedback to our processes, how we're doing.

Managers typically report on these at our daily managers meetings. We have pots-work ALARA evaluations that go on after jobs that have significant rad exposure or a threshold of rad exposure, and we use that feedback to improve our ALARA process.

We have a formal suggestion program where forms are at the front gate or can be provided separately, and employees are asked and encouraged to write down feedback and suggestions and drop them in there, and they are all looked at an answered by the resident manager. Specific to ALARA, we have a suggestion program where people can

actually earn points and get prizes for good suggestions. We have a suggestion program for plant improvements where we also aware prizes. Hundreds of dollars have been awarded to employees that provide input on better ways to do our jobs where we end up with better quality or more safe equipment.

Plant industrial safety, we've made great gains in that area in this past year. We've reduced our reportable injury rate by approximately 50%. We just after the first of the year passed one million man hours without a lost time accident.

The next story I was going to talk about was improving safety culture and work practice improvement.

MR. DAVIS: Can I ask a question?

MR. CULOMB: Sure.

MR. DAVIS: During operation, how many people do you have on site in the M&O mode?

MR. CULOMB: We have about 580 permanent NYPA employees, and about 130 NYPA temporaries and long term contractors.

MR. DAVIS: Is that considered an acceptable nominal number, or do you have plans to try to reduce it?

MR. CULOMB: No, I believe that's an acceptable nominal number. Can you help me there, Ralph?

MR. BEEDLE: That number is based in part on a study that was conducted for us in 1991 by Tim Martin

Associates, not to be confused with the Region 1 Tim Martin.

MR. CARROLL: Or the Diablo Canyon training Martin.

MR. BEEDLE: Or the Diablo -- yes, that's another one. There are Martins all over the place. This Tim Martin, though, took a look and compared the Fitzpatrick Plant, our Indian Point facility, and our corporate office, recognizing we had a central engineering, we had two different varieties of nuclear plants, and benchmarked with industry staffing, and these numbers of about 600 at each plant were numbers that we got from Tim Martin.

MR. DAVIS: How many of those are there because of NRC requirements and not because of the need?

MR. BEEDLE: None.

MR. DAVIS: None?

MR. BEEDLE: Well, no, I'll take that back. I do have some operation staff in the control room that are there because the NRC says that you've got those as a requirement, but I'm adding even more to that. I am not operating this plant because the NRC says you've got to do that. I'm operating this plant because it makes economic sense to do it, and I intend to do it right.

MR. DAVIS: How many security people do you have?

MR. BEEDLE: I don't -- 40?

MR. CULOMB: Approximately 70, 75.

MR. DAVIS: Thank you.

MR. SEALE: Is that part of your 600?

MR. BEEDLE: Yes.

MR. SEALE: Do you have six shifts or five?

MR. BEEDLE: We have six -- you're talking operation shifts?

MR. SEALE: Yeah.

MR. BEEDLE: We have six shifts.

MR. SEALE: Thank you.

MR. CULOMB: Next, I'd like to talk about some work practice improvements we have seen in the past year. In the area of radiation protection, even though our outage was approximately a year long, our exposure during the outage was the lowest yet for a refuel outage. Our exposure was still high. It was about 680, and our goal for this year is, if we make our goal, which is 280 man rem, will be our lowest year of operation.

In order to improve rad protection practices at the site, we developed an enhanced rad worker training program where we gather different disciplines of people in the training center in groups of approximately 10, and by different disciplines, I mean electrical maintenance people and mechanical maintenance people, instrument control technicians, rad protection technicians, decon crew people, and put them in a situation that's intended to improve their

work practices.

First, we train them. We tell them what are the expected rad worker practices in the plant, and then we actually put them in a lab setup with small running tank and pump, put them in a situation where they do repair work, including all of the preps, writing up radiation work permits, planning the job. In the training facility, we have dusted it with fluorescent dust and special fluids that show up under blacklights, and then we test them at the end of film it, and they watch and critique themselves. Then at the end of the class, we do an evaluation. It's been very effective in improving rad worker practices. It's also been effective in making people understand what the other person's part of a job is, and that's very important. When a mechanic goes out there, he understands what the rad protection person has to do for his part of the job in order to perform work at the plant.

MR. SEALE: A question?

MR. CULOMB: Sure.

MR. SEALE: You said this last year, your exposure was 600?

MR. CULOMB: During the refuel outage.

MR. SEALE: And this next year, you expect or you're shooting for 280?

MR. CULOMB: Our goal is 280.

MR. SEALE: You do not expect to have a refueling outage during this year, though?

MR. CULOMB: That's correct. We expect to have a short outage the end of the year.

MR. SEALE: Okay. I assume that if you had an outage in .he forecast, that your expectations would be appropriately larger?

MR. CULOMB: That's correct.

MR. SEALE: Okay, so that's driven by an understanding of the tasks at hand, and not a number that comes out of the air?

MR. CULOMB: That's true.

MR. SEALE: Okay.

MR. CULOMB: Work requests, during this outage, we worked approximately 3500 work requests, and approximately 2,000 preventative maintenance work requests, totalling almost 5,000 work items. Temporary modifications and jumpers, going into the outage, we had over 100 temporary modifications and jumpers in our system. We had a goal to get that down below 50 before startup. We made and exceeded that goal.

Modifications, plant modifications, we implemented over 200, approximately 225 plant modifications during this outage. If there are no questions?

MR. SEALE: You say you've reduced the number of

modifications?

MR. CULOMB: No, I say we implemented them.

MR. SEALE: I'm sorry, you implemented them. Are you working off the long ones? Do you understand what I mean, the ones that have a long schedule associated with them?

MR. CULOMB: Yes, we are.

MR. SEALE: So, you've reduced the number of extended duration?

MR. CULOMB: Yes, we have, and I think we've been effective at that.

MR. SEALE: Fine.

MR. CULOMB: Yes, sir.

MR. CARROLL: Ralph, we have a pause here. Let me look at the logistics. How long does the staff need for the presentation?

MR. COWGILL: I'm prepared for about a 15 minute presentation and take any questions you have. I can shorten it to 10.

MR. CARROLL: That sounds like we ought to wrap you up, then, by like five after two, so --

MR. BEEDLE: We'll be done. I'll talk faster.

MR. CARROLL: Good.

[Slide.]

MR. BEEDLE: We've already mentioned the column

identification increase number of AWCRs written by non-QA people. Lower threshold indicates people are, in fact, interested in improving the quality of the facility.

[Slide.]

MR. BEEDLE: The next item is the formal start-up program that I think is the culmination of this year long effort to try and change the way we look at the operation of the facility, and I'd like Harry Salmon to discuss this improved safety culture, as evidenced by this start-up process that we recently completed.

MR. CARROLL: But before he begins --

MR. SALMON: I'm Harry Salmon, the resident manager at Fitzpatrick. I spent 28 years in the Navy nuclear program. I had jobs as a submarine CO, squadron commander of the Trident submarine squadron at King's Bay, and I was the force maintenance and nuclear training officer for the Atlantic Submarine Force. I've been with Fitzpatrick for about a year-and-a-half, and I assumed this job in April of 1992.

MR. CARROLL: Without going through INPO?

MR. SALMON: I stopped an INPO and said hello and got some good words of advice. I did spend -- in part of the training program, I got a chance to do the five week senior manager's course in February and March and visited the Hatch Plant in Arkansas Nuclear and got a good chance to

do some work at some good plants.

MR. CARROLL: I think the committee members might want to hear just a few words about the senior manager's course that you went through. It's a very impressive course.

MR. SALMON: The senior manager's course is five weeks in length. We spend two weeks in Atlanta going through areas of management concern, and each course is about 12 people from plants around the country. We have a mentor who's a senior nuclear executive of one of the power companies. We had Doug Gibson from Detroit Edison was a mentor one week, and one from Callaway. They're there to add depth to the thought process and give you other ideas and keep you on a straight course if you get ideas that sound good in the classroom but wouldn't work out in the field.

Then two weeks you travel to a plant and really are indoctrinated by the management of that plant. They go all out to show you the various aspects of their operation, show you the good things they do, tell you the things that don't work, and I was fortunate to spend the week at Arkansas Nuclear, and one down at the Hatch Plant in Georgia.

Then you come back, and the last week is a case problem based on things you saw at the plant. That gives

you a good chance to talk with peers in the industry. It gives you a chance to visit other plants, and also to establish communications links with the people at INPO who have special knowledge that will be useful to you later on.

MR. CARROLL: Is my impression correct that virtually every plant manager or what I would call a plant manager where I came from in the U.S. utility is gone or is scheduled to go to this course?

MR. SALMON: It's almost 100% at this point.

MR. CARROLL: Yes, thank you.

MR. SALMON: In getting ready to start up, we had spent a lot of time making significant improvements to Fitzpatrick, and we wanted to go at the startup very carefully. We thought we had established a very good inquisitive effort in the people, but we've been shut down for 14 months. We had done 200 modifications. We had done 5,000 and more work items in the plant, and we wanted to make sure that the plant was operating properly as we brought it up so that we would provide the reliability that's important to a good operating plant.

So, we established seven milestones, and then a program for each milestone to get all of the people in the plant involved in how the plant was operating. The key things were, we had a specific list of prerequisites to reach that milestone. Then we had each manager was

responsible for being out in the plant and having his people out in the plant doing formal management observations and doing informal observations to assess whether the things we had in place were working, whether the people were following procedures, whether the equipment was operating, whether they were pulling the strings on things that didn't look right.

As we reached each milestone, we'd have an assessment meeting. Each of the department heads had to come in an report to their plant leadership team what was the observation you'd done, what were the things seen there, was there anything that he knew about that we should stop and fix before we proceeded to the next milestone. We did that at each milestone, had an assessment meeting, met formal prerequisites, assured ourselves that we were ready to proceed and then proceeded. Or, we would pick any number of material deficiencies that had come up or questions, and add those to the prerequisite list and say we'll proceed after we resolve these following four items.

The system served us well. We stopped, we determined root causes and corrected problems. There are some examples there. One had to do with core isolation cooling turbine. We were trying to get the overspeed trip set, and we couldn't get repeatable trip settings. After three tries, we said something's wrong here. We

disassembled it. We found a problem that had existed for a number of years. We looked back in our history and found out that the last time we did this, it took 29 adjustments to get the trip setting correct, and none of them was -- still the scatter was pretty high. After having made the fix, removed the interference that was there, we took one more setting. The thing locked in and was repeatable within about five rpm. So, we had fixed a problem by being careful that had existed for a number of years and been worked around and fixed. We carried that out in a number of cases. There are some examples. Next slide, please.

[Slide.]

MR. SALMON: We had latched on to this example of how would you know if you had the right culture, and you see this way by Dr. Murley back at a regulatory conference in 1989. As I look at this today, I am really pleased to say we're Plant A. There is nothing there anymore in the Plant B column that reflects Fitzpatrick. To show you a few of the things, in all of the observations we do, our guys now know what's expected in procedural compliance. When they find a problem with the procedure, they stop, they come back, they get the procedure changed, and we march on from there.

We've had numerous observations of our own, and by other people who watch us, that says that is the road that

everybody's doing business, and we're pleased with that. We're fully staffed. Anybody that comes to our control room is impressed by the professionalism of the operators.

MR. CARROLL: Do they wear uniforms?

MR. SALMON: They wear -- senior license operators wear a shirt and tie, not industrial uniforms, but they have shirt and tie and look professional.

MR. CARROLL: But no particular?

MR. SALMON: No particular, no. They get to choose their own at this point. We're thinking about it.

MR. CARROLL: Don't think too hard.

MR. SALMON: Before, there were a few that had Harley shirts on, but we have made that change. More importantly, they're using very rigorous three point communications, an order of feedback and acknowledgement that you repeated the order back. They have come to believe in that. We put a TV camera in the simulator. They watched themselves when they didn't do it. They watched themselves when they did do it, and they realized, that's the right thing to do. They've started to impart that to the non-licensed operators. We have the IC techs and the mechanics also learning to do that, and our standard is that in doing operational business, everybody in the plant will be using three point communications. Our control room is really good at this.

MR. SEALE: Excuse me. Do your instructors in your training department wear shirts and ties?

MR. SALMON: Yes, they do. There are so many places where we're doing real well on these things, that I'm very proud of where the plant is in this Plant A culture. I want to relate to you a story. About a year ago, Chairman Selin came up to the plant, and he visited the Fitzpatrick Plant in the morning, and the Niagara Mohawk Plant in the afternoon. Then at a press conference, he said that well, Niagara Mohawk is like the Buffalo Bills. They're established. They're mature. The Fitzpatrick Plant is like the Cowboys. They've hit bottom, and it looks like they're turning the corner. That was a year ago. Today I really like that analogy. I will tell you that we have come a long way, and this Plant A is the Fitzpatrick Plant. We have a lot of improvement to do in those areas, but we are in Plant A in every one of those categories. Thank you.

[Slide.]

MR. BEEDLE: This is the reason that we've had changes at the Fitzpatrick Plant. We've got a new resident manager. We've got a new plant organizational structure. I'll describe that in just a moment. It consists principally of three general manager positions where we've divided the span of control in order to provide more senior look at the day to day operations in the facility. We have

a new I&C department head, a new radiological environmental services department head, a new tech services department head, a new fire protection supervisor, and a new fire protection engineer. Some of these, but not all of them, have come from outside the Fitzpatrick organization.

We've got new plant departments and operating experience review in licensing, new configuration management group, planning and scheduling groups specifically dedicated to that task. We've added 48 new positions at the facility. The operations department has been strengthened with 17 new positions. In the past, we operated with a combined STA assistant shift supervisor. We kept telling ourselves that we could cover the STA thing as sort of an afterthought with one of our licensed operators, and after going through agony and a number of events, we found that you just can't do that. So, we're now staffing, providing an independent STA to provide that engineering expertise on shift. We're also adding a new -- and addition reactor operator in the control room. That's all in the process. They're going through the training programs as we speak.

MR. CATTON: A new resident manager, is that because you couldn't instill the new culture in the old one?

MR. BEEDLE: I had difficulty communicating with the previous resident manager.

MR. CATTON: I see.

MR. BEEDLE: Now, Mr. Salmon came on board, and I mean, I knew what he'd gone through, and I knew him years ago, so there was no doubt in my mind that he and I would be able to communicate effectively. That's probably one of the key reasons that the previous resident manager is no longer with the company.

In addition to the operation staff additions, we've had increased management training programs, and yes, we're using the INPO loan program. I have two senior managers at INPO right now. One of them was a director of engineering in the White Plains office. He's due to return in June, and we just recently sent the superintendent of power from the Fitzpatrick Plant down to INPO to start an 18-month program, and that was started about three or four months ago.

MR. CARROLL: INPO brings to mind HPES. How extensively are you using that in your new organizations?

MR. BEEDLE: Mike Culomb is responsible for the operating experience review analysis of events process.

MR. CULOMB: As a matter of fact, our root cause program at Fitzpatrick is based on HPES, and we do use it extensively.

MR. CARROLL: Okay.

[Slide.]

MR. BEEDLE: One of the major changes that we made

in the world o. engineering was a fundamental shift in the way we do engineering. In the past, our technical services organization was responsible for not only the day to day engineering support, they did the operations review, the performance evaluations. They also did a lot of modifications at the plant, and in order to gain better control of configuration management of the facility, we have separated the responsibilities, and the White Plains engineering organization is responsible for the maintenance of the design basis for the plant. They are the organization that developed any modifications necessary for the facility, and the technical services organization is solely responsible for the operations and maintenance day to day engineering support, utilizing a system engineer approach to this business.

As I mentioned, the new manger in the technical services organization, he comes with a great deal of experience. It just turns out that he happened to work for the NRC sometime in his past, so he's --

MR. CARROLL: Keep an eye on him.

MR. BEEDLE: Well, we do. We keep close tabs on him, but he's really doing good work for us. He's got good standards. He's out to try and solve the problem in the technically correct way.

[Slide.]

MR. BEEDLE: The organization slide next, my organization consists of the two plant managers and three divisions in the White Plains office. Operations and maintenance, including planning and a new assessment group under Bill Josiger. Vice President of engineering is Sal Zulla, and as I indicated, he has the design basis group, nuclear engineering design, and then he has a project engineering group for Fitzpatrick and one for Indian Point. On site is a component of that project engineering group, resident on site with a site engineering manager so that the resident manager has real time access to this modification control process.

MR. CARROLL: How is it split? How many people in White Plains versus the people in the two plants?

MR. BEEDLE: Let's see, the site organization consists of about 36, roughly, at each facility, and then another roughly 40 in the project group back at the headquarters organization. These two organizations, there's relatively little shift from the Fitzpatrick group to Indian Point, so they're able to devote full attention. The engineering support that they get from the nuclear engineering group is a combined effort for both facilities.

MR. DAVIS: Excuse me. I don't see an entity on that organization chart that has safety as their responsibility.

MR. CARROLL: Everyone has that.

MR. BEEDLE: Industrial safety?

MR. DAVIS: No, plant safety.

MR. BEEDLE: Well, we've got the plant operation review group that review all of the processes for the facility from a reactor safety point of view, and then I have a group for my safety review committee that reports to me. I have a dedicated individual that sits as the chairman of the safety review committee.

MR. DAVIS: Okay. You haven't shown that on this chart?

MR. BEEDLE: No, that was not -- it wasn't one of the major department heads. An important element. I would not try and tell you otherwise.

That safety review committee consists of the two resident managers and the vice presidents and the director of QA, plus -- and we have an independent consultant, plus whatever expertise they need to deal with any particular problem that they might be reviewing on a monthly basis.

MR. CATTON: Do you have anybody skilled in PRA? I think that's what Peter was looking for.

MR. BEEDLE: Yes. In the PRA area, we've got a nuclear systems analysis group that reports to Mr. Converse. We have created our own PRA for Fitzpatrick. We're doing our own PRA. We've had some consultant assistance, but

relatively little. It's our own work. We've just recently completed an inspection of the Fitzpatrick plant on the PRA, and we've got some pretty good comments about the quality of the work, the detail that went into it, the comprehensiveness, responsiveness to the generic letter that dealt with the IPE.

MR. DAVIS: Yeah, we have, in fact, been exposed to that PRA, and at least some of us were surprised at the low core damage frequency. It's also planned to use that PRA in your actual plan of operations in terms of scheduling maintenance and determining what risk significant equipment exists and so forth. Do you endorse that use of the PRA?

MR. BEEDLE: Yes, sir. We took the position that instead of just doing an independent review of the plant, just do an IPE, and then set it on the shelf and forget it, that we wanted to build something that represented long term usage. We could take a look at this to determine whether or not we ought to be putting more effort into service water, for example, or the emergency diesels.

MR. DAVIS: Good.

MR. BEEDLE: If I could digress just for a moment, I'll be finished here in three minutes. The issue of the PRA and the low core melt frequency, Rad, would you explain why Fitzpatrick has got a low core melt frequency, and it's not significantly lower than the rest of the industry, but

it may be a little bit lower.

MR. DAVIS: Well, it depends on what you call lower than the industry. It's all relative.

MR. CONVERSE: There are some substantial differences at Fitzpatrick, and we think relative to, for example Peach Bottom and some of the other plants, that ours is not a lot lower. There are some substantial differences in Fitzpatrick, and we think we did a good job of taking the PRA review team that visited Fitzpatrick site through them. Probably the most major one in my recollection is that Fitzpatrick has four diesels. Each of those diesels is 2600 KW. One diesel will keep you from having a core melt.

Two or three other items, very quickly, our --

MR. CARROLL: They're all the same manufacturer, though.

MR. CONVERSE: That's correct.

MR. CARROLL: So, the real dominating influence is common cause failure.

MR. CONVERSE: Yeah, there could be a common cause failure, that's correct.

MR. DAVIS: That was considered in the PRA.

MR. CONVERSE: Absolutely. Also, the MSIV -- our MSIV isolation is set lower than most facilities, although most facilities are going to the same set point that we have. General Electric offered an analysis early on, and we

took advantage of it. We have a cross tie between our diesel fire pump that allows us to pump through to the -- through a couple of cross ties to the reactor vessel. That helped lower the frequency. The configuration of our plant is such that the standby liquid control tank sits above the CRD tank or CRD pump, and that allows us to cross tie via hose the standby liquid control tank and use the CRD pumps, in addition to the standby liquid control pumps. Those are the kind of things that made Fitzpatrick's core melt frequency somewhat lower than the other facilities.

MR. CARROLL: Do you want to sum up, Ralph?

[Slide.]

MR. BEEDLE: Okay. The last slide in the package, I'd like to go to that, and there's a whole series of slides where we talk about the nuclear leadership team, the plant leadership team --

MR. CARROLL: I think we've got a good flavor of what you're doing. That's all we really want.

MR. BEEDLE: Okay, summary. The plant is operating at 100% reactor power today. We've conducted a deliberate process of bringing the plant on line. I'm convinced that we've got a competent plant staff with control over the facility, as evidenced by the smooth progression to this initial startup following better than a year of shutdown.

I'm convinced that we did the job right in bringing the plant back on line. I would point out that the Nuclear Regulatory Commission did not shut the Fitzpatrick Plant down. I shut the plant down in December of '91 because I was concerned about our ability to meet our fire protection Appendix R requirements, and we've just spent the last year resolving those concerns in my mind and in the minds of my staff engineers.

The last thing I'd point out, and it's not on the slide, is that our relationship with the regulator, I think, has changed dramatically. We view the regulator as a nuclear professional on site. He's not in bed with us. He's not part of the plant staff, but he's there to carry out his responsibility to the citizens of the United States to ensure that we meet regulatory requirements. I think that that fundamental shift in the way we deal with the regulatory is one of the principal reasons that we've enjoyed success in returning the plant to service in an efficient and effective manner.

So with that, sir, I apologize for taking --

MR. CARROLL: No, no problem. Bill, you had a question for Ralph?

MR. LINDBLAD: Ralph, could you perhaps be philosophical for a moment and tell us, do you think that you've got it fixed forever, or do you think that possibly a

management team can become complacent and has to go to the woodshed every ten years or se?

MR. BEEDLE: Well, I am convinced that we will become complacent if we don't continue to strive for excellence. If we don't continue to try and do our job better every day, we will become complacent. We could become complacent now. We've got the plant back on line. We did a good job at that. Let's rest on our rewards. Now, the one thing that I'd like to try and avoid is taking people to the woodshed periodically. Certainly, I don't want to go to the woodshed, and the way I intend to do that is to continually rotate these senior managers so that they don't become stale in doing their work. One of the problems that we had was that we continued to promote people up essentially doing the same job. We had an I&C manager, for example, that had been in the same job for almost 17 years. He ran out of good ideas 15 years ago.

MR. CATTON: He got replaced, too?

MR. BEEDLE: He was replaced. We have not gone after the employees and sent them looking for other jobs. We have only lost one employee.

MR. CATTON: How far down into the management did this disruption penetrate? You got rid of the top guy.

MR. BEEDLE: Yes.

MR. CATTON: How many levels below that?

MR. BEEDLE: Probably three. At least two.

MR. CATTON: Three levels below?

MR. BEEDLE: Yes. Department heads, some supervisors were moved.

MR. CARROLL: I want to ask you one more question.

MR. BEEDLE: Yes, sir.

MR. CARROLL: I know we're getting into time problems. I notice on your slide labeled capital improvements, you set up a video conference system between the corporate office and the sites, or you haven't done it yet?

MR. BEEDLE: No, we do have. We have a video conferencing system today that connects the White Plains office, Indian Point and Fitzpatrick. We have three way communication.

MR. CARROLL: ACRS is, of course, moving to new quarters, and we're looking at the question of how useful that would be to us. Does your system work pretty well?

MR. BEEDLE: It has been of immense value. It is used by -- I would say our utilization of that has exceeded our wildest dreams. We've got QA using it, engineers use it, I use it, training people use it. It's a system very much in demand, and it's of particular value in this particular month, and in January because of the inclement weather at Fitzpatrick. So, we cut down on some of that

travel to the north.

MR. CARROLL: My hope is I can stay in California and attend ACRS meetings.

MR. CATTON: but the question is where on the West Coast is it going to be? There are several of us.

MR. BEEDLE: It is very effective.

MR. CARROLL: Okay -- oh, do you have one more question?

MR. MICHELSON: I have the first question. On your slide on fire protection, you referred to a term that I'm not familiar with. What is Bondstrand piping?

MR. BEEDLE: Bondstrand is essentially a plastic fiberglass wound pipe.

MR. MICHELSON: It's a duct of some sort?

MR. BEEDLE: I beg your pardon, sir?

MR. MICHELSON: It's used like conduit?

MR. BEEDLE: No, it's a regular fluid flow system.

MR. MICHELSON: Well, this is under --

MR. BEEDLE: This is principally piping, but it penetrates our fire barriers, and we found that we did not have a tested configuration for that, so we had to go back and do tests. We've had to make some modifications to accommodate that.

MR. MICHELSON: The other question is, did you have thermal lag problems?

MR. BEEDLE: No, sir. No thermal lag.

MR. MICHELSON: Okay.

MR. BEEDLE: I know that probably sounds amazing, but we didn't have thermal lag in either one of our plants, so I thank God for a few small favors.

MR. CARROLL: Okay. Thank you very much, Ralph. It's been a very good presentation, and we've enjoyed it. It was educational. Now, let's see what the staff has to say about all of this.

MR. COWGILL: Good afternoon. My name is Kirk Cowgill. I'm Chief of Reactor Projects Branch 1 in the Region 1 Office of the Nuclear Regulatory Commission. My purpose here today is to discuss the NRC evaluation of the readiness for restart at the Fitzpatrick Station following the 1992 refueling outage.

You folks have heard about the decline of the performance at the facility and the fact that in the 1991 summer senior management meeting a diagnostic evaluation was performed at the facility. Concurrent to the diagnostic evaluation, the licensee was performing their own assessments of the decline in performance of the facility, and, as you've also heard, they've developed a Results Improvement Program.

In November 1991, the facility was shut down for technical reasons. And as Mr. Beedle stated, he intended to

keep the plant shut down through the refueling outage to correct fire protection problems.

As a result of all of these activities, there would be -- the NRC would be significant effort to follow actions to correct problems at the facility. And the NRC directed that an assessment panel be formed to assist Region 1 and NRR in the coordination of NRC resources for these activities.

The charter of the Fitzpatrick Assessment Panel, the principal parts of that charter were to have -- assume NRC inspection oversight at the facility for follow-up of all actions, including the diagnostic; to assess the adequacy and follow the progress of the utility's implementation of the Results Improvement Program; and following the conclusion of the outage, provide a recommendation to NRC senior management on readiness for restart at the facility.

The panel's membership included a diverse technical group. I am the Chairman; Mr. Bob Capra, the Project Direct at 1-1 who is here with me today, was the Vice Chairman. Other members included the branch chief of the Operations Branch and the Radiological Protection Branch in Region 1; Brian McCabe, who is the Project Manager for Fitzpatrick; and Bill Cook, Senior Resident at the facility. Also the Project Section Chief in Region 1 responsible for

the facility was on the panel.

The NRC's assessment process is based on NRC Inspection Manual Chapter 0350, Staff Actions for the Evaluation of Plant Restart. The key elements of this process included an independent development of restart issues for the NRC to evaluate. The issues were developed from the diagnostic evaluation, ongoing NRC inspections, various technical issues that were developed at the plant, and relevant generic issues.

There were substantial NRC inspections conducted at the facility during the year 1992 and late in 1991. Those included two major team ir pections directed by the assessment panel in the areas of f're protection and in emergency service water, to assess problems in those two areas; as well as substantial resident and regional-based inspection efforts at the facility. It also included an additional resident inspector at the site for most of the year 1992.

The panel also monitored the implementation of the Results Improvement Program and the various other self-assessment efforts at the facility.

In the fall of 1992, a Restart Assessment Team inspection was conducted at the facility, which was an in depth evaluation to assess the degree of readiness of the New York Power Authority to safely restart and operate the

Fitzpatrick Plant.

Following the completion of our inspection and evaluation activities, a documented Readiness for Restart Evaluation was performed, which I will discuss further in this presentation. And following the completion of that evaluation and all required activities, and a statement by the New York Power Authority that they were ready for restart, the Regional Administrator of Region 1, after consultation with the executive Director for Operations and the Director of the Office of Nuclear Reactor Regulation, agreed with the New York Power Authority that Fitzpatrick was ready for restart.

During the restart efforts, NRC had augmented inspection at the facility, including some around-the-clock inspection coverage.

Next slide, please.

MR. CARROLL: But in spite of all of this, according to Energy Daily, they're still on the watch list, is that right?

MR. COWGILL: Yes, Mr. Chairman, they're still on the watch list. And just because the plant has successfully completed their outage and completed a restart, NRC believed that we needed to observe a period of sustained full-power operation before we were ready to remove that plant from the watch list.

MR. CARROLL: Okay, thank you.

MR. COWGILL: The Readiness for Restart Evaluation was conducted using the guidelines of Inspection Manual Chapter 0350 that contained the following elements: root cause, identification, and corrective actions. The Fitzpatrick assessment panel performed an in depth review of the Fitzpatrick results improvement program.

This review ensured that the root and contributing causes identified by the New York Power Authority for the decline in performance at the Fitzpatrick Plant were consistent with those identified by the NRC diagnostic evaluation.

Further, the review focused on ensuring that the actions described in the plan to correct the problems were identified, and that the time frame for each of the corrective actions was appropriate.

The NRC reviews concluded that the Results Improvement Program was a comprehensive plan that addressed the root causes for the previous decline in plant performance and that it provided corrective actions and a reasonable process for assessing the effectiveness of these corrective actions.

Physical State of Readiness. In evaluating the physical state of readiness at the plant, the NRC considered the following areas: material condition of the plant,

maintenance backlog, plant modifications, control room deficiencies, system alignments, including some independent verification of system alignments by NRC inspectors, and evaluation of numerous technical and hardware issues.

MR. CARROLL: What do the regulations say about the maximum allowable number of backlog maintenance items?

MR. COWGILL: I don't think there's a regulation on that, sir, and you have to -- I don't think you can take a look at numbers in maintenance backlog. I think what you have to do is take a look at what goes on, the maintenance backlog at a facility, and the process that the utility uses for prioritizing the work, working the activities; and in the case of the restart of Fitzpatrick, how they determined those items that would be left to be completed after restart, and whether those items would, in fact, affect safe plant operation. And the NRC concluded that they would not.

MR. CARROLL: So it really is a matter of case-by-case judgment?

MR. COWGILL: Yes, sir. If a backlog -- I think if there is a very, very large backlog, we would question whether the facility had done enough maintenance to start up. But, in general, I don't think you can take a look at backlog and identify absolute numbers and draw any sound conclusions.

MR. CARROLL: Okay, thank you.

MR. COWGILL: The NRC concluded that the licensee had completed extensive physical work during the outage which included substantial corrective maintenance, numerous modifications, substantial reduction in the control room deficiencies, and substantial reduction in temporary modification.

Based on substantial NRC inspection of these activities, the NRC staff concluded that the physical condition of the Fitzpatrick Plant was adequate for its safe restart and operation.

Plant and Corporate Staff Readiness. In evaluating this area, the NRC evaluated the operating staff, the maintenance staff, engineering and technical support staffs, and the corporate and site staff interfaces.

With respect to the operating staff, the NRC concluded in May of 1992 that the licensed operation re-qualification program was satisfactory, and in late 1992 observations of the conduct of the licensed operators and auxiliary operators at the facility was good. Specifically, we concluded that procedure adherence, communications, shift turnover, and professionalism of the operating staff were strong.

Also, there were several additional staffing changes. In other words, they added staff to the Operations Department.

In the maintenance area, the NRC had determined that the staffing, organization, and programmatic changes made, corrected the previously identified programmatic weaknesses in the Maintenance Department.

With respect to the engineering and technical support, the utility told you they had made a number of ch[illegible] in the engineering and technical support. They c[illegible] a single design authority in the corporate office, established a new site engineering group; they realigned their Technical Services Department, and theu redefined the responsibilities for engineering and technical support at the facility.

The NRC concluded that the engineering organization has been effectively supporting plant operations, and that the previously identified deficiencies with respect to poor communication and poor coordination within the site and corporate organizations were improved.

With respect to the corporate and site staff interfaces, several actions were initiated to improve the communication and interfaces between the site and corporate organizations. Our observations indicated that there was improved communication and cooperation between both the site and the corporate office.

In addition, the NRC noted that the nuclear leadership team has served as an effective mechanism for

ensuring that corporate management oversight of the Results Improvement Program, and that the cooperation between the corporate and site staffs was adequate to support safe plant restart.

Licensee Management and Oversight. The New York Power Authority management demonstrated a commitment to improvement and provided the management attention and resources necessary to implement the programs.

You've heard the utility highlight what they believe were a number of their changes. I will identify a number of actions that they took that we were concerned with. There were --

MR. SHEWMON: We're running behind schedule. If you could summarize, it would help.

MR. COWGILL: Sure. We also took a look at licensing actions, and there were a number of licensing actions that were completed during the shutdown. We evaluated r imerous technical issues, over 80, the principal ones being the fire protection, electrical cable separation which developed late in the outage; also, well radiography quality.

Overall, the NRC concluded that the physical condition of the plant operating and maintenance staff and the oversight functions were satisfactory to support safe plant operation.

Ongoing Activities. As described earlier in the presentation, the New York Power Authority has returned their plant to operation. However, there are still several outstanding issues remaining to be evaluated by the NRC. These items include follow-up of long-term corrective actions, which include some of those from the diagnostic, and some fire protection long-term corrective actions.

We will meet with the New York Power Authority to discuss their self-assessment following their restart. We will continue with our assessment panel to follow closely the Results Improvement Program implementation in other self-assessments. We will conduct a SALP in the near future, in the spring, in April. And as we've discussed before, the plant will remain on the watch list of those plants requiring close observation.

This concludes my presentation, and I would be happy to answer any questions you might have for me.

MR. MICHELSON: Has there been an 89-10 type team go to this plant?

MR. COWGILL: Yes, sir. That team just went to the plant about -- I think it was last week. And the results were that the program was properly implemented and there were no significant issues identified during that team inspection.

MR. MICHELSON: That team report will be available

pretty soon, I guess?

MR. COWGILL: Probably about a month.

MR. LINDBLAD: Mr. Cowgill, does the State of New York have any state regulatory oversight on the plant?

MR. COWGILL: There is -- there are state representatives who periodically visit the plant and discuss activities with the resident inspectors, but no direct regulatory oversight.

MR. CARROLL: Other questions? Thank you very much.

MR. COWGILL: Thank you.

MR. CARROLL: I guess I view this as an information briefing, with the possibility that if any of the members felt there were issues we might want to write a letter about, we certainly have that option. Does anyone have such a concern?

Okay. No letter.

MR. CATTON: I think it was a good presentation, from my point of view. We don't see enough of these sorts of things, I don't believe.

MR. CARROLL: Well, we talked about plant procedures yesterday. There's another one coming up with the restart of Brunswick in a few months. So please accept that, because I offer the opinion we ought to hear about that one, too.

MR. CATTON: I think so.

MR. SHEWMON: Okay. We.l, thank you. Mr. Calvo?

MR. CALVO: If you think it's a good presentation and you want to write a letter, you're more than welcome.

MR. SHEWMON: We're running behind schedule. Why don't we take a ten-minute break and then we'll start with the next item, which is already waiting; people are waiting.

(Whereupon, a brief recess was taken.)

MR. SHEWMON: The next item on the agenda is the NRC Regulatory Review Group that has been set up, and Jim Sniezek would like to introduce them.

MR. SNIEZEK: Good afternoon, Mr. Chairman and committee members. I'm Jim Sniezek, Deputy EDO. I just have a few opening remarks before I turn the presentation over to Frank Gillespie.

First and foremost, we are very pleased to be here to brief you on the planned activities of the Regulatory Review Group, where we've gone so far, and insights we have after only being in existence for about one month.

I hope you have all had the opportunity to review the charter of the Regulatory Review Group which was submitted to the Commission for approval in early January. It was just recently approved by the Commission on February the 2nd.

The task for the review group is to determine what

revisions to NRC regulations, guidance, and practices should be made to give increased flexibility to the industry and plant operations without negatively impacting overall reactor safety. In fact, we would hope that increased flexibility could even improve operational safety.

Frank Gillespie from NRR is leading the review group effort. The review group is composed of nine full-time staff members representing the regions, NRR, research and OGC. The review group possesses detailed firsthand knowledge of Agency activities in the operations, construction, licensing, inspection, rule-making, risk assessment and legal arenas.

We would appreciate your candid feedback as part of our dialogue during this briefing. I will now ask that Frank begin the briefing. Frank?

MR. GILLESPIE: This is really a follow-on from a meeting that occurred in October, where we discussed and just touched upon something called risk-based regulation. Then it was undefined, now it's still relatively undefined, but we're attempting to put some definition on it.

Where it comes into play is a subset of what we're doing. The real goal of our group is to look at how do you put more flexibility back at the site that either our rules, practices, guides, standards, or something has usurped, and usurped over the last 20 years and with time. So we're

going to attempt to identify those elements of the regulatory structure or practices which are prescriptive.

This is a vital first step before you can get to risk-base regulation because before you know what you have to fix, you have to first figure out exactly what in the structure is broken. And that's what the first two speakers are going to speak to.

Mr. Johns Jaudon, who is a Deputy Division Director now in Region 2, formerly in Region 4 -- he's in between assignments -- is going to discuss a review we've undertaken on regulations and supporting documentation, with the emphasis to date in our first month having been regulations. And Cecil Thomas, who is a Deputy Division Director from NRR, will go into some details of a review and how he's doing it on some specific licenses.

The two efforts right now, as it happens, are meeting in the middle, and we're starting to develop some ideas on what things might need to be changed, what things might need to be fixed.

MR. SHEWMON: One of the things which has come up a couple of different times in the last few months has to do with not necessarily unnecessary regulations but unnecessary paper work, or redundant. And I guess there was a NUMARC presentation on that, which I read in my paper work not long ago, too. Is that part of the charge of your group or is

that somebody else?

MR. GILLESPIE: Yes. The second step in our review is, first, we're going to look at the requirements that currently exist, I mean requirements broadly. The second piece that we're charged with doing is looking at everything that's going on, or basically has been requested to go on, and see if that looks like it's addressing the problem. And what we've already found in cataloguing what all is going on, even within the NRC, we're finding lots of things that at least we, when we started, didn't know about.

In fact, the NUMARC letter that came in to the Commission in December which had, I think, nine or 11 issue sections in it, that is going to be part of what we're going to fit in with what's going on. On this one, particularly on reporting requirements, there is an effort under Brian Grimes in NRR which is looking at it.

And what we're bouncing -- we will bounce what he is doing against what we're doing, because we're looking at not only reporting requirements in the regulations, but Cecil is looking at reporting requirements in the license to see if the whole spectrum is, in fact, covered. We've already been talking a little bit with Brian.

MR. SNIEZEK: I'd like to add something to that, if I could. I look at us to make a judgment on whether what's going on in the rest of the staff right now is

enough. And so we're going to make some judgment on that, whether they're going far enough and really addressing the real issues.

MR. SHEWMON: Thank you. Yes?

MR. LEWIS: I just wonder if I could ask one question. What you've described sounds like it might actually be worthwhile, I don't deny that. But it has a little bit of -- because it starts with what we're doing now and asks what can be changed -- I think those were your words?

MR. GILLESPIE: Right.

MR. LEWIS: It has a little bit of an aspect that I sometimes describe by saying that if somebody looks at a Harlequin book and says I'd rather have Shakespeare, and then you say then what would you change, is just not the way to get there from there.

I wonder if any effort at all is being spent on what used to be called, if you remember that far back in the Carter Administration, used to be called zero-based budgeting. We may learn about it again, I don't know. But in any case, the idea would be to pretend you were starting out, somebody just invented nuclear power. And you asked yourself, how would you regulate it in the interest of the safety of the population; would you do it in anything resembling this way. Is that worth a little bit of effort?

MR. GILLESPIE: We're doing a little bit of effort. And one of the commissioners, as we were going around talking to commissioners, the one who admitted, by the way, that he put zero-based in the SRM, asked us about that.

MR. LEWIS: It was in the SRM?

MR. GILLESPIE: Yes, it was in the SRM. And it occupies a sentence in the beginning of the charter and it created -- I'll tell you the truth, it created a conflict, a little bit of a conflict. So we're only doing a little bit on it.

And the conflict was, we've got a group that's in place for six months, and we've got an immediate problem. The immediate problem is looking at the burden our regulatory structure is putting on plants that are operating today. So if I go back and look at something like the contents of the construction permit and say do I really need that, that has absolutely no impact on an operating plant today, I'm not saying -- I maybe shouldn't go back and clean it up, but it's not my immediate problem.

Now, what we did tell him was we would take a shot at looking at functionality. Somewhat ill-defined. And we are trying to kind of step back from the regulations and say how do these regulations fit in a slightly different scheme.

If I jump just a minute to advanced reactors, and

there was a discussion in advanced reactors to something called the containment performance goal, a ten percent goal, and I apply that same principle to the primary circuit and I apply that same principle to maybe the core configurations, I've got the old principle of barriers. And then say, now there's other functions I need to ensure, I need to make sure I've got an ultimate heat sink, I need to ensure I've probably got some kind of power supply to power everything.

I probably have six principal functions that I, in fact, could put a performance goal on and command it that way. We're nibbling. It's not a major part. I'm not sure, in about the last month as we were putting the report together, how much more than just taking a look at it we're going to do.

MR. LEWIS: The sort of thing that we're now talking about, which is kind of taking a broad look at how you achieve your primary objective, or primary six objectives -- I can count to six -- is not the sort of thing -- you know, it can be done very badly by assigning it to the wrong people. It can only be done well by assigning it to really very fine people or to college freshmen, of course. We can redesign everything instantly. But you don't want to do that.

And so it's something you either don't do or else you do it seriously, I think.

MR. GILLESPIE: I think we're going to -- I shouldn't put my prejudices on it. But my personal prejudice would be I think we're going to find that you cannot adequately get from our current body of rules to a functional arrangement, or on a one-for-one basis from some more functional set to our rules.

MR. LEWIS: Well, that may be because you have a limited perspective in time.

MR. GILLESPIE: Yes, it is, it is. I can see that I have a limited perspective in time, and my primary mission is a different mission.

MR. LEWIS: One of the functions of -- I don't know, maybe it's a legal dimension. One of the functions of religion in this world is not to describe something that we can get to tomorrow, but to sort of set an example that we might aspire to over a number of generations. Do we need something like that?

MR. GILLESPIE: I'll withhold what my recommendation would be, but concede that we're not going to do it. We're going to dabble.

MR. LEWIS: Then forget it, is my thought.

MR. GILLESPIE: And that's fine. I'm more than happy to accept that. It was more than we could do, and do the main focus.

MR. LEWIS: That's okay. We'll do it some

afternoon.

MR. GILLESPIE: I'll come. I'll take notes.

MR. SNIEZEK: Frank, I want to add something here.

To make a short-cut answer to what Frank said, we did consider that. And let's face it, in doing what we're doing, we've got to sell the outcome to the NRC staff. We have to make sure we maintain the safety envelope because the public has to buy in on what we're doing. There has to be some real advantage to the utility in a real-life time frame, and I believe it's going to take -- once we come up with our recommendation, it will take several years even to fully implement all of them.

We'd like to get some near-term things implemented. And to take the four approach from zero base and start over and reconfigure all the operating licenses, which would mean the plant operating practices and that, I'm afraid plants would be in de-commissioning before we got done, and we could not give -- do the main objective of trying to make sure the operating plants today aren't overly burdened with things that do not have a positive impact on safety. That's the real reason why we haven't undertaken that.

MR. LEWIS: I understand the argument. The only response I would make is sometimes it's easier to do dramatic things than to do incremental things. You know,

you hit everybody at once instead of hitting them one at a time. I'm certainly not looking forward to it or predicting it, but you get yourself a bunch of dramatic nuclear accidents and, boy, that whole system is going to change under you whether you like it or not.

It might be nice to know which way it ought to change.

MR. LINDBLAD: Let me say, Frank, that I'm disappointed about what you think you can accomplish in six months. Granted, you have a limited life, but I think the committee can accomplish a great deal by reporting back to the commissioners about continued efforts.

I think that if you narrow your sights on what might be accomplished and say, well, gee, we're only a few people, then in six months the perception is going to continue in the industry that there is no cure for the increasing regulatory burden. And you're concerned about de-commissioning plants will accelerate rather than be maintained.

MR. GILLESPIE: Well, let me -- how incremental some of the things that we're now concepting out, I think, would be better left if you let me say what they are because it may not be as incremental as you're thinking.

I think, as you know, we've got an overseeing structure. We have an oversight committee we're meeting

with tomorrow which is comprised basically of all the office directors. And they have not heard any of the concepts that we're going to be putting on the table. It's strictly our group's current thinking as to how we'll get to where we're going to go, and what some c our recommendations are based on our review to date.

So let me at the end -- once we describe what we're doing and some examples of areas we're starting to focus on, then I'd like to come up and get a little more specific about how we see some of the recommendations being implemented, in particular in the area of tech spec's and use of risk in tech spec's, QA, and some of the things we're finding in QA, which Johns is going to cover.

And although the timing is terrible, we're now waiting for the results of the IIT that's a TMI on physical security, we did have some thoughts on physical security in response to some inquiries from the industry.

With that, let me answer one question that I will ask myself, and then ask Johns to come up and start the discussion on what we're doing in the rules and supporting documents.

But the question is -- and I almost have to do away with this question in the beginning -- why are we doing this. Why are we doing something where the intent is to give the industry on a plant-by-plant basis more flexibility

and control and, in principle, save them money.

We're not an economic regulator, but I happen to pull out the principles of good regulation, and there's one under efficiency, which is why we're doing it. I'm kind of sorry that when we wrote the charter up we didn't quote it because it's always nice to have a philosophic base for what you're doing.

And in it, it goes on to say, "The American taxpayer, the rate-paying consumer and the licensee all are entitled to the best possible management and administration of regulatory activities. The highest technical and managerial competence is required and must be consistent with Agency goals.

"NRC must establish a means to evaluate and continually upgrade its regulatory capabilities. Regulatory activities should be consistent with the degree of risk reduction they achieve. Where several effective alternatives are available, the option which minimizes the use of sources should be adopted."

It's kind of nice to realize that the Commission had that as a basic premise before they invented our task group. But, in essence, that's our real goal, to try to do something to effect that principle.

I am going to at the end get kind of specific on several recommendations. And let me ask Johns to come up.

MR. CARROLL: On the way back to your table, Frank, you might look on the wall over there.

MR. SHEWMON: Oh, good. You have a copy, too. I tried to get one and couldn't.

MR. CATTON: Is that because we take that much more seriously than anybody else?

MR. SNIEZEK: Let me assure you I have a framed copy in my office.

MR. JAUDON: Good afternoon, Mr. Chairman, gentlemen. I'm John Jaudon. I'm formerly Region 4, soon to be Region 2. I'm head of the subgroup doing the regulation review.

We started with Parts 50 and 73 and 21 because we wanted the definitions that were in there and the interface with Appendix B in procurement. We also started -- initially said we're going to try to do Part 26, and we later dropped that for reasons I'll explain.

We tried to eliminate from the regulations those that have little effect on current licensees, examples, even though there are problems in them. If you apply for a license and put an amendment in, you have to send in 37 copies of everything you do. It seems kind of strange, since in some instances we found out 36 of them get thrown away, and then we make more copies and pass them out. So nobody is applying for a license, so that's not a real big

issue.

We also tried to eliminate things that are really under review and just go look at what's happening there. That includes the Marginal for Safety Program. For instance, Appendix J is under re-write right now, so we'd like to see where that's going before we say whether that can be improved. We eliminated those things that have been recently revised or issued, such as Part 20, at least an initial review.

To conduct the review, we first tried to develop a form, and it turned out to be three pages. This was to force us some to add some discipline into our process so we would capture data and have it there if we wanted to go back and look at it.

We used our OCG rep to assist us in looking at the statements of consideration, so that we would understand what the rule was supposed to be doing and the regulation was supposed to do. And then we used the experience of Ms. Craig and myself, as ex-inspectors from the region and her as a PM for awhile, to see what was really going on with this rule, given rule, and was it really doing what it was supposed to.

The problem with that philosophy is the statements of consideration are very weak on the older rules and they're very detailed on some new rules.

We go through the initial screening of 50, 73, and 21, and we're now starting to do what we call "pull the string," which means we try to identify through various data bases every place that rule shows up, or every document that implements it or makes comments on it.

In our first couple of examples or trials we did, I think on one of them we found over a hundred documents. For instance, on the blackout rule, going back 20 years or more, which affect or say something that's covered in that rule, or talked to it. This is almost mind-boggling. So we decided we couldn't do that for every rule, and we had to limit them to rules we thought would have some affect.

We also had second thoughts on Part 26 because a lot of that is being worked right now as far as fitness for duty, and we didn't think there was much to be found there.

MR. CARROLL: Have you -- in this screening, are you limiting your scope to just what the regulation and the statement of consideration say, or are you looking at the broader picture of how it's implemented?

MR. JAUDON: Implemented, that's what we're after. The reg guides, ANSI standards where they've come into play, standard review plan, inspection procedures.

MR. CARROLL: How Joe Resident Inspector interprets?

MR. JAUDON: Well, that's why I use my kind of --

in fact, I think Frank and I said the other day we're going to have to go to a plant and look at something because we don't really trust -- we don't understand why it's working the way it is. But I'll get to that one in a minute.

MR. LINDBLAD: It seems to me what I just heard you say is that when you pulled the string on a typical regulation and found there were a hundred referenced documents or other issues that were associated with it, you threw up your hands and said, "It's too big a problem, so I'll do something else." And that's just what the licensee has to cope with every day.

MR. JAUDON: No, no. I said we couldn't pull them on every single regulation. We had to pick the ones we felt were affecting licensees.

MR. LINDBLAD: Yes, but that is what the licensee has to do every day. He can't pick and choose which regulation he's going to work on that day, but he has to do all of them.

MR. JAUDON: I don't argue with that at all.

The first thing that struck us just in the initial screening was there's basically 54 areas which we turn over to the licensee and say, "You manage the problem, tell us what you're doing." The first is changes in the plant, as reflected under 50-59 and they modify the FSAR. And that's a very powerful regulation, very significant. A lot of

changes are getting made there. They have to send us an annual report and keep some records on the site.

In the QA area, 50-54(a), they have to update their program, tell us about the updates at least once a year. And in that report they have to describe changes which do not reduce commitments. If they want to reduce commitments, they have to come in ahead of time. And I want to talk about commitments in a minute because it's a little gray what a commitment really is when you start talking specifics.

In the area of security program, 50-54(p), they get 60 days and they have to report to us, and it's pretty strenuous and you start looking at licenses and the security plan, and a particular revision effect shows up. We get the license amendment to change security plans, which I would argue do not have nearly the same effect on safety as 50-59 has, potentially.

In the EP plan they only get 30 days to come in and talk to us, that's 50-54(q), and tell us what they've done if they did not decrease effectiveness. And security is not to decrease plant effectiveness, are the words in the rule.

We have a hard time understanding and trying to figure out, or ask the question why are each of these four areas handled differently, and what's wrong with the 50-59

mold for these things that appear to be of lesser safety significance. We don't understand why licensees have to report so often, we have to exchange correspondence on things we're going to approve.

But, moreover, this got us to the point of what is truly a commitment. Our OCG rep will not tell us, as there is no firm definition of a commitment. And we know that practice very often says that a commitment is whatever you put in the plan that you send in.

We believe that the commitment probably is to the base NRC regulation. In other words, in QA, it's to Appendix B. It's not every method I described in telling you how if I was a licensee I was going to carry out Appendix B.

We also believe the same is true in security and EP. We think that we need to get a definition of what a commitment really is.

MR. LEWIS: Ask any teenager.

MR. JAUDON: Well, we believe if you -- at least our conclusion is if you do it the other way and say everything you told me is your commitment, then we're trying to regulate a hundred different ways out there. We don't think that's going to work very well.

MR. SEALE: Have you asked a utility vice president what he thinks a commitment is?

MR. JAUDON: No, sir, we have not yet.

MR. SEALE: That might be instructive.

MR. JAUDON: As I said, we think we have to go to a site to ask a few questions there.

MR. GILLESPIE: We do have a meeting scheduled for Tuesday afternoon with NUMARC. And what we're doing right now is accumulating our questions that we could then cover at that kind of meeting. We've got a number of them that we'll share with you in a little bit.

MR. JAUDON: Frank mentioned lots of changes out there, lots of things that are going on. We're trying to catalogue all those and run around and find out what is being done about them. At some time we'll try to reach a decision and keep on the right track. Many of these are things that are up -- have been sent up to the Commission already and they're in the rule-making process. So there are things happening right now.

The biggest thing that we have found so far just from the rule screening that is not happening is in the QA area. Appendix B Criterion 2 states, and I quote, "The Quality Assurance Program shall provide control over activities affecting quality of identified structures, systems, and components to the extent consistent with their importance to safety."

This sounds like it means a graded approach to QA.

I've been in the field 12 years for this Agency and I've only seen one flavor out there of QA. It's everything on everything. And that's what has been happening.

We look around the Agency and we find papers that are written and say, gee, this is strange, why is this happening. And we've got papers like that. We don't understand exactly why it happens either, especially when you tie that to dedication.

We find that a great many things in the QA system are tied to the pedigree procedure which we view as a surrogate for quality. It's a measure of something you're trying to do to get quality, it's not a direct measure of quality.

If somebody said you're -- absolutely you got what you ordered, how do you know you ordered the right thing? Another part of QA. We believe the real issue is reliability. We also understand the licensees are not out there ordering structures, systems, and components much now; they're ordering parts and material. They're repairing components and structures, they're not building new ones.

And every part on a safety-related component is not necessarily as important as every other part. It really depends on what that part has to do with its functionality and how good is good enough. We believe it takes reasonable engineering judgment, and that dedication is not as hard a

process as it appears to have become.

When we look at the EPRI documents that describe it, and that the staff nominally endorse in a generic letter and so on, we find that the right kind of words are there, but that nobody ever did it. And I'm not at all sure that anybody's expectations were such that graded QA was going to be accepted. I mean, it's kind of a change in philosophy and it requires a lot more thinking to apply graded QA. It's easy to say everything on everything, it's no problem.

MR. CARROLL: I can say to that that my former employer for 35 years did embark on a graded QA program in the early '80s, and it was getting ridiculous in terms of ordering laboratory equipment for the chem lab or EP supplies or bullets for the guards' guns. So we did start doing graded QA and it was accepted in Region 5. So you might want to see how that's progressing.

MR. JAUDON: That's certainly interesting. I don't --

MR. CARROLL: I, personally, helped write the QA procedures for some of these activities that we thought fit under the graded umbrella.

MR. JAUDON: I also believe, and I've been told that some AE's in helping develop Q-lists originally made kind of a -- they took things out of the main flow path, for instance, on an ECCS system that were kind of minor and

perhaps put less requirements on them, because if they failed it didn't affect the functionality of the system, all of which makes a lot of sense to me.

My only experience, also, is that when I needed to build something, to make it work, I could make it happen and have enough faith and bet my life it was going to work. And I believe that reasonable engineering judgments can be made in the areas of procurement and commercial dedication.

I also recognize there are a whole lot of effective QA systems out there that aren't Appendix B. And I'm not sure why we can't take advantage of QA systems that are in effect out in the industry, and so on, and the ones that are becoming international which U.S. companies may come into.

We're not that far down the path on this yet, but we think that's where it perhaps goes, and we think that not using graded QA takes up so much management time and effort that it may actually detract from safety, if we're chasing around.

We think we understand how QA got where it is because it started in construction. And in a perfect world, I would say I want more QA for construction because there's a lot of room for mischief there. There's a lot of stuff being bought, there are a lot of contractors, and a lot of things go wrong.

Operating plant QA perhaps could be applied more selectively to get -- to maintain the level of quality and functionality you're looking for.

MR. GILLESPIE: We've got an example that I'm going to go through in the end on how we could see risk insights being applied to QA. And, in fact, we've got two different kinds of graded QA, and we'll kind of address both of those relative to a real QA plan that we looked at.

MR. CARROLL: I am certainly not suggesting that it's easy to do the graded QA. It's a tough job, the selling job to the NRC and to your own QA people, as well.

MR. SNIEZEK: That's the biggest issue. There may be one or two utilities that regress in that area, and we bought it. I think the industry needs an overall signal that it's okay by us to do it that way, and work with the industry group for the industry to develop a way they want to do it, and then we buy off on it in a generic sense, so we don't have individuals imposing their own beliefs on utilities.

MR. JAUDON: That was kind of the end of what I had to say.

MR. GILLESPIE: Let me jump to Cecil in looking at licenses. Then I want to say a few words before we get into Joe Murphy and the risk technology task, because it was important to marry what the first two groups find with the

technology available.

MR. THOMAS: Good afternoon. My name is Cecil Thomas, and I'd like to begin by acknowledging the other two members of our task group.

First, Tony Cerne is Resident Inspector at Pilgrim and he brings to the group lots of resident inspector experience. Prior to being at Pilgrim he was at Seabrook.

Byron Siegel is the Project Manager in projects in NRR, and he's had a lot of experience in NRR and brings that experience to the group.

Perhaps the two biggest challenges that our group faced when we started was how we got our arms around the problem. When you're considering about 110 plants currently licensed to operate and the fact that each license contains not only the license that we traditionally think of, tech spec's and maybe an environmental protection plan, you're talking about maybe 300 to 350 individual items in that license.

There's no way in the world that we could possibly do a reasonable job of accomplishing our objective in that period of time that we have, with our resources, with all of those. So --

MR. CARROLL: I submit it's a lot more documents than that, simply because the tech spec administrative controls require or say that all your own procedures are --

MR. THOMAS: Absolutely.

MR. CARROLL: -- part of it. And that gets you to a lot bigger number.

MR. THOMAS: Absolutely. In addition, there are a lot of documents that are referenced in the tech spec's.

So, anyway, the first problem we faced was how can we get our arms around the problem. So what we first looked at was how can we select and how many -- can we select the licenses for the plants whose licenses we review, and how many of those can we possibly review.

We thought about what might be important in looking at the licenses. It's probably a reasonable assumption that most of the licenses out there have a great deal in common, but a lot of them may not have. And probably one of the most important considerations is the age of the license. So we thought we should at least look at a recently licensed plant and we should look at an older plant.

We also thought there might be some differences between BWRs and PWRs. And we wanted the plants that we chose to be representative of a number, anyway, of plants so what we found would have some meaning.

The last thing is the third part of our group that you haven't heard from yet has to do with PRA, IPE risk and everything associated with that. And we thought there might

come a time in the tenure of our group that we would want to look into what has been said about the plant in an IPE or a new Reg 1150 or PRA that we might have.

Based on that, we chose these four plants. Seabrook is recently licensed, one of the more recently licensed PWRs. That's a four-loop Westinghouse plant. We've completed our review of the IPE.

Surrey was one of the earlier licensed PWRs. It's a three-loop PWR. And our IPE review is nearly complete. Perry is a recently licensed BWR. It's representative of the BWR-6 Mark III plants, and it was -- we have an IPE under review. I forgot to mention that Surrey was also a new Reg 1150 plant.

And, finally, Peach Bottom was one of the earlier licensed BWRs. It's representative of the BWR-4 Mark I, and also is an 1150 plant.

So we began by -- once we established the methodology which I'm going to describe generally in a moment, we began looking at Seabrook. And when I go through and describe the methodology, I'll punctuate it with some preliminary results we've gotten from Seabrook. And I'll also conclude by sharing with you a few selected preliminary conclusions that we've gotten to when we talk about the schedule.

MR. SHEWMON: Will you tell me what a licensed

item is? Could you go by that?

MR. THOMAS: Thank you. Very good. To get our arms around this, we had to somehow then break down the licenses. We have four licenses to look at. And, again, we can't review everything. It turns out there were between 300 and 350 things in each license.

To get our arms around it, we defined -- we need to talk about items and categories. We defined an item as anything that has an alpha numeric designation in the license, whether it's a licensed condition like 2(b), or whether it's a tech spec like 3.0.3, or whether it's something in the environmental protection plan or anything that's attached to it. So if it has an alpha numeric designation, it's an item. In a tech spec, a limiting condition for operation and the action statement was considered one item.

We also developed some categories for expediency. Would you go to the next slide, and then we can come back and I'll show you some of the categories that we came up with. The idea was to see if we could come up with some categories in which we could place as many items as possible that had similar characteristics and could be maybe looked at as a group.

For example, there is something like 43 definitions in the Seabrook license, and those can all be

handled as a group. It doesn't make sense to say I want to review a fixed percentage of the definitions; we'll just put them all in one category and try to dispose of them, and I'll use the term collectively.

As we went through the process, we reviewed the items either individually or collectively. So one of the reasons for choosing the categories that we did was to see if we could get as many as possible done collectively. Then we would divide up the others and see what percentage then we thought we could review in the time we had, and we reviewed them in depth individually.

Would you go back to the previous slide?

So what we did was go through the license item by item, and we did a cursory review of the item and assigned it to one of the categories that you just saw and you have in your handout.

After we did that, we looked at the items, we looked at the categories and we said hey, there are some of them that we can analyze collectively, everything in there. For example, the last category, "Other," was made up of the tech spec definitions and legal findings in the license itself. And that was pretty easy for the things that we were looking at like -- that I'll get into in just a second. There wasn't anything important about those.

Unique plant features, for example, tech spec

design features, where they were pretty much just statements of reactor coolant system volume, containment design pressure, the site exclusion area, they were pretty much statements of technical facts. So there really wasn't much there, so we could dispose of all of those.

It turned out in the Seabrook license there were 331 items. We were able to address 77 in three categories. The remainder, about 254, we looked at to see how many we thought we could really do justice to, and we thought we could probably do about 25.

So we took the remaining categories, and 25 was ten percent of the remaining items, and we said, okay, we'll do ten percent of the items in every category. And we didn't select those ten percent randomly. We looked at the items to see if it had certain characteristics, like did it have a sound regulatory basis; was it overly prescriptive; was there potential for enhanced flexibility; was there some particular interest to the members of the group like similarities of reporting requirements, as Johns talked about, for the emergency plant, quality assurance plant, and the security plant.

We chose the items to be analyzed based on considerations like that, and, also, in some cases, under representativeness of the rest of the items.

MR. CARROLL: You're telling me that MO license,

including the tech spec's, you only found 300-and-some-odd licenses?

MR. THOMAS: In the Seabrook license there were 331 alpha numerically designated things, items.

MR. CARROLL: Okay.

MR. GILLESPIE: I think when I get to the end on QA, I'll show how that blows up. The documents would support the facility. As one item says have a QA plan, then you go to Chapter 17 of the FASR and that leads you into a quandary of procedures.

MR. CARROLL: Oh a swamp.

MR. GILLESPIE: A swamp, yes. To go back to --

MR. CARROLL: My experience there was to -- I was the project manager to try to set up a commitment management data base. It did include commitments to others besides the NRC, but the NRC was 90 percent of it. It was about a, oh, five man-year project. I don't know what the hell it cost us ultimately, but it was several million dollars to put this thing together. And as I remember, there was something like 10,000 commitments at Diablo Canyon.

MR. GILLESPIE: Yes. And that's one of the problems both Cecil and Johns faced. Our first approach is what are the literal words that our requirements require.

MR. CARROLL: Okay.

MR. GILLESPIE: And then you take the next step

beyond that to try to understand where and how it blew up, exactly.

MR. CARROLL: Okay, got you.

MR. THOMAS: To wrap that subject up, as you mentioned before, I was talking again about first-tier requirements in the license and tech spec's and the environmental protection plan. I'm not including FASR, I'm not including sub-tier documents. We'll get into more detail for the 25 items that we selected to look at individually.

So for each of the 25 items we made up a questionnaire that asked standardized questions of all the items we analyzed to try to establish the items, safety significance, regulatory basis, inherent flexibility, potential for enhanced flexibility, and things like that. And the idea was to give every item we looked at the same level of analysis and detail.

We went through and did a preliminary analysis of each of those items and filled out a form. And later on when we did later research, that served as a basis to trigger us to go deeper. So the idea was to focus discussion on each one of those.

We then took each of the items and subjected it to further research, as necessary, to try to answer those four questions that I just mentioned was the item: does it have a

sound regulatory base; is it truly safety significant; does it have inherent flexibility; or is there a potential it could be somehow modified to provide additional flexibility, or eliminated or whatever.

Then we prepared an assessment summary. And later when our report comes out you'll find in the appendix there will be summaries of the assessment for each of the items that we did. Then we pulled together overall conclusions and recommendations, and that's where we are right now on Seabrook. We've gotten to the point that we have prepared assessment summaries and we're pulling up forward conclusions and recommendations for further work based on those.

Just for some numbers -- would you go to the next slide, please, the one that says "Categories"?

[Slide.]

MR. THOMAS: It says Categories of Items.

Just a breakdown: The one on technical requirements included things like tech spec, safety limits and LCOs. There were 136 of them in the Seabrook license, and we looked at a tenth of them. We looked at a tenth of each of the ones that were done individually.

The non-technical license conditions were things like financial protection, the effective and expiration dates in the license. There were four of them. We did them

all as a group, so there were four looked at.

Conditions which rely on other documents: Physical security is a good example; shift working hours. There were 32 items. We looked at three of them.

Administrative controls exclusive of reporting and recordkeeping requirements. That's things like onsite and offsite review committees, temporary changes of procedures and so on. There were 50 of those; we looked at five.

Reporting and recordkeeping requirements, things like reporting of violations, monthly operating reports. There were 36 and we looked at four.

Unique plant features were things like tech spec design features, things related to the site and the reactor. There were ten, and we looked at all ten in a group.

Finally, other was legal findings in the license, tech spec definitions and so on. There were 63 and we looked at all of them as a group.

So we wound up looking at about 102 of the 331 items in the license.

Would you go to the slide entitled Assessment Questions?

[Slide.]

MR. THOMAS: This slide just summarizes the major questions we asked. We had a more detailed questionnaire that we went through as a group when we looked at each of

the items.

As I said, we have now prepared assessment summaries for each of the 25 items we assessed individually, plus the three categories we did collectively, and I'll share with you a few of the preliminary results we came out with.

MR. SEALE: May I ask a question?

MR. THOMAS: Surely.

MR. SEALE: At this stage, have you identified those items which are specific to that PWR?

MR. THOMAS: Some of the items we identified are specific to that PWR. We have not -- we did not choose every single item that was specific to that.

MR. SEALE: Okay.

MR. THOMAS: We're going to be doing three more licenses, and one of the -- we're going to choose the item on the subsequent licenses for two ways. One is to try to validate what we found on Seabrook, and secondly we're going to broaden the scope in each of the categories.

MR. GILLESPIE: By the time we're doing, we've done all four licenses, we basically would have hit every significant topic in any one of the licenses, and it's not a random selection process. I mean, this is a specific sample that we're looking at for where we think we can make progress.

MR. THOMAS: One of the interesting things --

MR. LINDBLAD: Excuse me. Does this specific license requirement include looking at the NRC inspector's guidebook?

MR. THOMAS: Are you asking if we look at the guidebook while we're doing this?

MR. LINDBLAD: Yes, to see what he is requiring people to do.

MR. THOMAS: To some extent. I can't give you the definite yes, but that's one of the things we were --

MR. GILLESPIE: The definite yes is yes, the group is looking at it, and that comes in as kind of like Step 2.

Once we look at the rule and look at the license on what specifically is required, one of the things we're finding with the supporting documentation is that when you look at the pool of information the inspector has and the reviewer has, it is what it is. In essence, he is falling back on the regulatory guides as the one acceptable way of doing something. All those same references exist in the SRP for the reviewer and in the inspection guides. In some cases, they read like requirements, which would cause an inspector to interpret them like requirements.

So we are going to be hitting that, and, in fact, there is one procedure already being changed by the appropriate branch when we brought something to their

attention. So definitely we'll be looking at the procedure.

MR. THOMAS: I'll share with you three preliminary results that we found. Like I say, we're writing up the results section, so we've at least covered these.

One of them we've already talked about some in essence. One of the items we chose was the license condition on physical security plans. We noted that whether a plan is a -- we noticed there are similarities between the physical security plans, the emergency plan and the quality assurance plan. There are some similarities and there are some differences.

The physical security plans are license conditions; the others aren't. They are somewhat similar, but yet pretty radically different language in how you are able to make changes to these plans with and without prior NRC approval and so on.

So we're asking the question, why are these different and would it maybe appropriate to standardize the approach? Because it's not clear that the security plan, for example, that is a license condition -- why is it that much more important than the other two plans as far as safety is concerned?

MR. CARROLL: Well, but I guess I would argue that the emergency plan has equal weight in the eyes of the inspector because you have committed to follow your own

procedure, so you can certainly be cited for not dotting the I's and crossing the T's when it comes to the emergency plan just like it could be cited for the security plan.

MR. THOMAS: Yes. Let me cover that at the end when I go over some of the thoughts we had in security and what I'll call -- it's kind of built into the rules -- a ratcheting device in that the rule and the licenses never really define effective to do what? And we've got some detailed thoughts on that which apply equally to both areas.

The inspector will always have the ability to cite. The question is, if a licensee does something because he thinks it's the right thing, does he now get cited for not doing something that was above and beyond what was required?

MR. CARROLL: Okay.

MR. THOMAS: And that's the fundamental question we're looking at in this area now.

MR. CARROLL: I know what you're saying.

MR. THOMAS: We are not to the point where we have answers for these questions. We're posing the questions. And that's one of the good things about the group -- we have the charter that says we can ask these kinds of questions, and that's what we're doing.

One of the second areas we've --

MR. CARROLL: It also allows you to try to answer

them, I hope.

[Laughter.]

MR. GILLESPIE: Yes. We are required to answer them.

MR. THOMAS: Another interesting one is the technical specification on meteorological instrumentation. The technical specification says if you have one or more monitoring channels that are inoperable after seven days, you have to submit a special report to the NRC within ten days.

You kind of wonder how that's going to help things. Here's the special report the licensee has to do; does that really help or hinder him getting his monitoring instrumentation back on line? So that's a question we're asked.

MR. CARROLL: You are not the first one to have asked that exact question.

MR. THOMAS: Now, in all fairness, the improved standard tech specs do not have that as a requirement, so the staff -- we have some evidence that at least part of the staff is forward-thinking on that. But that has the potential for a line item deletion for some of the others. At least we want to look at it.

MR. SNIEZEK: Cecil, let me add something to that. That's the type of thing that I envision that we could do

quickly. If we decide we don't need it, we issue a generic proclamation. All licensees come in with an amendment and we'll rubberstamp it and do away with it if we buy off on that. That's the type of recommendations I would hope to come up with.

MR. LINDBLAD: Each licensee will need an amendment in order to do something you have agreed to do already?

MR. SNIEZEK: Well, I don't know whether you'd need an amendment or whether you could just do it generally. That's why we're having legal counsel look at it.

MR. GILLESPIE: You know, I think reasonably you have to consider the license is the operable regulatory document at each facility, which means, in general, there is a regulation which says to change the license, it has to go through certain steps. So even though we say we'd like to do it, it still has to meet that procedural requirement.

MR. THOMAS: The last item I want to mention is Tech Spec 303, which, as I'm sure you all know, is the -- excuse me. Did someone have a question?

MR. CARROLL: No.

MR. THOMAS: It's the LCO of all LCOs, I guess. If everything else fails, if all the other LCOs and their associated action statements can't be met, 303 takes effect and it prescribes that you have to, within an hour, start

toward cold shutdown, and it gives you up to 37 hours, I think, to get to cold shutdown if you can't get whatever was causing you the problem to start with fixed.

The questions that that raised in our minds was, Gee, is that really in the interest of safety, some blind, blank, very prescriptive statement like that? Shouldn't we be looking at maybe what equipment is operable and what's not operable in some of the lower modes?

Not only that, you are putting the plant through a pretty severe transient here. Is it maybe better to stay where you are if you know you're going to get it fixed say in a couple of hours or a factor of two times what the regular LCO says than to take the plant through that transient all the way to cold shutdown?

So we're posing that question as something we'd like to see looked at too, and that kind of sets the stage for, I know, some things Joe will talk about in a little while. But it's that sort of thing that we're coming up with. I think they're probably pretty typical.

Lastly, we have the schedule for our sub-group.

[Slide.]

MR. THOMAS: We are fastly approaching the report due date for the first license review, which is a week from tomorrow. We're going to make it.

We have three more plants to do. We'll probably

do Surry next, primarily because the PWR's fresh in our mind and, as I said, one of the things we're going to be doing is to try to validate some of what we saw here. Then we'll pick up with Perry and Peach Bottom. We hope to have all the reports done. The reports will be made available as soon as they're completed -- we won't hold them up until the end -- on April 23rd, and then we'll pull together our findings and conclusions in a final report.

Any questions?

MR. CARROLL: And potentially then go back and do the whole spectrum instead of just the sampling, or do you think you --

MR. THOMAS: No.

MR. CARROLL: -- have enough at this point to pick the really important items?

MR. THOMAS: We think by the time we get through with the four plants, we will have covered them. I guess our experience suggests there's probably quite a bit that's common to most of the licenses. There will probably be some unique things, but by and large, it'll be common. I think we'll have a pretty good feel that we've covered almost everything that's important.

MR. GILLESPIE: Yes. You know, every item in the regulations and every item in the, you know, license is not equal, and therefore, if we were picking a random sample,

I'd have some pessimism that we wouldn't hit the right ones. But when you read through the definitions, you realize you tick off the definitions and you say I'm not going to look at definitions again, and you rapidly hone in on the ones that either are so prescriptive -- not only prescriptive, but require the licensee to do something which consumes resources and in general is repetitive in nature.

I can give you an example: the rule on ATWS. We looked at the ATWS rule and checked it off needing basically no further work. It's done, modifications are made, and it becomes a rule then that goes towards the bottom of the pile of interest for our kind of review.

So there's a lot of one-time things in licenses and one-time things in rules, and you end up finding out that it's a very small pool of real requirements that causes a proliferation of plans, procedures and inspections.

MR. CARROLL: Well, except I'm not sure you haven't chosen an unfortunate example. ATWS is causing the boilers a lot of grief in terms of the instability issue.

MR. GILLESPIE: But the rule itself is -- again, you know, our first step was literally look at what the rule says and say what is the impact of these literal words? Now, the problem of instability is a current and real safety issue.

MR. CARROLL: Yes, and one of the things that's

making it important is that the ATWS rule was flawed in terms of the assumption made that the occurrence of that was --

MR. GILLESPIE: If the safety issue requires re-looking at the rule, then that's a --

MR. CARROLL: If you could look at ATWS on a real probabilistic basis, you might conclude you're not very worried about the instability issue. Joe looks skeptical over there.

MR. GILLESPIE: I have asked Joe to kind of scoot through is slides quickly so he can get to some specific recommendations which I need Joe's participation on and I'm going to describe on risk-based tech specs and using risk as a perspective to come to true graded QA.

There are two levels of graded QA. One is they're safety related, important to safety, and QA plans tend to have three or four classes of things. Our focus is going to be more on the top class, where people say that we've got 10,000 items on the Q list, because we've already got indication from Mr. Braun from the NUMARC submittal that there is a real cost factor in the procurement programs. So we're going to really focus on the Q list element of graded QA, and as best we can discern from the small sample and looking at specific plans, it's not clear that graded QA has been applied to Q list equipment at reactors, that when you

get to that point, it's all one flavor.

Yet, Appendix B, which is specific to Q list equipment, has you should do it in proportion to its relevance to safety written in Criterion 2, and we really did pull this string all the way down to try to see what would have to be changed if someone really wanted to have a graded Q list.

Anyway, Joe, why don't you go through yours.

[SLIDE.]

MR. MURPHY: Good afternoon. Gentlemen, my name is Joe Murphy and I am working on the Risk Technology Task and . want to acknowledge Mary Drouin who is working with us. Mary is relatively new to the NRC but has been an expert in PRA for a long time and we are very glad to have her. May I have the next slide, please?

[SLIDE.]

MR. MURPHY: Frank asked me to go fast and I will unless you slow me down. Basically the task that we are involved with is first an assessment of the current strengths and weaknesses of PRA methods.

This, of course, has been done many times in the past but I think the last time it really was done in a comprehensive manner was about eight or nine years. We are trying to update it from the research that has been done since then and actually just the listing of what the

strengths and weaknesses are helped us as we then later tried to contemplate its uses. We have a list of limitations that we have to focus on as we go through that.

Secondly, there is a body of work already ongoing, some of which we are aware of and some of which we are not. We are bringing ourselves up to speed. First there is a body of work that is sponsored by NRC and the Office of Research on various things, techniques to improve operations and this includes various things on optimization of AOTs and STIs and I will show you an example of one of those in a minute.

We are not as a team yet familiar enough with what is going on in NRR and there actually should be a third bullet on there for AEOD. We also want to find out what is going on outside the NRC community in terms of what is being done by others.

The U.S. industry and this will be a topic of our discussion with NUMARC. We are looking at what is going on outside of the United States. Mexico has gone very far in the direction of risk-based regulation on the Laguna Verde plant.

There is a Heysham 2 plant in the U.K. and there is a configuration control system that is operable and gives a lot of flexibility to the plant. We met yesterday with representatives of the Federal Republic of Germany to find

out what they are doing.

I would say that they are roughly at the point that we were about a month ago was the message I got. They are starting to think in terms of what they need to change to go to the risk based regulation. We plan to contact some of our contacts in other countries as well. Next slide, please.

MR. DAVIS: Joe, before you go on, where does the effort that Mark Cunningham has underway fit in all of this. I thought he was looking at NRC use of PRA.

MR. MURPHY: Yes.

MR. DAVIS: You are aware of that, I guess.

MR. MURPHY: Yes.

MR. DAVIS: And are you going to use it?

MR. MURPHY: Yes. Mark's group is looking at how PRA is used within NRC. We are looking at it more in terms of how it is used outside of NRC but clearly they are related. I haven't seen Mark since one o'clock this afternoon and we talk to each other a lot in the process. There is a close communication between the two groups.

As a matter of fact, I have just been reassigned so that I am now the Deputy Director of the Division of Safety Issue Resolution which means that Mark reports to me. Now I am full time on this task force for this six month period but in our organization we are aligned so that we

talk to each other more often.

MR. DAVIS: Thank you.

[SLIDE.]

MR. MURPHY: The hardest part of what we are going to do is the part we haven't done yet and I guess that is always the case and that is that we are going to try to come up with a set of principles that will lay the framework for how you go forward with some kind of integral analysis and regulation.

At the moment and this could change, we think our emphasis is going to be as Frank has said on tech spec improvement, on graded QA and a loose term that I will call prioritization but think of this perhaps in things like response to generic letters and things of that sort.

What we want to do is to take the inherent limitations, set some groundrules, high level principles to say, "Here are the inherent limitations of PRA and don't forget them. How do we use this in the balancing and prevention and mitigation."

MR. CARROLL: Give me an example of what you think an inherent limitation of PRA methodology would be?

MR. MURPHY: An inherent limitation, for example, if you just take the mathematics and you look at a PRA and you say, "How important is the reactor vessel? How important is Section three?" You will find that you usually

won't find failure of the reactor vessel showing up in any cut-sets.

The reason is because it was assumed out of the analysis at the beginning. The analyst said that that is a low probability event and didn't model it or if he did model it, it didn't survive truncation as he went through the analysis so it doesn't show up in the final analysis.

Does that imply that therefore we don't need section three of the ASME code? No. What it implies is that you have to know that that wasn't in the analysis to start with so you can't assume that it is unimportant. So you have to look at it in terms of what is in there and what isn't and what are the inherent limitation.

Another one may be that we don't handle operator errors of commission very well. We have to go back and if we have something that is in that area, we have to be careful. Security safeguards events are generally not modeled in PRA so again, that is an inherent limitation. When you get to a rule or a regulation in that area, don't look for PRA to help you unless you look at it very carefully to see where it can and where it can't.

MR. KRESS: I wish you would change the word "inherent" in that context.

MR. MURPHY: I agree with you. I think there could be better choices. Do we balance prevention and

mitigation as we look at the application of PRA? I guess my answer right now is my gut response is no, we should have prevention and should have mitigation and as we look at it, they probably shouldn't use one to balance the other.

How about balancing functional unavailability and let me start out with balancing of system unavailabilities. Let's say I have two systems to satisfy the criterion for high pressure safety injection. Can I balance the reliability off of one system off against the other? Can I accept the lower reliability on one if I am getting a higher reliability on the other so that the system function availability -- I am sorry, the availability of the function stays the same or improves.

I can do the same thing and look at functions in terms of how they apply to the total say of core damage frequency. Can I balance function availabilities up against each other? I need to set some groundrules to say that this you can do and this you can't, very top level, high principle kind of thing.

What is the scope of the analysis that I require to use a risk analysis in a regulatory mode and what boundary conditions and the assumptions that are buried in it and that is sort of the same thing as the first one.

Often we forget that the analysis in many ways is as good as the scope and its boundary conditions. What do

we need? Can I full power PRA do the trick? In many cases it can. In some cases, ,ou may want to worry about shutdown risk.

Quality of the data, if we are using a PRA, how are we using it? What is the specific application we want in a risk based regulation kind of environment? Can we operate with generic data or do we need plant specific data? It will depend on the specific application and we are going to have to come up with some specific groundrules as to when you need plant specific and when you can go with generic.

How important is the data? How well parsed should it be? In some cases to do the analys s, I may really need causal data so I can model it exactly right. In other cases, I may not need it.

Uncertainty analysis, to what extent do I need it? How important is it as I go forward? Exactly where does it fit into the analysis? I don't have an answer to these questions yet. That will come hopefully before the end of the task force.

Then when we are all done, do we need to do anything more or are we, in fact, done or is there more research to be done in this area before we can really use it in a routine manner?

Finally, what are the implications of all of this? Some of the things that have been talked about are very easy

to implement and I don't think the resource commitments are all that wide in either the industry or the NRC and some of the others, what some people call a full based living PSA, I guess is the standard term, risk based set of regulations can be very demanding in terms of resources and very beneficial in many ways. There is a spectrum.

I can use risk based analysis in a way and I will show you on the next slide that addresses an AOT or an STI. It is very simple. It is risk based but it is based on a static PRA that exists data on data that exists today, something that I can do very simply.

I can do something simple like the British have done on ESSM and basically they have employed, and that is E-S-S-M, and that they have employed on the Heysham 2 plant. Basically there when you close a valve in that plant by pushing a button on the switch, you automatically change the PRA and that PRA is updated and your AOTs and STIs change as you do this.

Now if you are going to use that in a regulatory mode, there are many parts of this thing that we have to look at more carefully. The quality of the PRA has to be high. The method of updating it has to be high. How we would use it would be different than in some other applications so we are going to have to look. The degree to which you implement some of these things affects the degree

it takes to keep them current, the degree it takes us at NRC to review them.

It is not clear what the optimum is at the moment. With that, let me get to an example. May I have the next slide, please?

[SLIDE.]

MR. MURPHY: The example is a very simple one and it is drawn from some work that is near completion and being sponsored by the Office of Research at Brookhaven National Lab. This is tech spec information from a BWR-6 specific plant in terms of what the allowed outage time for various trains being out of service for either the RHR system or the standby service water system, the suppression cooling mode and containment spray mode. LPCI, of course, is low pressure core injection.

The AOTs for two trains being out of the RHR are eight hours in the suppression pool cooling mode and the containment spray mode and for three days in the LPCI mode. The risk insight from this is that the risk of shutting down, just the transient you go through in the process of shutting down exceeds the risk of continued operation for six days with trains A and B out of service. On a risk based specification, you change these numbers to six days rather than eight hours.

In terms of the standby service water system, the

risk of shutting down exceeds the risk of continued operation for three days with A and B out of service, for 14 days with A, B and C out of service.

Right now we require immediate shutdown. Now A, B and C service, let me explain just a little bit. We have no standby service water system. What this really says is and it is common sense in a way, it says that when you get into that situation, you should stay at power. You don't want to shut down.

Now the other thing that you also have to look at is not just these points where you have a cross-over between the risk associated with staying at power and the risk associated with shutting down, you also have to look in terms of what the absolute magnitude of that risk is.

In some cases it is so low that you may not worry about it. Small variations in time don't matter. In other cases, the risk is high and you do have to worry about it a little bit more.

I think these are illustrative of here a zero that logically could be like three days, here eight hours that again logically could be in the six day range.

MR. DAVIS: Joe, let's say you come to that conclusion. Now how do you get the tech specs changed? Does this require something? It doesn't require rulemaking but what does it require?

MR. GILLESPIE: Joe, that is a leap into my closing discussion.

MR. MURPHY: Thank you, Pete.

MR. CARROLL: You are a good straight man.

[Laughter.]

MR. GILLESPIE: It is hard to believe that I asked each of my task leaders to take no longer th n ten minutes to leave me with enough time to ramble at the end. Now that we are an hour and a half into our two hours, so let me quickly get specific on some recommendations that are kind of coming out of an integration of actually all three tasks.

Let me first address something I already started on and that was graded QA. The question is what is graded QA. I found even as early as yesterday afternoon in talking to Claudia and we looked at the Sequoyah QA plan as referenced in Chapter 17 of the FSAR and Cecil had looked or at least skimmed through the Seabrook plan referenced.

Our question was, do they have graded QA and someone told us that Sequoyah has graded QA and I looked at it and said, "This ain't graded QA the way I meant graded" so I immediately realized that I had a communications problem with my own group.

Graded QA as best as I can evolve from a very limited sample in QA plans tends to take things like safety systems and some other small subset of something else and in

some cases, it was Appendix R types of things and toss them into a top category.

Then it had things that were important to safety or Appendix A stuff in the next category and then they had another category which was security systems and something else. What you had was maybe four categories and that was graded QA.

I said, "Wait a minute. That wasn't my graded QA." My graded QA was attacking the top category. In principle what I am about to say, I think, applies to the other four categories also because the problem at hand that the industry has brought to the Commission was procurement.

It does bother me that someone pays $333.00 for a set screw when it is not intuitively obvious by looking at the set screw that it really should cost that much and you can buy it at Hechingers for 35-cents so there really does appear to be at the outset a discrepancy.

In NUMARC's report or submittal, I am not sure, the package that was submitted to the Commission in December, they go on and reference the report they had commissioned to have done which had some other examples of things like copper tubing which would on the surface look exorbitantly expensive.

So we focused on the "Q" list and the question was, what requires everything on the "Q" list to have some

awful lot of stuff done to it which costs a lot of money. We looked at the rules. Well, it wasn't in the rules, in a literal reading of the rules.

So we said, "okay" and in the back and we don't have a viewgraph for it because it was too busy, but the next page in the handout has a simplified schematic of the major standards which support QA, ANS 3.2 or ANSI 18.7, kind of the same document currently being upgraded. The NRC missed endorsing the last two upgrades. That is endorsed by Reg. Guide 1.33. That indirectly gets you to NQA 1 and NQA 2 for procurement.

I read all that and all that has words in there like appropriate to safety. All the right words are in there. I said, "Well, who is doing this dastardly dead? It is not ANS. It is not ANSI. It is not the NRC. Who is doing it?

MR. CARROLL: I know!

[Laughter.]

MR. GILLESPIE: This is Where Johns reference comes in. I said, "I have to go to a plant and find out who is doing this." Then we got a security -- yeah, security, that is my other topic. Then we got a QA plan and I said, "well, let me read the QA plan" because 50.54(p) talks about commitments can't be reduced.

Besides commitments being kind of fuzzy, let me

accept that anything that is in an FSAR is a commitment for now and the QA plan at least in some cases is in the FSAR as Chapter 17 or at least referenced and then there are words in the plan which imply that this is a commitment.

Well, I read through one that had pages and pages and pages of references to Reg. Guides I never thought I would want to hear about. It had the four categories as I described earlier. It had all the right words in the commitments about relative to importance to safety, the systems engineer, the engineer in charge of the line management of the area should establish the critical function.

I said, "Well, okay, the utility didn't do it to itself in the QA plan, now where is this dastardly deed done that is making copper pipe for the bathrooms in a nuclear power plant cost a whole lot more than they do in my house?"

I don't have a set of plant procedures and the plant procedures, of course, are greatly influenced by reviewers and inspectors and are greatly influenced by that great bulk of referenced documentation.

One of the things that we are going to talk to NUMARC about on Tuesday, now that I have it down to the point where it is not real clear that even the plans and commitments would have to be changed is why is the copper pipe in every port costing so much and there were about six.

I don't dispute that it costs that much but I have to effectively get at the cause and where is that cause written down because if you don't change the written communication, you can't change that communication to the licensee, to the reviewer, to the inspector.

So until I can hone in on it, I have a problem of identification. So we are still in an identification process. Let me throw out in theory what the group has kicked around. If through a risk perspective I would establish and this is kind of like what Laguna Verde is doing, three, four, five risk categories and in putting something and I use "something" loosely right now because I have systems, components and parts and I put something in a risk category, what do I consider?

I consider the system. What is the importance of the system? I consider the component, the component's importance to the function of the system. Do I have replicate components? I consider the part relative to the function of that component.

Let me focus on maintenance, O-rings, gaskets, nuts, studs, motor windings, brushes, things that get replaced a lot. In a safety grade system on a component that is important, how much of a pedigree does that individual part need relative to its functioning on a component which is replicated in a system whose function is

duplicated?

There evolves a process that you can actually set up that is potentially a graded structure where although your "Q" list may be 10,000 items long, there are potentially 3,000 items on the bottom where if we focus that QA is a process by which you assure you got what you wanted, it is not what sets the requirements, that normal industrial practice may be good enough.

If it is a crushable O-ring and I say, "well, what happens if the O-ring fails and what is the reasonable failure mode" and the answer is "I have a leak" but the pump still pumps. It is just that it is messy and I have a leak and I am out some bucks because I have to shut down to clean it up. I am not sure why commercial grade isn't good enough for that particular O-ring gasket material. You have to look at it for form and function. It has to be in proportion to its importance to the component within the system.

If you did set up categories on the "Q" list and once something is in a category, you could statically if you would specify what is expected for things that make it to that category and what I am focusing on now is how do I use risk insights to focus on the "Q" list and on procurement and why isn't someone doing it.

I have not found or my group hasn't found any and

I am not going to talk processes and people's opinion, but any regulatory obstacle to doing it and I also wonder if it could not be done in a relative sense with some consistency design to design and maybe not all Westinghouse plants but four loop plants, three loop plants, the old two loops, and that there isn't kind of a reasonably efficient way to come at it.

I really do have to get an understanding of why the copper tubing costs so much because it is not obvious from the material on the docket file yet I have no doubt that our QA people over the last 20 years and the industry's QA people who have very, very similar outlooks, I am not going to let inspectors and reviewers take all the heat here, very similar outlooks --

MR. CARROLL: Exactly.

MR. GILLESPIE: -- have not come from the mil standard background where more has always been better and it is interesting that 50.54 which covers reducing commitment says that if you reduce your commitments, you have to get the NRC's permission which is why I looked at the plan and said, "even if I assume the whole plan is a commitment, do I have a problem?" It was very frustrating yesterday after looking through a plan to say, "no." I was almost kind of hoping that I would be able to channel in on exactly what it is. I think we have an opportunity here to not be critical

of practices of the past but challenge the premise that is.

The staff focus right now has tended to be how do you dedicate a part to be equal to a full Appendix B program, whatever "full" is. We are stepping back and asking the other question, "why are you dedicating it at all?" It is not that you do not have to address the things in Appendix B but it is the degree to which you have to address them that we think could stand some challenging and review.

We tend to think that this is a prime area where if you are going to have grading, you need some method of grading and an integral analysis kind of starts, which is what your PRA is, gives you an approach to doing it and then you have to deal with Joe's list of can'ts.

If I deal in a relative sense, before and after, system reliability before, system reliability after, and I say that I can use, I am not a statistician so Hal, don't beat me up on this, some place there exists a standard statistical test to compare the uncertainty before and after, someplace.

So I can say that yes, I am uncertain, but I am no more uncertain that I was in the beginning. I am not going to get into any more statistics than that because we have to find the test first.

I think this is an area where if we were receptive

as an agency and I haven't talked to our steering committee about this so I don't want to offer that we will be receptive, but conceptually, if it is receptive, I think it gives us a point of departure on applying this kind of risk based approach to QA. Now let me rush on to the next one.

MR. CARROLL: Let me just add one insight since I have been in this world for a lot of years.

MR. CATTON: Why does the copper tube cost more?

MR. CARROLL: I was the original chairman of 18.7 back in 1[illegible]6 and that was bloody. The professional QA people that had come into this business for construction and design just could not accept the idea that there was anything but Appendix B.

These operating phase people who were trying to interpret it and do something sensible were just trying to undercut the whole QA program. You are right. It wasn't just the NRC. It was industry doing it to themselves. I almost got fired a half a dozen times for bucking our QA organization.

But I think that has evolved to some degree. I think it is a receptive audience today that would look at this. But the answer to your question, Ivan, is that when you ask a vendor to put all his pedigree on stuff, he will do it for you. He is going to hire some people and they are going to go through all the mickey-mouse and you are going

to get the same roll of copper tubing as if you went in as a private citizen to buy it for your house.

MR. GILLESPIE: Conceptually, I needed to know where I wanted Joe to focus because what I don't want to do is spend our time looking too globally at PRA. Now I want to know what are the Ten Commandments, Joe is going to be Moses, he is going to come down from the Mountain with the Ten Commandments of Risk Assessment as applied to QA and I hope in a positive sense and not, "here is why you can't use it" but we are going to try to do it in a sense of "here is why you can use it" and it would be a reasonable approach to grading, that upper tier that everyone has in their graded approaches.

MR. LINDBLAD: Let me comment a little bit on grading. It sounds like you are either talking about a rigorous algorithm for grading which perhaps is associated with a PRA or an exercise of judgment by a design engineer or maintenance engineer or something like that.

One calls for a documented rigor and the other kind of calls for a qualified person signing off on something. When you get down the level of the set screw or the copper pipe for the plumbing, you kind of say, "That is going to cost $333.00 to do the rigor as well" and people say, "To hell with it all, I will go with the paper and not hire all these people it takes to come up with a graded

program if it is to be done by the licensee."

MR. GILLESPIE: Yes. We have kind of an informal reporting system and we addresed internally to ourselves exactly that point and it is not either-or. In fact, the PRA has capabilities and if you remember back to Hershel Specter's presentation in the fall, first to do any kind of effort in here, you are going to have to sort systems. PRAs can do that. You can use them for relative sorting of systems.

If it is done to the right level, you get insights on major components or as a minimum groups of components that are in parallel. Past that, now you are into engineering analysis. You are into the guy who knows form, fit and function of a particular part and I think there is a place for that also in the grading system.

I would also propose that is a one shot deal. You evaluate a part and you look at system, component in the system, part in the component and you put it in a category and the category should already have pre-established criteria in it of how far is far enough for that category.

There is a start-up cost to it. We are not doing this on a cost beneficial basis. What we are doing is trying to look at where without reducing safety and where within our current requirements can we give the licensee the opportunity to make that choice. I don't want to make it

for him.

I would say that within design groups and I don't really think it is owner's groups, it is within groups of reactors that are close enough in specific design there are probably opportunities for people to get together and at least do the system component piece and maybe actually a lot of the part part of it also.

So we do recognize this. It is not all or nothing and, in fact, we were going through Appendix B and Appendix B by the time you get to I think it is the fourth paragraph finally uses the word "part" and although there is no history behind it that any of us can remember, there is at least a recognition that there is a difference between component and part because they use two different words.

I think we have an opportunity now to potentially assign some definition to those terms which has not been done in the past within a system that could be set up and proposed that may be very workable and I mean workable and not something that takes five years to develop, that the system, the approach, the concepts, the number of categories, the criteria for what you consider in each category could, in fact, be done by some smart people building on currently available insights and information.

Let me jump to tech specs if I could. As we get into this in more detail, we would be happy to come back in

another month on specifics on things like this even if it was with the subcommittee on risk.

Tech specs. We looked at tech specs. Everyone talks about risk based regulation and they kind of throw AOTs and LCOs around and stuff like that and talk about living PRAs and how do you make all of that come together.

Tech specs are required by the regulations. What is in them is what is in them and, in fact, to change them takes a line item approval and they are all different. That is why you can't do it.

Now let me tell you some of the things we are toying with for proposing what you can do. If I start with a stable base and my stable base is going to be the new improved tech specs where not only do I have tech specs which people, people being the NRC and the owners group have already shaken hands on if you would and agreed have an in document and an out document and have to some degree a bases written up that can be referenced.

If you picture a table and the LCOs, AOTs and surveillance intervals prescribed in the new improved tech specs is column one, I would propose that you could add a column two which would in its simplest form be a comparison on a number-by-number basis of extending that tech spec by some small factor equivalent to what we now call enforcement discretion.

It would be taking eight hours and saying, "if you find yourselves in this condition," and this condition being that you didn't finish some maintenance, you didn't do this, you didn't do that, it wasn't planned, you did in good faith expect to do it, instead of calling the NRC, you could double it, triple it, whatever the right number is, but it would be small, therefore it is bounded potentially with a report when you do it to the NRC with a slight possible extension on that and that is configuration control and you can do it if you confirm the following small subset of systems is operable.

Now I am starting to creep into some of the things that Hershel was talking about but I am doing it in a fixed tabular form because I am not going to have an operator there with his PRA meter on the panel. It doesn't exist right now.

Let me go now to column three. Column three is the pre-planned column. In particular on surveillance frequencies, if I can extend the surveillance frequency and I will allow that to be extended given a set of conditions or allow an AOT to be extended even in an extreme amount, i.e., Joe's previous slide, with a much expanded contingency table attached to that number.

I now can pre-plan and go on forever with certain components with two, three, four times their surveillance

intervals as recorded in a standard tech spec as long as I meet these conditions and it is not considered a bad thing any more.

One of those conditions may be that you have checked the operability more frequently than the original tech spec would have required of some other system. Now I get to the win-win situation. I am trying to focus on a table that would actually be a part of the tech specs itself.

It would be relatively generic in a design specific sense if you would. Each plant would customize it based on its IPE and its insights but you wouldn't need a living PRA in the sense of you are actually hooked into it

MR. CARROLL: Real time.

MR. GILLESPIE: You don't need it real time for this kind of thing. In fact, as long as you updated your IPE or your PRA probably on a refueling cycle basis, that would probably be good enough.

MR. LINDBLAD: But notice what you are doing is expanding regulation by adding more regulations even though they happen to be beneficial in this case.

MR. GILLESPIE: And they are optional.

MR. LINDBLAD: Rather than removing the burr that is unnecessary.

MR. GILLESPIE: I am trying to give flexibility

and therefore it becomes optional. I really am not adding. I am adding choice.

MR. LINDBLAD: But you recognized at the outset that one of the problems is the total volume of references and documents and issues that had to be considered so great that your own task force was overwhelmed by the task you were given and you are adding to it.

MR. GILLESPIE: I am trying to be very specific at something that I think can be done in less than two years and if someone has a better way of doing it, what we are doing right now is we are inviting them to tell us. I am offering one option. We are not married to it but it was kind of the thought process of how we got there.

This would give a utility a set of parameters significantly expanded beyond the parameters they are currently dealing with. If they don't want to use them, that is their choice. If they do want to use them, it is their choice and you don't have to do the whole plan at once. You can do it line by line by line by line by line or you can do the whole plan at once.

Tony who has been a resident at two different sites or three, two, said when we were kicking this around, he said, "Do you really expect a guy on the backshift who would like to double his frequency because the part didn't show up to have a PRA guy on call as part of the engineering

expertise on shift?" I kind of said, "Ah, yes, you are right."

Then we said that you probably have to write it down in something an operator can easily follow and easily understand and know that he is within the bounds of what is going on. I am not tied to it. If someone says that having a computer there as the British are going, that is fine.

I would say that after we came up with this idea, Joe stuck a pin in our balloon and burst our bubble and everything else and he said, "Oh, I was looking this up and I found out they are doing this at a plant in Scotland."

In fact, the U.K. half of the British Isles is going the computerized real time, a staff of people keeping it up to date and there is some indication and we are going to be looking into it a little more that the northern part of the United Kingdom is going the more tabular approach that is a little more definitive for the operating staff right there.

I don't want to propose that either one is a better way. I would propose that either one will work. You can computerize a table or you can print the table. I am kind of indifferent. It was a way of, is it a table that is in a book or is it a data base on a computer? Do you want to keep your tag-out log tied into your PRA?

I am not sure that we are ready to buy off on that

because if you take the step of the true living PRA, you are going to find the NRC wanting to get involved in the details of the model, how the model works, how do all the factors go into it, how does it do comparisons to change control system on the PRA.

But if I can do it one time and give the flexibility, I would probably get a shot at reasonable people coming to reasonable conclusions.

MR. SHEWMON: Are you going to come to the end of your presentation pretty soon so we can ask some questions?

MR. GILLESPIE: Yes. The last item is security and as I said, timing is everything as Jim Sniezek keeps telling me but we are going to wait before we get pushed too much on it. The question in security was shift staffing and we have to see what the IIT at TMI comes out with and 50.54 which talks about if you reduce the effectiveness of a safeguards program, we went in and asked, "what is effectiveness," effectiveness to do what?"

It was kind of a tortuous path through the regulations to define the effectiveness, to find out what the design objective is in 73.55(a) which is meet (b) through (h) and then we said, "Well, why are people doing more than meeting that" and in there it says, "and if someone wants to do more, the rule says it is okay, they have done it."

Then we struck upon an I&E Information Notice which came in in a letter from a Mr. Perry who is involved with the Clinton facility and he said that 86-88 was an information notice which said that you cannot use the same people for compensatory measures as who are on the response force.

We got it out and we found that the title of that Information Notice was prolonged compensatory measures and it appears that someplace along the line at some facilities the word "prolonged" got dropped and the implication is that there are eight people sitting around waiting for something to break in addition to the ten people who were there doing normal patrols and are designated as part of the response force.

We found nothing that would prohibit dual roles for those people and, in fact, the rule says "nominally ten" and nominal meaning planned on and we would think that if you had a compensatory action which was very much extended or prolonged, you would have to plan on that but the idea of having people sitting around waiting for something to break is kind of foreign to what we think the principle involved was. So we are digging into the supporting documentation on things like that.

MR. CARROLL: The other thing that is really ratcheted security were the RERs. They really forced people

to go beyond what they committed to do in their security plans.

MR. GILLESPIE: Yes. I think what you would find and, of course, everyone volunteered to do that --

MR. CARROLL: Right.

MR. GILLESPIE: What we are re-baselining is we are saying "effective to do what" and we are finding that it is ill-defined. In fact, it is not defined and putting in an appropriate definition which ties it back to the performance requirements in the regulation, we think would be an important step, not only in security but in EP which is covered with very, very similar words and in the same section you also have QA covered but QA uses the word "commitment" and that doesn't bother me as much now that I have read the commitment and they don't seem to be the big hang-up either. It may be the stuff below the commitment.

Mr. Chairman, that concludes my remarks. Thank you.

MR. SHEWMON: Bill, if you were King for a Day, how would you go at this job of reducing regulations or paperwork instead of increasing it with increased flexibility?

MR. LINDBLAD: I think I would identify some of the unnecessary silly things and tackle it directly with the staff management. I think there are many pressures within

both the utility and the NRC staff to maintain some of these details that are so expensive not at a high level but at the low level.

Basically a security manager at a power plant probably likes the specificity and the requirement and the empire that one has with the current security plan so one doesn't go to the security manager and ask him how he would change it. He goes to the vice president or the comptroller or the financial officer and asks him how he would change it.

I think the same thing has to happen here in the agency by looking at some of these issues and then taking them to Mr. Taylor and Mr. Murley and say that it doesn't seem to the Committee that it needs to be done this way, can we start to change the regulations.

MR. SHEWMON: Would you start with the NUMARC list or you would make up your own?

MR. LINDBLAD: I think you would look at the NUMARC list but you would look at your own as well and say that it is not a job that can be done in six months and so it requires a tasking for longer than six months.

Either that or within the six months, all you have to do is identify the problems and then establish an action plan with the Commissioners for Mr. Taylor to change it. But apparently Frank thinks that he has to identify them and

then solve the problem in six months and that is an impossible task.

MR. CARROLL: Don't you view it, Frank, as having a pilot program to see what can be done.

MR. GILLESPIE: Yes. I have layers.

MR. SHEWMON: Jim is trying to say something.

MR. SNIEZEK: Let me address that. Item "D" of the charter, 7(D) of the Charter is very specific. Recommendation for follow up efforts by the staff to implement the results of the review. We are going to solve very little during this six months. We are doing exactly what Mr. Lindblad said and that is to identify the problems, talk with the public, the industry, the individual Commissioners, the Commissioners as a group, the ACRS and make sure that we have the problems identified and look at what is the best way to solve those problems and get it back to the line organization to make the fixes because if the line organization doesn't make the fixes, they will not be accepted.

So that is exactly what we are going to do. We are not going to solve them all. But while we are in our process, we would like to identify three or four things that can be done quickly while the task force is still in existence to start the momentum going.

MR. GILLESPIE: There is a layering here. We are

not just looking at the regulations, period. If you recall back, part of what caused us to get going was also, I think, kind of an impatience on introducing risk technology into the whole structure also.

I do feel, therefore, an obligation in the areas where I feel risk technology if you would could be introduced to be applied to some of the more significant problems where, in fact, the industry has complained. They complained about procurement, about staffing levels overall and let me give you a for instance.

If I took one plant which I know the details on, the example in security I gave you accounts for eight people on five shifts at about $50,000.00 per contract guard for 75 cents with an average length of 20 years, that change is worth three billion dollars.

Now why am I focusing on it? Well, three billion dollars will buy someone a whole new plant over 20 years. So rapidly things like that really rise in what we are looking at. Now Johns is actually developing a list of not nits but of recommended changes and reconciliations that really need to be made, like reconciling the change process that is in 50.54 to ones in 50.59 where 50.59 is controlling true safety systems.

Yet, why does all the other stuff appear to be more restrictive? We are going to have that list and we are

not going to attempt to say anything other than you need to fix this to make some consistency here.

Also, in looking at supporting documentation, when we came up with so many supporting positions which are still on the books today for individual areas, reg guides, bulletins, generic letters, information notices, it is incoherence at its worst because there is no way an individual reviewer in making a finding under 50.63 in station blackout even knows some of these exist until we had gotten all of this information plugged in so we could key word it on a computer system.

So I am not going to solve incoherence in a topical area. I can only suggest that in the long term, someone needs to clean it up.

MR. SHEWMON: Time is up for today. When do we see you again or when do you want to see us again?

MR. GILLESPIE: I left it with Dick that it really is at his pleasure. I am going to say that we could use a couple of interface meetings with NUMARC. So I would anticipate, the way we have it scheduled is that it would be the first meeting in April. That gives us the rest of February and March to get some work done.

MR. SHEWMON: All right, fine. We will see you then.

MR. GILLESPIE: Thank you.

MR. SNIEZEK: We need to have those interface meetings with NUMARC and the public.

MR. SHEWMON: Thank you very much for coming down. We will take the next several minutes to clear the room because the next thing we do will be in closed session on the appointment of new members. That ends the reported portion of today's meeting. Thank you.

[Whereupon, the reported portion of the meeting was concluded at 4:35 o'clock p.m.]

REPORTER'S CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission

In the Matter of:

NAME OF PROCEEDING: 394th ACRS Meeting

DOCKET NUMBER:

PLACE OF PROCEEDING: Bethesda, Maryland

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

Marilynn Estep

Official Reporter
Ann Riley & Associates, Ltd.

<u>Presentation by L. N. Rib</u>

My name is Louis Rib and the purpose of my brief presentation is to introduce Mr. Doug Hink. Mr. Hink is the Vice President and General Manger of Atomic Energy of Canada, Limited's U.S. Subsidiary, AECL Technologies. A one-page summary of Mr. Hink's background is available in our handout package.

Prior to his appointment to AECL Technologies, Mr. Hink was the General Manager of AECL CANDU's CANDU 3 program in Canada. He joined AECL in 1973 and held a variety of positions which included:

- NSSS Engineering Manager for the Wolsong 2 project
- General Manager of AECL Advanced Systems
- Engineering Manager of AECL nuclear power plant project in Romania
- Executive Assistant to the President and CEO of AECL in Ottawa, AECL's Head Office
- Assistant Dept. Manager CANDU Control Engineering in Montreal

I am pleased to present Doug Hink.

Presentation by A. D. Hink

I am very pleased to accept the ACRS's invitation to attend this meeting on the NRC staff's draft paper on Policy Issues related to the Advanced Reactors and CANDU 3. With me is Louis Rib, who just spoke. He is AECL Technologies' Supervisor for CANDU 3 Licensing activities in the U.S. Also here with me is David Wright, of AECL-CANDU's Safety and Licensing Group for the CANDU 3 Standard Product.

While I am new here, I am familiar with the CANDU 3 product and program since, prior to this current appointment, I was responsible for AECL's CANDU 3 program.

As part of this role, I have become familiar with the regulatory issues and processes as they are applied to CANDU 3 in Canada. While there are some differences in philosophy here in the United States, I expect that many of the procedures and practices are similar.

Today, I would like to give you an overview of the AECLT organization and current status of our interaction with the NRC staff on the preapplication review of the CANDU 3 and address any questions the ACRS may have concerning our comments.

Presentation continues from the viewgraphs:

- #1 Defining AECL (in Canada)
- #2 Defining AECLT (in U.S.)
- #3 Genealogy of CANDU Reactors *(Stress evolutionary aspect and benefits to U.S. utilities)*
- #4 CANDU Reactors - World Power Performance (as of June 30, 1992)
- #5 CANDU 3 Strategy
- #6 CANDU 3 Strategy - USA
- #7 CANDU 3 Upfront Licensing Approach
- #8 List of CANDU Report Transmitted to NRC

AECL

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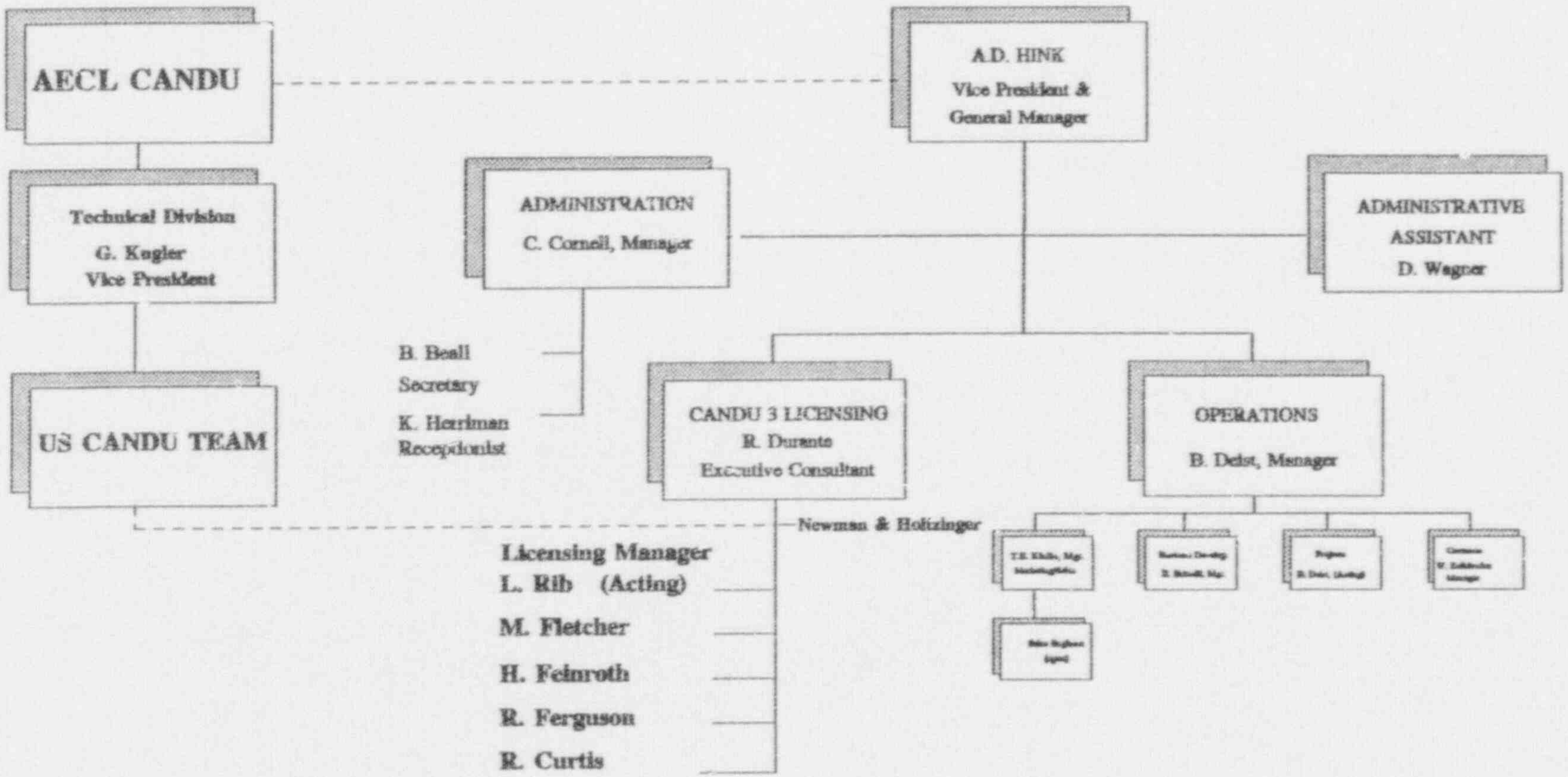
A.D. Hink, VP

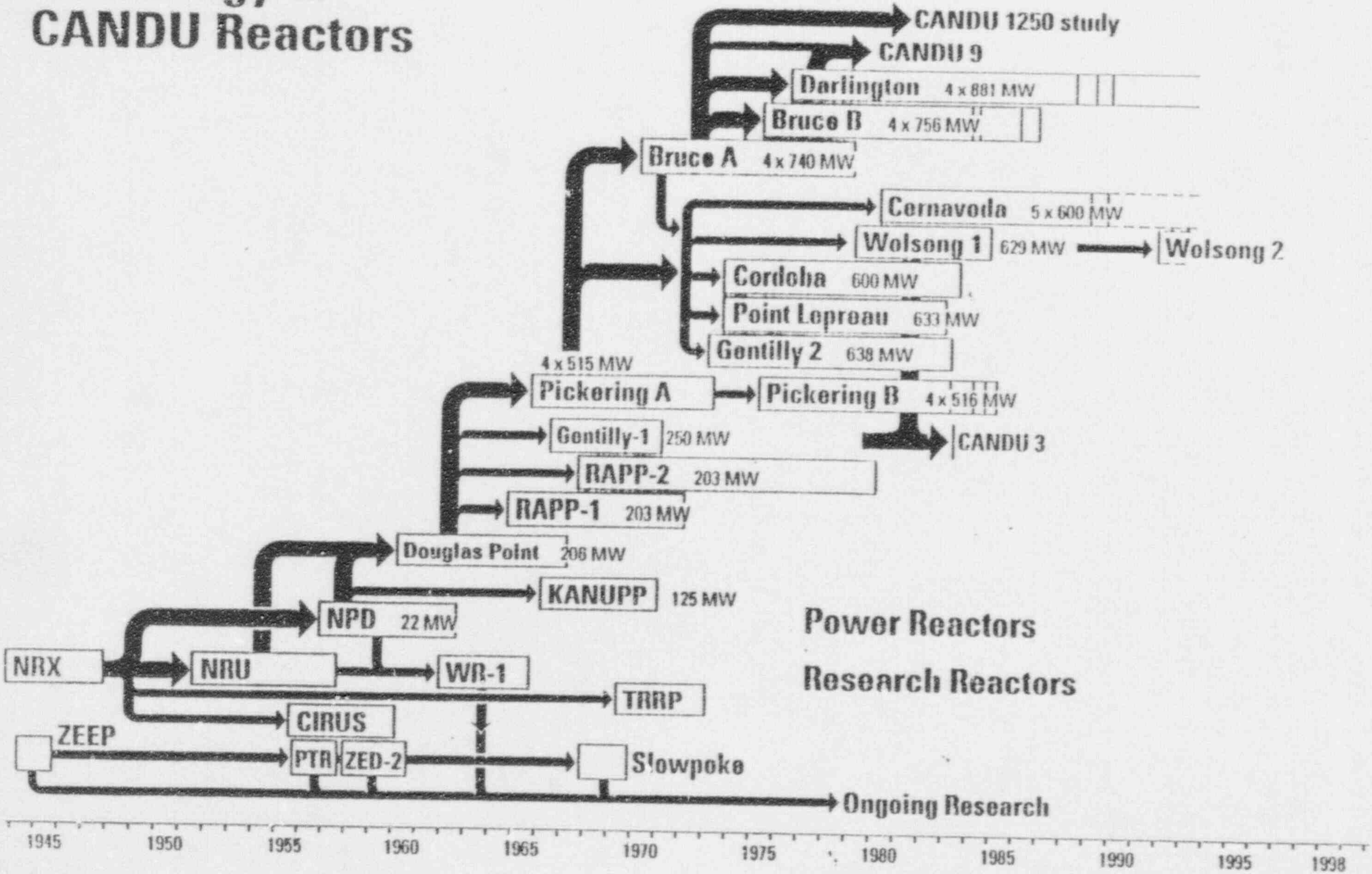
AECL CANDU
D.S. Lawson
President

* CANDU Reactor Design
* CANDU Engineering
* Engineering Services

AECL TECHNOLOGIES



Genealogy of CANDU Reactors



The Top Ten

Lifetime World Power Reactor Performance to June 30, 1992*

from among 354 reactors over 150 MW

Country	Ranking	Unit *(in-service date)*	Type	Capacity Factor %†
Canada	1.	Point Lepreau *(9/82)*	CANDU	90.4
Germany	2.	Emsland *(4/88)*	PWR	90.3
Germany	3.	Neckar 2 *(1/89)*	PWR	88.8
Finland	4.	Loviisa 2 *(11/80)*	PWR	87.0
Hungary	5.	Paks 3 *(9/86)*	PWR	86.6
Belgium	6.	Tihange 3 *(6/85)*	PWR	86.6
Canada	7.	Pickering 8 *(1/86)*	CANDU	86.6
Hungary	8.	Paks 4 *(8/87)*	PWR	86.6
Germany	9.	Grohnde *(9/84)*	PWR	86.5
Canada	10.	Pickering 7 *(11/84)*	CANDU	86.3

**Source: Nuclear Engineering International*

†Capacity Factor = $\frac{\text{actual electricity generation}}{\text{perfect electricity generation}}$

920918

CANDU 3 STRATEGY

- OBTAIN LICENCE FROM AECB
  70% COMPLETE

- PRIORITY ON CONCLUDING DOMESTIC OPPORTUNITY

  . NEW BRUNSWICK
  . SASKATCHEWAN

- INTERNATIONAL MARKETING EFFORTS STARTED

AECL EACL

AECL CANDU EACL CANDU

CANDU 3 STRATEGY USA

- WOULD LIKE TO LICENSE PROTOTYPICAL PLANT DOMESTICALLY
- PROGRESS ON U.S. NRC CERTIFICATION
- REVIEWING EPRI PARTICIPATION
- MAJOR STUDIES CONDUCTED '90 (SRI) AND '91 (GOLDMAN SACHS)
- OBTAIN STRONG U.S. PARTNER(S)

CANDU 3 Up-front Licensing Approach

1. Letter of intent to apply for a Standard Design Certification (5/18/89)

2. Guidance Document: AECLT-guidance for AECL-CANDU support activities

3. HPLI evolves to ESi (AECLT/AECL-CANDU activities)

4. Proposed draft LRBD (1/31/91)

5. Recommendations for Preapplication Review Plan (11/19/91)

6. CANDU 3 general technology and design-related reports. (See attached listing)

02/02/93

List of AECLT documents transmitted to the NRC since March of 1991.

TTR-291	The Technology of CANDU Fuel Channels
TTR-305	The Technology of CANDU On-Power Fueling
TTR-306	The Technology of CANDU Shutdown Systems
TTR-276	The Technology of CANDU Loss of Coolant Analyses
TTR-384	The Technology of CANDU Source Term Calculation
CANDU 3 Technical Outline, Rev. 11	
TTR-423	CANDU 3 and the U.S. NRC General Design Criteria
TTR-429	Comparison of the CANDU 3 with NRC Positions for Evolutionary Light Water Reactor (LWR) Certification Issues in SECY-90-016
CANDU 3 Systematic Review of Plant Design for Identification of Initiating Events	
TTR-410	Equivalent Safety Issues: Primary Heat Transport System
TTR-409	Equivalent Safety Issues: Emergency Core Cooling System (ECCS)
TTR-411	Equivalent Safety Issues: Containment Design
TTR-412	Equivalent Safety Issues: Auxiliary Support Systems and Components
TTR-413	Equivalent Safety Issues: Classification of Systems and Components

A.D. (DOUG) HINK
VICE PRESIDENT/GENERAL MANAGER
AECL TECHNOLOGIES

Mr. Hink is Vice President and General Manager of Atomic Energy of Canada, Limited's U.S. subsidiary, AECL Technologies. AECL Technologies was formed in 1989 to market and introduce Canadian/Nuclear technology in the United States.

As Vice President and General Manager of AECL Technologies, Mr. Hink's main responsibility is the initiation of the licensing process and development of the infrastructure and program for the introduction of the CANDU reactor into the U.S. In addition to the CANDU licensing program, the Business Services unit markets CANDU derived technology to operating LWR's; decommissioning technology to all reactor types and technical support/equipment retrofits to research reactors and thermal power plants.

Mr. Hink joined AECL in 1973 and held a variety of positions. Prior to his appointment to AECL Technologies, he was General Manager of AECL CANDU's CANDU 3 program.

Before taking the position as General Manager of the CANDU 3 program in Canada, Mr. Hink was NSSS Engineering Manager for AECL CANDU's Wolsong 2 project which is for the supply of a second CANDU 6 plant to the Korean national utility. In this position he lead the negotiation of the technical scope for the nuclear steam supply portion of the project. He also established the team and managed the early implementation of the engineering program for that project.

Other positions within AECL were; General Manager of AECL Advanced Systems which is a spinoff involving robotic and machine vision technology applications. He was Engineering Manager on AECL CANDU's nuclear power plant project in Romania and served in a project engineering role on AECL's Wolsong 1 project. He served as Executive Assistant to the President and Chief Executive Officer of AECL's Corporate office in Ottawa and was Assistant Department Manager of AECL CANDU's Control Engineering division in Montreal. In this capacity he was responsible for process control and electrical system design functions for CANDU power plants.

He obtained his B.Eng. (Chemical) degree from McGill University in Montreal, Quebec. He is a registered Professional Engineer in both the provinces of Ontario and Quebec.

Mr. Hink was born in Montreal, Quebec Canada and presently resides with his wife, Beverley, and their daughter in Rockville, Maryland.

PRESENTATION

TO THE

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
ADVANCED LIQUID METAL COOLED REACTOR
MODULAR HIGH TEMPERATURE GAS-COOLED REACTOR

FEBRUARY 11, 1993

BY

JERRY D. GRIFFITH
DIRECTOR

OFFICE OF ADVANCED REACTOR PROGRAMS
U.S. DEPARTMENT OF ENERGY

ENERGY POLICY ACT OF 1992

- SEPTEMBER 30, 1996 — SUBMIT APPLICATION TO NRC FOR PRELIMINARY DESIGN APPROVAL OF THE STANDARD PLANT
  - STANDARD PLANT PSAR
  - SAFETY TEST PLAN FOR PROTOTYPE

- SEPTEMBER 30, 1998 — SECRETARY SHALL SUBMIT TO CONGRESS RECOMMENDATION TO BUILD A PROTOTYPE DEMONSTRATION REACTOR
  - PRELIMINARY DESIGN APPROVAL REQUIRED TO SUPPORT RECOMMENDATION

- DECEMBER 31, 2010 — R&D AND DEMONSTRATION COMPLETE TO SUPPORT THE DESIGN OF ADVANCED REACTOR TECHNOLOGY CAPABLE OF PROVIDING ELECTRIC POWER TO A UTILITY GRID

ADVANCED LIQUID METAL REACTOR PROGRAM PLAN

• DEC 31, 1993	COMPLETE ADVANCED CONCEPTUAL DESIGN; PSER DUE FROM NRC
• JAN 1, 1994	START PRELIMINARY DESIGN ACTIVITY; PSER REQUIRED FROM NRC BEFORE ACTIVITY BEGINS
• SEP 30, 1995	COMPLETE STANDARD PLANT PRELIMINARY SAFETY ANALYSIS REPORT AND SUBMIT TO NRC
• MAR 31, 1996	COMPLETE PROTOTYPE SAFETY TEST PLAN
• SEP 30, 1996	SUBMIT APPLICATION TO NRC FOR PDA APPROVAL OF STANDARD PLANT
• MAR 31, 1998	PDA APPROVAL FROM NRC
• SEP 30, 1998	SECRETARY SUBMITS RECOMMENDATION TO CONGRESS TO BUILD A PROTOTYPE DEMONSTRATION REACTOR

ADVANCED LIQUID METAL REACTOR PROGRAM PLAN (CONT'D)

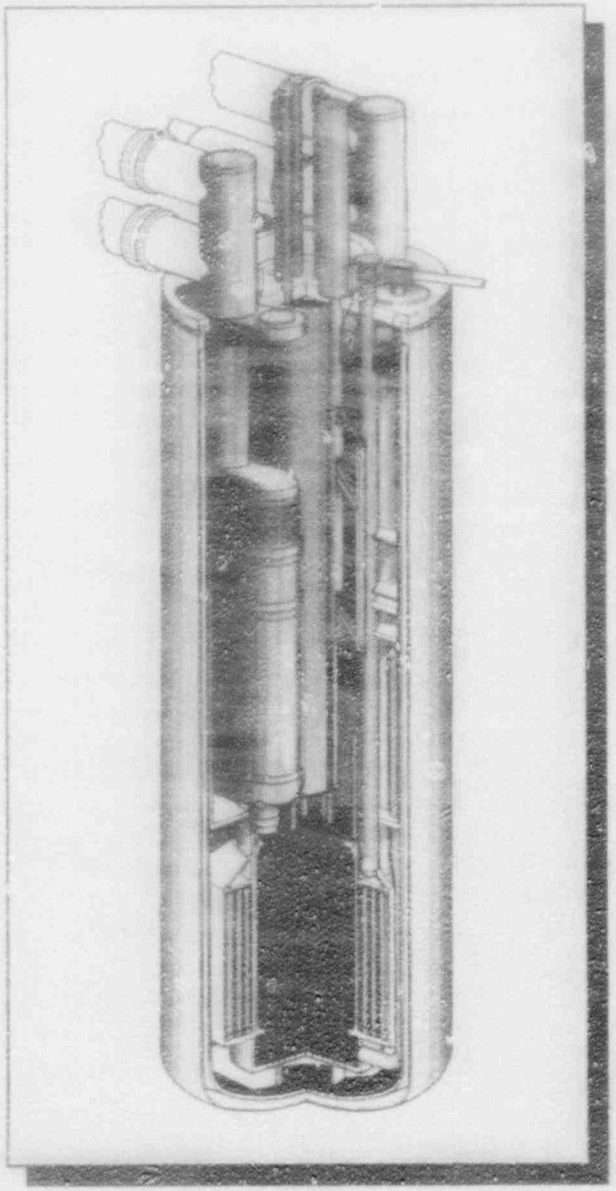
• 2000	BEGIN CONSTRUCTION OF PROTOTYPE WITH A LIMITED WORK AUTHORIZATION
• 2001	PROTOTYPE COMBINED OPERATING LICENSE
• 2005	COMPLETE CONSTRUCTION, BEGIN SAFETY TEST
• 2007	SUBMIT APPLICATION FOR STANDARD PLANT CERTIFICATION
• 2009	CERTIFICATION OF STANDARD PLANT
• 2010	PROTOTYPE PLANT PROVIDES ELECTRIC POWER TO A UTILITY GRID

MODULAR HIGH TEMPERATURE GAS-COOLED REACTOR PROGRAM PLAN

- APR 1993 UPDATE TECHNOLOGY DEVELOPMENT PLANS
- JUN 1994 RECEIVE FINAL PSER FROM NRC
- JUN 1995 COMPLETE PRELIMINARY DESIGN
- SEP 1995 SUBMIT PRELIMINARY SAFETY ANALYSIS REPORT TO NRC
- SEP 1996 SUBMIT APPLICATION TO NRC FOR PDA APPROVAL OF STANDARD PLANT
- JUN 1998 RECEIVE PDA FROM NRC
- 1999 SUBMIT PROTOTYPE ENVIRONMENTAL REPORT AND SAFETY ANALYSIS REPORT TO NRC

MODULAR HIGH TEMPERATURE GAS-COOLED REACTOR PROGRAM PLAN (CONT'D)

- 1999 SUBMIT PROTOTYPE ENVIRONMENTAL REPORT AND SAFETY ANALYSIS REPORT TO NRC
- 2001 RECEIVE LIMITED WORK AUTHORIZATION; BEGIN LIMITED SITE WORK
- 2002 RECEIVE COMBINED OPERATING LICENSE
- 2005 COMPLETE CONSTRUCTION; BEGIN SAFETY TEST
- 2007 SUBMIT APPLICATION FOR STANDARD PLANT CERTIFICATION
- 2009 RECEIVE CERTIFICATION OF STANDARD PLANT
- 2010 PROVIDE ELECTRIC POWER TO UTILITY GRID



ALMR

Advanced Liquid Metal Reactor (PRISM)

presentation to:
The Advisory Committee on
Reactor Safeguards

February 11, 1993

GE Nuclear Energy

Advanced Liquid Metal Cooled Reactor (ALMR) Program

Position on NRC Advanced Reactor Policy Issues

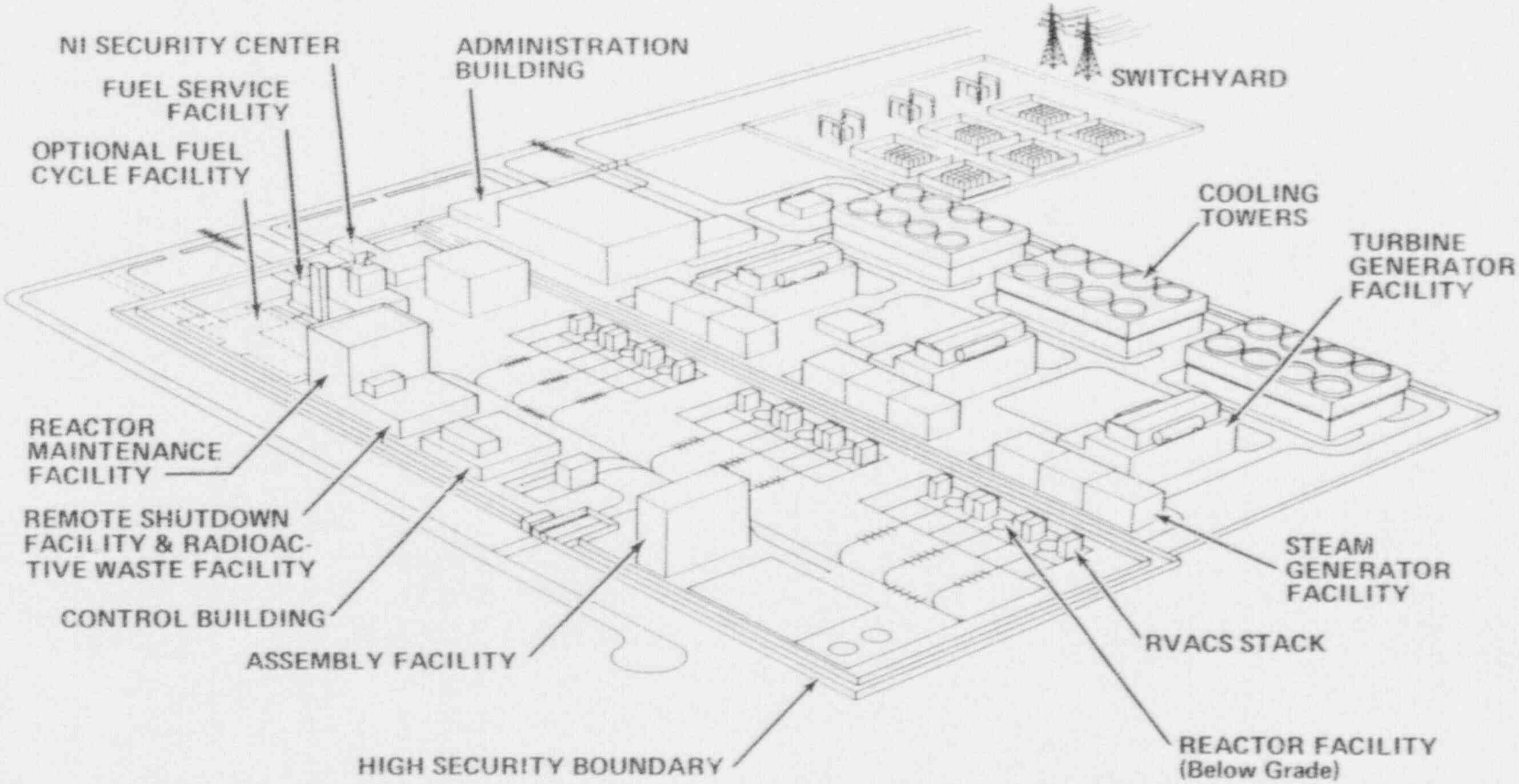
Richard W. Hardy
Safety & Licensing
GE Nuclear Energy

February 11, 1993

Major Features

- *Compact modular reactor in underground silo.*
- *Factory fabrication with rail or barge shipping.*
- *Metal Fuel*
  - *Integral fuel cycle with on-site or off-site location option*
  - *Inherent safety characteristics*
  - *High core internal breeding*
  - *Low excess reactivity*
  - *Actinide recycle and burning*
- *Natural circulation air decay heat removal.*
- *Passive response to transients without scram (ATWS).*
- *Limited safety grade systems and power requirements.*
- *Seismic isolation with high seismic margins.*
- *Prototype demonstration of safety features.*

ALMR Power Plant (3 Power Blocks) - 1395 MWe



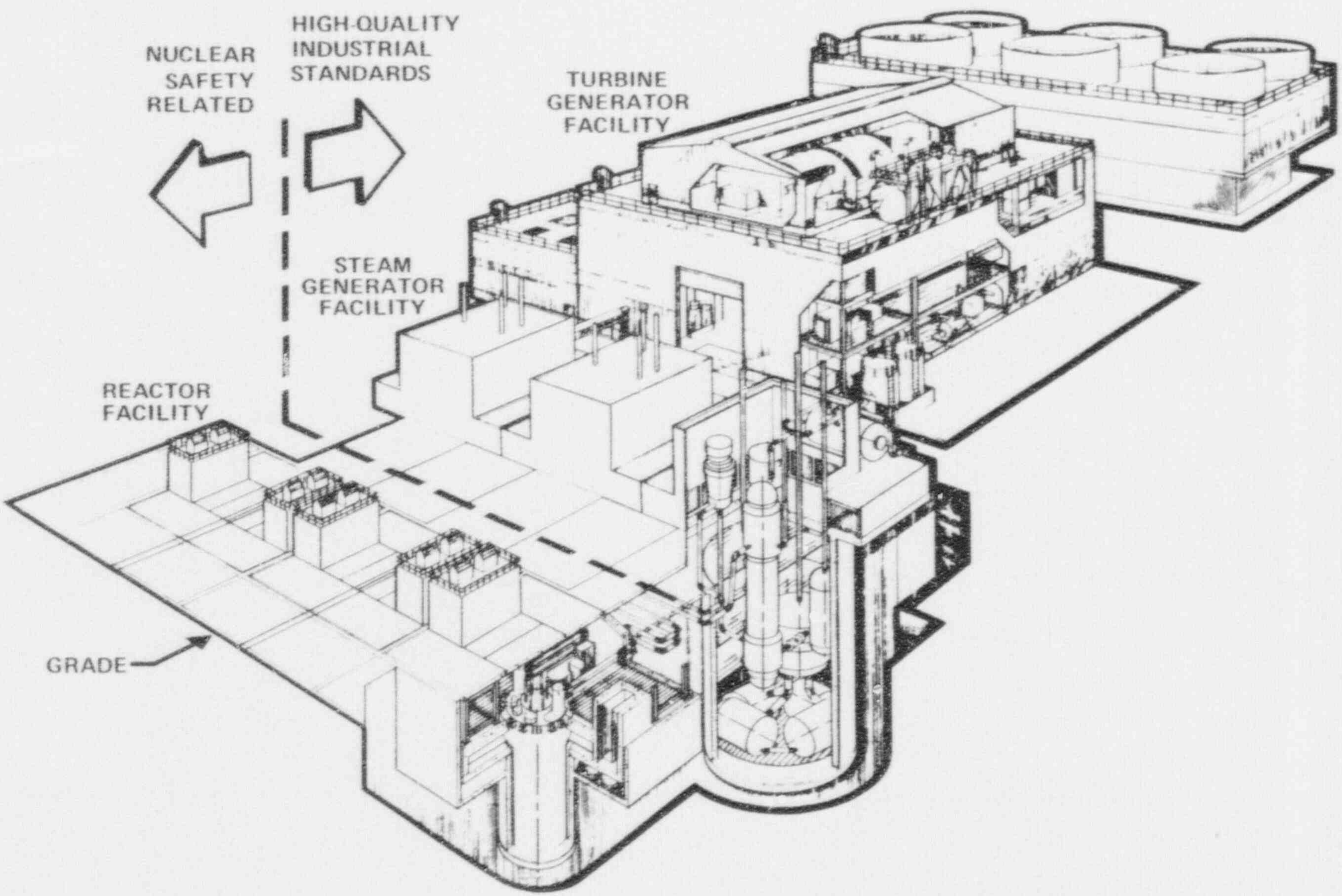
90-181-01 (7/11)

ALMR Design Data

• Overall Plant	
– Number of Reactors per Power Block	Three
– Number of Power Blocks	One / Two / or Three
– Net Electrical Output	465 / 930 / or 1395 MWe
– Net Station Efficiency	32.9 %
– Turbine Throttle Conditions	955 psia / 540 °F (sat'd)
• Reactor Module	
– Thermal Power	471 MWt
– Primary Sodium Inlet/Outlet Temp.	640 °F / 905 °F
– Secondary Sodium Inlet/Outlet Temp.	540 °F / 830 °F
• Reactor Core	
– Fuel	Metal (oxide backup)
– Refueling Interval	18 Months
– Breeding Ratio	1.12 ref., 1.23 capability

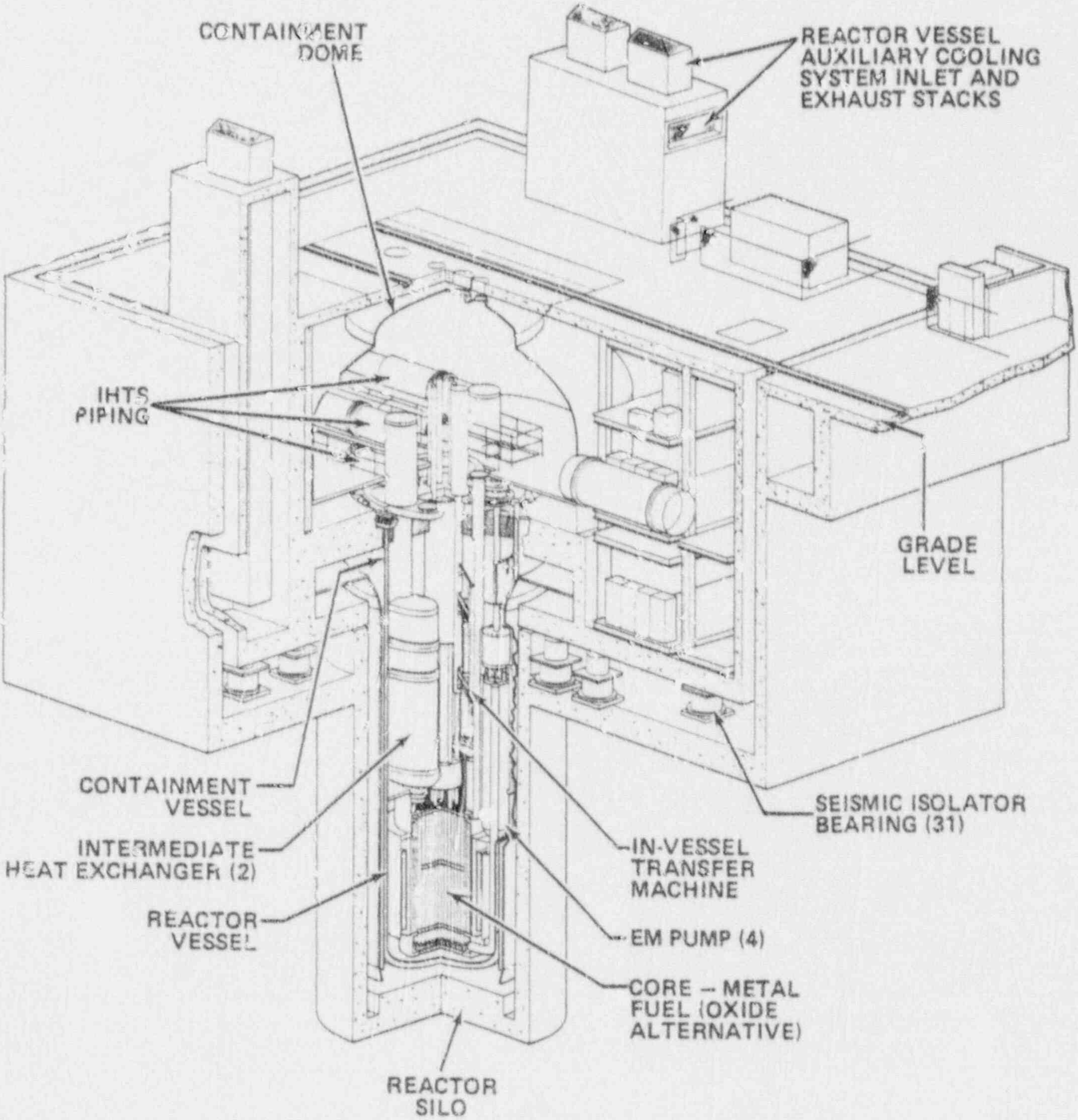
90-336-01

ALMR Power Block – 465 MWe



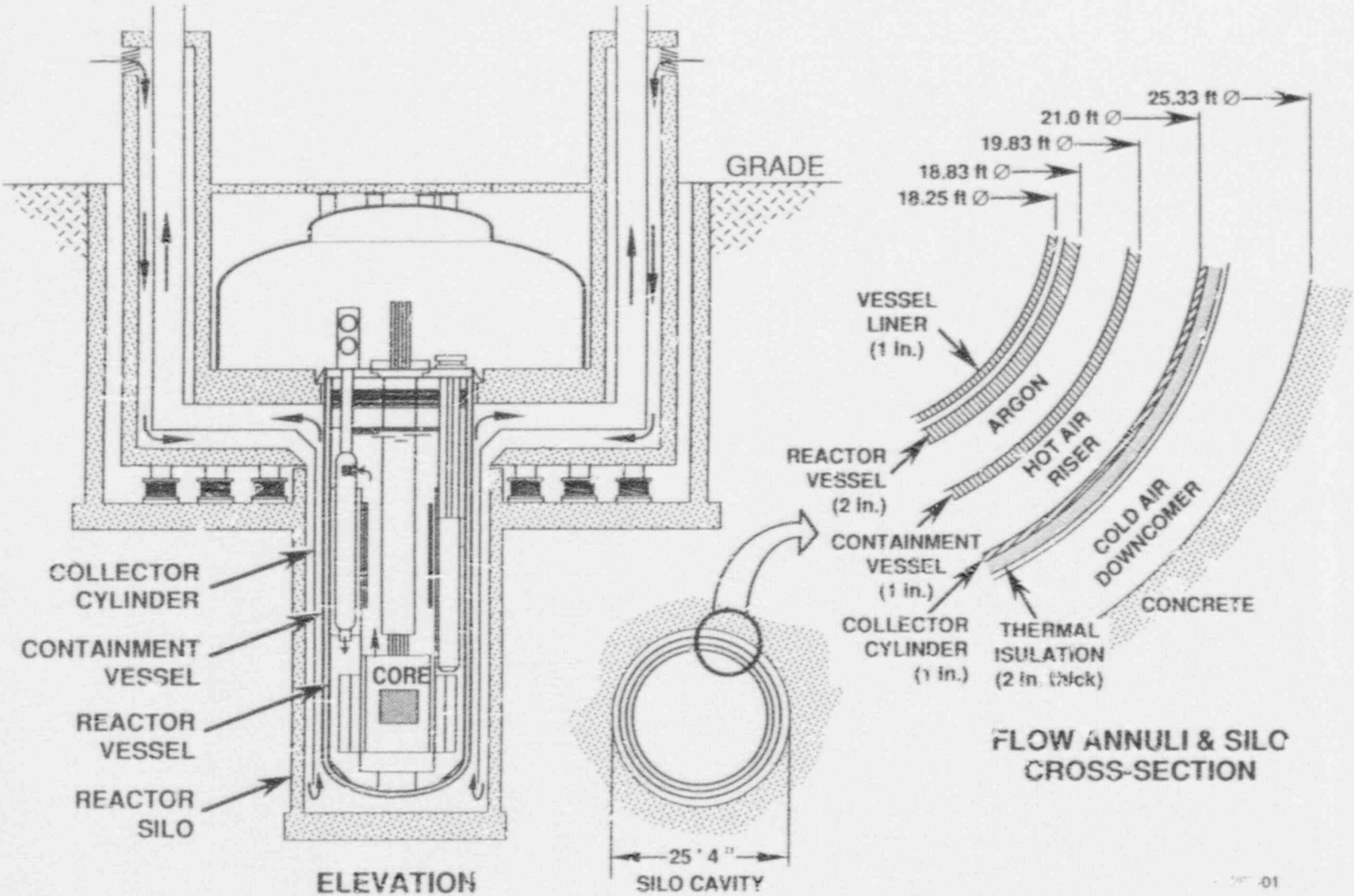
89-081-03

ALMR Reactor Facility

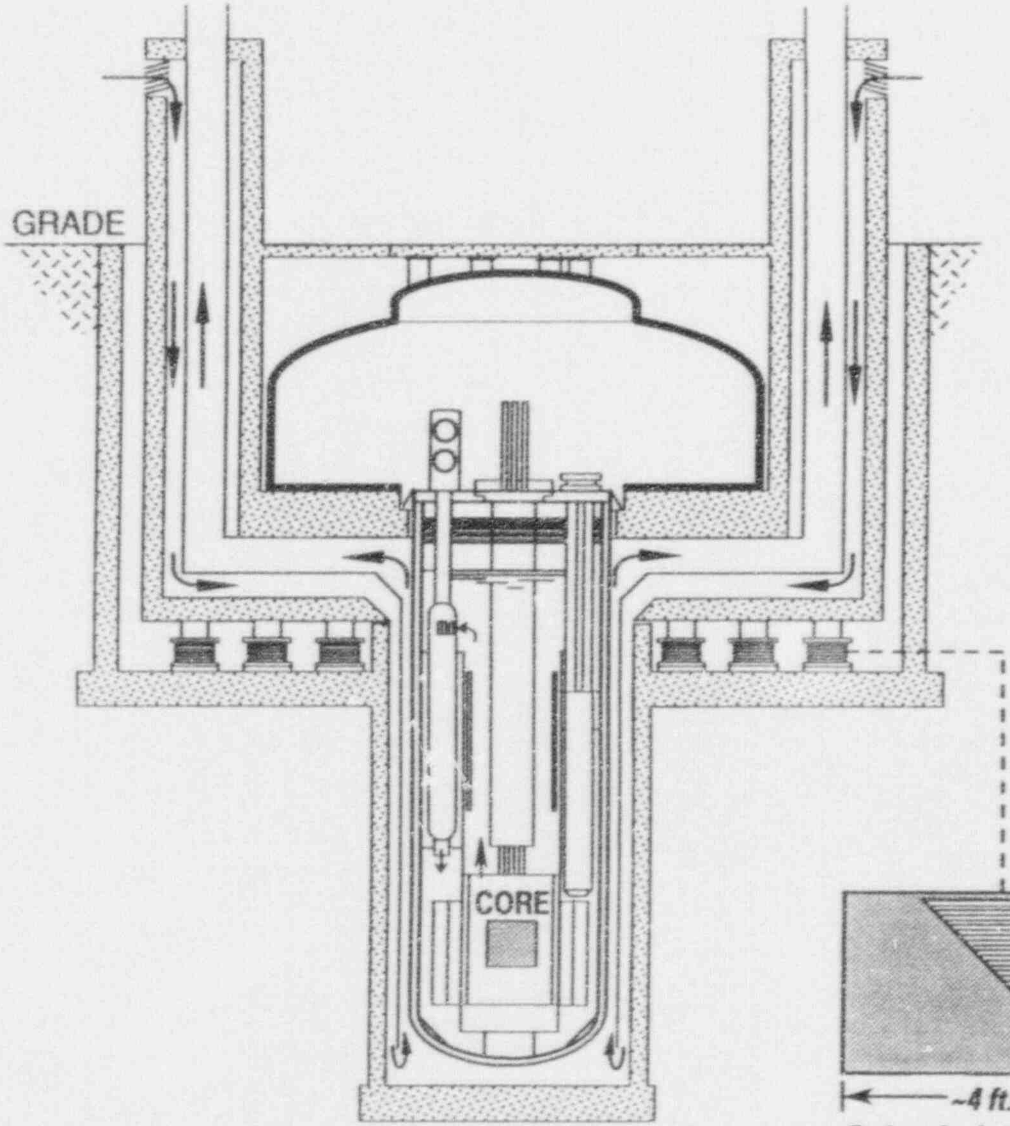


90-181-02 (7/16)

Reactor Vessel Auxiliary Cooling System (RVACS)

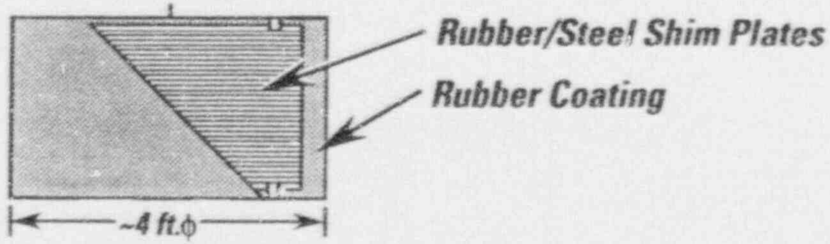


Seismic Design



Seismic Isolation System Characteristics

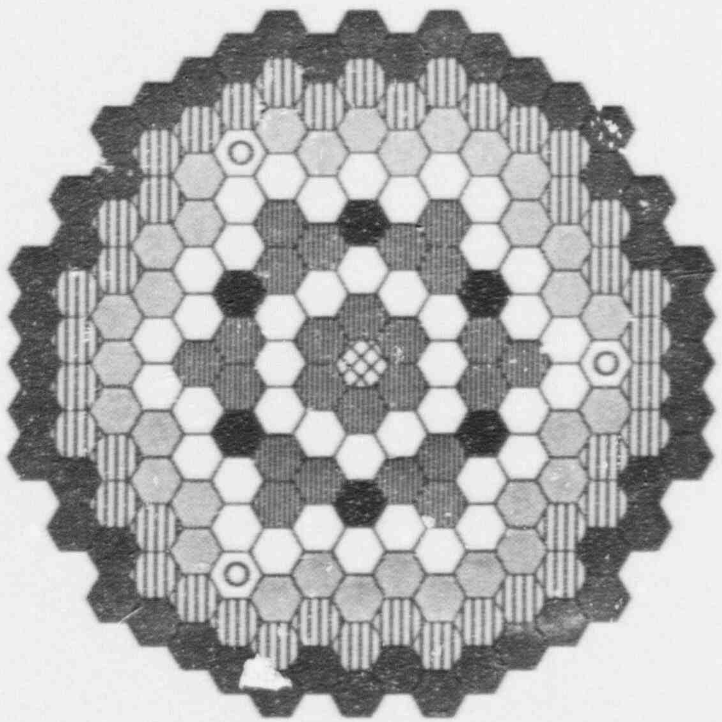
- Safe Shutdown Earthquake (SSE)
  - — Design Requirement 0.3g (ZPA)
  - — Design Capability 0.5g
- Lateral Displacement
  - — at 0.3g 7.5 in.
  - — Space Allowance
    - Reactor Cavity 20 in.
    - Remaining Structures 28 in.
- Natural Frequency 0.75 Hz
- Lateral Load Reduction >3



Seismic Isolator (31)

90-286-07

Reference Metal Core



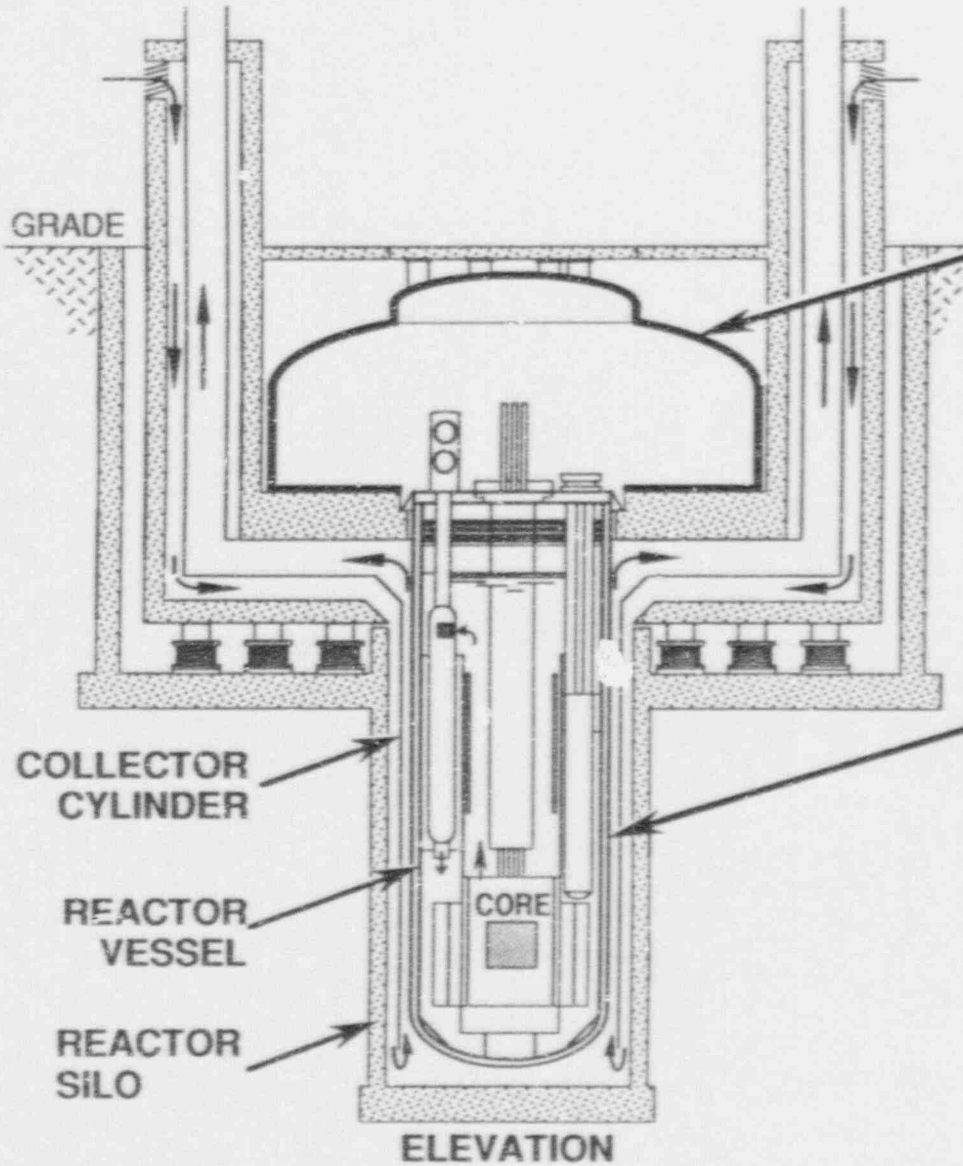
Driver Fuel	*42*	*Gas Expansion Module*	*3*
internal Blanket	*24*	*Shield*	*48*
Control	*6*	*Reflector*	*42*
Ultimate Shutdown	*1*	*Radial Blanket*	*33*

Total: 199

Peak Linear Power	***10.5 kW/ft***
Peak Fuel Burnup	***135 MWd/kg***
Breeding Ratio	***1.1 - 1.2***
Fuel Lifetime	***4.5 Years***
Refueling Interval	***18 Months***
Burnup Reactivity Swing (Nominal)	***-\$0.43***
Single Rod Scram Worth	***~ \$2.60***
Cold to Hot Full Power Reactivity	***~ \$1.20***

90-286-02 (7/31)

Reactor Containment



Containment Dome

- ASME Section III, Div. 1, Class MC
- Material – SA 516 Grade 70
- Design Requirements:

  < 1% / day at 25 psig/700 °F

Containment Vessel

- ASME Section III, Div. 1, Class MC
- Material – 2 1/4 Cr - 1 Mo
- Design Requirements:

  Zero Leak Rate at 60 psig/800 °F

90-286-03

NRC Advanced Reactor Policy Issues

- Seven issues which apply to ALMR/PRISM for which departure from current regulations should be considered:
  - Accident evaluation
  - Source term
  - Containment performance
  - Emergency planning
  - Operator staffing
  - Residual heat removal
  - Positive void reactivity

- One issue which applies to ALMR/PRISM for which departure from current regulations is not warranted at this time:
  - Control room design

ALMR Position on Seven Policy Issues

- *The NRC staff positions concerning the seven issues for which departure from current regulations should be considered largely parallel positions taken previously by the ALMR/PRISM team.*

- *A general characterization of these positions for the seven issues is that:*

  - *departure from current regulations should be considered*

  - *where deviations are necessary they should be performance based rather than prescription based*

  - *additional work is required to generate the data require to make final judgements*

ALMR Position on Eighth Policy Issue

- *The NRC staff position concerning control room design differs from that taken by the ALMR/PRISM team.*
- *Specifically, the staff recommends that until passive LWR policy for design requirements of control rooms and remote shutdown facilities is finalized, current LWR regulations and guidance should be applied to the preapplication reviews.*
- *This would mean that safety-related equipment would have to be available to the operator in the control room, and that the control room/building would have to be designed and built to seismic Category I standards with 1E instrumentation/controls and HVAC.*
- *The ALMR/PRISM team has presented the technical basis for its reference design which features strict separation between the safety related reactor protection system and the non-safety related plant control system. This approach is:*
  - *performance based*
  - *is believed to meet the general design criteria*
  - *takes into account the passive and inherent safety features of the ALMR*
- *We believe this issue should be treated similarly to the other seven issues by using a performance-based approach, and allowing the design team to develop the additional information required to demonstrate this performance.*

RWHardy 2/11/93

Treatment of Conservatism

- *Where deviations from current regulations are recommended, the staff proposes more conservative alternatives to the preapplicants' proposals to account for uncertainties associated with the conceptual design.*

- *We have a concern that excessive conservatisms included in the preapplication review will be difficult to reduce as additional data are developed to support detail design.*

- *The end result may be alternative regulations serving as surrogates which create defacto new policy which is more conservative than the NRC safety goals.*

- *To avoid this problem, we suggest that performance criteria should be developed which must be met regardless of uncertainties and status of design details. These performance criteria should be comparable to those of LWRs and consistent with the safety goals.*

- *Allowance for uncertainties, commensurate with the level of knowledge and detail, should be made in the evaluation process. As new information and details are developed, reevaluations should be made against the original performance criteria, using revised uncertainties appropriate for the level of new information and details.*

US-DOE MHTGR PROGRAM

MHTGR DESIGN RESPONSE TO NRC KEY ISSUES

Presented to Advisory Committee on Reactor Safeguards

February 11, 1993

Fred A. Silady
Manager and Senior Technical Advisor
Engineering Development

GENERAL ATOMICS

FAS 2/93
ACRS

US-DOE MHTGR PROGRAM

MHTGR RESPONSIVE TO ADVANCED REACTOR POLICY

- Advanced Reactor Policy Statement provided desired characteristics of advanced reactors
  - to increase assurance of safety with expectation of enhanced safety
  - to promote more effective regulation
    - through early interactions, e.g., preapplication reviews
    - less prescriptive design criteria

- MHTGR Key Issues under review since September 1985

- First version of Key Issues (SECY-88-203) provided basis for specific criteria based on Safety Goals, 10CFR, Severe Accident Policy and Standardization Policy
  - accident selection
  - source terms
  - containment
  - emergency planning

GENERAL ATOMICS

FAS 2/93
ACRS

THE ADVANCED REACTOR POLICY AND SAFETY GOALS SHOULD GUIDE KEY ISSUE POLICY

- Advanced Reactor Policy challenges both the designer and the NRC to develop new approaches to safety
- NRC Safety Goals define an acceptable level of radiological risk to public health and safety
- NRC policy guidance on key issues should:
  - foster the development of regulatory criteria specific to the performance attributes appropriate to advanced reactor technologies
  - focus on risk-significant plant features specific to the attributes of the technology
  - provide a quantifiable threshold based on the safety goals for judging systems, structures and components

ACCIDENT EVALUATION

- Staff to develop single approach for accident evaluation to be applied to all advanced reactor designs

- Events to be grouped and categorized based on frequency of occurrence

- Consequence acceptance limits to be established for each category

- Methodologies and evaluation assumptions consistent with existing LWR practices

---

- MHTGR approach responds to NRC guidance
  - event selection uses deterministic selection and engineering judgement with insights from PRA
  - "Neither the designers, the NRC Staff, nor the members of the ACRS have been able to postulate accident scenarios of reasonable credibility, for which an additional physical barrier to release of fission products is required in order to provide adequate protection to the public" - October 13, 1988, ACRS letter

- Concern: Categories and corresponding limits not defined; LWR based methodologies may not be applicable to MHTGR

US-DOE MHTGR PROGRAM

SOURCE TERM

- Staff to recognize mechanistic ("...best estimate phenomenological...") source terms for advanced reactors

- Requires from applicants:
  - research, development, testing to provide confidence,
  - understanding of transport models, and
  - set of bounding events

- MHTGR responsive to NRC guidance
  - conservative evaluation of design basis events
  - best estimate assessment of events beyond design basis
  - no core damage identified within licensing basis
  - technology program planned to provide required data for prompt and delayed source term

- Concern: Need guidance on treatment of uncertainty

GENERAL ATOMICS

FAS 2/93
ACRS

CONTAINMENT

- LWR high pressure, low leakage containment not mandated
- Staff proposes to postulate a "containment challenge event"
- Limiting containment leak rate not to be exceeded during the first 24 hours of the staff's hypothetical event
- Containment integrity maintained after 24 hours

- MHTGR prompt source term decoupled from delayed source term enables use of vented, low pressure containment to provide an independent barrier to radionuclide release
- Concern: Policy does not define an approach to selecting the "containment challenge event"

US-DOE MHTGR PROGRAM

EMERGENCY PLANNING

- Staff will require advanced reactor designs to establish offsite emergency plans
- Plans will require provisions for periodic offsite drills

- MHTGR safety design approach results in offsite doses less than EPA PAGs at plant boundary
- Concern: No guidance or criteria for level of offsite emergency actions

GENERAL ATOMICS

OPERATOR STAFFING AND FUNCTION

- Staff acknowledges that staffing needs may be design dependent
- Staff to evaluate the following:
  - effective response to worst case events,
  - effective shutdown of modules operating normally with accident in one module (while one operator short),
  - safe shutdown under seismic, blackout, etc.

- MHTGR to develop staffing based on design detail and task analysis
  - will include normal and accident response
- Concern: None

RESIDUAL HEAT REMOVAL

- "...reliance on a single, completely passive, safety-related RHR system may be acceptable."
- will assure consistency with passive LWRs

- MHTGR meets NRC requirements -- passive heat removal is continuously operating and monitored
- Concern: MHTGR residual heat removal capability should not necessarily be linked to ALWR precedent

US-DOE MHTGR PROGRAM

CONTROL ROOM AND REMOTE SHUTDOWN AREA DESIGN

- Staff to apply current LWR regulations and guidance to the review of advanced reactor designs

---

- MHTGR designed without need for operator actions. However, operator has manual scram capability from:
  - control room,
  - remote shutdown area, and
  - safety-related plant protection instrumentation cabinets
- Concern: MHTGR should be evaluated on own merits and should not necessarily be linked to LWR prescriptive regulations

GENERAL ATOMICS

SAFETY CLASSIFICATION

- Per the Staff's evaluation, the MHTGR is the only advanced design that is not in compliance with current requirements

- Staff intends to apply current LWR regulations to classification of system, structures, and components (SSC)

- MHTGR approach simplifies extent and reliance on safety systems to meet Safety Goals
  - safety classification identifies those risk-significant SSCs that are functionally required to meet offsite dose requirements
  - fewer safety-related SSCs permits increased emphasis in risk-significant areas

- Concern: Current classification is LWR specific; MHTGR safety functions are not one-to-one with LWR
  - LWR-type severe accident/core-melt scenarios not applicable
  - PAGs met even with primary coolant boundary failure

SUMMARY

- MHTGR design is responsive to Advanced Reactor Policy
  - meets the Safety Goals with margin
- Framework and basis for Key Issue Policy should be linked to the Safety Goals and the Advanced Reactor Policy
  - should include quantitative guidance and acceptance criteria
  - should not be prescriptive or rely on LWR precedent or yet to be determined ALWR precedent
  - should support development of regulation based on risk importance

Some Thoughts On Using Safety Goals

T. Murley

ACRS
Feb. 11, 1993

HEIRARCHIAL ARRANGEMENT OF GOALS

Level One - NRC Qualitative Goals

Level Two - NRC Quantitative Health Objectives

Level Three - Large Release Guideline

Level Four - Performance Objectives

(1) Core Damage Frequency (Prevention)
(2) Containment Performance (Mitigation)
(3) Operational Performance

Level Five - Existing Regulations and Practices

ACRS 5/13/87

NRC SAFETY GOALS

Quantitative Health Objectives:

Prompt Fatality Goal = 0.5×10^{-6}/year for a person
living within 1 mile of plant

(0.1% of normal accident risks)

Latent Fatality Goal = 2.0×10^{-6}/year for a person
living within 10 miles of plant
(0.1% of normal cancer risks)

<u>Large Release Guideline</u>:

Large Release Frequency $\leq 10^{-6}$/Reactor-year

COMPARISON OF HEALTH OBJECTIVES vs. DESIGN GUIDELINES

	Core Damage Frequency	Individual Risk
Health Objectives	(?)	$\sim 10^{-6}$/Yr
Design Guidelines	$\sim 10^{-4}$/R-Y	(?)

COMPARISON OF HEALTH OBJECTIVES vs. DESIGN GUIDELINES

	Core Damage Frequency	Individual Risk
Health Objectives	($\sim 10^{-2}$/R-Y)	$\sim 10^{-6}$/Yr
Design Guidelines	$\sim 10^{-4}$/R-Y	($\sim 10^{-8}$/Yr)

Practical Partitioning of Safety Goals

I. Qualitative Goals
Quantitative Health Objectives

II. Large Release Guideline (10^{-6}/RY)

Core Damage Frequency $\leq 10^{-4}$/R-Y

Conditional Vessel Failure Probability $\leq$ 0.1

Conditional Containment Failure Probability $\leq$ 0.1

PROMPT FATALITY GOAL

$$\underset{\text{core damage}}{(CDF)} \times \underset{\text{vessel}}{(CVFP)} \times \underset{\text{containment}}{(CCFP)} \times \underset{\text{facilities}}{(CF)} \leq (5\times10^{-7}) \times \underset{\text{population at risk}}{(N)}$$

$$(CDF) \times (0.1) \times (0.1) \times (\tfrac{N}{16} \times 0.08) \leq (5\times10^{-7})(N)$$

$$\boxed{CDF \leq 1 \times 10^{-2}/RY}$$

LATENT FATALITY GOAL

$$(CDF) \times (CVFP) \times (CCFP) \times (CPD) \times (RF) \leq (2\times10^{-6}) \times (N)$$

core damage — vessel — containment — dose person-rem — risk factor — population at risk

$$(CDF) \times (0.1) \times (0.1) \times (3\times10^{6}) \times (5\times10^{-4}) \leq (2\times10^{-6}) \times (1.5\times10^{5})$$

$$\boxed{CDF \leq 2 \times 10^{-2}/RY}$$

LARGE RELEASE GUIDELINE

$$\underset{\text{core damage}}{(CDF)} \times \underset{\text{vessel}}{(CVFP)} \times \underset{\text{containment}}{(CCFP)} \times \underset{\text{large release}}{(CLRP)} \leq 10^{-6}/RY$$

$$(CDF) \times (10^{-1}) \times (10^{-1}) \times (1) \leq 10^{-6}/RY$$

$$\boxed{CDF \leq 10^{-4}/RY}$$

SCHEDULES OF NRC REVIEW OF PROPOSED ADVANCED LIGHT WATER REACTOR DESIGNS

PRESENTATION BEFORE THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

DENNIS M. CRUTCHFIELD
ASSOCIATE DIRECTOR FOR ADVANCED REACTORS AND LICENSE RENEWAL

FEBRUARY 11, 1993

STAFF SCHEDULE CONSIDERATIONS

- FIVE PROJECTS CURRENTLY UNDER STAFF REVIEW
  - THREE PROJECTS (ABWR, SYSTEM 80+, EPRI PASSIVE URD) SCHEDULED FOR NEAR TERM COMPLETION
  - TWO PROJECTS (AP600, SBWR) IN EARLY REVIEW STAGE

- INSUFFICIENT STAFF RESOURCES TO AGGRESSIVELY PURSUE COMPLETION OF ALL PROJECTS ON THE SECY-91-161 TIMETABLE

- FACTORS AFFECTING COMPLETION OF NEAR TERM PROJECTS (ABWR, SYSTEM 80+, EPRI PASSIVE URD)
  - COMPLETION OF A DESIGN REVIEW IS ADVANTAGEOUS IN ORDER TO FURTHER EXERCISE THE PART 52 PROCESS
  - ABWR REVIEW IS MORE MATURE FROM A PROCESS POINT OF VIEW
  - ABB-CE HAS BEEN VERY AGGRESSIVE IN RESPONDING TO AND RESOLVING IDENTIFIED ISSUES ON THE SYSTEM 80+ DESIGN
  - COMPLETION SCHEDULES ARE MORE DEPENDENT ON THE IMPLEMENTATION OF ISSUE RESOLUTION RATHER THAN MAJOR POLICY DETERMINATIONS
  - COMMISSION DIRECTED THE STAFF TO RESOLVE PASSIVE POLICY ISSUES IN EPRI URD INSTEAD OF THE DESIGN REVIEW OF THE PASSIVE PLANTS

VENDOR SCHEDULE CONSIDERATIONS

ABWR

- STAFF AND GE RESOLVED 10 SYSTEM ITAAC AND 7 GENERIC ISSUES IN JANUARY
- STAFF AND GE CONTINUE TO INTERACT ON DFSER OPEN ITEMS
- AWAITING GE's SCHEDULE FOR COMPLETION AND SUBMITTAL OF THE ABOVE ITEMS

SYSTEM 80+

- ABB-CE RESPONDED TO DSER OPEN ITEMS IN LATE JANUARY ALTHOUGH SOME ITEMS INCOMPLETE
- ABB-CE INTENDS TO MAKE A COMPLETE ITAAC SUBMITTAL BY THE END OF MARCH. THE QUALITY OF THAT SUBMITTAL IS UNCERTAIN.

EPRI

- EPRI/NRR MANAGEMENT AGREED TO A FRAMEWORK FOR RESOLUTION OF THE REGULATORY TREATMENT OF NON-SAFETY SYSTEMS ISSUE IN LATE JANUARY
- EPRI TO PROVIDE DETAILS OF THE RESOLUTION IN FEBRUARY

VENDOR SCHEDULE CONSIDERATIONS
(continued)

AP600

- APPLICATION SUBMITTED IN JUNE 1992; ACCEPTED AS COMPLETE BY THE STAFF IN DECEMBER 1992
- 680 REQUESTS FOR ADDITIONAL INFORMATION (RAIs) ISSUED TO WESTINGHOUSE

SBWR

- PARTIAL APPLICATION SUBMITTED IN AUGUST 1992
- GE TO PROVIDE THE REMAINDER OF APPLICATION IN FEBRUARY 1993

ACRS SCHEDULE CONSIDERATIONS

- CONTINUE TO SUPPORT PARALLEL REVIEW ACTIVITIES ON THE NEAR TERM PROJECTS SUCH AS:

  - MEETINGS ON THE SYSTEM 80+ DSER
  - MEETINGS ON ABWR CHAPTER 19 ISSUES
  - REVIEW OF STAFF POSITION ON REGULATORY TREATMENT OF NON-SAFETY SYSTEMS WHEN AVAILABLE

- WHEN SCHEDULAR UNCERTAINTIES RESOLVE, SUPPORT AGGRESSIVE PROJECT COMPLETION

FUTURE STAFF SCHEDULE PAPERS

TOPIC	PROJECTED COMPLETION
ABWR REVIEW SCHEDULE	MARCH 1993
ADVANCED REACTOR SCHEDULES	SPRING 1993

New York Power Authority

James A. FitzPatrick Nuclear Power Plant

Ralph E. Beedle
Executive Vice President
Nuclear Generation
New York Power Authority

Meeting of the Advisory Committee on Reactor Safeguards
Bethesda, Maryland
February 11, 1993

NEW YORK POWER AUTHORITY

Power Authority of the State of New York - 1931

Not-for-profit public benefit corporation

25% of all electric power consumed in State of New York

Electric capacity of 6,800 megawatts

JAMES A. FITZPATRICK NUCLEAR POWER PLANT

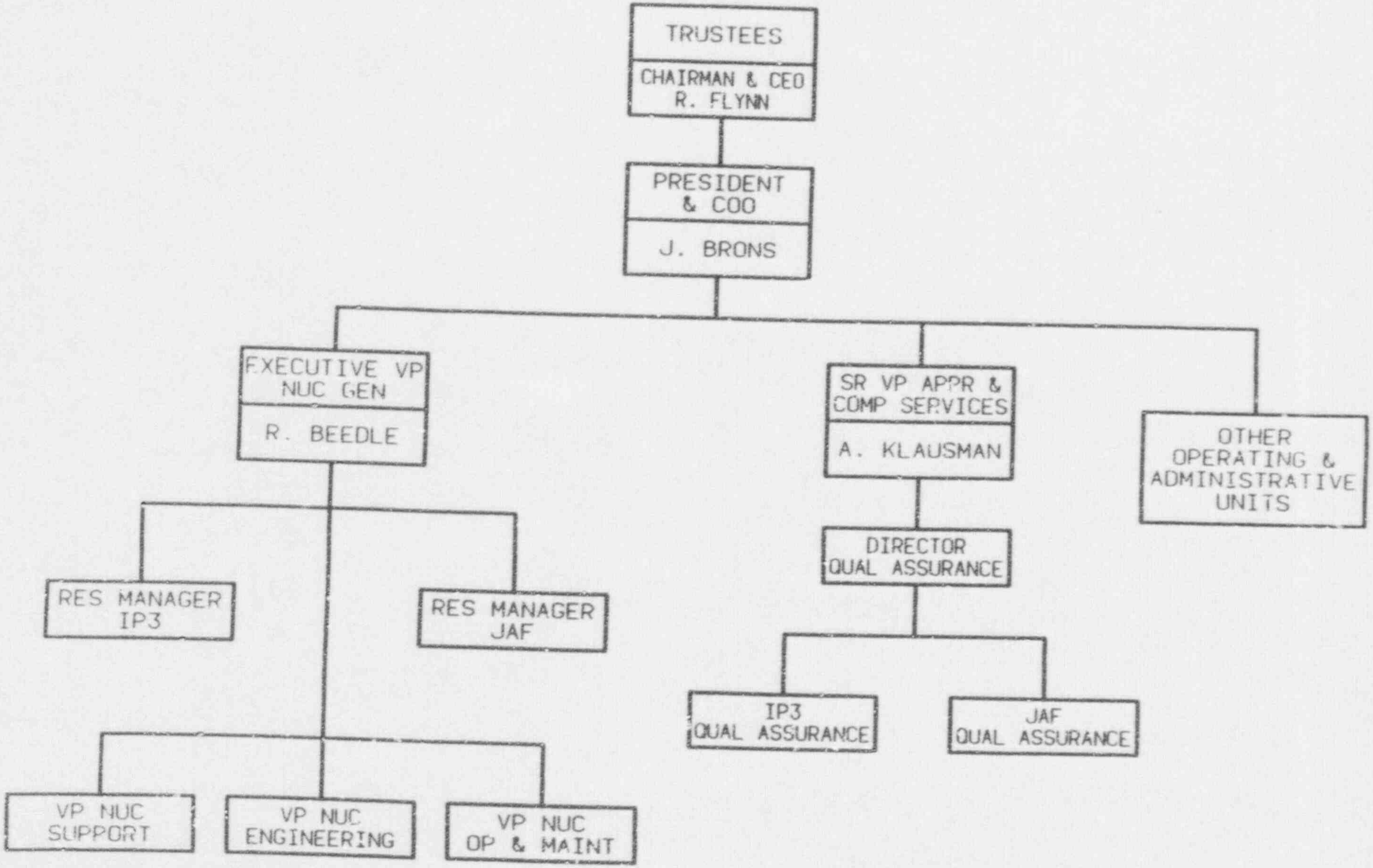
Boiling Water Reactor (BWR IV)

Generator Electric Output	820 megawatts
Operating License	1974

License transferred to New York Power Authority in 1977

New York Power Authority

NEW YORK POWER AUTHORITY



IDENTIFICATION OF NEED FOR IMPROVEMENT

Authority Recognition of Decline in Performance

Declining performance indicators

SALP

INPO evaluations

IDENTIFICATION OF NEED FOR IMPROVEMENT

Authority Issues Team

Inspections and evaluation reports

Employee feedback

NRC Diagnostic Evaluation Team (DET)

IDENTIFICATION OF NEED FOR IMPROVEMENT

Determined Root Causes

Inadequate management oversight, direction and support

Ineffective planning and resource allocation

Lack of policies to promote and enforce standards for performance

IDENTIFICATION OF NEED FOR IMPROVEMENT

Determined Contributing Causes

Communication and teamwork

Industry operating experience

Long standing problems

Management leadership

Attention to detail

Planning

IMPROVEMENT INITIATIVES

Developed Action Plans

FitzPatrick Results Improvement Program

Integrated Nuclear Generation Business Plan

IMPROVEMENT INITIATIVES

FitzPatrick Results Improvement Program

Purpose:

Provide a plan for continuous improvement

Objective:

To be a top performer in the industry

IMPROVEMENT INITIATIVES

FitzPatrick Results Improvement Program

Input:

- Departmental improvement plans
- Employee feedback programs
- Employee suggestion programs
- Issues Report by the Issues Team

Features:

- 600 specific actions to correct root and contributing causes
- Assigned responsibilities
- Action item tracking
- Performance indicators
- Periodic assessment of progress

IMPROVEMENT INITIATIVES

Nuclear Generation Business Plan

Philosophy:

A unified Nuclear Generation Department Plan

Key Objectives:

Nuclear and Industrial Safety

Professionalism

Performance

Regulatory Compliance

Cost Management

Strategies and Action Plans

IMPROVEMENTS TO SAFETY CULTURE

Management standards and expectations

Employee involvement

Work practices

Quality culture effectiveness

Start-up program demonstrated implementation of improvements

IMPROVEMENTS TO SAFETY CULTURE

Management Expectations Established and Communicated

Safety and quality are more important than production

Management wants problems identified

Questioning attitude is an important part of safety

If in doubt, proceed conservatively

Procedures and safety practices must be followed

Resources will be provided to do the job right

Do the job right the first time

Pay attention to detail

IMPROVEMENTS TO SAFETY CULTURE

Employee Involvement

- Formal feedback process
- Plant worker observations
- Post-work ALARA evaluations
- Employee suggestion programs
  - ALARA
  - Plant improvement
  - Plant industrial safety

IMPROVEMENTS TO SAFETY CULTURE

Work Practice Improvement

Radiation protection

Work requests

Temporary modifications and jumpers

Modifications

IMPROVEMENTS TO SAFETY CULTURE

Indications of quality culture

Problems are being identified

Personnel not in QA initiating AQCRs

IMPROVEMENTS TO SAFETY CULTURE

Formal start-up program established with milestones

When problems were encountered -

- Stopped, determined root causes, corrected problems, then continued start-up
  - Reactor Core Isolation Cooling pump turbine oil foaming
  - High Pressure Coolant Injection over-speed trip
  - Main Turbine reset
  - Service Water Leak
    (Reactor Building Closed Loop Cooling heat exchanger)

EXAMPLES OF TWO DIFFERENT CULTURES

PLANT A	PLANT B
Well-trained staff	Poorly trained staff
Plant-specific simulator	No plant specific simulator
Staff rigorously follows procedures	Staff doesn't use procedures
Fully staffed	Many management and staff vacancies
Very little overtime	Routine use of high overtime
Good nuclear work ethic	Fossil plant culture
Professional decorum in control room	Noisy, undisciplined control room
Scrams extremely rare	Frequent scrams
Diligent, probing PORC	Ineffective, pro forma PORC
Good preventive maintenance	Run equipment until it breaks
Shutdown to fix safety systems	Routinely operate in LCO action statements
Low maintenance backlog	High maintenance backlog
Equipment repaired immediately	Equipment out of service for long periods
Clean plant	Many high radiation areas
System engineers on site	No engineering site presence

Thomas E. Murley
Director, Office of Nuclear Reactor Regulation
April 18-20, 1989

MANAGEMENT AND ORGANIZATIONAL IMPROVEMENT

Engineering Organization

Philosophy:

- Corporate office controls licensing and design basis
- Technical Services Department provides operating engineering support

Technical Services Department

- System Engineering expanded
- Performance Engineering expanded
- Operating Experience Review transferred

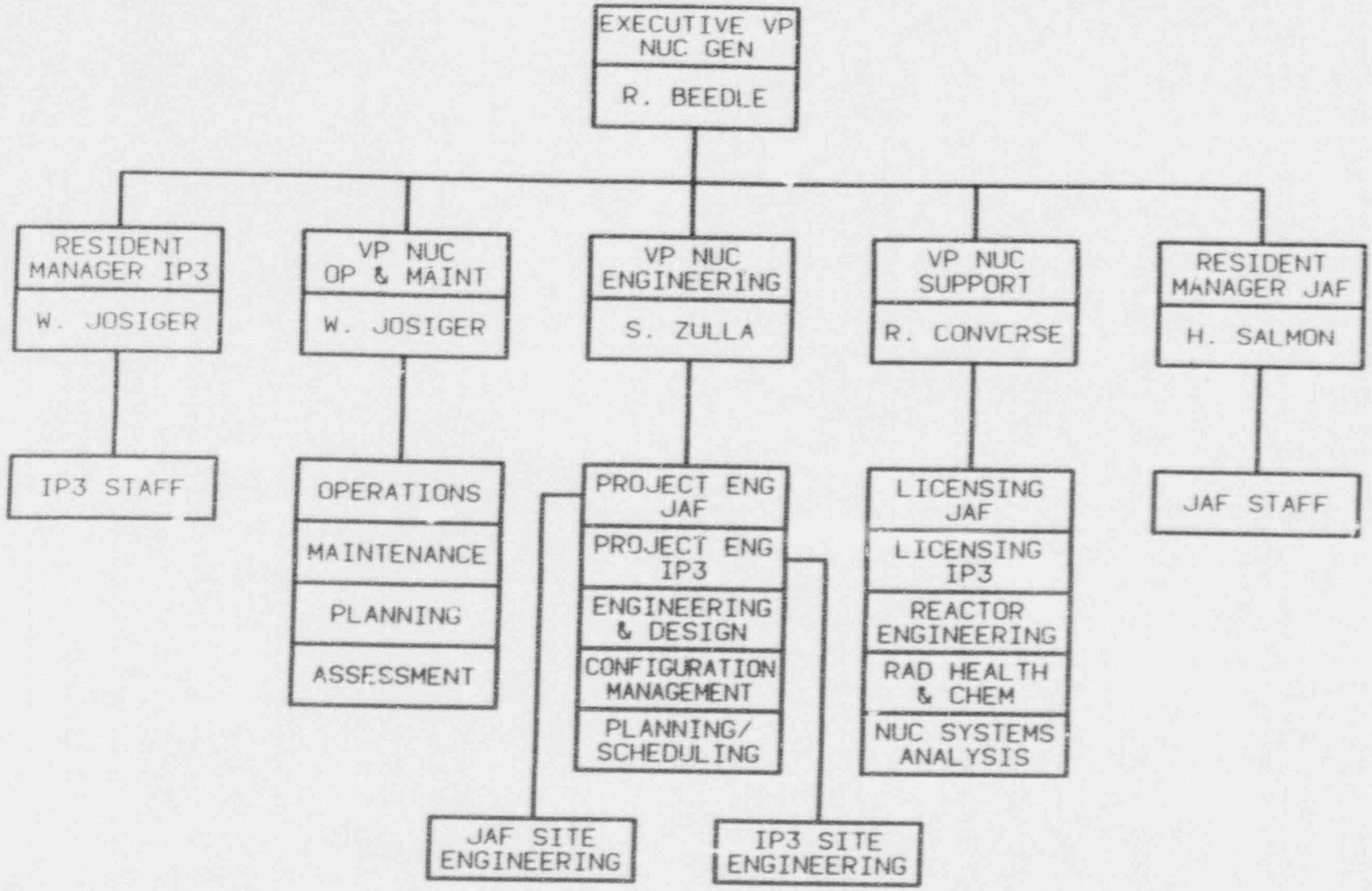
New corporate engineering group

- On-site
- Responsible for modifications
- Organization expanded 300%

New fire protection engineering group

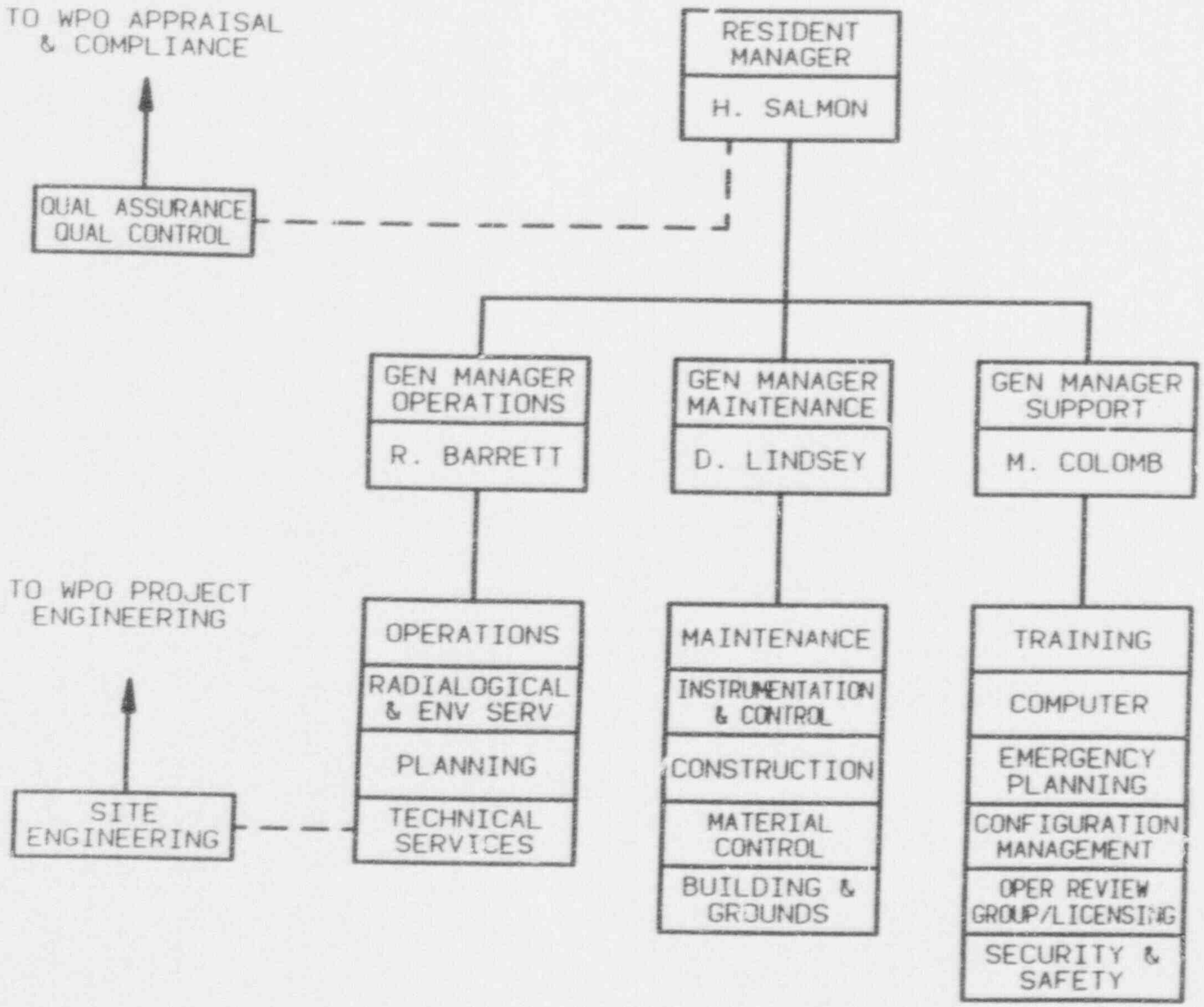
New York Power Authority

NUCLEAR GENERATION DEPARTMENT



NewYorkPowerAuthority

JAMES A. FITZPATRICK NUCLEAR POWER PLANT



MANAGEMENT AND ORGANIZATIONAL IMPROVEMENT

New Resident Manager

New plant organizational structure

Three new General Manager positions
- Decreased spans of control

New plant departments

- Operating Experience Review and Licensing
- Configuration Management
- Planning and Scheduling (significantly expanded)

48 new permanent positions authorized on plant staff

Operations department strengthened with 17 new positions

Management training program expanded

INPO loan program participation at senior management level

MANAGEMENT AND ORGANIZATIONAL IMPROVEMENT

Nuclear Leadership Team

Objective:

Provide leadership, management and oversight

Membership:

Executive Vice President for Nuclear Generation
Resident Managers of James A. FitzPatrick and Indian Point 3
Vice President of Nuclear Engineering
Vice President of Nuclear Support
Vice President of Nuclear Operations and Maintenance

Responsibilities:

Establish policies
Nuclear Generation Business Plan

New York Power Authority

MANAGEMENT AND ORGANIZATIONAL IMPROVEMENT

Plant Leadership Team

Mission:

The safe, reliable, and efficient generation of electricity

Membership:

Resident Manager
General Manager of Operations
General Manager of Maintenance
General Manager of Support Services

Responsibilities:

Establish standards and goals for the plant
Identify needed resources
Oversee FitzPatrick Results Improvement Program
Establish priorities and long term vision

PROGRAM IMPROVEMENTS

Fire Protection

Motor Operated Valves

Performance Indicators

Operating Experience Review

ALARA

Nuclear Generation Department Assessment Section

PHYSICAL IMPROVEMENTS TO THE PLANT

Fire protection program Appendix R modifications

Fire Dampers

Battery Room corridor suppression system

Fire detection north of electric bays

Residual Heat Removal and Core Spray injection valve bypass switches

Penetration seals

Fire wrap Appendix R cables

Bondstrand piping

Emergency lighting

PHYSICAL IMPROVEMENTS TO THE PLANT

Fire protection program modifications (continued)

Fire doors

Install fire protection system to Residual Heat Removal Service Water cross-tie

Carbon Dioxide control panel

Reactor Protection System relays

Low Pressure Coolant Injection independent power supply bypass switch and removal of environmental enclosures

Residual Heat Removal reactor head spray piping

Containment isolation valves

PHYSICAL IMPROVEMENTS TO THE PLANT

Service Water piping

Emergency Service Water check valves

"B" Core Spray piping and safe end

Diesel Generator cooling line to discharge tunnel

Torus temperature measurement

Diesel Generator, High Pressure Coolant Injection, and Reactor Core Isolation Cooling control circuit isolated power supplies

Emergency and Plant Information Computer / Implement 3D Monicore

Electrochemical Potential sample flange in recirculation loop

PHYSICAL IMPROVEMENTS TO THE PLANT

Main steam line drain valves

High Pressure Coolant Injection model system modifications

Reactor water level instrumentation piping / remove supports

Instrument air system modifications

CAPITAL IMPROVEMENTS

Video conference system between corporate office and nuclear sites

Administration & maintenance support building

Computer network integration with corporate office

Control rod drive replacement

Containment isolation valve replacements

SUMMARY

ON LINE AT 100% POWER

Slow and deliberate four week start-up program following a 14 month outage

Competence of plant staff and completeness of controls evidenced by:

- Smooth progression from initial start-up to full power
- Seven milestones from start-up plan
- Problem root causes located and corrected before continuing power ascension
- Did the job right the first time

NRC STAFF PRESENTATION TO THE ACRS

SUBJECT:	FITZPATRICK RESTART
DATE:	FEBRUARY 11, 1993
PRESENTER:	C. J. COWGILL
TITLE:	CHIEF, PROJECTS BRANCH NO. 1, REGION I
TELEPHONE NO:	(215) 337-5233

BACKGROUND

- PERFORMANCE DECLINE
- DIAGNOSTIC EVALUATION
- RESULTS IMPROVEMENT PROGRAM
- FITZPATRICK ASSESSMENT PANEL FORMATION

NRC ASSESSMENT PANEL

- CHARTER
- PANEL COMPOSITION

NRC ASSESSMENT PROCESS

- DEVELOPMENT OF RESTART ISSUES
- NRC INSPECTIONS
- MONITOR RIP IMPLEMENTATION AND SELF ASSESSMENT EFFORTS
- RESTART ASSESSMENT TEAM INSPECTION
- READINESS FOR RESTART EVALUATION
- CONCURRENCE FOR RESTART
- AUGMENTED RESTART COVERAGE

READINESS FOR RESTART EVALUATION

- ROOT CAUSE IDENTIFICATION/CORRECTIVE ACTION
- PHYSICAL STATE OF READINESS
- PLANT AND CORPORATE STAFF READINESS
- MANAGEMENT OVERSIGHT
- SPECIFIC TECHNICAL ISSUES
- LICENSING ACTIONS

CONTINUING NRC ACTIVITIES

- OPEN ITEM FOLLOWUP
- RESTART SELF ASSESSMENT
- RIP IMPLEMENTATION AND SELF ASSESSMENT FOLLOW-UP
- SALP

ASSESSMENT OF REGULATIONS

AFFECTING POWER REACTORS

U.S.NUCLEAR REGULATORY COMMISSION

REGULATORY REVIEW GROUP

REGULATION REVIEW SUBGROUP

JOHNS JAUDON
MACK CUTCHIN
CLAUDIA CRAIG

REVIEW OF REGULATIONS

- INITIAL SCREENING
- FOLLOW UP ON SELECTED REGULATIONS

SCREENING FINDINGS

- CHANGES UNDER LICENSEE CONTROL
- COMMITMENTS AND METHODS
- MANY REGULATORY REVIEWS
- QUALITY ASSURANCE

ASSESSMENT OF OPERATING LICENSES

U. S. NUCLEAR REGULATORY COMMISSION

REGULATORY REVIEW GROUP

LICENSE ANALYSIS SUBGROUP

CECIL THOMAS
BYRON SIEGEL
TONY CERNE

PLANTS (LICENSES) SELECTED FOR ASSESSMENT

- SEABROOK STATION, UNIT NO. 1
- SURRY POWER STATION, UNIT NO. 1
- PERRY NUCLEAR POWER PLANT, UNIT NO.1
- PEACH BOTTOM ATOMIC POWER STATION, UNIT NO. 2

SUMMARY OF ASSESSMENT APPROACH

- o REVIEW EACH OPERATING LICENSE ITEM AND ASSIGN IT TO A CATEGORY
- o DETERMINE WHICH CATEGORIES CONTAIN ITEMS THAT ARE APPROPRIATE TO BE ASSESSED COLLECTIVELY
- o DETERMINE WHICH ITEMS FROM THE REMAINING CATEGORIES WILL BE ASSESSED INDIVIDUALLY
- o ASSESS ITEMS IN ACCORDANCE WITH ANALYSIS QUESTIONS; RESEARCH ITEMS AS NECESSARY
- o PREPARE ASSESSMENT SUMMARIES
- o INTEGRATE RESULTS, AND DEVELOP OVERALL CONCLUSIONS AND RECOMMENDATIONS

CATEGORIES OF ITEMS

- o TECHNICAL REQUIREMENTS

- o NON-TECHNICAL LICENSE CONDITIONS

- o LICENSE CONDITIONS WHICH RELY ON OTHER DOCUMENTS FOR REQUIREMENTS

- o ADMINISTRATIVE CONTROLS (EXCLUSIVE OF REPORTING AND RECORDKEEPING REQUIREMENTS

- o REPORTING AND RECORDKEEPING REQUIREMENTS

- o UNIQUE PLANT FEATURES

- o OTHER

<u>ASSESSMENT QUESTIONS</u>

- o REGULATORY BASES
- o SAFETY RELEVANCE
- o INHERENT FLEXIBILITY
- o ENHANCED FLEXIBILITY POTENTIAL

SCHEDULE AND WORK PRODUCTS

ACTIVITY/WORK PRODUCT	COMPLETION TIME	COMPLETION DATE
SELECT PLANTS (LICENSES), DEVELOP APPROACH, IDENTIFY WORK PRODUCTS, DEVELOP SCHEDULE	2 WEEKS	1/22
DRAFT REPORT ON PLANTS, APPROACH, WORK PRODUCTS AND SCHEDULE		
REVIEW FIRST (PILOT) LICENSE	4 WEEKS	2/19
DRAFT REPORT ON FIRST LICENSE		
OBTAIN FEEDBACK, PERFORM ADDITIONAL REVIEW AND REVISE APPROACH AS NECESSARY	IN PARALLEL WITH CONTINUING REVIEW(S)	
REVISED REPORT ON FIRST LICENSE, APPROACH, AS NECESSARY		
REVIEW SUBSEQUENT LICENSES	9 WEEKS	4/23 (FOR LAST REPORT)
DRAFT REPORTS ON SUBSEQUENT LICENSES		
INTEGRATE FINDINGS AND PREPARE FINAL REPORT	2 WEEKS	5/5
FINAL REPORT		

ASSESSMENT OF REGULATIONS

AFFECTING POWER REACTORS

U.S.NUCLEAR REGULATORY COMMISSION

RISK ASSESSMENT GROUP

RISK ASSESSMENT SUBGROUP

JOE MURPHY
MARY DROUIN

Risk Technology

- Assessment of current strengths and weaknesses of PRA methods

- Assessment of NRC-sponsored efforts on use of PRA techniques to improve operations
    - NRR
    - RES

- Assessment of efforts on use of PRA techniques to improve operations sponsored by others
    - U.S. Industry
    - Foreign Activities (Mexico, UK, FRG, Sweden, etc.)

- Required Principles for use of integral PRA analyses in regulation (Emphasis on Tech Spec improvements, graded QA, and prioritization)
    - Inherent limitations
    - Balancing of Prevention and Mitigation
    - Balancing of functional unavailabilities
    - Balancing of system unavailabilities
    - Scope
    - Boundary conditions and imbedded assumptions
    - Data quality
    - Uncertainty analysis
    - Nature of additional research needed, if any

- Implications regarding resource commitments for different degrees of risk-based regulation
    - Industry
    - NRC

EXAMPLE
RISK-BASED ACTION STATEMENTS

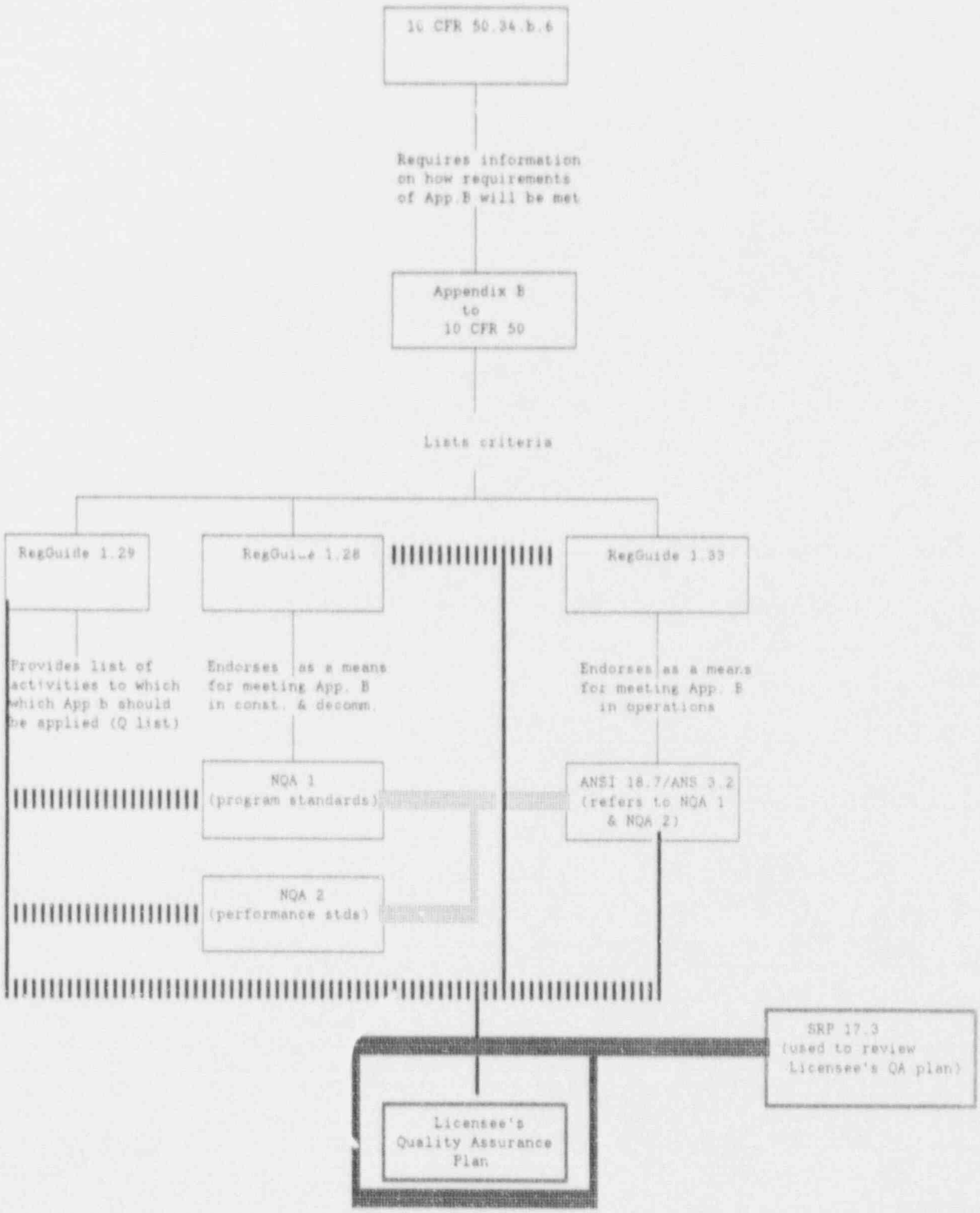
(Based on pilot application to RHR/SWS systems of a BWR6)

CURRENT TECH SPECS:

SYSTEM	INOPERABLE TRAINS	AOT	LCO SPEC.
RHR/SPC	A AND B	8 HOURS	3.6.3.3
RHR/CS	A AND B	8 HOURS	3.6.3.2
RHR/LPCI	A AND B	3 DAYS	3.5.1
SWS	A AND B	0	3.7.1.1
SWS	A AND B AND C	0	3.7.1.1

RISK INSIGHTS:

- FOR RHR, RISK-BASED ANALYSIS INDICATES RISK OF SHUTTING DOWN EXCEEDS RISK OF CONTINUED OPERATION FOR INITIAL 6 DAYS WITH BOTH TRAINS A AND B OUT OF SERVICE.
- FOR SWS, RISK OF SHUTTING DOWN EXCEEDS RISK OF CONTINUED OPERATION FOR 3 DAYS WITH TRAINS A AND B OUT OF SERVICE, AND FOR 14 DAYS WITH TRAINS A, B, AND C OUT OF SERVICE.


10 CFR 50.34.b.6
Requires information on how requirements of App.B will be met
Appendix B to 10 CFR 50
Lists criteria
RegGuide 1.29
RegGuide 1.28
RegGuide 1.33
Provides list of activities to which which App b should be applied (Q list)
Endorses as a means for meeting App. B in const. & decomm.
Endorses as a means for meeting App. B in operations
NQA 1 (program standards)
ANSI 18.7/ANS 3.2 (refers to NQA 1 & NQA 2)
NQA 2 (performance stds)
SRP 17.3 (used to review Licensee's QA plan)
Licensee's Quality Assurance Plan

MATRIX OF REGUALTORY ACTIONS

Regulation	Group	Description	Contact
[illegible]	Fitness for Duty	SECY-92-271 - Recommends Commission reduce testing rate to 50% for licensee employees but maintain 100? for contractors. Commision has approved and a Notice of Proposed Rulemaking is forthcoming.	L. Bush NRR
		SECY-92-308 - Identifies a number of proposed amendments to the FFD rule based on lessons learned. This has been before the Commission since Sept 92; there have been concerns regarding backfitting and RES has been asked to to look into it.	
		COMSECY-92-018 - Requests the staff to look into the scope of testing under the FFD rule (i.e., should s-cretaries with no vital area access be tested). The staff is review-ing the issue.	