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UNITED STATES
NUCLEAR REGULATORY COMMISSION

In the matter of:

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
240th GENERAL MEETING

Place: Washington, D. C.

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UNITED STATES

NUCLEAR REGULATORY COMMISSION

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240TH GENERAL MEETING OF THE ADVISORY COMMITTEE

ON REACTOR SAFEGUARDS

- - -

Room 1046, 1717 H Street, N.W.
Washington DC
Friday, April 11, 1980

The Advisory Committee on Reactor Safeguards, 240th General Meeting, met, pursuant to notice, at 8:30 a.m., Dr. Plesset, Chairman of the Committee, presiding.

PRESENT:	Dr. Okrent	Mr. Wilson
	Dr. Lawroski	Mr. Mark
	Mr. Etherington	Mr. Siess
	Professor Kerr	Mr. Moeller
	Dr. Shewmon	Mr. Carbon
	Mr. Israel	Mr. Mathis
	Dr. McCreless	Mr. Ebersole
	Mr. Bickel	Mr. Lewis
	Mr. Fraley	Mr. Ray
	Mr. Doppler	Mr. Jacobs
	Mr. Tedesco	Mr. Tam

and others

P R O C E E D I N G S

CHAIRMAN PLESSET:

registered and include the transient for stops and vulnerability of B&W nuclear steam supply systems and a proposed nuclear data length.

The Committee will also meet with the NRC Chairman Ahearne to discuss the ARCS review of the NRC action plan and the proposed deadening of the TMI-2 containment.

Copies of the Federal Register notice are posted at the door. The discussion of proposed changes in 10-CFR-50 Appendix K, ECCS evaluation models have been postponed to a future meeting.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act and the Government in the Sunshine Act.

Mr. Peter Tamm is the designated Federal employee for this portion of the meeting.

May I remind everyone that for those portions of the meeting where a transcript is being kept, it is particularly important that speakers identify themselves and speak with sufficient clarity and volume that they can be readily heard.

We have received requests from the Toledo Edison Company to make an oral statement regarding the transient response of B&W reactors. Time has been set aside for this statement.

Before I call on the chairman of the Subcommittee, let me make a few remarks to help you in thinking about the agenda and what we have scheduled.

As you know, we postponed the discussion of nuclear data link from last night to today; and this will come immediately after our meeting with the Commissioners. I believe that three of the Commissioners will be down here at 1:00 o'clock, and this will -- this has been done, in part, to help the people who were put off from yesterday: Mr. Stello and others.

So they will be here at 2:00 o'clock, and the consideration of the proposed reply to Commissioner Zelinsky regarding the pause in licensing will come immediately after that portion of our session.

I'd like to correct one statement I made yesterday: that the revision of the Appendix K would be considered next month. That's not the case; it'll be some months away, because there will be a Subcommittee meeting of the Fuels Committee, Dr. Shewmon's subcommittee, and the ECCS Subcommittee to consider the information again. And it most likely will be a few months before this comes back to the full committee.

I also might want to call to your attention that when Commissioner Ahearne come down -- comes down -- he will be asking us questions that you might want to think about a

little bit.

You, you have a copy of his letter; and in that letter he indicates a couple of points that he'd like to ask the Committee about.

Also, Commissioner Bradford is interested in our evaluation of Staff responses to ACRS recommendations, and he will very likely ask us about that.

Well, without --

MR. FRALEY: Can I mention just for one --

CHAIRMAN PLESSET: Yes. Please.

MR. FRALEY: Do you remember yesterday I said we would give you some background material related to these questions that will be discussed with the Commissioners?

And three bits and pieces have been passed out, if there -- if you can't find them in your piles, let me know and I'll give you another copy.

There is a proposed letter, a draft letter with credits to Andy Bates, called "Additional ACRS Comments on the Reactor RCP Trip and HPI Termination Criteria Contained in the Recommendations of the Task Force on Bulletins and Orders." That's in response to one of Commissioner Ahearne's questions.

There is another document which says "Background Information" on it, and it's actually a copy of Chairman Ahearne's memo with a lot of material attached, regarding

the questions he asked about our NTOL letter; and that, that is not in the nature of a specific comment. It is truly in the nature of background material.

In addition, this morning I guess you have received or -- this document called "Summary Status on NRC Staff Responses to ACRS Requests and Recommendations." And it's got a few statistics down here at the bottom. This was put together by Andy Bates and may be useful to you.

So those are the three documents that we promised. And if you have a chance, you might glance at them before you meet with the Commissioners.

If you can't find them, let me know and I'll get you another copy.

CHAIRMAN PLESSET: I have four pieces of information that -- what is a -- pick one. The item prepared in response to Commissioner Bradford's request. Then a letter dated April 1 from Commissioner Ahearne. And another one, which is a long sheet, from Commissioner Ahearne. And then a short one dated April 8th. If you have all of those, you should be well prepared.

MR. FRALEY: Just one more thing with respect to this background material, I understand it is boiled down into recommendation form; and that will be available later this morning. It's in the typewriter right now.

DR. OKRENT: I'm sorry: where is this draft thing

that Andy Bates has heard?

MR. FRALEY: If you can't find it, I'll get you a copy.

DR. LAWROSKI: What's the title on it? What's --

MR. FRALEY: The title is "Additional ACRS Comments on the Reactor RCP Trip at HPI Termination Criteria Contained in the Recommendations of the Task Force on Bulletins and Orders." And it looks like a draft letter, and it's on black-and-white paper.

DR. LAWROSKI: Would you get me some, please.

(Brief discussion.)

MR. FRALEY: I'll pass another one around to everybody, so if you get duplicates please just destroy them.

(Brief discussion.)

I'll pass it around again, gentlemen.

CHAIRMAN PLESSET: Okay, thank you, Ray.

Now let me call the proceeding to the scheduled agenda item. Let me call to Harold Etherington, who is Chairman of this Subcommittee on the Transient Response and Vulnerability of B&W Nuclear Steam Supply Systems.

Harold, would you take over?

MR. ETHERINGTON: Yes.

The Subcommittee met on Tuesday of this week to review a number of items relating to OTSGs and other B&W matters. We were first to the desirability of stopping

construction of B&W reactors for which construction permits have been issued.

Secondly, to review a draft of NUREG-0667 titled "Transient Response of Babcock and Wilcox Design Reactors."

And thirdly, to hear progress reports on a number of other items.

Regarding the first item, stopping of construction, the Committee will recall that last fall Mr. Denton was considering the advisability of holding up construction pending final decisions relating to the test of B&W plants for certain transients.

On October 25, he requested holders of construction permits for B&W reactors to respond to six questions. Four of them were technical in nature, and two concerned the status of construction and the impact of halting construction on the utilities program.

The utilities concerned were Consumers Power, TVA, Washington Public Power, and VEPCO. VEPCO decided that -- notified the Commission that they were not planning to proceed with construction at this time, so they are not involved at the present time.

Based on responses to the questions, Mr. Denton on January the 22d advised the Commission, first, that there would be little benefit in holding up construction; second, that a discussion with ACRS was planned for April; third, that

the Staff analysis and conclusion should be completed in April; and fourth, that Washington Public Power has been asked to make a risk study, which is expected to take about six months.

A letter from the Committee on the proposed continuation of construction is desired at this meeting.

The utilities have representatives here to make presentations and to answer questions.

On the second matter, the draft of NUREG-0667, we received this only recently. The report is dated April the 2d, and we received it only a few days ago. Also, there's one chapter today.

The Subcommittee was briefed on the report, but did not feel that this constituted an adequate review. The report is the product of a special task force which was set up following the Crystal River III incident; the purpose, to assess the sensitivity of B&W plants in the light of that latest incident.

The Subcommittee indicated that it would review the report at a future meeting and assume that the Committee would not want to write a letter of this meeting -- or perhaps even to review the report in any great depth.

The Subcommittee felt that the Committee would like to hear shortened presentations of each of the items reviewed by the Subcommittee on Tuesday. One of the presentations is

a report by Dr. McCreless on three of the ACRS fellows.

It's been requested that the final version of this report be made available to others. At present I think it's an official-use-only document, and I think the Subcommittee -- I think the Committee will want to make a decision whether they should make documents of this kind available to the other participants in the meeting and therefore to the public.

You have a draft of a very short letter relating to the holdup of construction. I have no illusions that this letter will stay as it is; if it does, it will be the shortest letter the Committee's ever written.

(Laughter.)

MR. ETHERINGTON: I believe it represents the consensus of the Subcommittee.

The items that were reviewed by the Subcommittee included a presentatation -- the presentation I mentioned by Mr. -- by Dr. McCreless and the fellows. It was thought that the full Committee would like to hear part of that presentation.

There was an introduction by Tom Novak, which I presume will be repeated.

The Staff analysis on the sensitivity of B&W plants to feedwater transients -- that's the report which I mentioned, but we did not consider in detail. The Committee would like to have a very short briefing on that, I'm sure. This was

the result of a past study, a two-week study. And it'll be reviewed by the full Committee at a future -- by the Sub-committee at a future time.

MR. ETHERINGTON: Mr. Jensen presented a revision of the relap calculation showing that the calculations now conform reasonably closely to the trap-2 calculations by the industry.

There was a short progress report on the ANL plant sensitivity program. This is a one-and-a-half year program that has just commenced.

There was another report on pertinent results from the integrated reliability evaluation report, by Dr. Murphy. This is an updating of information that was provided during January. It relates to the Crystal River program and subsequent plans. I think this is the document that was mentioned yesterday and that you showed interest in, Dave.

Is that -- does that sound like it?

DR. OKRENT: If the one you're referring to is the one that someone showed to me later during the afternoon session, it resembled to me what, in fact, we had seen the previous month. It was sort of a qualitative description showing some interconnections of --

MR. ETHERINGTON: Yes.

DR. LAWROSKI: -- of -- one of the service water cooling systems and AC power and so forth. It did not give

any quantitative results.

MR. ETHERINGTON: I thought that would be your impression of it. As I indicated, there was something like it handed out.

Then we have presentations on Washington Public Power, Consumers Power, and TVA. And Mr. Taylor, of B&W, and Mr. Dominic, of Toledo Edison, also made made short presentations. They were not preplanned, but requested from the floor.

That completes my report, Mr. Chairman.

CHAIRMAN PLESSET: Thank you, Harold.

MR. ETHERINGTON: There are some of the other Subcommittee members who may wish to add --

CHAIRMAN PLESSET: All right. Who were they, Harold?

SPEAKER: No comment.

SPEAKER: No.

SPEAKER: No comment.

CHAIRMAN PLESSET: Phil?

PROFESSOR KERR: In the summary of the meeting, on page 3, there is a statement that after the Crystal River III incident -- this is item 4 -- the Staff has decided that it should deemphasize quantitative risk assessment but should emphasize diverse applicability of accident sequence analysis.

What does that mean?

(Pause.)

DR. OKRENT: The silence was deafening.

CHAIRMAN PLESSET: Yes. Who was the -- who is the author of those --

SPEAKER: While they're meditating, can you tell me --

CHAIRMAN PLESSET: -- of those words?

PROFESSOR KERR: I'm reading from a --

DR. SHEWMON: Thati's something that's handed out loose and not in the folders.

PROFESSOR KERR: It's dated April 10th, and it's titled "Summary of the April 8, 1980, Meeting of the B&W Reactor Subcommittee."

MR. ETHERINGTON: This is the handout there?

PROFESSOR KERR: Yes, sir.

(Brief discussion.)

MR. ETHERINGTON: Page --

PROFESSOR KERR: Page 3, item 4, last paragraph under item 4.

CHAIRMAN PLESSET: Well --

DR. OKRENT: I think we should have a rule against members reading their morning mail so fast.

CHAIRMAN PLESSET: Yes --

(Laughter.)

-- I think that's a very good -- but Peter Tamm says that's a direct quote of a statement from a member of

the Staff.

MR. ETHERINGTON: They, they just do this to embarrass subcommittee chairmen, that's all.

(Laughter.)

PROFESSOR KERR: I'm not questioning it. Direct quote. I just, I just wondered what it meant.

MR. FRALEY: Well, perhaps someone from the Staff could address it.

CHAIRMAN PLESSET: Well, it was Mr. Murphy. Is he here?

SPEAKER: Mr. Murphy will be here at 10:30 to --

CHAIRMAN PLESSET: Do you know what he had in mind, Sandy?

MR. ISRAEL: Yes. The concern is that the Staff does not feel comfortable with the data base, but they wanted to put a great deal of emphasis on the quantitative results of the reliability studies.

We want to continue with these studies, using some fixed data base, and look at the qualitative aspects -- in regard to fixating more on the quantitative --

CHAIRMAN PLESSET: Are you --

PROFESSOR KERR: That's what is meant then by "diverse applicability of accident sequence analysis"?

MR. ISRAEL: That's --

PROFESSOR KERR: It sounds interesting enough, but

I'd be -- I would -- it sounds fascinating. I'd be interested in some or all of it.

CHAIRMAN PLESSET: Well, I guess he'll be later. And if he said those words, he can maybe edify you suitably.

(Pause.)

Any other comments before we proceed with our agenda?

DR. SHEWMON: Can I get another copy of that summary? Neither Lewis nor I seem to be able to find it here.

CHAIRMAN PLESSET: I couldn't find it either, to tell you the truth; but I took it as hearsay.

PROFESSOR KERR: It's really something I wrote myself.

(Laughter.)

SPEAKER: Do you want to give it to the Washington Post?

(Laughter.)

CHAIRMAN PLESSET: Well, let me -- we have as a first item a discussion with the ACRS Staff, which prepared a study of a request of this question. And I think that Tom McCreless is going to kind of lead this.

Would you take over, Tom?

DR. McCRELESS: Thank you very much.

CHAIRMAN PLESSET: I should mention that the -- Tom McCreless had a group consisting of Staff fellows Bickel,

Young, and Abbott in this effort. Is that correct?

DR. McCRELESS: You -- unfortunately, you just took away everything I was going to say.

CHAIRMAN PLESSET: Oh!

(Laughter.)

CHAIRMAN PLESSET: I didn't mean to do that.

DR. McCRELESS: During the last full Committee meeting, a task force was established to look into some of the aspects of B&W reactors. And that task force is, comprises, Dr. Plesset said, of Ed Abbott, John Bickel, John Stampoulos and Gary Young and myself.

And we were -- our first task, of course, was to decide just exactly what we could do to best serve the Committee. And two subcommittees, both the B&W Subcommittee and Crystal River.

We realized that we would not in the time available to us be able to prepare a single report that would cover both or all the aspects of B&W reactors. So we decided to postpone the investigation of the Crystal River incident and just devote all of our efforts to assist the B&W Subcommittee meeting in its determination: should construction permits for B&W plants be continued?

It was our intent here, at least in our discussions with the staff we were led to believe that there would not be a Staff report available prior to the Subcommittee meeting.

Now, that turned out not to be true. But I say that to explain why we prepared the report as we did. We thought that we would try to gather together some information on B&W reactors that probably would have been included in the Staff report but that was not currently available. And we decided to look into the design of the once-through steam generator, look into the sensitivity of B&W reactors to feedwater transients, look into the reliability of the integrated control system, and then to perform a dynamic analysis of the B&W N-triple-S.

And it's that part today that we're going to talk about: the dynamic analysis. We prepared the report. We sent you copies, with a letter dated March 31st. That was the preliminary draft version 1. On April the 7th we revised some pages to clarify some of the things that were -- obviously needed clarification. And that's preliminary draft 2.

And I put copies of that, those changes on your chairs this morning.

The task force stands ready to answer any questions that you may have on the report, following the presentation by John Bickel, of the dynamic analysis.

John, are you ready?

PROFESSOR KERR: Is anybody besides me missing page 17?

DR. McCRELESS: Are those -- are the whole report? We'll bring you a copy.

PROFESSOR KERR: Okay.

I thought maybe it just didn't exist. But there is --

CHAIRMAN PLESSET: No, there is one.

PROFESSOR KERR: Okay.

(Pause.)

MR. BICKEL: Good morning, Mr. Chairman, members of the ACRS.

I would like to discuss, or attempt to discuss briefly, the findings I made regarding the inerrant dynamics of the B&W NSSS. We examined -- or I should say "I examined" basically several factors, being that I only had a limited period of time.

The main things which I looked at were the load-change capability, the rate at which you can change pressurizer pressure and pressurizer level in this type of a plant, and also how rapidly one can change the heat transfer from the primary coolant system to the steam side during anticipated transients and limiting accidents -- faults.

The first thing I think it's important to recognize is that there are advantages and disadvantages to the B&W design; and I'll go into that right now.

The load-change rate in any pressurized water reactor can be somewhat ascertained or put into perspective

by taking note of what they call a power-defect equation.

PROFESSOR KERR: John, step on this side.

(Pause.)

SPEAKER: If you do it right, you can block --

(Laughter.)

SPEAKER: Move that chair --

MR. BICKEL: I wouldn't want to do that.

(Laughter.)

This thing they generally call the power defect equation. It says that if you want to change the load in the reactor from one power to another, you must insert a small change in reactivity which is equivalent to overcoming the moderator reactivity change and the Doppler reactivity change.

One can take this and figure out how quickly you can change power, based on the reactivity insertion or removal rate. Then you just divide it by what is essentially the moderator coefficient of reactivity, times the temperature program with power, plus the Doppler reactivity and the fuel temperature coefficient -- or fuel temperature versus power.

Now, in a B&W reactor the thing it is of interest to point out is that they essentially run with a flat T-average program.

Now, when this is done, you end up with a much, much higher power change rate. In other words, you've eliminated all terms in the denominator which are reflective

of a moderator reactivity feedback. And all you've got left is the Doppler. One of the advantages of this, is it means that the control rods give you a much higher -- well, it looks like an effective word: the controlling power

And this is achieved by having the integrated control system or, in the manual of the operator, regulate the feedwater such that they drop the cold-leg temperature as they go up in power or increase as they go down in power.

Now, the advantages that you can find out of having such a scheme is that it permits loading and unloading of the reactor at about 10 percent a minute, between 20 and 90 percent load. This is considerably higher than U-2 pressurized water reactors, which are limited at about 5 percent a minute.

The B&W NSSS can also accommodate a loss of a single feed pump via a 50-percent per minute runback rate, without providing oversizing in the feedpumps. This is an advantage I will talk to in a minute or so.

The B&W NSSS can also accommodate a loss of load, or turbine trip, by again -- by this fast 50-percent-a-minute runback and, again, without oversizing the steam bypass system.

It can also accommodate the loss of a single reactor coolling pump, by running back, again, very quickly to about 75-percent load.

PROFESSOR KERR: John, excuse me.

MR. BICKEL: Yes.

PROFESSOR KERR: What do you mean by "oversizing"?

MR. BICKEL: I'll get to that in a minute, I guess.

Basically, they can get down in power very quickly if -- under a control action.

By the term "oversizing" I mean, if you have a feedwater system that is designed for normal operation, it means that the individual trains are generally sized to provide about 55 to 60 percent flow if on their own.

If one wants to provide the ability to run, runback the reactor without tripping from full load if you lose one of the feedwater trains.

In a U-2 plant what is generally required is about 85-percent oversizing of one of the individual trains. What that buys you is that you can speed up the remaining feedwater train and get the reactor power down, but it has to go at a slow rate because you are not on a flat T-average program, which B&W has.

In other words, they can get the reactor power down quicker; so they do not have to oversize the feedwater train to accommodate the loss of a single feedwater pump.

Now, the subtle advantage of this is that they are limited, therefore, into how much of a runaway feedwater incident they can get.

The other plants typically, like a good example is

Arkansas Unit II. To the best of my knowledge, I think they have a feedwater transient individually sized at about 85-percent flow.

Now, this is -- like I say -- is related to the fact they are limited in how quickly they can reduce power, because they have a T-average program which I'll show you is a little bit different.

This, as I mentioned, is the temperature control program used by a B&W reactor. As you know, it has a flat T-average. This is dropped, the T cold leg -- or the T cold temperature -- is dropped by the proper regulation of feed-water.

In a U-2 -- this is more typical. This is a CE system 80 type plant. You find they've got this ramp, TF. In other words, as they try and go down in power by putting control rods in they get a, they get an increase in power due to the feedback from the moderator. So they can, they can be -- their power reduction rate is a lot lower.

An additional example of oversizing has to do with the accommodating of a turbine trip. To normally accommodate a turbine trip without this extremely fast runback capability, which is inherent of B&W plants, one has to provide a lot of oversize feed-bypass valves.

Typically, if one wants to provide full load rejection capability in a U-2 plant, you're talking about 70

to about 85 percent steam bypass float -- steam bypass capacity. With the B&W plant, I'm not as sure of the exact number, but I know it is considerably less.

What this means -- and this again is a subtle point -- is that a spurious incident, like say at full load, where you open up all the steam-dump valves -- and this event has happened, in a pressurized water reactor -- they're limited as to how much of an increase in steam they can see.

Well, the next point --

(Pause.)

There have been -- there are in existence -- oops! -- actual field measurements of the dynamic response of the B&W plant. This is not generated with a computer; this is done by making an actual frequency response measurement in a Babcock and Wilcox PWR and then comparing it to a Westinghouse.

Now, the two plants chosen, the ones with the circles, represents a CONY-1. This data was taken during start-up. The one with the diamonds is the H. B. Robinson plant, which is a Westinghouse plant. What you note is in the range of operation, which is generally in these bands right here.

The B&W plant can be loaded, you know, it can change its power significantly faster; and if you look at here, it's about a ratio of almost 3 to 1 on a logarithmic scale.

Now, we've also looked at similar data for Milstone

II; and we find it is again about the same as the Westinghouse plant.

This improvement in gain and changing power is solely, from what I can tell, is almost all reflective of the plant T-average program. Of the phase -- is not too different, so I don't know if I really want to show -- I'll just show that for a quick one.

Very quickly.

This is the phase shift. As one finds, in about the range of operation, the shift in the phase of the response in power to reactivity changes -- they're sort of about the same. They start to deviate about here.

These plots, like I should mention, are plotted for -- the first one was a function of gain versus frequency. This is the phase shift versus frequency.

The next I want to look at was the -- Russell looked at the pressure response. I think the pressure response is a very important item, because we've all -- you know, the one of the major concerns is that B&W plants seemingly, you know, were designed initially with a PORV that would open to relieve pressure.

Now, what I've got here is a plot of the gain in pressurizer pressure versus reactivity versus over-frequency here. And, again, I'm comparing a Westinghouse plant, H. B. Robinson, with a CONY.

PROFESSOR KERR: John, what reactivity is being referred to? Is that reactivity insertion?

MR. BICKEL: Of the control system.

PROFESSOR KERR: Of the control system. Okay.

MR. BICKEL: You could, of course, if you had a -- if you wanted to look at the really, really slow end of the thing, you could probably also be dealing with, you know, boron injection.

PROFESSOR KERR: No, I was, I was just wondering what reactivity was referred to. And it, it's the external reactivity that is injected by the control system.

MR. BICKEL: That's correct.

PROFESSOR KERR: Thank you.

MR BICKEL: That is correct.

I'm looking here at the response in pressurizer pressure for H. B. Robinson versus Acony. Now, what is indicative of this figure, if one takes a look, is that the H. B. Robinson plant gives you a bigger response in pressurizer pressure versus Acony, when one changes, you know, by moving control rods in.

The mechanism is very simple. When you're, you, when you insert reactivity into the core via pulling a control rod out a little bit, the water heats up a little bit. The increased water expands. And you get a small, you know, very small surge into the pressurizer. Basically, what's being

shown here is that on a B&W plant the response in pressure is going to be a lot smaller. And if you look right here, it's, it's a, it looks like around in this range it's almost 4 to 5 to 1.

Okay. Now, I want to get into exactly how this is achieved.

The basic physics of what is involved, how this is achieved, I think is very important to understand. What we did, because I didn't have an unlimited amount of time, was I looked at the most simple model that could kind of classify what was going on.

What we can, what I constructed was a saturated pressurizer model. I agree this is crude, but I think it, it, it'll highlight the essential physics that's involved here.

I took a saturated pressure, pressurizer model; and I hooked it to a coolant system. And I just calculated what is the derivative of pressure, based on the derivative in T-average, which is what is changing during any one of these transients. In other words, during any secondary perturbation or motion of control rods, all you're really doing is changing the T-average. And if the temperature of the water in there is affecting the expansion and contraction of the water --

The derivative of pressure -- in other words, the rate at which you can change pressure -- is highly dependent on the ratio of the ratio of the reactor coolant system volume

to the pressurizer volume. That's basically what you would expect.

There are other terms that are related here to, if you have chargeant flow on, letdown flow-on, what the pressurizer volume is.

Now, the other item is the level-change equation. This is, essentially comes from similar mathematics. It was shown in an appendix up there. Again, it is highly dependent on the ratio of the coolant system volume to the pressurizer volume -- and this change in T-average.

The point that is important to recognize is that during any transient the initial stages of the pressure increase and the level increase or decrease is going to be related to that fundamental ratio of the two volumes.

Here is a typical comparison of what finds when you go through all the, a lot of pressurized water reactors. Generally, the B&W plants all have about the same reactor coolant system volume. Now the small differences will occur due to the different pumps that might have been used.

They all have 1,500 -- this is the 177 plan I want to highlight. It's got about a 1,500 cubic foot pressurizer. They have a ratio here of 6.67.

If you look at some of the other vendors' plants, you will find that some are a little bit lower, ending in .3, meaning it will be a little bit more sluggish.

There was a smaller -- the smaller this ratio is, the smaller the derivative of the slope is, at pressure level, when a transient starts.

What one finds if you also look very close is that there are a number of plants that're going to respond excessively fast in both pressure response and in level response.

The Arkansas plant, NO-2, is fairly high. And Yankee Row is about -- well, might be even 50 percent higher, faster.

It appears from what I have, from the transients you've looked at, that the numbers chosen by B&W appear to be a little bit more, they, on the, on the whole, compared to the range that are available in all the other vendors' plants. They appear to be a little bit better of a ratio. I'm not sure that the method I used was the method they used. I've talked to a couple of their people, and they say that their sizing was done solely on providing pressure and level control for a turbine trip and a reactor trip.

Those are the two limiting things on either end that led to, you know, the volume sizing and the level, initial operating water level.

Now, what I've examined so far is the response in the pressure versus T-average to essentially close the loop in the discussion about, you know, how the whole overall

plant goes. We now want to consider what can change T-average.

And of course, of major interest is changes in the heat transfer across the steam generator.

End Tape 1

Tape 2

I considered five events which I believe to be -- and I think if one looks at -- the most limiting events that affect the heat transfer. They are a main steamline rupture, a turbine trip without any controlling actions or bypass, the total loss of feedwater, a runaway feedwater incident, and a trip of a feedwater heater -- in other words, a drop in feedwater empathy.

Looking at comparative response for the various types of plants, I just chose to examine data out of the FSARs.

Now, if one takes a look at diamond here as ANL-1, this little triangle is a B&W unit, one finds a response something like this.

(Pause.)

If I look at it over a period of about a minute, as I recall, there is a drop rate in T-average of about 120 degrees Fahrenheit a minute, average; in other words, if I just kind of straight line it down here.

If I look at a typical Westinghouse unit, Indian Point Unit II, shown in the circles, I have a little bit more gradual decrease.

Now, the gradualness of the decrease, I would point out, is somewhat related to the fact that a Westinghouse

plant like Indian Point is a four-loop plant. In other words, if I rupture a steam line, there's proportionally a lot less steam I can get out of the, out of the steam generator; whereas the B&W units are all two-unit plants. If you rupture a steam line, you're affecting half the heat removal instead of a fourth of it.

Their main, their drop rate is about 95 degrees a minute.

The Milstone II CD plant, they show the analysis; and they analyzed in both cases at a hundred-percent load and at zero-percent load. And this one being the most adverse from zero-percent load, I believe had a drop rate of about 150 degrees a minute; and from zero load, it was a little bit lower.

PROFESSOR KERR: I'm sorry. Which is the lower one? Which plant?

MR. BICKEL: This one right here. This was from zero-percent load.

PROFESSOR KERR: No, but what plant?

MR. BICKEL: Millstone 2.

PROFESSOR KERR: Thank you.

MR. BICKEL: Millstone 2.

The analysis they conducted at two places. At zero percent load would be the highest steam pressures existing in a U-2 plant. In other words, it would be about a hundred

pounds higher initially than if you were at a hundred-percent load.

They also did it at, they also did the analysis at a hundred-percent load. The diamonds, then; you can see that the, the drop in T-average is not as adverse.

This drop rate in T-average, you've got to remember, is affecting two things. It's affecting the pressure on the primary side, ard it's also giving you the level response. This is the main thing that's leading to some of these over-cooling transients they've had.

MR. RAY: Before you take that away, John:

What's the characteristic of the B&W design that causes those swings so, so wide?

MR. BICKEL: Well --

MR. RAY: I notice that the others don't swing that much.

MR. BICKEL: I was hoping somebody wouldn't ask me that.

I am not completely sure. I have not investigated it. I did this kind of phenomenologically; in other words, if I had to guess, I would guess that they are related to the fact that you've got a lower water inventory. When you start bleeding off a heck of a lot of steam, my guess is that the first thing it's going to do is it's going to just flash everything in there; and then it's going to also suck a lot

of water in quickly.

And I think that's what you're seeing right here, is it just completely flashes, then it sucks water in, then it kind of goes on its way down. But that is a guess; I will not, you know, claim that that is the answer.

Maybe somebody from B&W could answer that a little later.

The point to be made from this is that the rate of change in T-average for a B&W plant lies within the range of all the other PWRs, or at least the ones I studied -- the inference here being that the pressure change and the level change is, is going to be a little bit smaller, because they've got a more sluggishly responding pressurizer. Well, that's only one incident; there are others.

MR. EBERSOLE: Before you leave that --

MR. BICKEL: Yes. Jesse.

MR. EBERSOLE: That supposes that the main feedwater abruptly cuts off and works properly. It will look a great deal different if the main feedwater runs on.

MR. BICKEL: I agree completely. The purpose of generating this slide was as follows:

I wanted to get a handle on the delta in heat removal versus a change in steam flow, and this was one of the ones I could get.

MR. EBERSOLE: But from the standpoint of looking

at the maximum chilling rate of the primary loop and subsequent recharging at the low temperature --

MR. BICKEL: Yes.

MR. EBERSOLE: -- perhaps the ultimate accident is when you leave the main feedwater on.

MR. BICKEL: I agree. I agree.

MR. EBERSOLE: Thank you.

MR. BICKEL: And could get -- under those situations you described, I believe you could get a considerably fast -- because you're going to have more water in there.

MR. EBERSOLE: Then you're subsequently going to recharge to full relief pressure with cold water.

MR. BICKEL: With cold water, right.

But this was -- unfortunately, this was the data I could get ahold of quickest. I agree you could probably get one that might be more than the CE one, which was about 155 degrees a minute. I think you could probably get it maybe comparable.

But even if you did, the pressure and level response is going to be slower. It's a more sluggish responding pressurizer. In other words, I don't think you're going to drain it as easily.

Continuing off, the next item I wanted to look at was the response to a turbine trip. Got that?

(Pause.)

NO-1, B&W unit, is shown without the ICS runback here with the dots. As you can see, you get a rather tremendous increase in temperature over a period of about 7 seconds. And this, it turns out, if one looks at the safety analysis, the turnaround here is generated by the tripping of the reactor.

This is a rather -- very, very rapid increase in T-average.

With the ICS in operation, however, one only gets about a 10-degree increase; and that kind of holds constant. With the ICS in operation, I think what they've analyzed here is a case where they got normal moderator feedback. In this case here, I think assumes almost nothing. So you're getting none of the beneficial normal reactor feedback that you would get after you acquired a little bit of burnup in the core.

PROFESSOR KERR: I don't understand, John. I, I thought you said the first one was without ICS.

MR. BICKEL: That's correct.

PROFESSOR KERR: You're saying it's not only without ICS but also without considerating moderator temperature feedback?

MR. BICKEL: That's essentially the way the turbine trips are usually analyzed. They're generally analyzed with the most adverse, which would be either a zero or a very slightly positive moderator.

PROFESSOR KERR: So it's a, it's assuming a beginning of core situation with --

MR. BICKEL: That's correct. That would be the most adverse case for looking at a turbine trip. This gives you a very, very rapid increase in T-average, because you're not getting any damping from the, the reactor feedback.

So this I would view, then, as more the kind of a limiting increase you can get in T-average. This is without any steam being bypassed by the steam-bypass system.

And I think it's kind of a, as an engineering judgment point of view, I would say that a steam-bypass system is more likely to open and fail to receipt properly than it is to fail to open. That is, unless assuming you've got some guy that's completely turned the thing off. You know, from experience I would say that I have, I've generally seen incidents where they've, they've opened and opened more than you wanted them to, rather than failing to open at all.

I think this has a very limiting effect.

The other one looked at was Millstone 2; and again, they assumed a zero moderator feedback effect. They assumed a, no action of the anticipatory trip of the reactor on turbine trip. Such a trip is provided on some of the earlier CE plants.

Response here, as you can see, is a lot more sluggish in the increase; and the main reason being is that

they've got a lot of water around the tubes. In other words, when you trip the turbine and you bottle up all that steam without any bypass, you get a situation where you've still got a lot of water around the tubes acting as a heat sink, where in the B&W plant one does not.

Now, furthering on: the next event to look at comparative response is during a total loss of feedwater. Look here to Davis-Besse and again compared it to Millstone 2. One finds a faster increase in T-average on, on the B&W plant than on the CE plant. I think there's, there are a lot of phenomenological reasons: mainly, this thing has a much quicker, you know, dry-out time. I don't think it's, it doesn't dry out, as I understand, for -- what was that number? Is it 47 seconds at full power? Who had that number?

DR. McCRELESS: 27, wasn't it?

MR. BICKEL: 27? Excuse me.

The thing doesn't really dry out for 27 seconds; but at this point now you've really, you've increased the, the pressure enough -- in other words, by the temperature going up you've gotten an in-surge to the pressurizer which drives the pressure up and it trips the reactor in high pressure.

But it's a fairly hefty increase in T-average.

On a U-2 plant the response is a heck of a lot more sluggish. You can see -- you can just barely see -- it looks about a 2-degree change at the most. And you would hardly get

any, you would just get a very small pressure increase during this.

The event is terminated in a U-2 plant by use of a, a low-steam generator water-level trip. Now, the use of this trip -- I guess somebody erased; I had a little picture up here.

(Pause.)

The U-2 plants, you got to recall, look something like this. They've got two, two bundles that go in here. They're sensing level up in here.

Everybody see that there?

Jesse, I know you can't see.

MR. EBERSOLE: Isn't it always above the tubes, though?

MR. BICKEL: It's always above the tubes. Yes, I've got a bad tube drawn here. You're absolutely right. It's always above the tubes.

In other words, you trip the reactor on a total loss of feedwater in a U-2 plant, maybe when the water level gets down to about here, and you don't even begin -- and generally, you will never uncover the tube bundles in this type of a transient. In other words, you're going to cut the power back, and the heat flux goes away, and basically is not that bad an event.

(Pause.)

Okay. So you get a very small change in pressure. This is a, this is a substantial difference between the two plants.

Continuing on, the excess feedwater. All that one has to remember here is that the B&W plant having, not having these large oversized feedwater systems but still having the same availability, they're limited in just how far, you know, you can get a runaway feedwater event. I think that's an important consideration. In other words, they've provided availability in their plant via sophisticated control of the reactor.

They haven't done it by providing, you know, big feed pumps that may decide to come back and haunt you at some later date.

Okay. I've looked here at a Davis-Besse and a standard B&W plant versus ANO-2. This is a response in T-average to excess feedwater flow. The Davis-Besse event is analyzed from zero load; in other words, where it's just essentially a high critical, shown down here, essentially is, you ramp open feedwater, they're assuming the conditions are as follows:

They've got a steam bypass valve open; they're letting out, they're bleeding steam out. And they're bringing the reactor's just in block critical. And I guess they're moving control rods. And all of a sudden the feedwater pump

takes off, goes out to, you know, its full range. What essentially happens here is the T-average drops; as it does, the reactor power is going to start to essentially take off. It's going to go up and start generating a lot of, a lot of heat.

Then what occurs then is the heat being generated makes more steam, and the steam being generated then starts, you know, building up pressure in there. The increased pressure in the generator then starts to limit the amount of feedwater that you can get in there.

Eventually, one finds that within about 2 minutes you've got what is essentially a self-limiting event. It doesn't go anywhere and it, according to the analysis, it doesn't lead to reactor trip. It leads to a steady state being established.

Again, they look at the same event for the B&W 205 plant; and same characteristics, shown on a different side here, the temperature for the 205 plant. It kind of reaches a steady state.

For ANO-2 from, they looked at it; and in their view, being that they had these 85-percent feed pumps or feedwater trains, they analyzed the event initiated at a hundred-percent load. In other words, they're sitting at a hundred-percent load and all of a sudden the feedwater system goes awry and tries to crank up the flow a whole lot more.

And again the get a, they get a drop in T-average of about 3 degrees and basically levels out. According to their analysis, it shows that it would not -- they should have a margin to ride through it. The trip that it would be most limiting would be the trip on over power; in other words, the high-neutron aux trip.

Any questions?

I'll go on to the next one. I'm trying to speed this up a little.

Fifth and final is a comparison of the response of the various plants to a drop in feedwater entropy. A typical cause of this event -- and it's happened quite a bit -- is you trip a feedwater heater; or you open up a feedwater bypass line. And you essentially drop the temperature of the water you're bringing into the steam generator.

Now, the B&W system is automatically designed to accommodate for this. In other words, it -- it's -- the water injects into the steam generators, is regulated, based on the water temperature, so they get a constant heat-removal process.

In the U-2 plants this is not the case. They regulate solely on level and steam and feedflow. In other words, if the temperature starts to drop, the U-2 plant -- they essentially -- it's not accommodated for in the control systems.

Comparing the different plants, one finds the following:

Down here in the bottom, with the dots, is Indian Point: very, very slow response.

We look at another U-2 plant, ANO-2. Again, only about a degree change in a minute -- the main reason being they've got large inventories of water in the tube-bundle region. In other words, when you change that temperature, you've got a mixing time that you've got to take a -- you know, it's got a takeover. And it shows around at this point.

And all of a sudden you really start to see the thing drop off, as you approach 2 minutes. This is in the Westinghouse plant.

In the B&W plant one finds it's a little bit more fast. It looks like about maybe twice as fast, in the initial slopes here. The sudden drop here in increase is due to the fact they assume that they get a reactor trip, which trips the rods and also trips the turbine. That drives the temperature up a little bit -- and then back down.

But summing these all up, one can now -- the following:

As a crude way of assessing exactly how much you can change the heat transfer across the steam generators,

not having all kinds of sophisticated computers I could work with, did a real simple thing. I said that the change of energy which is the mass of water in the reactor coolant system times the heat capacity times the rate of change of T-average is going to be equal to sudden changes I've seen between the core heat rate and the steam generator heat-removal rate.

And I then calculated very crudely the percentage change in steam generator heat removal, based on just taking a look at that mass, times the heat capacity, times the rate of change in T-av and then dividing by the full load heat removal rate of the steam generator.

When one compares a once-through steam generator against a more limiting U-tube steam generator response, you find the following:

For main steamline break, the two respond about the same during the initial phases. In other words, as you really start letting a lot of steam out of the generator in a U-2 plant, the heat transfer looks like it improves about 32 percent, where in a once-through it improves a little bit more. It looks like about 38 percent.

On a turbine trip, as we noted -- I noted, attempted to note earlier -- the response is more adverse in a once-through plant, by a ratio of maybe 3 to 1. It's much more adverse.

Whilst the feedwater, similarly, you get hardly any drop in the heat-removal rate in the U-tube plant, because you've still got all the tubes covered for quite a while.

In the once-through, it's much more rapid.

For the excess feedwater flow, it's basically pretty small in a U-tube plant, because you've got all that water you've got to change. You've got to try and, you know, add to.

And similarly, for the once-through it's quite a bit higher. Again, this is small for the feedwater entropy decrease for about the -- these two, for about the same reason it's bigger for this.

I would highlight that there's probably a, oh, I'd probably guess at about 5-percent error in doing this, because it's -- you got a lot of crude numbers. I was looking at slopes of T-average. But I think it does put a handle on the response of the various, you know, the various plants, on a comparative basis.

Now, based on these conclusions, I think you -- or based on looking at this -- I kind of concluded the following: and I will state these as being my own opinion; other people have probably got other opinions.

I think it's very important that this plant does have anticipatory trip on turbine trip if the steam-bypass

system is not functioning properly. I think that's clear because you get a very rapid loss of heat-removal capability. It also looks very important for total loss of feedwater event.

One of the things that concerns me about this -- and I think, you know, recent history in the last few months has brought this out -- is that we have all these marvelous improvements in safety, have essentially doubled and in some -- I understand in the case of Crystal River, has increased their frequency of trips by a factor of about 7 to 8.

And I don't always believe the idea that tripping a plant is the safest mode of operation under all times. I think when you frequently trip plants you frequently expose the, the operators, the control equipment, and a lot of the stuff that you don't think about very often, to a lot of changes: temperatures, pressures, levels.

And I don't generally think it's a great idea to be doing this on a very frequent basis.

Therefore, I would hope that over a long term people would recognize that a, that an anticipatory trip on turbine trip should only be an interim fix until somebody can get a better trip reactor that allows one to take credit for the steam bypass actions if they, in fact, do occur.

I think if one thought about it you might be able

to come up with a trip possibly based on steam pressure or some other parameter that would allow you to say, "Okay, well it looks like, although the turbine has tripped, the bypass valves are opening up and relieving pressure, and there is still steam getting out of the generators, steam generators."

Similarly, for the loss of feedwater, that plant was, the B&W plant is designed to ride through the loss of a single feedwater. And just tripping the reactor now, when you detect that you've tripped a feed pump, I think means that anytime any one of them trips -- and you still have the capabilitity of riding through it -- you're going to be tripping.

I think maybe a little bit thought might be put into how one goes about doing it.

Like I say, I view the anticipatory trips that have been added via post-TMI fixes, should be considered as an interim fix. I would hope people would think about something over the long term. The other item is, there has been a lot of concern expressed about the level response in a B&W plant.

You know, we've heard all kinds of stories about cavorting and all this other sort of stuff. And the statement that they are easier to drain the pressurizers. Well,

I basically find that statement to be untrue. The level response is, is physically more sluggish.

But I do think if one takes a very close look, you'll find, is that they actually -- what appears to be the problem is not the actual level response but the spread of the taps in the pressurizer indicating level.

On ANO-1, Rancho Seco, Crystal River III, and Davis-Besse, some of the ones which have been notorious for apparently losing level, one finds that these are the plants that correspondingly have the narrow-range pressurizer transmitters.

I understand there's been a lot of encouragement out to get wide-range pressurizers like the other B&W plants, and I think this is to be encouraged. It makes sense. It means that they have the water there. Let's just make sure that the operator knows it's there.

And that basically concludes what we looked at.

I will entertain questions. Anybody. Baffled everybody.

CHAIRMAN PLESSET: Tom --

DR. McCRELESS: That completes our presentation.

CHAIRMAN PLESSET: Yes.

Paul, do you --

DR. SHEWMON: Yes. I'd like to go off to a

slightly different subject. It seems to me that one of the things that happened at Crystal River was that the, they had a power failure and the computer started doing things to the reactor that the reactor operator hadn't asked once and didn't understand.

Is that going to come up in the discussion this morning? Or --

MR. BICKEL: I don't know who's going to discuss it. I, I think one of the things that's bother me about --

DR. SHEWMON: I'll be interested in your comments on that part of the incident, in view of what you said.

MR. BICKEL: I think it's important to recognize that at Crystal River the reactor protective functions contained an awful lot of information; so did the safeguards functions. They have all the indicating they need; they've got, you know, they've got better power supplies. They were running. They tripped the reactor. They initiated the emergency, you know, ECCS water that got in there. And all of this.

They were all functioning. They had indication. Unfortunately, the operator was denied a mechanism of getting in there, taking a look at what was going on in those protective system channels.

I think that there's something -- I know I, I've

designed this type of equipment in the past, you know, under past experiences. And one of the things that is a source of major frustration is the inability to utilize good information on highly qualified power supplies -- that you've calibrated more frequently than you calibrate your control-system equipment, and this stuff is unavailable to them.

And it's unavailable, from what I, I don't completely understand it; I think it's a lot of self-perpetuating rules may be what they are -- that you can't display all the safety-system equipment for controlling the plant.

DR. SHEWMON: But these are NRC rules, then?

MR. BICKEL: I think they come out of reg guides and, I guess, what you call "interpretation of reg guides."

But it's something that has concerned me historically, is that you've got some of the best information available to the safety systems: you've got the pressurizer pressure; you've got the, you know, reactor power; you've got the temperatures. B&W has temperature trips. They've got the, they've got safety-grade RTDs and things going into the reactor protection system weren't available; the operator couldn't go over and look them up, unless he maybe knew the, knew in his head, "Well, let's see. I've got a voltmeter here and the -- now, this thing puts out so many volts and he can run in there." He can't -- he doesn't have access to

it.

MR. EBERSOLE: What you're really saying is, the safety systems are inadequately instrumented.

MR. BICKEL: Oh, inadequately displayed.

MR. EBERSOLE: Well, that's what I mean.

MR. BICKEL: Yes.

PROFESSOR KERR: Oh, Jesse, what he's saying --

MR. EBERSOLE: The operator is historically not been thought to be important.

MR. BICKEL: No, that's -- I think that's correct.

PROFESSOR KERR: Jesse, this stems from a separation philosophy, which says --

MR. BICKEL: Separation philosophy -- and I think it's been carried to --

PROFESSOR KERR: I would urge that we have a seminar on this sometime, because I think that is right. It's an important topic, but it's one that --

CHAIRMAN PLESSET: Yes, this --

MR. BICKEL: You could go a whole day on this whole subject, I agree.

CHAIRMAN PLESSET: Yes.

Jesse, we're not going to let you speak until you use your microphone next.

MR. EBERSOLE: Oh, sorry about that.

CHAIRMAN PLESSET: That's all right. Next time. Dave.

DR. OKRENT: I think it's fair to say there's more than one point of view on how you could one and the same time provide immediate separation, whatever you think that is for safety function, and adequate reliability for the information that the operator sees.

So I don't want to leave the implication that all the Committee members think that what we should do is necessarily take the safety instrumentation and immediately tie it into --

MR. BICKEL: I'm not saying that at all, no. All I was saying is, you've got, you've got an instrument rack for like, say, the reactor protection system and you've got an instrument rack for the engineering safeguards. And one might consider putting a heck of a lot more meters, gauges, knobs, and dials, unless you can see what the heck's going on.

DR. OKRENT: Well, one might consider making the control system a better system, I would say. And however one goes at it.

MR. BICKEL: Yes.

DR. OKRENT: But one thing I wish you'd help me: I think you suggested that the B&W plants were not more

sensitive with regard to --

MR. BICKEL: Pressure increases.

DR. OKRENT: I guess it would be under, I guess you'd call it overcooling transients, which could lead to lowering of the level in the --

MR. BICKEL: Okay.

DR. OKRENT: -- vessel.

But you and the Staff both indicate that, at least for many of the B&W plants, the ratio of reactor coolant system volume to pressurizer volume. Let's see: if you go that way, the ratio is larger in the B&W plants; or if you go the other way, the ratio of pressurizer volume to reactor systems --

MR. BICKEL: I want to make one comment.

DR. OKRENT: So for some transients that has to go in the direction of more sensitivity, for the class of transients.

MR. BICKEL: Yes. I agree.

DR. OKRENT: All right.

MR. BICKEL: When one considers optimization of pressure versus T-average response, you've got two ends obviously. On one end you've got the possibility of dropping the, you know, dropping and increasing pressure too quickly. And that's undesirable. And on the other end, if the thing

is too darn slow, you will find that pressure changes and temperature changes don't trade each other off from the thermal-margin standpoint of view.

So there's obviously some number right in the middle. Now, the reason why I said I believed from what I had seen that the B&W ones were a little bit better than I think is generally recognized.

First of all, I was going to say the -- a couple of the NUREGs I looked at by the Staff, which considered this number, I found they contained a little bit of an error in it. When they calculated, or they showed in these tables of RCS volume, they included the volume of the pressurizer. That's incorrect.

The pressurizer fluid and the surge-line fluid are not expanding and contracting when T-av goes up and down.

And the numbers I show there were essentially calculated by going and getting the actual volumes, rather than looking at what they say is total coolant system volume. So my numbers I found different from the ones they showed when they had their, you know, their showing of that ratio.

CHAIRMAN PLESSET: All right.

John?

Yes, Jesse.

MR. EBERSOLE: Did you find that the main feed pump, pump characteristics were deliberately made steep so it would turn off at high pressure? And deliberately damp that overflow?

Do they have a pump which is particularly designed to that end?

Do you, do you know what I mean?

MR. BICKEL: This, this was for the event of an excess feedwater flow event from low power.

MR. EBERSOLE: Yes. Right.

The pump characteristics tailored to cut that off like that.

MR. BICKEL: I have not looked at that adequately enough to say. The main thing I do note is that they do not require the same type of excess sizing; in other words, to deliver, you know -- what I was saying: to provide, in usually in pressurized water reactors, to give you the ability to ride through a loss of one of the feed pumps.

They generally size them, like in CE and Westinghouse plants, at about somewhere in the range 70, 85 percent on the individual train. And that would be like if it was running by itself, it could go up to 85 percent.

On the B&W plant they don't have to size it that big, anywhere near that. I would assume, but I'm not sure

that they maybe size the individual trains at about, I'd guess, maybe 55 to 60. But I'm not sure. I have not looked at it that closely.

MR. EBERSOLE: By the way, isn't it true that on these big two-steam generator plants now there's a difference like between Arkansas and a B&W plant. And an aspect of the fact that the, that the primary containment may be sized to the secondary problem, and that the B&W plant has an advantage in this aspect.

MR. BICKEL: In other words, that it has a bigger containment.

MR. EBERSOLE: The wet plants do, the U-tube.

MR. BICKEL: I hadn't, I did not consider --

MR. EBERSOLE: You didn't go --

MR. BICKEL: Containments. I think that might be an interesting point for later work, though.

CHAIRMAN PLESSET: Well, I think we can go on, Todd. Do you have any further --

DR. McCRELESS: No, sir.

CHAIRMAN PLESSET: That's it?

DR. McCRELESS: We welcome any comments or criticism on the report.

CHAIRMAN PLESSET: Well, I'm sure you'll -- yes.

DR. McCRELESS: It's a preliminary form. I don't

know if we'll ever finish it.

CHAIRMAN PLESSET: Yes. I think you'll --

MR. BICKEL: I have.

CHAIRMAN PLESSET: Yes.

Yes, sure.

Provided you use a microphone.

(Pause.)

SPEAKER: Brad Shurer (phonetic spelling), from the Staff.

One comment on the depressurization and the amount of swing one sees in the B&W plants: one of the key parameters that we, we saw in comparing plants which is in a table, chapter 5 of our task force report, is the amount of fluid in the primary system that is actually at the hot-lick temperature.

And we found that in B&W plants the ratio of the amount of fluid that is in the primary system at the hot-lick temperature, compared to the total volume, is greater in the B&W plants, primarily because of this hot-lick that comes up a candy cane.

And as a consequence, when you strip the plant and the delta-T across the core collapses, you are basically cooling down or shrinking down a, a much greater volume of fluid in a B&W than, say, in a Westinghouse plant, on a, on

a relative basis. And I think that it should be kept in mind when one looks at the pressurizer sizing considerations, that a much larger volume of fluid must shrink down and therefore a much larger shrink must be accommodated by the pressurizer.

MR. BICKEL: Did you compare the -- one question:

Did you compare the relative pressurizer response showed between the various vendors' plants? one against he other? to look at that characteristic?

CHAIRMAN PLESSET: Well, he'll -- okay, that -- they're going to consider that.

MR. EBERSOLE: I'd like to mention: when you spoke about T-average, I thought you were averaging the coolant across the whole circuit, were you not? Or were you --

MR. BICKEL: That's correct.

MR. EBERSOLE: Okay. So his remark, then, it was considered.

MR. BICKEL: Sort of, sir. I agree that you would see some effect --

CHAIRMAN PLESSET: I don't think that's quite right, Jesse; it doesn't sound right.

MR. EBERSOLE: His T-average could have been T-average across the board or T-average across the whole loop.

MR. ETHERINGTON: Doesn't "T-average" mean the average of the hot-leg and of the cold-leg temperature, the

arithmetic average?

MR. BICKEL: You have to -- yes. You have to average if you look at the way we calculated. You have to make the -- you've got to consider the relative ratios of cold-leg volume, hot-leg volume, and volume that is, you might call it the average temperature.

I agree. That, that is an important consideration.

Now, the other things that that will affect is the responsiveness -- in other words, the smallness -- of the cold leg, will reflect how quickly you can change T cold; in other words, how quick does it get to the reactor and start affecting the reactor feedback? It is an important consideration.

I'd like, you know -- we did this on a, under what might be considered very fast -- it was a quick look.

CHAIRMAN PLESSET: Okay. Well, thank you.

MR. ETHERINGTON: Mr. Chairman, there has been a request that this report be released to others. I think that's something the Committee might want to take up.

CHAIRMAN PLESSET: Well, what I would like to suggest, Harold, if that's agreeable with the Committee, we speak about it tomorrow. I was going to have an informal ad hoc subcommittee, consisting of Kerr and Okrent to tell us what to do.

Is that agreeable with the Committee?

SPEAKER: You'd better put three people on it.

CHAIRMAN PLESSET: Well, I don't know.

(Laughter.)

Harold is -- if there was a, if there was a devastating result, we might win. The rest of us might win.

Is that all right for you gentlemen?

PROFESSOR KERR: I'm sorry. Did you say Okrent and me?

CHAIRMAN PLESSET: Yes.

PROFESSOR KERR: It's all right with me.

CHAIRMAN PLESSET: Is it all right with you, Dave?

DR. OKRENT: I have a preconceived notion.

CHAIRMAN PLESSET: Well, maybe we should put a third one.

(Laughter.)

SPEAKER: Just put the disclaimer, but --

CHAIRMAN PLESSET: Well -- no, I think there has to be the question that Harold raised that has to be answered. Should we -- yes.

So if we -- is that all right to leave it that way? And you can tell us as soon as you have a decision.

All right?

PROFESSOR KERR: I can't think of a better-

qualified pair of --

CHAIRMAN PLESSET: Oh, I can't either.

(Laughter.)

DR. OKRENT: Did we get an expense account for this subcommittee?

End Tape 2

(Laughter.)

CHAIRMAN PLESSET: What Ray is telling m is there is a Freedom of Information Act, but that doesn't mean we publish it very formally.

However, it's still a draft, which means it's something that's being worked on, and that's what I was getting at, what kind of revisions would the authors accept before we consider it something that is somewhat more generally available.

MR. OKRENT: I have one request. I wish they would take the new pages and put them into my copy.

MR. McCRELESS: I agree. I'd be delighted to do that. It appeared as though we were gonna be making so many changes that we couldn't do it.

CHAIRMAN PLESSET: I didn't want to indicate withholding. I thought there might be some suggested improvements or revisions or disclaimers that might go with more general circulation.

I think that takes care of your point, Ray, doesn't it?

Since it's still a working paper, I think we can improve it before we make it generally available.

MR. ISRAEL: Oh, yes.

CHAIRMAN PLESSET: I thought these gentlemen would help us do that.

MR. SIESS: Making it available will contribute to peer review?

CHAIRMAN PLESSET: Yes, right. Thank you.

Well, I think now we'll go to discussion which is scheduled with the staff and I believe that Sandy, you're gonna run this?

MR. ISRAEL: Yes, thank you, Dr. Plesset. I'm pinch hitting for Tom Novak.

The reason we're here today is to discuss the recent staff activities with respect to unique aspects of the B&W plants.

I guess I really want to stress unique aspects of the B&W plants because we seem to have a tendancy of also including other concerns that we may have that are more generic and not unique, necessarily to B&W.

And so, in order to be fair to B&W, I want to make that disclaimer up front.

There has been alot of activity with respect to the B&W plants and I think it's important that I quickly summarize what we have been doing so it may give some organization to our madness almost.

Back in May of last year, because of the Three Mile Island incident, we were concerned about two things. One was undercooling with the seeming reduced inventory

of the B&W plants and the other aspect was opening up the PORV's which in effect could lead to continues blowdown.

And, on the operating plants, we instituted certain requirements with respect to the auxilliary feed water system, the inclusion of anticipatory trips, and the inversion of the PORV and high pressure reactor trip setpoints so as to minimize the PORV opening.

And orders were issued to the operating plants to stay shut down until certain requirements were implemented.

Subsequently, in the Fall of 1979, our attention turned to plants under construction, B&W plants under construction. And the concern here was that after the operating plants had gone back into operation in July, there seemed to be a continuing number of feed water transients and certain perception on the Staff's part that we're not having an overcooling problem.

As a result of that, the question was raised whether construction should be halted on the plants under construction, by the 6 B&W plants under construction. And, that was the Denton letter of October of '79.

The applicants responded to that letter. Here again, we're dealing with the construction permit holders, discussing the extent to which construction had progressed

at their plants, the impact and benefits of stopping construction, potential benefits of stopping construction at this time and they also considered the continuing concern we had about sensitivity of the once-through steam generator.

And they all avowed, that yes, they also were concerned about certain operational aspects of the once-through steam generator and each of the licensees came back, I guess applicants came back with proposed additional studies, and modifications they may make to their individual plants.

Based on these responses, Mr. Denton wrote a letter to the Commissioners in January of '80 stating, if I can paraphrase, we did not see any reason why we should stop construction on these plants that were already under construction.

To a larger extent, I believe that decision was made on the fact that the major construction of the plant was already completed on most of these plants.

But more importantly, based on our review at that time, he stated, to date, we have not identified a requirement for changes in large components that would require removal and replacement.

And, he also stated that it appears unlikely

that such changes will be required.

That does not mean that changes won't be made til the plant's under construction but the changes that we're considering mainly in the electrical area, I believe, electronics control systems, that sort of thing.

And that's what Mr. Evan's committee, I believe -- Subcommittee was reviewing, was our actions on the plants under construction.

The next event that came along was Crystal River, and Crystal River to my mind had nothing to do with sensitivity. It had to do with possibly what we call a design deficiency, certainly single fault that would open up and the PORV was undesirable.

Certainly, it also pinpointed previous knowledge that the B&W licensees had a limited amount of readout instrumentation they had in the control room, most of which was tied to one pile bus.

As a result of the Crystal River III event, the Staff then swung back to the operating plants again and a task force was formed under Bob Tedesco to rereview we we're doing with the B&W plants as a result of the Crystal River event.

And, I keep swinging back and forth between CP's and operating plants because it's important we know

where we're coming from.

Today Mr. Tedesco will describe the recommendations of his committee, which was formed, as I say, after Crystal River III event, dealing with the operating plants.

Now, it's obvious that his recommendations that are finally adopted for operating plants will be composed on plants under construction.

I will also talk later on a little bit about the work we've been doing with, or our concern with the sensitivity, if you will, the overcooling in the plants under construction.

The extent to which modifications are agreed to on plants under construction, those are backfitted to plants that are already operating is unknown at this time.

Obviously, we don't even know what the recommendations are, but the backfitted, that has not been cited.

Also as part of the construction permit effort, Reliability Staff and Research has performed a mini-wash 1400 for Crystal River, and Joe Murphy will talk about the results of that.

Where all this is leading, I believe, is that possibly later on this summer the plants under construction

will have sort of finalized what they think the modifications should be to their individual plants, staff studies under tech assistance contracts will have reached some sort of milestone, and what I visualize is that at that point the staff will be able to make more definitive proven evaluations of the situation with respect to the construction permit plants.

The reason we're here today is that we would like the full committee to consider possibly sending us a letter. And, I'm pinch hitting for Tom Novak, and I had trouble last night defining what the letter was that we're request- from you.

But, I believe -- It has two aspects to it. Obviously, we've already made a commitment in terms of -- or, made a judgment in terms of halting construction on plants, the CP plants, the Belefont, Brooks, and Midland.

And, I guess what we'd like you to do is to support that recommendation that Mr. Denton made to the Commissioners. At this time we see no reason to stop construction of those plants.

The second aspect that the committee might consider and this might be more important, actually, than support of the -- in terms of helping the staff, is to provide comments and advice as to our activities in this

area. And, I talk about comments and advice, we're still in the early throws of our evaluation of potential modifications of the construction permit, permitees are making.

And, perhaps the committee may feel that they can give us further direction, maybe things we're spending too much emphasis on, things we're not spending any effort on that you think should be spent on.

This would be helpful because we're in the early stages of our evaluation and we're probably less defensive now than we would be 6 months or 8 months from now.

Mr. Etherington noted that it's really very premature to address the Tedesco report, which is NUREG's 0667, which -- just received last week, and I guess that will be taken up at a later committee meeting.

CHAIRMAN PLESSET: I think Mr. Etherington wanted that.

MR. ETHERINGTON: Is the Tedesco report, would that be a factor in any recommendations that the committee might want to make in a letter? Is it an important consider -- matter for the committee to consider before he makes a recommendation?

MR. ISRAEL: Mr. Tedesco tells me that he would

like one letter on the whole subject. I have to confer with Mr. Tedesco.

MR. ETHERINGTON: Do you think that's an important factor in whether the committee is prepared to make any comment?

MR. ISRAEL: I am informed that what we're looking for is one letter that will in effect embrace the recommendations of the Tedesco report.

If that's the case, then obviously the letter cannot be written this month. It will have to wait until the committee obviously has a chance to --

CHAIRMAN PLESSET: I think Harold has exposed a problem that -- The committee just saw this on the table this morning, so it's gonna be a little difficult to persuade them to include the critique of that report in a letter at this meeting.

MR. ISRAE: I understood. And from what Mr. Tedesco now tells me, I guess we'll have to wait an extra month until -- I believe you're gonna meet again with Mr. Tedesco on his report and probably following that meeting or another meeting with the full committee next month.

He would then be able to write a letter combining all aspects.

CHAIRMAN PLESSET: So that presumably we'll not attempt to make a letter at this meeting.

MR. ISRAEL: Correct.

CHAIRMAN PLESSET: But Mr. Etherington has a subcommittee meeting planned for 29, April.

MR. ETHERINGTON: RIGHT.

CHAIRMAN PLESSET: Is that right, okay.

MR. ISRAEL: I stand corrected.

The first item on our agenda is a presentation by Mr. Tedesco on results of his -- B&W Transients Response Reivew Committee.

I guess I sort of wince at the vulnerability task force, on identification.

MR. TEDESCO: I can share with you briefly this morning about the task force that had been established in March.

But yet this has really occurred, was Mr. Denton's concern, regarding the acceptability of recent events in the B&W operating plants, particularly the Crystal River event of February 26, and considering the event last November.

And we also should recognize that B&W is not the only design plant to have transier t. We have had them in other plants, at the Prairre Island steam generator,

with two ruptures and the North Anna incident. But, there just seems to be a concern about the recurring sensitivity of B&W plants and their operations.

And while we clearly indicate that the Crystal River III event may not have been one that endangered the health or safety of the public, Mr. Denton has expressed an unwillingness to accept such a plant response to a transient event, an event like this that ended up with some 40,000 gallons of water into the containment.

And then overlaying this in the relatively short period of time that we have had, the B&W plants showing something like 38 reactor years, there doesn't seem to have been too many instances of undesirable events.

Also, since TMI-II --

MR. KERR: Excuse me, Mr. Tedesco, what is meant by the statement that Mr. Denton refuses to accept such an event?

MR. TEDESCO: Mr. Denton has expressed his concern that the feeling that when your plant has a transient, a transient being something as an anticipated event, that we should be able to ride through it, the system function properly and the recovery done in a normal way, that you do not undo a challenge of the engineer safety features.

MR. KERR: But I'm trying to interpret the operational significance of such a statement. It seems to me, for example, that Mr. Denton would also refuse to accept a core melt or significant release of radioactivity and yet I don't think that means that Mr Denton is going to quit requiring containments and the principle purpose of a containment is to take care of the situation in which this occurs.

So, I'm trying to understand what is meant by the statement that Mr. Denton doesn't accept something. Does it mean that he's gonna quit designing for it or that he's going to design so that it absolutely can't happen?

MR. TEDESCO: Well, I'm leading up to why we're here, as task force, starting with Mr. Denton's unwillingness to accept these events. He's looking for something to be done and he wants to know why it happens and what's --

MR. KERR: Is he trying to reduce the probability of such an event to an acceptable level or is he saying that we just can't have this and we're going to design systems in which it will never occur?

MR. TEDESCO: I think you realize that --

MR. KERR: No, I don't realize. I have heard statements of this sort attributed to Mr. Denton and I look forward to trying to find out what is meant by the

statement and I must confess, I don't know what is meant by the statement.

MR. TEDESCO: I can only share with you where I am coming from with Mr. Denton. And, we are looking for a reduced probability and mitigate the consequences of such transient.

I don't know how anyone could possibly say we were going to outlaw and therefore never have happen at any plant --

MR. KERR: What criterion of acceptability is being worked toward?

For example, are you going to tell us the probability level or are you working toward a criterion which says that it is at this level that we're willing to consider certain transients?

MR. TEDESCO: I will get to that, further into the workings of the task force and where we're coming out at.

MR. KERR: Okay.

MR. TEDESCO: I hope that that question will be answered at that time, as along the lines we're talking about right now.

MR. KERR: I shall look foward to it

MR. TEDESCO: Okay. The concern that Mr. Denton

expressed to us, he then established a task force that will look into the operating history of the B&W plant and also give consideration to the actions that have been taken by the task force and the task force, as to their effectiveness in improving the situation.

Now, we have issued our task force report as a draft on the 2nd of April and Mr. Denton has expressed that he has no formal position at this time on the recommendations that we have made.

And the basis for that is that section of the report is still under completion and section 7 of the report will deal with an attempt to make an assessment of the risk reduction potential of each of the items that we have recommended.

So, what we're looking for is some way of assessing the effectiveness and concern of the improved safety that one might realize if we went ahead and implemented these actions.

So, right now there's people from the Probabilistic Assessment Branch or Staff, are performing such an evaluation. Our preliminary feedback from them is something like next week. We will be in a position, perhaps to have some opportunity to see what the results of their assessments are.

So, as you have the report now, as a draft, we hope to have it completed after we get the input from the PAS people.

And, we also are giving encouragement to B&W operating plant owners to vigorously pursue ways to improve their plant response of an anticipated event.

And so, we are encouraging them to share with us in this mission. From a longer term look, the task force believes that acceptance criteria should be developed to deal with the operating transient on a more uniform basis that will apply to all the white water reactor plants.

And in this regard, we encourage B&W to take the lead and they have indicated to us last week a willingness to perform this task.

Now, Mr. Denton also requested the advice of the committee by way of a letter on the task force recommendation that are being set forth in our reports.

The report has been given to B&W and to the operating reactor owners at a meeting that we held with them on the 3rd of April.

We are prepared to discuss the report and the findings of the Commission next week. We have scheduled a meeting with the owners on April 23rd and at that time

we hope to have our draft of Section 7 so that we will be able to discuss with them the results of the entire review.

B&W and the owners have indicated to us that they would like to participate in the review of the outcome of the evaluation of Section 7. And while we have no particular problem with it, we think that to make the whole review process a more efficient one, we'd like to encourage them to perform some independence studies of their own as far as the assessment of the items given in our report so that when we have this meeting, we'll be able to share on a mutual basis.

So, actually the status of where we are -- I have prepared a presentation and I'll try to make it as brief as possible and we have handouts. There are certain aspects I'll go over quickly. If you want to stop and dwell on them, we can.

The overall background and summary of our task force, exhibit on the first slide -- Turn the lights off, please?

The task force was established on the 12th of March by the Director of NRR to give him a short-term assessment of where we are in the B&W plant, as far as our recent operating experience.

And we were to come up with any recommendations that may deal with further licensing requirements, to give assurrance about the response of the plants to anticipated transients.

The main areas of review that we looked at dealt with response and recovery from the overflowing and undercooling transient, and also the effects and consequences of malfunction, failure to the control systems, and the non-nuclear instrumentation system.

The aspect was manifested themselves most prominantly during the Crystal River III event. We are also giving consideration to the effectiveness of all the actions that the NRC has taken in response to TMI-II and it will include the lessons learned in the task force, to assess whether or not their implementation has been effective to help to improve the safety on these plants.

And, as I indicated earlier, our draft report, NUREG 0667 is our, we're looking for assessment, complete Section 7 so that we can get a better understanding of what the effect of some of these recommendations might be in terms of their risk reduction potential.

The next line is a identification of people on the task force. I think the main point that it says

here, is that they do have an inter-disciplinary task force of both NRR as well as the upper offices of Research and Inspection and Enforcement, as well as a consultant from Oak Ridge.

The general finding that the task force has made, are characterized in four areas, that we have found in the B&W design plants are more responsive to a secondary site preservation than the other white water reactor plants.

We found this, and I think John Abbott has shared some of his findings that lend support to the general finding that we have.

And, the point wasn't through a steam generator design, that we have found it's basically a sound design, but yet because of it's light capacity as a heat station, it required a highly interacted responsive control system, and here we're focusing on the integrated control system that interlaces and interacts with the power control, and primary and the secondary systems, for plant operation and response of the transient.

And here, we do find that there's a high degree of overall plant interaction that manifests itself in an inherent way in the ICS and the once-through steam generator.

The basic design features and the response that are being manifested in the B&W plant, this does effect the operators, and in this regard we found that the operators are required to take a more rapid action and have a better understanding of the response than operators, as we understand are required to do in other plants.

There are certain features of response that the operators have to do when they have a trip, like add another pump, makeup pump and terminate in the valve, so they will improve their response. Yes, sir?

MR. OKRENT: Before you run from the slide --

I think I could visualize another situation where we were missing one of our general design criteria and somebody submitted a reactor with a positive power coefficient but he didn't violate the design criteria because that one was missing.

And then, you could say, the core with the positive power coefficient is basically sound, but it requires a highly interacted and responsive control and protection system.

Now, in the case of control of the power in the core, the Staff and the Committee chose to discourage plants that needed this interactive and responsive control

and protection system.

I just want to mention the possible analyses.

MR. TEDESCO: Okay. I guess -- I appreciate what you're saying.

MR. EBERSOLE: On the other hand, that resulted in a plant, namely the BWR, which operates in such a manner that the negative power coefficient in this case is a positive power coefficient when one has turbine trip and you have an even worse problem than you would had it worked the other way.

MR. OKRENT: I don't know that it resulted in the BWR, Jesse.

MR. EBERSOLE: What I'm saying is, the negative moderate temperature coefficient is the problem of the boiler, reactivity-wise.

MR. OKRENT: I don't think you could stand a boiling reactor with a positive moderator coefficient.

MR. EBERSOLE: Oh, true, but you have a problem in that, as you well know, for ATWS.

MR. KERR: Mr. Tedesco, the -- I might as well make a comment on the last paragraph also.

I'm not sure whether you consider that an advantage or a disadvantage or just a statement of the fact.

MR. TEDESCO: A statement of fact and points.

MR. KERR: Okay.

MR. TEDESCO: The next point, I give your our recommendation as far as the other aspects of -- The pertinent to minimize the frequency of the consequences of these preservations, about providing more reliable instrumentation and control systems, assurring the availability of the heat sink, and the aspects of plant recovery.

As you look more and more upon the history of the operation of these plants and the aspects of failure and where we're going, we point more and more towards the needs to really insure to a high degree of confidence the availability, that maintaining that heat which is our once-through steam generator, allows a good margin for a plant to recover and ride through the transient.

But when you find that there's alot of interaction going on, there are failures in control systems, you know, by the very nature, you're not gonna prevent -- the control system is not signal failure proof.

But it interlaces in such a complicated way that it does effect the heat sink availability. So, what we've done is we focused on action areas that dealt with

these aspects of the plants, namely, the auxilliary feed water system, the I&C system, and in addition to these are interlaced in design and operational matters and also general areas of improvement that were worthy of long-term consideration.

In the recommendations that are coming up, we realize perhaps in some instances are very similar to some of those that are expressed in 3 of the TMI action plan.

So, what we would encourage, when our report becomes finalized, and the recommendations become accepted, that these actions would be incorporated into the TMI action plan, recognizing that some of these may require a faster implementation, develop them further.

MR. SHEWMON: I'm not sure when it comes or if it comes in your report, but one of the things I'm interested in is, as a result of the TMI-II incident, the Staff went to anticipatory trips so that you wouldn't exercise the PORV so often.

And, that is understandable reaction. If something burns, you usually like to stay away from that part of the stove or the kitchen.

But that also then brings in more SCRAMS which has it's disadvantages and I wondered, if as part of your

study or as part of the yet to come Chapter 7, will be a discussion of some kind of a trade-off of the relative problems of these two philosophies?

MR. TEDESCO: We treat them as points, Dr. Shewmon.

MR. SHEWMON: Pardon?

MR. TEDESCO: As we get further into the presentation, we do speak to that.

MR. SHEWMON: Good. I'll wait. Thank you.

MR. TEDESCO: Yes, sir.

Now, it's all been a very specific recommendation on the auxilliary feed water system. The action that we're talking about here are to have separated from a normal plant operation and to then classify it as an engineer safety feature and it would be required to meet safety rate requirements.

We have questions here. At this point, because of the time that we have had, whether or not the requirements of being engineer safety feature would include upgrading to a seismic design requirement.

And so, we have asked the PAS people to give us an assessment of their views at the benefit of requireing seismic designs.

This hasn't been provided to us yet, so it's

an open question that we have in our report.

There also may be instances where operating may not be a feasible option, and therefore we would still expect to be operating, to have it operating as much as we can, but ultimately, maybe a third change may be necessary so that this would give us the capability of having a feed water system that was engineered, safety feature and quality, and give us the high degree of reliability that we want to insure the availability of the heat sink.

Also, the instrumentation and control system, as is now interlaced with the ICS should be removed, that a separate control system provided that would be independent of the ICS and the NNI and other non-safety systems.

We just want this system now to be characterized as an engineer safety feature that would not be adversely effected by failure of the control system.

The lesson to learn, to also ask for a normal sack signal of the aux feed water system, and we're confirming that. However, we're saying that the selections of that normal sack signal should be optimized to give us the greatest margin against dry-out.

And also, the once-through steam generator controls, to prevent overcooling in the recovery transient,

there should be a lever control in there, and there also should have an overfilling system to prevent us from overfilling not only the steam generator, but also the steam lines.

Now, that one's also an issue that came up as a result of a part 21 nullification by TVA, regarding their Belefont plant where the concern was expressed that overfilling the steam generators and steam lines could lead to failure of the steam lines, that they were not designed to take this type of load.

Now, we all felt -- It may have been at the same time or just before it, -- that to prevent the over-cooling concerns that we should have an overfilling trip as an example of a way to accommodate this.

So, our recommendations are going out that we need to terminate feed water before we overfill the secondary.

Number three deals with the Davis Bessie plant where we recognize that it has two steam driven auxilliary pumps that place a high degree of reliance upon once-through steam generators availability to provide steam.

This was mentioned earlier on the task force, that we have now required that a diverse pump be provided. Also in the core was a diversion, or

the diverse requirements that we have, so we also understand by talking with Davis Bessie, although it hasn't been officially stated yet, that they are providing a diverse pump.

Number four, goes back to the Crystal River problem where you had a logic system that would isolate a particular steam generator upon the indication of a break in the main steam line, namely if you got low pressure, you would not -- it would not feed that steam generator.

Well, at Crystal River we did not have a steam line break, but we got to the condition where we got low pressure and it isolated the auxilliary feed water system.

So, what we're asking for, is now we want to eliminate adverse interaction in this system, such that you would be able to make a proper distinguishment of a steam line break, another steam line break in regards to overcooling or undercooling transients, again to point more towards insurring the availability of the heat sink of these plants.

I have a couple on this slide that indicate Item 2, where we were talking about separable systems. IMPO in their report on Crystal River has also

eluded to this type of separation, and it's also talked about that task action plan in Section 2, E-1.

MR. OKRENT: Before you leave the slide, under Item 1 you note that you're asking the Probabilistic Analysis Staff to evaluate seismic design requirements.

Are you asking them to evaluate what constitutes an acceptedly good auxilliary feed water system aside from whether or not it meets the safety grade criteria?

In otherwords, I could visualize the situation where if it meets your current single failure criteria, coupled with other plant features, when you analyze it probablistically, you judged that it was okay.

On the other hand, you could have another plant where just meeting your single failure criteria left you still in a less reliable situation than you'd like.

Are they being asked to do that?

MR. TEDESCO: It's in total prospect of what you're saying, yes.

MR. OKRENT: But what you've got there now is that they're only looking at the seismic design aspect?

MR. TEDESCO: Well, it's a need for the system, in the event of an earthquake, an engineer safety feature.

MR. OKRENT: Again, let me make it clear. Right now the term safety grade criteria has a certain

connotation and it's not a reliability connotation. It leads to some level of reliability.

There are some plants that may be adequate or even more adequate. For other plants, because of their configuration when you consider common-mode failures or the fact a system may be, one part of the system is down part of the time and so forth, and if it happens to be a very essential function, that the single failure criterion is not adequate.

And so, I'm just asking whether you're asking PAS to think about this. In otherwords, all B&W plants are not the same, within that single context, and you've already indicated right on your viewgraph here that there's a difference among them. There are other differences.

MR. TEDESCO: Well, this is basically the issue that we're dealing with, that they aren't all different. And within the context of where we're going, is to make a more uniform approach.

You know, a lot -- The reason I'm hesitating, the seismic design requirements can't be looked at only for the aux feed water system. There may be backup options. You may have feed and bleed, or some path that might be an acceptable way out.

MR. OKRENT: I agree.

MR. TEDESCO: Okay.

MR. OKRENT: And that's in fact a valid reason for looking at the seismic design requirement. But I'm saying, here is an equally valid reason for looking at whether the term safety grade criteria is sufficiently meaningful.

4/1

MR. EBERSOLE: -- if you have a seismic event, the one system that's really going to have to work is the aux feedwater system unless you have a loca and everybody hopes you won't have a loca with a seismic event. If you could program a loca with a seismic event you wouldn't need aux feedwater but you won't do that.

So you're left with aux feedwater as the critical necessity for a seismic event. So the conclusions of PVS must already be in hand.

MR. TEDESCO: Well, I understand what you're saying but I -- I mentioned earlier there -- there may be alternate ways of assuring safedown -- shutdown using the feed and bleed systems on some plants -- on some plants.

You -- you induce a small loca --

MR. EBERSOLE: If you could make a small loca you would be in good shape.

MR. SHEWMON: If you understand his question would you explain it to me. Why is it obvious that you need this if there's a seismic event.

MR. TEDESCO: You need your instinct. You have to have a way of getting a heat removal system in effect.

MR. SHEWMON: You assume you loose your turbine -- is that it.

MR. TEDESCO: Off sight power and turbine --

4/2

MR. EBERSOLE: Another thing, why do you have on 2C -- yeah, how many -- did you say it that way because you know already that the main feedwater post has the qualified safety grade --

MR. TEDESCO: There is -- there is a level trip on that.

MR. EBERSOLE: So it's already there. So you're just adding the aux feedwater.

Okay.

MR. TEDESCO: The next category is on instrumentation as a control aspect. Here we're dealing with some of the lessons that came on Crystal River. I -- I think it's awful unfair if we indicate that a task force is not charged exclusively with Crystal River action. But there are some things that came out that were rather obvious that we're dealing with. But there is a separate group reviewing the overall Crystal River --

What we're looking for here are the INC aspect are improved separation and channelization of the power buttons for the NNI so that when -- a better degree of independence of the non-necular instrumentation systems.

We're also looking at a reconsideration of the design aspect of scaling non-necular instrumentation at the mid-scale. It may be preferable to consider a zero scale or

4/3

full scale failure mode rather than mid-scale that create an inpusion to the operator at Crystal River to the point that it would not believe some of their other instrumentation.

The other one that when you do have failures in the NNI, the operator should have some way of knowing what instrumentation has failed so that he can assess his proper reliance of the other instruments.

Then the control systems themselves should have capability to maintain a proper mode of operation automatically so that they don't have a gross failure that would just promolgate through the plant. So that they would have a defensive action automatically and they can terminate them.

Then there should be a review to rearrange and make a proper balance of the NNI budget so that we have a redundancy of the indication for each reactor -- so the operator could -- if he looses one bunch he'd still have the other one to deal with.

There are some ongoing actions that we would recommend continuing and accelerating. That the ICS reactor reliability studdies, the impact and inplo recommendations, bulletins 79-27, they're all related to the NNI aspects.

Number six is a matter that has been talked about

4/4

for some time. It's well up in our task action plan and the more we got into the issue of Acconi and on Crystal River, the more we believe in these or the necessary action to take to establish a very select set of data of the main principle plant parameters that would be provided safety grade for the operators so that he would have a way of assessing reliably changes in plant operations and we would give him a select set of data of pressure, pressurizer level, make up type level, temperatures, containment conditions, conditions in the secondary and the necular aspects to be like a safety base factor or a system safe factor that we were talking about before.

We believe that we're at that point now. We definitely improve the operator capabilities if he had a set available to him. This is a recommendation that the staff is making at this point.

Other items that are related to the INC deal with the improved use of the incore thermocouple in two ways. One, that the operator would have the flexibility of using these incores to give him a better assessement of margin saturation. Also that he would have the ability for continuous or -- play of the thermocouple, it would be more readily available to him. This is varying from plant to plant. Some plants are -- have it available already but

4/5

others don't.

Then number eight deals with a safety grade containing high radiation signal. Right now the containment purge of that valve are not necessarily isolated on radiation.

The isolated -- these are containment type pressure or a safety system actuation. There are conditions where you may start to release activity into the containment and if you're purging you couldn't release directly outside the environs without getting a containment pressure buildup or before you would get SIS indications.

So we believe that as a result of our review of the task force that we should have a radiation signal for isolation.

MR. OKRENT: I find that last recommendation interesting in the following way. Back in August, one of the ACRS staff, in fact, suggested to the TMI2 implication subcommittee that where you could you ought to look at the phenomenon you were particularly interested in and measure that directly in order to give an actuation signal. And in fact, there was such a recommendation made in one of the ACRS letters written in August and this is, in fact, an example, now --

MR. KERR: Have you changed your mind?

4/6

MR. OKRENT: No, I have not changed my mind but I want to go on from here to get to what I consider a more important point.

What's not clear to me is how to get the staff more into an anticipatory mode and less of a reactive mode. In fact, I think this is a good study and based on a quick reading it seems to me you've done really a good job in a couple of weeks.

I think though you've got a lot of recommendations which are still relatively in an interactive mode although there are a few that are more general in nature.

But one could have anticipated this kind of situation which you now because -- in fact, it sort of occurred you're getting to. And if I can get to a more general point, the whole question of the problems with the control system which was raised by Disteckis and raised by others. Disteckis didn't identify this problem that has arisen here. But in fact, you could say it was partly raised by the Rancho Seco transient which was sort of hard to get the staff to focus on until much more recently.

And I think one thing you really need to look at is this difference in the mode of -- of trying to cope with some of these things.

MR. MOELLER: To comment further on your item H,

4/7

recalling the TMI event, I believe that the containment there isolated only on pressure and that's why there was a considerable delay, 5 hours or whatever it was.

Now, is your recommen -- I understood I believe the same as what Dr. Okrent was saying that now you were recommending the pressure, temperature and radiation, you know, three indicators for isolating containment.

Now, is this recommendation different in any way? I mean is -- is the radiation signal that's recommended on the basis of the TMI experience, is it not a safety grade instrument that would give you that indication.

MR. TEDESCO: Let me see if I can clarify it.

On the TMI lessons learned we came up with a recommendation that we would have diverse signal for containment isolation. All the containment isolation signals. We had -- did not require at that time that radiation be one of them which is not excluded but it wasn't required and it would be one of them.

So most of the action from the short-term lessons learned dealt with diversity for containment pressure or safety system initiation. Engineering safety feature actuation.

There is another aspect for a longer term approach which is in -- 1.163 which deals with the overall problem of

4/8

isolation. That is where radiation is going to be included.

Now, what this one here is doing, they've taken this part of it, the containment vent and purge value below because it was a very large valve and saying regardless of these other things that we are recommending now that you have radiation to isolate these valves there would be a safety grade signal.

MR. MOELLER: Well, couldn't that same actuation signal isolate the rest of containment?

MR. TEDESCO: Well, it could be and it may on the long-term upbringing, yes, it may but we haven't taken that position yet.

MR. MOELLER: I guess what is confusing to me is I thought that this had all been discussed and settled and now I find that it's still being thought about.

MR. TEDESCO: Yeah, I thought we -- well, I -- I hoped that we were clear on the short-term lessons learned where I'm involved that we were looking for diversity.

MR. OKRENT: We talked about it, in fact, and I couldn't -- you have to be careful that you don't isolate too much of the containment where you won't be able to get cooling water back in or whatever. It -- it's a situation that has to be thought through carefully.

MR. MOELLER: And so when you're saying diversity

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you're giving them the option of using, I guess pressure is almost an absolute is it as one of the indicators?

MR. TEDESCO: Yes, it is.

MR. MOELLER: And so they can use a multitude of pressure sensors meaning, you know, several systems or a combination of pressure temperature and so forth?

MR. TEDESCO: No, it's either or.

MR. MOELLER: Oh, it's either or.

MR. TEDESCO: It's not and, it's pressure or.

MR. MOELLER: Yes, okay.

All right.

MR. TEDESCO: Any of these you want to take up?

MR. BEARD: I guess the only thing I want to say is that on the lessons learned at -- which I anticipated, there was a requirement that all the plants have diverse initiation signals for that. The way it was implemented was the pressure was required, most -- directed to the safety injection signal.

Few plants have radiation -- isolated purge valves. They were installed some time ago to your provisions. -- considerations, it was not safety graded.

The problem that we ran into were the hesitations, is to a place existing -- good quality with equipment that we felt really was just more expensive because it had the

pedigree papers and while there's a whole lot to be brought by requiring full safety grades I think now the Tedesco task force is saying let's -- we've been talking about this and requiring, it's in -- as he's mentioned and implementation date is to be established when approved to be implemented.

We're saying we really have been talking about this, we want it done promptly. That's what I read into it.

MR. KERR: Two questions. First. in the reg activities committee meeting on Wednesday, at least within that group that was meeting with us, the term safety grade is out and safety related is in. I don't know how universal that terms is. It hasn't gotten to you yet.

MR. TEDESCO: No, sir, it hasn't.

MR. KERR: Okay.

MR. TEDESCO: I -- I would discern a difference though.

MR. KERR: I'm not certain that I know what the difference is but we had one regulatory guide in which safety grade was consistently crossed out and was replaced by safety related. But -- so you might want to try to get up to date in your thinking.

The second is, what is high radiation in the context of that recommendation or is that an open question?

4/11

MR. TEDESCO: I don't think we have a level established yet. I think we have to be --

MR. KERR: Well, are you thinking of twice background or a thousand times background or do --

MR. TEDESCO: I don't have a number yet. I don't. -- something about the background.

MR. MATHIS: Mr. Tedesco, how much longer do you think you need?

MR. TEDESCO: All right.

I have four more and I can do them fast or I can go to the end one and -- and --

MR. MATHIS: I wonder if we might let you finish those and perhaps aim for a break and then perhaps questions could be still brought up --

MR. TEDESCO: All right.

MR. MATHIS: -- on your points you raise.

MR. TEDESCO: Okay.

All right.

The next one has to do with some design and operational matters of -- for looking for improvements on this pressurizing response. We believe that some of the plants have veteran capability on the tap.

There's also an evaluation that we understand could be made with regard to the secondary size of modifying

4/12

the relief value set point that might allow an improvement in the level of shrink in the primary system for tripping.

We're looking for sensitivity studies on what modifications might be done by the owners for -- to reduce the response of the steam generator to these problems.

We're looking for the owners in B&W to help us out in this area to improve the capability. Also we want to see if can take some actions that would eliminate the demands that are placed upon the operators. If there are things that are being done in the plant that the operators are required to do in the short-term, we will look forward to upgrading these systems in a way that they could be automatic so you wouldn't have the operators required to do them all the time.

We're looking for the requirement that would establish a qualified an INC technician on duty with each shift -- Crystal River I understand had a technician on duty and he was helpful in terminating the event.

And so we ask ourselves perhaps a question had this occurred on a back shift or something like that what might have happened.

So there are advantages to be considered having a technician on duty for each shift. They're certainly not -- so it would be a beneficial improvement.

4/13

There should be more operative training of the Crystal River 3 event as well as each particular plant because the NNI and ICS are unique in each plant so we feel that should be a part of the training. That B&W should be developing the generic guidelines for the loss of the NNI and ICS that the plant operator could use.

-- number 15 calls us to a mandatory one week training on the simulator for the operators as part of the requalification program.

This is somewhat optional now and a lot of them are doing it but we believe it should be required for all.

Then if we could encourage our staff evaluation of the pump trip as far as the restart criteria for the transient.

17 deals with the point that Dr. Shewmon brought up about the review of alternate solutions to the PORV unreliability and safety systems calibration surge. And I just show that slide quickly, you may want to come back after.

But the people at Consumers Power Company made some suggestions that we understand other people are looking at now about improving the capability of the PORV in the plant to the extent of upgrading the PORV to a safety grade valve giving better indication or have the duel safety valve

block valves, completing a test program which a -- requirement, safety grade anticipatory trips and then finally we can talk about going back to where we were before of resetting the PORV to a point below the trip point.

Now, they feel that if they go through a program like this that they should be able to then restore the plant to its original design and we're recommending that the task force that this evaluation was given, that consideration necessary to review it and see where we come out.

Now, we don't have a position yet but we're encouraged by the action that we recommended that we recommend staff review of this and see where we're going.

So that's a proposal that didn't help right now and we certainly want to put our efforts into it. Recognized that the operational history has shown an increase in the trip that we're getting on the B&W plant now compared to the time before TMI.

There are operational aspect about the ability to ride through a transient and Consumers is saying, well I have a better PORV valve, I might be able to do this.

MR. SHEWMON: What does a fully qualified safety grade PORV mean?

MR. TEDESCO: Well, it would be one that has the proper qualifications of being able to survive this type of

4/15

event. Of being able to pass signal phase, trip phase, solid water or whatever it might be.

MR. SHEWMON: My feeling is that you could have that and it would not have eliminated any of the PORV sticking open problems which at least in a couple that they've able to take apart, TMI2 isn't available yet, were corrosion or other kinds of problems.

So I wouldn't entrust that entirely to a mechanic or electrical engineer and think you've accomplished it.

MR. TEDESCO: Well, the working part of that capability here, you know, we're not going to make a signal failure group.

MR. SHEWMON: Well, I -- I -- the usual sorts of things that mean safety grade are usually redundancy and checked off when it's brand new and shiney.

MR. KERR: Now, I think, Mr. Shewmon, what that means it that one has a pedigree on the value. A stack of documents which show that it has indeed been built of -- of material and inspected.

MR. SHEWMON: I'm sure it will be built of material.

MR. KERR: But it may not be a value any different than the existing valve, it's just that you can prove it is.

MR. SHEWMON: And that and a quarter may buy you a

4/16

cup of coffee is what I'm saying.

MR. KERR: Well, I mean it's -- it's documented.

MR. EBERSOLE: Well, these things have a double ended function. They've got to be guaranteed to open with the safety grade. Nobody has ever really said that they've got the guarantee to shut.

MR. SHEWMON: I just don't know the tests you're going to do for it and I don't think the staff does, though it's possible if they have one I'd like to hear about it.

MR. TEDESCO: Well, there is -- there is a test program going on by -- in this area that is supposed to be definitely --

MR. SHEWMON: Well, I would like to see it some kind. I think we'll both watch in two years and see if it does any good.

MR. EBERSOLE: On the subject of safety grade, Bob, if we can run back to the main feedwater safety grade system --

MR. TEDESCO: Not the main feedwater.

MR. EBERSOLE: The main feedwater for terminating flow, could you characterize how that is accomplished with safety grade manuvering.

MR. TEDESCO: Now?

MR. EBERSOLE: Yes, it it -- I understand it's

4/17

safety grade -- feedwater turbine trip, it would still leave the motor --

MR. TEDESCO: It will be -- it will be safety grade.

MR. EBERSOLE: Well, hasn't that already been necessitated by containment over pressure requirements?

MR. TEDESCO: No, we have asked initial report control grade anticipatory trip --

MR. EBERSOLE: No, not anticipatory. This is over fill trip.

MR. TEDESCO: Oh, go ahead, I'm sorry.

MR. EBERSOLE: This is over fill trip which I thought was mandated by the fact that you would over pressure the containment on the main steam line so you could do the testing.

MR. TEDESCO: My understanding is the control grade trip --

MR. EBERSOLE: Oh, then I think we got a -- I have a gross misunderstanding.

MR. TEDESCO: I think it's a control grade.

MR. EBERSOLE: On the main steam line failure if you don't turn off the main feedwater, you're going to blow the container out.

MR. TEDESCO: If you keep feeding the -- that

4/18

generators that had the fail line in it, that's -- that's the problem. If you have a break in the containment.

MR. EBERSOLE: Well, you have to have a qualified safety grade ECCS and all those other things to type the termination of the main feedwater. And I thought that had to be in place now.

MR. TEDESCO: Well, I might be wrong. It's my understanding that the control rate -- Don, do you want to help me?

MR. QUICK: Don Quick from Region Two. I think the steam brick matrix that is available on the B&W plant is safety grade.

MR. EBERSOLE: To terminate main feedwater?

MR. QUICK: To terminate main feedwater and main steam both on the affected steam generator.

MR. EBERSOLE: Now, that being the case how was the main feedwater terminated? What were the -- what were the redundant devices that turned off main feedwater?

MR. QUICK: At Crystal River are you referring to?

MR. EBERSOLE: Well, any -- any of the systems that require termination of main feedwater. You trip the turbine and is the steam valve trip one qualified? Are these all fully qualified dual track?

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MR. QUICK: The steam break matrix basically is a safety grade system.

MR. EBERSOLE: It is?

MR. QUICK: You get into single valve isolation on both feedwater and main steam, from that standpoint. So you can have a single failure of a value and fail to isolate that particular generator.

MR. EBERSOLE: Then -- containment on a main steam line failure. Are you telling me that?

MR. QUICK: It -- it depends on the particular design. Not all steam break matrix -- these steam break matrixs are all different on these B&W facilities.

MR. ISRAEL: Let me speak to that if I may for a moment. Let's see, about three years ago there were 27 contentions dealing with safety issues on nuclear power plants.

The first one dealt with use of control grade equipment for steam line break or something of that nature. I'm familiar with that one, I was involved with that. And when the staff came out on that, it said look at, we will accept the use of control grade or essentially non-safety grade equipment as a backup to a single failure in safety grade equipment.

So, if we're talking about a main feedwater line

4/20

isolation, certainly one of those valves would have to be -- at the very least have to be safety grade. The other one we may give them credit for would be the normal throttle valve or whatever that that would get a signal to close on whatever the initiating signal was.

However, Bob, I think the containment branch was looking for having double safety grade isolation valves on the feedwater line and I don't know where -- I don't recall where that stands.

MR. EBERSOLE: Well, I think its effect is the modulating value which is -- which -- might be used for isolation and in fact, it's probably not qualified to -- it.

MR. ISRAEL: Right.

MR. EBERSOLE: So -- that that is a part of the safety train is not -- you know, one of its individual -- level off.

MR. TEDESCO: Yes, in full control, yes.

That is not a safety break valve.

MR. EBERSOLE: I guess -- I guess I have an unclear picture as to what we really got.

MR. TEDESCO: Well, I think what -- what we're telling you is that termination of your feed flow to an affected steam generator that may have a steam line break

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in it is affected by your main steam line break detection matrix.

MR. EBERSOLE: Well, I want to know what puts the muscle here.

MR. TEDESCO: Pardon?

MR. EBERSOLE: What has the final action? I think I'm hearing that one safety grade and one non-safety grade preception.

MR. TEDESCO: Yes, you're getting down to that point, yes.

Back to the last point on this page. Well, the last one on this line talks about -- Crystal River review also insofar as the aspects of the IREP Program and then based upon the results that we get from here what other ramifications may come out based upon these results.

Further aspects here of -- okay.

One of the concerns that we had when we started talking to Mr. Denton about how he would express the concern and the unwillingness to accept transient response, what -- come up with ways that would improve the performance and we struggled with this and realized that really the only way to approach it would be for us to start looking for the development of criteria for anticipating transient.

Right now we are guided pretty much by criteria

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that say you should not go into a DMV condition, you should not exceed system pressure by more than 10 percent. And while you meet these criteria, you still raise the uneasy feeling that you have about the recovery of the plant forms.

So the task force took the approach that the best way to -- that we would go would to hurry a development of performance criteria to deal with the anticipated transient for all white water reactors. And we have discussed it with the owners and B&W and they have expressed support to us and B&W at a subcommittee meeting has made some suggestions on their preliminary thinking that might go along in -- the historic development of such criteria.

MR. OKRENT: Would the Rancho Seco transient been an anticipated transient before it occurred? ou mean in other words, would it have been on your list?

MR. TEDESCO: Yes. Yes.

MR. OKRENT: Did that combination of events --

MR. TEDESCO: That's right. Failure in the control system.

MR. OKRENT: Oh, but it wasn't just any old failure in the control system?

MR. TEDESCO: Yeah, well, it manifested itself ultimately in the control system being affected by the initial -- by, you know, what happened to it. Just like

4/23

Crystal River, you have a failure in the power supply that promolgated through the plant, it gives you false, erroneous signals in the control systems and the control systems just acted the way they were told to do. So these are transients.

MR. OKRENT: Okay.

I'll let it at that.

MR. TEDESCO: And that -- and that was -- yes.

Also, we want to continue our studies of the need to trip the pumps that are in small break locas. IMPOL made that recommendation and we currently support it. We also look for perhaps an assessment of proper injection nozzle on the aux feedwater systems. It presently in some plants is in at the top. That may not be the best point even though it gives you a maximum pull, it may give you a greater potential for over filling transient.

And then there's some history that we've shown about LER's that there may be more licensed personnel errors on the B&W plant than others and we just want to look into that some more. We don't have a definite position of it yet but we -- it's something that we wanted to look into.

MR. MOELLER: How much higher are the LER's from the B&W plants?

MR. TEDESCO: Bruce?

MR. WILSON: This is Bruce Wilson, I operate a

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licensing branch. The study was only done from 19 -- January 1978 to the present and that's essentially since we started classifying personnel errors by licensed personnel. The numbers are 6.45 per facility from '78 to the present for B&W versus the highest I believe was combustion engineering was 5.70.

CE, GE and Westinghouse fell within the range of 5.30 to 5.70, whereas B&W was 6.45. Now, what the significance of that is we don't know at this point. We'd like to look at it.

MR. TESESCO: In the last blank, kind of a summary conclusion, the task force has come up with 22 recommendations for looking out for the establishment of some measure of effectiveness of it and people from the problem with the condensor assessement staff are helping us with that.

We believe that a recommendation that we had made as well as those from -- the bulletin and other task forces certainly have attributed to the improvement of the plant. Recommendations of our task force should be incorporated into the overall task action plan.

We believe that continued plant operation is permissable. However, there are some actions that we feel should be recommended promptly based upon what we experienced at Crystal River. There is a program going on a Crystal

4/25

River now with industry and IMPO and we've had -- the results of their findings should be made applicable to all the operating B&W plants.

And finally the NRC should be expediting its review of Crystal River 3 event in the licensing responses. We sent a letter out on March 6th to the owners, the responses are in, we will be meeting with them and we said that review should be completed expeditiously.

So, that completes the briefing that we had prepared on the task force. Our next action will be -- meet again with the owners, complete Section 7, put our report in final form and then I can come back to you next month and share it with you. But we are going to meet on the 29th with the subcommittee.

MR. ETHERINGTON: In the afternoon, I took that to be enough. Is that your judgement?

MR. TEDESCO: Well, we've gone through quite a bit of the background so I would hope that we can get down to very specifics on the afternoon so it should be all right.

Thank you.

CHAIRMAN PLESSET: Well, I believe the Vice Chairman promised you a break but before we go to that let me put some unpleasant possibilities to you.

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We're behind schedule. Now, we did have a commitment to meet with several of the commissioners down here at 1:00 o'clock. Now, we can go straight through until 1:00 and then have lunch at 2:00. Or the other possibility -- well, not lunch at all, would be to stop at noon, meet with the commissioners and then come back to this subject that we will have to continue.

So it's up to the committee members to tell me what they want. If you want to tell me after you come back from the break, that's all right too, or if you can lobby with me during the break.

So let's take a 10 minute break and you can tell me what we're going to do for the rest of the --

MR. EBERSOLE: Do we have an agenda for this part of the program?

CHAIRMAN PLESSET: Yes.

MR. EBERSOLE: How much more remains of the --

CHAIRMAN PLESSET: Well --

CHAIRMAN PLESSET: Let's reconvene and start the agenda again. Let me point out that if you look at your agenda for this part of the section, Item 3 and 4 are related. We're going to have comments by Toledo Edison, B&W, then the Staff will present their IREP discussion, and we'll have discussion of the utilities ability, the B&W plan.

I point out that every minute beyond 12:00 is just subtracted from your lunch time and the Committee's lunch time, and I was thinking of not having lunch so it won't bother me too much. Let me plead with the people who have presentations to be as concise as possible because it's very possible that some of it may have to come at 2:00 if we don't finish it by noon.

I'll call on a representative from Toledo Edison.

MR. NOVAK: Thank you Mr. Chairman and Members, I'm Eugene C. Novak, General Superintendent of Power during construction at the Toledo Edison Company. With me today is also Mr. Richard P. Kraus, Vice President, Nuclear, at Toledo Edison.

I'd like to first say that we appreciate the opportunity to participate in your meeting today on the B&W reactor transient response issue and the draft new Reg 0667.

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Our comments today reflect the viewpoints of Toledo Edison and the B&W owners group and pertain primarily to the draft new Reg 0667 and our thoughts on continued relationship with the NRC.

MR. LEWIS: You mean the possibility of it or the nature of it?

(Laughter.)

MR. NOVAK: The New Reg Report represents a commendable effort by the Staff considering the time available to the task force. We feel that the report provides an excellent focal point for the Staff and B&W owner representatives to discuss the Staff's and the owner's observations, conclusions, recommendations in improving the transient response capabilities of the B&W powered plants.

With only two weeks available to the Task Force they have of necessity had to address the B&W powered plants generically with only minimal recognition of the specifics of plant designs. Designs related to main feed water, auxiliary feed water, steam line and feed water line break mitigation systems, and even the vintages of B&W, ICS, NNI systems differ significantly among the B&W powered plants.

We note that the Task Force report does not pointedly caution the reader of potential differences

among the plants. We caution that misleading conclusions can be drawn from addressing B&W powered plants or any other vendor's plants in a generic rather than a plant specific fashion.

The Staff noted in their earlier presentations that there is a need for an expedited review of the Crystal River Three events and the licensee response is already in to the NRC. We encourage this effort so that NRC direction can also benefit from all reactions resulting from the Crystal River Three event.

Since the release of the draft report, we've not had an opportunity to present our comments and viewpoints to the Task Force on the report and its recommendations. We're encouraged by the Staff's plans to meet with the owners on April 23 to discuss the New Reg Section 7, Implementation, Priorities, and Schedules. We hope this is not an after the fact dictation of the Staff's requirements, but an honest effort to get our viewpoints before the positions get cast in concrete.

I might note that it appears that the April 23 meeting may be too late. That the Commissioners are being briefed next week. We're wondering how will the Commissioners benefit from our input.

An open approach may result in our mutually finding that some of the recommendations may not be

PL 4

supported by risk assessment conclusions and we may even have some approach that the NRC hasn't considered.

This leads me to our primary message today and that is let's work together. Neither we nor the NRC nor the vendors have a corner on the knowledge and the innovative approaches to nuclear power. We've seen where by not working together we've jumped to conclusions, made changes in design operation and then have thought better of it. In order for the nuclear industry to survive, we must together reestablish and maintain credibility with the public. We feel this can be best be done again if we work together and not put ourselves into a situation where we find ourselves countermanding either our own or each other's recommendations, corrections and actions. We'd like to share viewpoints with the Staff on the New Reg recommendations. We want to participate and establish new design criterias suggested in Recommendation 19. We surely feel that with the limited resources of both manpower and money in our industry that nuclear safety can best be served if we work together. Pride of authorship surely can't be paramount to nuclear safety. Respective viewpoints and a sense of contribution to the requirements and rules for operation can accomplish more toward nuclear safety than threats of civil penalties for noncompliance. Let's participate before your recommendations are presented

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to the Commissioners for concurrence.

As the industry's individual and collective efforts have shown since the Three Mile Island incident, we share with the NRC a mutual goal of assuring nuclear power plant safety. We will continue to work with you to evaluate proposed improvements which are productive and apply them in a most efficient manner. This combined effort should continue to recognize the high level of safety already achieved and remedial actions now underway to reinforce what is now in place.

New regulatory requirements that are not incrimentally significant can seriously dilute and detract from this effort and can be counterproductive to overall safety. We urge for those proposed requirements of secondary importance but worthwhile of later consideration, the NRC should reach a judgement of safety goals in which these additional considerations can be evaluated before they're imposed NRC regulatory requirements.

Additionally, action should be taken to remove from consideration those items which have marginal value. I must admit that while these latter thoughts I presented to reflect our viewpoints, they are taken from Mr. Brian Lee's letter to Mr. Harold Denton on February 22, 1980, expressing AIF's observations on the NRC action plan New Reg 0660. Again, we endorse those thoughts as being just

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as valid today. Thank you for your attention.

CHAIRMAN PLESSET: Thank you, Mr. Novak. I wonder if I could persuade Mr. Taylor to yield to Mr. Hoppler? He has some travel problems and he has a brief statement he'd like to make.

Mr. Taylor is agreeable, so Mr. Hoppler do you want to come up now? That will help you, I believe.

MR. PORTER: I'm Bill Porter from Washington Public Power Supply System, the Design Engineer and Supervisor. Mr. Hoppler was not able to be here so he asked me to make his presentation for him today. I'd like to do that and take this opportunity .

I'd like to put on the -- in our meeting with the Subcommittee, we were asked to present only those items which have been brought up since our last meeting in January. I'd like to do that at this time.

I have shown on this first slide the changes which we -- you're seeing a recommendation. These are things we're actually doing off the WNP-1/4 plant to meet the requirements which we have been discussing this morning.

First of all, there are changes to retain in the original NSSS operating characteristics. First of all, in qualifying the PORV. We are participating with EPRI, B&W has been considering other valve types than what EPRI has been showing, and B&W has provided to EPRI

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the performance criteria and acceptance criteria for single and two phase flow which we feel we might have under those accident conditions.

Secondly, we are providing 1E control and power to the PORV. The design changes are underway. Our architect engineer is making the changes to wiring diagram and control loop, et cetera. We do not see any major problems in putting this into our plant design.

Thirdly, we are providing 1E PORV isolation valves actuated on low RCS pressure. The source has been identified and investigated and we're now waiting B&W's recommendation on the type and number of valves, and it appears right now that we will be using two valves for that purpose.

There's some changes we'd like to make to improve secondary system reliability. Namely, increase the water makeup capacity to condenser hotwell during runback after a turbine trip. This study is completed. We have accepted the architect engineer recommendation to increase control valve size from 6 to 12 inches, to increase our flow from 1500 to 4500 GPM. This increases the time to low hotwell trip from 4 to 11 minutes which gives us a substantial margin over what we've had in the past.

Secondly, to prevent a single failure in the

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ICS from providing steam dump capacity in excess of 25 percent. The analysis of this is complete. The engineering of interlock is underway. The schedule is there but I won't take time to read that. It's in the handout.

Thirdly, provide improved control reponse to the ICS following sensor failure. The first step is to define this interface criteria and that is being done at this time.

There are changes to improve the response of the nuclear supply system. Provide for rapid main feed water flow reduction following reactor trip. This is being accomplished.

Add 1E loss of all feed water trip. Preliminary work on the BOP criteria is underway.

Thirdly, add the overfill protection. This design also is underway.

Fourth item, feed water overfill protection rate control. That is being done by the schedule shown.

Fifthly, provide improved algorithm used for up speed water control. We have preliminary engineerings in progress and we hope that'll be carried out shortly to its conclusion.

We're doing some studies with the architect engineer and others, first of all one having to do with secondary system reliability. We're finalizing

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identification transients in the secondary system. By knowing what the transients are, we'll be able to provide the engineering techniques to take care of them.

Control AFWS supply system was a problem which we uncovered. And this study will identify the valves whose failure may give us problems and cause some transients. We could modify the fail position or provide accumulators as the case may warrent.

We'd like to provide a minimum final feed water response study. We're carrying that out, previous calculations have shown acceptable consequences are being reviewed to make sure that assumptions that you made at that time are still valid.

The Auxiliary Feed Water turbine reliability, this study is underway. Our steamline routing is being reviewed and operating data for governors is under review. We found that there was a question as to the realiability of a govenor that they're using and that is being investigated now.

Item 5 is rather appropri te, it had to do lately with the Crystal River event. This is again NNI/ICS products and product reliability. We're doing a total review of the power through these systems and other none running systems which are underway in response to TMI, the 79-27 and the Crystal Three event.

And lastly we are looking at the heater drain pump reliability. A study here is underway and the desirability of continuous cold water injection is being studied. We're also studying the need for upgrading of control systems in that area.

I've said a lot in a few minutes. I realize that we're short of time, but I want you to know that what is behind the essence and desires of this sensitivity program. We feel that the 205 Plant which has a lot of advantages over the old 177 plants will not have -- would not have had some of the problems that we saw in TMI nor would they have experienced the same extent of the incident at Crystal River.

MR. SHEWMON: Is that control air still -- how does it get connected with your instrument air?

MR. PORTER: Well this is instrument air. It's the Class 1 air system. There was concern as to its quality, the amount of air available, and more than that the operation of the valves in the fail mode. Will they fail open or will they fail closed? Would we have a total loss of power if we had a plant blackout? That was the main concern.

MR. SHEWMON: I was more concerned with filling it with water. Does that happen every so often? I thought they got water in the air lines by some failure

at TMI too?

MR. PORTER: I don't recall the details on that.

MR. SHEWMON: You might look into it just far enough to know that it can happen in your plant.

MR. PORTER: Absolutely.

CHAIRMAN PLESSET: Are you saying something, Jeff?

(Laughter.)

MR. EBERSOLE: A longstanding concern that might be worth your investigating in particular, and this is in a seismic event the air systems are suspect because you're going to shake up the packages and the filters and you may in fact at that moment unload all sorts of contaminents in the air streams and stop all your air controls. I think it would be worth looking at.

MR. PORTER: I think that'd have to be in looking to see whether you want to fail open or fail as is or closed. That's a good point. Any other questions?

CHAIRMAN PLESSET: Thank you, Mr. Porter. I apologize for using the name on the agenda.

MR. PORTER: That's all right, he's a good man.

CHAIRMAN PLESSET: Well, I want to point out to you and Mr. Novak that we're concerned about things getting acted on very rapidly with the Staff discussing

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with the Commissioners. You've already heard that we're not going to write a letter at this meeting. It'll be the next full Committee meeting and I would be very surprised if there would be any concrete set before that letter gets to the Commission.

Mr. Taylor? You will note the time, I'm sure the Committee will be watching with you.

MR. TAYLOR: B&W also appreciates the opportunity to meet with the full Committee this morning. I have comments that really are in three categories. One is some general comments on the sensitivity issue. Two, a suggestion for how we might move the sensitivity issue or transient performance issue forward in an orderly way; and third, to pass on a few brief comments about the report itself, New Reg 0667.

I want to make sure that none of the things that I would say would be taken out of context or misinterpreted. So I want to preface my remarks just by saying that we too endorse the efforts that have been taken by the Staff both in production of New Reg 0667 and also the report that was produced.

Until recently the subject of sensitivity has been subject to a lot of feelings and a lot of subjectivity, and we think it's important now that we push it into the area of objectivity and qualifications.

The most widely learned lesson that we came away from TMI 2 was the fact that we should pay attention to significant events when they do occur in the field. And then use these events and what we can learn from them as a springboard for corrective action wherever corrective action is appropriate.

The NRC is obviously placing a lot of attention currently in the area of events in the field, particularly the more significant transients. B&W endorses this emphasis. We have placed a lot of attention in this area ourselves since TMI 2. We have participated aggressively with Florida Power. I trust that ACRS members have all received a copy of the report that we turned in on Florida Power's behalf about two weeks after.

We also have an ongoing relationship with Florida Power. We've had people down there working on the effort that Mr. Tedesco mentioned earlier -- a rather extensive task force effort is going on at Crystal River now. We have people involved in development of recommendations regarding what can be learned from the Crystal River event and other similar events. It's not just looking at the Crystal River event.

The area where the Staff is focusing a lot of attention right now is in the area of primary and secondary imbalances -- heat imbalances. It's clear that

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the resolution of this issue -- so called sensitivity issue -- is going to lead to new requirements. And they're going to be requirements in an area where there has not been a lot of attention paid in the past. And I think as was mentioned by Mr. Novak, and I think alluded to by Dr. Kerr, if we make these requirements changes and impose hardware changes too rapidly, they have the potential for not only improving -- well, they have the potential for having negative impact.

So the changes that we introduce as a result of new requirements can have both a positive or negative -- can have either a positive or negative effect.

B&W believes that the development -- Peter, can you help me here? B&W believes that the development of these criteria can be approached in an orderly way with a three step process involving first of all the establishment of criteria for moderate severity transients. And that's what we're talking about here as opposed to normal operation. Not necessarily the case -- or in most cases it would not be a situation which involved the exceeding or violating a safety limit.

I think that it's important to establish criteria for these moderate severity events and become more quantified in our approach.

Then we think the next thing to do and we have

activities underway right now at B&W in these areas, to compare actual plant performance to these criteria and to utilize this comparison as a basis or springboard for action.

MR. SHEWMON: Anything that is a severe transient is already taken care of in the PSAR, is that it? Is that what moderate means?

MR. TAYLOR: Yes, that's our interpretation, yes, sir.

I think it's important also that we expect that the kinds of transients that we're getting into now with more detail, the kinds of transients which are going to be the subject of establishing new criteria are going to be periodically violated. I think we can expect that. And unlike plant safety limits, we should write the criteria with that thought in mind.

So we ought to have a criteria approach which recognizes things here on the next overhead for these moderate severity transients. That there's both a success statement which is measurable and meaningful, and that there's also a frequency expectation to that transient and there are a couple of alternatives that are possible whenever we talk about a frequency statement. One can be as low as practical, one might be a probablistic assessment, and I think the comments that were made by

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Dr. Kerr in the early part of the meeting indicated the need. I believe the staff recognizes the need now as indicated in their report to develop criteria which have a quantifiable nature to them, and we certainly would prefer the second approach in terms of the frequency status.

Now, one way to approach this issue of developing new criteria is to establish indicators of moderate severity transient performance and to see what historical performance from the operation to date actually is when compared to these indicators. Now, that would mean that would make possible -- that comparison would make possible without any preconceived notions a basis for identifying a potential expected performance. And we could also identify from this comparison potential trouble areas.

Now, there has been we believe a distorted impression of the performance of the B&W plant and B&W NSS, and it has been indicated that B&W plant performance consistently behaves in a very dramatic way. This is not the case. We believe that the Staff's report on New Reg 0667 is very balanced approach. It takes -- it goes a long way toward establishing the kind of criteria that I mentioned a minute ago.

Many of these criteria that should be developed and are mentioned to some extent in the Staff's report

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have far reaching implications. And we believe that it's necessary to consider them very carefully. We have not reviewed New Reg 0667 yet in depth. We believe it presents a balanced perspective as far as the OTSG is concerned and as far as the B&W plant is concerned. And we think this is really important.

The B&W NSS has a history of very good performance in areas of thermal performance, thermal efficiency, tube integrity, and transient load following capability. Because of the characteristics that the OTSG has, it has the ability to follow a load very closely. But also because of this characteristic it is important that feed water control be accurate and that feed water be available. B&W has made specific recommendations to its operating utilities and to the backlog utilities, and these recommendations are aimed at improving the performance of the plant in regard to this so-called sensitivity issue.

Currently these recommendations are being reviewed by each of the utilities for their plants specific applicability. This is another reason why we believe that whenever criteria are established that they go along lines of the probablistic approach which can then recognize the differences on a plant specific basis.

Now, I think it's also important to underscore

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the statement that was made by Mr. Porter in that many of the changes that will improve the performance of the B&W NSS in connection with this sensitivity issue have already been made and many of them are already -- many of the plants that are coming along later are already considerably advanced beyond the operating plants.

We believe as a result of the very significant differences that exist already in the 205 plants, that the 205 plants will perform differently than the operating plants and that further changes are certainly -- can be readily made.

Now, we have developed some preliminary criteria, this is my last slide. These are candidates for transient success statements. These are candidates that we have developed as a result of reviewing -- we have underway right now a review of over 300 reactor trips. And we believe that the operation of plants should be considered normal if these particular candidate statements are met. That is, if reactor coolant system pressure remains above the high pressure injection automatic actuation set point, that the reactor coolant system pressure does not lift the safety valves, that the reactor coolant temperature decreases and would remain within spec limits, reactor coolant is contained within the system and punch tank, the pressurizer level and OCS level

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would remain on scale.

Now, we have underway a review, as I said, of over 300 reactor trips -- post trip performers -- and in 90 percent of those cases the review so far shows that in 90 percent of those cases these kinds of success statements had been met. In those cases where performance has been outside these criteria, we believe that either actions have already been taken by related utilities or actions are being planned and studied that can significantly reduce the number of cases where the performance is outside these criteria and can bring many of the trips within those limits.

One of the ACRS consultants made a point at the last meeting which I think is somewhat systematic of some of the understandings. He raised the question why is the pressurizer level always go off scale in B&W plant during a transient? Well, it doesn't. And we want to make sure that this impression is put in its proper perspective.

We found that in only -- I think it was 12 or 18 cases out of these 350 -- over 300 trips where the indicated level had gone off scale.

MR. OKRENT: Excuse me, are you going to have a corresponding set of criteria for what constitutes an acceptable or unacceptable failure? Because in effect

it's not enough to know that 90 or 95 percent of the time you've been successful. There's very considerable interest to know about the nature of the failures and how bad they might be. And if that's not part of your overall picture, I think it would lead in a very important way.

MR. TAYLOR: I think that's the point where we are right now, Dr. Okrent. We recognize that it is necessary at this point to develop criteria which which enable you to evaluate these transients in a way that you can predict just how close you are to a dangerous situation. The thing that has been true until recently, the thing that really kicked off the sensitivity issue back a year or so ago was the issue of pressurized level going off scale. We think that it's necessary to become much more specific than that in the criteria. We have a program underway right now using the Arkansas Nuclear 1 plant as a trial case and called our Abnormal Transient Operting Guideline Program, and this is a very systematic review of the most frequent transients. They go through the development of operating procedures on a very systematic way. So I think the answer to your question is yes, we're not to the end by a long shot.

I can come to an example, my current

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understanding of the Rancho Seco transient, it included the possibility and not necessarily remote possibility that you could have lost both a main feed of feed water and auxiliary feed water and have further more difficulty of accomplishing lead. Now a system that is successful 95 percent of the time in meeting transients, but 1 or 2 percent of the time poses that picture if it's a correct picture . Doesn't in my mind, get 95 percent out of a 100 and an "A", I would give it an "F". Do you understand what I'm saying? Because it has such a severe potential failure mode if that picture is correct.

MR. TAYLOR: I understand what you're saying.

MR. ALAN: It's important, Dr. Okrent, to investigate for each of these transients which would be classified by such a system to be abnormal, exactly how the particular exceptional behavior occurred and to what extent this led you to a diminishment of the defense depth that's built into the system with the particular objective of (1) reducing the frequency of such events which might diminish the sense of depth in the future; and if necessary the option of improving the barriers which would remain after such a transient development.

If I understand the thrust of your comment, that's it and we do agree.

MR. EBERSOLE: Let me ask a question. I think Dr. Okrent's identification of a transient is in the Wash 1400 context of it being a transient. Would you call it a transient as we're talking about your design here?

MR. TAYLOR: Yes.

MR. EBERSOLE: It was a failure of course.

MR. TAYLOR: I would call it a transient of moderate severity. And you would expect to stay within some confined balance now when that occurs. I would expect in that particular case, the transient -- Rancho Seko -- would have gone outside those limits.

MR. EBERSOLE: Oh yes, but how far is the question.

MR. TAYLOR: Any further questions at this point? I'm very close to the end here. We did have a few specific comments with regards to New Reg 0667, and we have not completed our review of it and we plan to do that shortly. But the comments we have to date are, first of all, we believe the report does present a balanced perspective on the sensitivity issue, and we believe that the recommendations that are contained in the report have merit and should be carefully considered. That applies to all of us.

Secondly, we believe that the criteria needs

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further development along the lines of what I was talking about here, and these criteria are needed now. We need to move away from the area where we talked about it's just bad without some quantified basis for saying that if the pressurized level goes off scale, or the steam generator goes dry. We need to work with the staff in a mutually agreeable set of -- to develop mutually an agreeable set of criteria which can be measured and which are meaningful.

You ceratinly support the risk prioritization effort that was described by Mr. Tedesco and will be incorporated into Chapter 7 and we fully hope and want to participate in that effort.

We also support a reliability oriented approach to the upgarde of auxiliary feed ware systems and other systems as opposed to just the plant safety upgrade. We believe that that's the right way to go and I think that's the way to get the most for the investment time and money at this time. We believe that's also the Staff's intent.

We also believe that there should be equal emphasis placed on the improvements in the reliability of the main feed water system. We think that this is good from the standpoint of emphasizing -- giving equal emphasis to prevention, to that being given to

mitigation. In other words, we're saying that we believe that a lot of emphasis needs to be given to the main feed water system and to the extent that we're able to improve the performance of the main feed water system the importance of the out speed water system decreases.

So in closing I'd like to make three points. First of all, I'd hope that the ACRS would support the importance of early development of meaningful, measurable and complete criteria as an important step in an orderly resolution of the sensitivity issue. I think this gets right to the heart of the point Dr. Kerr was raising. And these criteria should take advantage of the information that we have from the operating experiences to date, and we have now a considerable amount.

The second point is that I would hope the ACRS would underscore the importance of balanced perspective on the sensitivity issue. All plants have their pluses and minuses and that's certainly the case for a plant with a steam generator.

And the third point is that we believe the sensitivity issue is not one which in any way should be the basis for stopping construction on the plants that are under construction because we believe that the kinds of changes that might be necessary to significantly improve the performance in this area are things that can

be done in parallel with continued instruction.

CHAIRMAN PLESSET: Thank you, Mr. Taylor.

MR. LAWROSKI: Have you given any consideration to which of these in the development of criteria that you might suggest be undertaken by industry in view of the fact that the Staff is already well overwhelmed with things that they're being urged to do?

MR. TAYLOR: Yes, sir.

MR. LAWROSKI: Including the near term CP, et cetera.

MR. TAYLOR: Yes, sir, Dr. Lawroski. I believe that we certainly can't do it alone because what is acceptable to us may not be acceptable to the Staff, but this was our initial attempt as a result of just what we've done so far in looking at the 346 trips with the sensitivity issue in mind -- these candidates that we came up with and recognizing that they should have some frequency statement attached to them. But we think there are certainly areas and that's what that effort was based on. Because we've got to move away from -- there's got to be some safety significance to the issue of for example losing pressure or boiling a steam generator dry. It's not something that we can just say we feel bad about it. How close were you to having something to proceed from that point on that

could develop to an issue that did more than just spill water on the floor.

MR. LAWROSKI: By industry I don't mean just limited to the supplies, but the users as well.

MR. TAYLOR: Yes, I think it's got to be a mutual effort because a lot of the things that affect the reactor coolant system are out in the balance of plant area. And I believe it's also an assumption that in order to keep the right perspective on the issue it's got to be done along the lines of the study that Dr. Bellows did where they not only look at the B&W plant but also the other plants as well.

MR. LAWROSKI: Could you identify for me at least a few of those criteria that the industry collectively could --

MR. TAYLOR: Well, we're talking now about developing criteria for transients where they have not been developed before. For example -- that's a first cut at the kind of things which we would say -- if a post trip performance of a transient falls within those limits, it should be considered normal behavior. Now we have to move on from that and say, okay -- and there are gradations. There's a certain frequency with which you would be expected to, based on transient performance to date in the plants, to exceed those

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MR. TAYLOR: -- involved process. I think it would be interesting to you. I would be glad to spend five or ten minutes with you explaining this. It -- using the eventries as a basis for discussion. We could do it now, too, if you --

MR. SHEWMON: While that's going on, let me ask a different question. There was some discussion by Tedesco earlier on -- I guess it was the pressurizer level scale.

MR. TAYLOR: Yes.

MR. SHEWMON: The pressurizer seems -- do you have a narrower height between these points on some of your older plants or --

MR. TAYLOR: Yes, sir.

MR. SHEWMON: Are you doing that on the 205's or --

MR. TAYLOR: No, sir.

No, the -- the pressurizers on some of the older plants -- the pressurizers are all the same volume on the 177 fuel assembly plants. They do have a different range -- two different ranges on them.

Some of them read 400 inch range; some of them read a 320 inch range. The later plants--the 205 fuel assembly plants have taken the full -- essentially

the full contents of the pressurizer and are measuring from the bottom hemisphere to the top hemisphere. So, we've gotten --

MR. SHEWMON: How many inches is that?

MR. TAYLOR: Well, it's a different diameter, but it measures about 90 percent of the pressurizer volume. And the pressurizer is about, I believe, 40 percent bigger on the later plants than the earlier ones. So, the visible volume to the operator on the 205 plant is about twice what it is on the older plants.

MR. SHEWMON: All right.

MR. TAYLOR: And by the way, I might also mention that these cases where the pressurizer level has gone off scale, we have made calculations which indicate that in no case was the pressurizer drained. And in 95 percent plus of those times it was on the pressurizer that had the shorter range on the older plants, the 320 inch range as compared to the 400 inch. There were only two cases where the indication on off scale on the 400 inch range.

CHAIRMAN PLESSET: Jesse, before you pose your question, I'm sure Mr. Taylor will be glad -- glad to be back at 2 o'clock. And -- is that all right?

MR. TAYLOR: Yes, sir.

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CHAIRMAN PLESSET: But we may have another change. I'd like to ask Harold, the staff has suggested that they could put off their RF presentation until the next meeting. Does that seem reasonable to you?

MR. ETHERINGTON: Yes.

CHAIRMAN PLESSET: Well -- so, then, we'll just have Mr. Taylor back, and we'll have Mr. Terrill from TVA.

MR. OKRENT: If Mr. Taylor could leave me a copy of his handouts, then I --

CHAIRMAN PLESSET: Well, I think we need those any way, Dave, yes. He'll do that.

MR. TAYLOR: Yes.

MR. OKRENT: I'm sorry, Pete.

CHAIRMAN PLESSET: Beg your pardon?

MR. OKRENT: I meant -- I'm sorry, Mr. Murphy. Mr. Murphy could leave a copy.

CHAIRMAN PLESSET: Oh, you mean now?

MR. OKRENT: Yes. But not the presentation. If he would be willing to.

MR. KERR: He's also going to explain what was meant by that statement in the meeting summary; isn't he?

Somebody volunteered him to do that.

CHAIRMAN PLESSET: Could you do that at 2 o'clock?

A VOICE: No.

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CHAIRMAN PLESSET: He doesn't want to do it at 2 o'clock.

Do you want to do it now? That's fine.

MR. KERR: No, I just want -- I don't need him now. I --

A VOICE: No, it's next month.

CHAIRMAN PLESSET. Next month.

MR. KERR: I was just curious as to what was meant.

CHAIRMAN PLESSET: Okay.

MR. TAYLOR: Go over what I'm explaining next month.

MR. ISRAEL: Dr. Kerr, maybe you want to repeat the question --

MR. KERR: All right.

MR. TAYLOR: It was on your last slide, Dr. Murphy. From last time.

Dr. Plesset, I --

CHAIRMAN PLESSET: Yes.

MR. TAYLOR: -- I'm through unless Mr. Ebersole --

MR. EBERSOLE: I gathered you were, but I thought that there might be a question of some length.

MR. EBERSOLE: Oh, no, I thought it might be

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of interest to the entire group here to get B&W comments on their feelings for need of feed and bleed or reflex connotation.

MR. EBERSOLE: That's why I thought it might be -- I don't want to make it to -- too rushed. If you could do it at 2 o'clock, it would be better.

MR. MURPHY: If you say at that time.

MR. EBERSOLE: All right. Can you do that?

MR. TAYLOR: Either I or -- or Dr. Womack will do that?

CHAIRMAN PLESSET: All right. That's fine.

Let's recess for lunch until 1:00. We will continue with this topic at 2.

(Lunch recess. 12:10 p.m.)

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A F T E R N O O N S E S S I O N

CHAIRMAN PLESSET. All right.

Mr. Womack, would you address Mr. Ebersole's question, please?

MR. EBERSOLE: On bleed and feed.

CHAIRMAN PLESSET: How's that?

MR. EBERSOLE: About bleed and feed?

CHAIRMAN PLESSET: I think that's what the question was.

MR. EBERSOLE: Yes, I was asking B&W to what extent they think bleed and feed is necessary in their plant in view of the fact that I think that their plants have the distinct advantage of being capable of complete solidification at will when they put the new valves on.

CHAIRMAN PLESSET: Would you make sure that that things work, Mr. Womack?

MR. WOMACK: Does it work?

CHAIRMAN PLESSET: Yes. It's working if you squeeze it.

MR. WOMACK: I can't tell from here.

CHAIRMAN PLESSET: Yeah. Go ahead.

A VOICE: We'll let you know.

MR. WOMACK: I think the -- I think that I would like -- before I make -- respond to your remark,

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I would like to make sure that I don't make the implication that steam generator heat removal is not the preferred method for high pressure heat removal from B&W plants; indeed it is.

CHAIRMAN PLESSET: Agreed.

MR. WOMACK : The steam generators are highly reliable -- and high integrity device, and that's the primary high pressure heat removal design basis and -- and we would want it to continue so.

And having said that we believe that the feed and bleed capability which exists in -- in all but one of the B&W plants represents a highly desirable capability for those plants who have it.

It is, in fact, a diverse high pressure decay heat removal capability which relies on safety grade components. And although as the staff has pointed out in paragraph 5.25 of the draft new reg 627, the plants were not specific. This -- this was not the specific design purpose of the -- of the system. It is a capability of -- and an advantage which should not be ignored. And it's a good example of plant specific defenses in which -- in plants which exist. Because what it represents is -- is a capability to mitigate a total loss of heat sink,

G/T 6/8

which would be a much more serious matter in plants without this capability.

And I relate this back to the discussion we had this morning about criteria, and the points that were made about the need to address plant specific capabilities in regard to making such criteria because in plants which have an alternative and diverse means, you know, high pressure decay heat removal, the total loss of feedwater, for example, would be of a different order of magnitude and concern.

So, that's basically where -- we -- the way we feel about it. I was pleased to see that the staff's discussion of it in that paragraph of NuReg 677.

CHAIRMAN PLESSET: Okay.

MR. WOMACK: We also had a question, I think, high point venting.

MR. EBERSOLE: -- you will have high point venting.

MR. WOMACK: Right. Of course, this was the follow-up item that the staff had requested from all licensees with regard to -- as a result of the lessons -- And the -- that is one of the unique capabilities of the straight tube and shell steam generator and the -- which, of course, as you know is fed from the hot plate which come up to the high point in thermahydrolic systems is

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not a heat transfer surface, but is in fact, the boundary of the pipe, and therefore, can be vented. And work is underway to examine the possibility of utilizing the existing manually operated vents which they are fulfilling the system in a potential mode in case the system should ever in an accident situation should become filled or partially filled with non-condensibles.

MR. EBERSOLE: Thank you.

CHAIRMAN PLESSET: Well, thank you. I would like to call on Mr. Salerno for a brief presentation, and then we will go to Mr. Terrill to -- to end this portion of the agenda.

MR. SALERNO: Good afternoon. My name is Mike Salerno with Consumers Power Company from the Midland Project. I would like to discuss the sensitivity issue that effects Consumers Power Company, specifically Midland. The history on where we stand right now, as you know, we received a request 10 -- 50504F request on a potential construction stoppage in October of last year. We responded to that in December. And our reponse was basically three parts.

One part was the status of construction on all the systems on the Midland Plant. Thesecond part was a prelminary set of analyses for overcooling transients.

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The third was a design discussion at the Midland Plant, specifically addressing the over ing issue.

This design discussion also was broken into three parts. First of all, we discussed the features of the Midland Plant that exist that we feel are beneficial preventing in overcooling type transients or mitigating consequences.

Second, we discussed the committee changes that we've already made internally that we are in the process of putting into the plant that address this issue.

Third, we discussed some further studies we have on-going within Consumers Power Company looking at this issue that might result in again further changes.

I discussed these changes in some detail before the ACRS subcommittee on January 8th. Subsequent to that Mr. Denton issued his letter of 22nd of January, preliminary, stating that he saw no reason for construction stoppage on the three CP plants.

Since that time on March 14, we received from the staff 27 additional questions. These questions were based on original submittal, specifically Appendix F. Appendix F was our discussion of design features at Midland addressing the over-sensitivity issue and we received 27 questions, as I said, from the staff on this

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part.

The questions basically asked for additional information on design changes and studies that we have identified. Although, we thought these were valid questions with respect to the design, and in general the issue of sensitivity, we thought that their questions in respect to construction stoppage were not appropriate. Therefore, were not -- should not be considered under 50504F.

However, we responded to the questions on April 3, in response to all 27 which is included in this document here -- to the staff. In addition, we supplied this document which was a modification to our original 1050504F response basically updating the analytical work that we've done.

Included the -- in the new information that we've provided under both these documents, I'd like to list some of the things we've outlined.

We've given some additional details in the area of the NNINICS that are under review at Midland. We provided some evaluation of some of the changes that were recommended by some of the other CP plants that we did not specifically recommend ourselves.

We provided a design criteria for revised AFW

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level control systems and provided some additional details for the modifications we're doing to the AFW piping system, both on the suction and discharge site.

We provided some design details of modifications we're doing on the pressurizer level indication. And we provided some additional information on studies on various INC type indicators such as incore thermocouples, P set, T set, meter, et cetera.

Along with that in our revision to our original response we provided more analytical work to complete the request that the staff originally gave of us in analysis on overcooling. This -- response included an analysis of a pressure regulator malfunction, sensitivity studies on small steam line breaks in a .5 square foot; additional sensitivity studies on the main feedwater overfeed case which we have supplied without sensitivity studies previously, and in addition a separate analysis of a large main steam line break taking credit for the Midland safety grade AFW level control system which previously had not taken credit for.

As I said, April 3rd, these were submitted to the staff. We haven't seen any results of their review y

Now, as far as Consumers' philosophy as far 1050 and 50504F is concerned, we feel right now that the

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staff has sufficient information as far as the Midland Plant is concerned to make a decision to justify continued construction.

We based that previously on the fact of the schedule that already included many of the changes we were making and the additional changes we thought we might -- might come about with the studies we were doing would generally manifest themselves in I&C type hardward changes which we thought the construction could accomodate.

The additional studies we performed as a result of these revised responses have not changed our conclusions.

Although the issue of sensitivity, of course, is not closed we though -- we feel it should not be pursued any longer under the construction stoppage but should be pursued as a normal licensing review of the Midland docket for which it was docketed. And the Consumers Power Company encourages the resumption of the licensing reviewing and is ready to meet with the staff on these specific issues.

That concludes my statement. Any questions?

CHAIRMAN PLESSET: Well, thank you. Any questions?

Well, presumably not. And thank you again.

MR. SHEWMON: Do we get a copy of this through

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the staff? Did you send a copy to the ACRS also or --

MR. SALERNO: We sent, I believe, ten copies to the NRC. No -- none specifically to the ACRS.

CHAIRMAN PLESSET: Do you want that, Paul? We certainly can arrange for that?

MR. SHEWMON: In fullness of time I expect --

CHAIRMAN PLESSET: Okay. Fine.

MR. SHEWMON: I haven't seen it yet.

CHAIRMAN PLESSET: Yes. Okay.

MR. SHEWMON: And being -- if it's being referred, why, that's probably why.

CHAIRMAN PLESSET: Fine.

And finally, Mr. Terrill of TVA. You've been very patient I know.

MR. TERRILL: Good afternoon. My name is Dennis Terrill, and I'm with Belfont Nuclear Plant, licensing project engineer. I'm working in TVA's office of power and regulatory staff in Chattanooga.

I plan to briefly outline the program that TVA has instituted for the resolution of the concerns regarding the sensitivity of the primary system -- secondary system for our Belfont Plant.

Accompanying me today is Clint Walker a principal at Nuclear Engineer from our division of

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engineering design. The nuclear engineering branch located in Knoxville. We plan to answer any questions you may have regarding the status of construction at Belfont and TVA's evaluation of the sensitivity concerns.

TVA's December 3rd response to Mr. Denton's October 25th letter included committments to perform studies and evaluations and to implement any changes proven to be appropriate. And the status of TVA's program can be summed up in the following manner. In the area of analysis since TVA's December 3rd response B&W has recently supplied us with a complete analysis and a detailed internal review has been initiated. This review will have insured that the analysis as represented at Belfont and is consistent with past analysis.

The TVA review reveals any major discrepancies in that analysis. NRC and B&W will be informed and the problems be resolved. We expect to finish our review and submit the complete analysis in mid-1980.

In the area of plant design TVA is undertaking an extensive program with B&W to study the feasibility of benefits of instituting additional modifications to further reduce the consequences of sensitivity and frequency of challanges to safety systems.

TVA's evaluation of these proposed changes is

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not sufficiently advanced to justify the listing of specific modifications or operating procedural changes at this time.

In general our list of modifications that we are looking at are very similar to the lists that have been presented. I won't go into those right now in order to save some time.

TVA is determining the desirability for each of those changes by performing the following evaluation in the areas of the potential for the proposed modifications that adversely affect the safety and availability of the plant in response to postulated events other than those of an overcooling event.

We are also going to do computer analysis to determine the degree of effectiveness in answering response to the primary systems in the initiating event. Looking at studies and analytical efforts already accomplished by B&W, operating plant experience and the reliability of proposed modifications.

TVA's evaluation of these proposed modifications is expected to be completed in early 1981, and we are working currently with B&W to expedite this schedule as much as we possibly can.

The following related actions are also to be

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taken by TVA to assist in the resolving of this concern. The NRC's RF study presently being performed on Crystal River 3 is being closely followed by TVA's reliability and availability group. TVA's nuclear safety review staff is independently reviewing the NRC's concern and the TVA program for its evaluation and resolution.

TVA is also performing a review of the reactor system at Crystal River and related work done by B&W and NRC for its applicability to Belfont. This review is expected to be completed in mid-1980.

All findings and recommendations which result from these studies will be examined for the potential they may have for being adopted as modifications to all the TVA plants, not just Belfont.

In summary, it is still TVA's position that construction of all portions of the Belfont plant should proceed. Design fabrication construction of Belfont has advanced to the stage where haltage of construction would not provide any foreseen advantage in resolving this concern. Potential modifications presently under study by TVA do not require significant changes in equipment and hardware will not be made more difficult by continued construction.

TVA believes that any hurried implementation of

potential modifications will not be in their best interest or the overall safe operation of Belfont. TVA also believes that each modification must be thoroughly exmained for that that new and as yet undefined safety questions are created.

Are there any questions?

MR. EBERSOLE: I've got a small question. When I saw the fellow's report I had a small twinge when I saw that line at the bottom that says, "No present B&W plants have fully qualified auxiliary feedwater systems" I said that's not so. Belfont does. Am I correct?

MR. TERRILL: That's right.

MR. EBERSOLE: Okay. I thought that was the case.

MR. TERRILL: Yes, I believe -- as to --

MR. EBERSOLE: So, that was an incorrect part of that -- the fellow's report. I guess they can correct that.

CHAIRMAN PLESSET: Is that right about the Whuff's Plant?

MR. TERRILL: I believe so. I think Newell and I discussed it when that statement was made, and we both have fully --

CHAIRMAN PLESSET: Okay.

MR. TERRILL: -- safety grade offspeed water systems right now.

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CHAIRMAN PLESSET: I'd like to call on Dr. Kerr to give a subcommittee report. The topic is nuclear data link.

Bill.

MR. KERR: I believe that you have in your materials, and I've lost the first page of aggenda, so somebody help me with a tab. It was tab something or other.

CHAIRMAN PLESSET: I lost mine, too. It's Tab 6.1

MR. KERR: Yeah.

Some information which is labeled background and -- well, project status report on nuclear data link. This is a proposal in a formative stage, I guess, by the NRC staff which has been discussed with the Commission. And I think as a result of that discussion the committee received a letter from Mr. Shalinsky asking for some comments on the proposal. And you also have in the same tab what is called a description of a nuclear data link.

Some of you may have also received a copy of a letter from Mr. Isenhook which went to operating plants and contained this specification along with the information indicating that it was fairly likely that the nuclear data link would be put into operation and asking for

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suggestions in cooperation of operating plants.

The subcommittee met on Wednesday with members of the NRC staff who discussed in some rather general terms how the data link might be used, although it was not clear to me from our discussions, which certainly was brief, exactly what it was going to be used for.

I would express my impression by saying that I think the staff feels that in the emergency center, which now exists, that in case of an abnormal situation in an operating reactor one needs information to make informed decisions and that the proposed data link which would collect information transmitted over a telephone line from each of 80 or so operating reactors, store that information for the last 30 minutes from any given time and then make it available for display and examination in various forms, that that would be desirable, if not essential, to the operation of the emergency management team as it carries out its responsibility for doing various things.

One of the things would be marshalling the resources of the NRC as it copes with an emergency.

We also received some information the proposal of -- of the system including hardware and some cost estimates as it is being developed under the supervision,

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I guess, of research by a group working at Sandea.

It has associated with it at present a cost estimate of somewhere around $25 million, if I understand the cost estimate correctly. And I think that does not include cost for operation either in manpower or in dollars.

I have no way of determining how accurate the cost estimate is. Although, I think it is one that has been made by the group at Sandea and the group here, so it certainly must have some credibility.

I guess -- oh, well, we asked the NRC people to make presentations of about the length as the presentation made to the subcommittee. These were short. And I would assume from those presentations that again we will get some information how the staff things the data link would be used and how it would be setup and how much it would cost, and is prepared to respond to questions.

Those are my comments. If there are comments that those of you who may have been present at the subcommittee meeting want to make, this is probably a good time to make them

CHAIRMAN PLESSET: I guess there are no further comments. Are there any other members -- oh, sorry --

MR. LEWIS: Well, just in triviality, the cost

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is very sensitive to the specs for the system, and I assume that the specs which includes certain data rates, numbers of parimeters and so forth, have been scrubbed by people. And I noticed some things that have to be updated every ten seconds, and I wondered whether anybody has, you know, really gone through the impact of making all the data rates have been biding on the cost.

Also, I noticed one sentence in the spec that just starting from the beginning that says that the transmission format has to be such as to minimize the possibility of leaks dropping interception and data qualification. And that's a completely open tract that can add billions to a system by incripting it. Is it a visage that this be an incripted system or --

MR. STELLO: We've removed that requirement.

MR. LEWIS: You removed it?

MR. STELLO: Yes.

MR. LEWIS: I see. Somebody else said what I said. Whatever -- whatever.

MR. STELLO: We removed it before we got here.

MR. LEWIS: I see. It's still --

MR. KERR: We did not explore those -- those are ligitimate items for exploration, and I noted as you did that there are some very specific requirements.

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MR. LEWIS: And the cost, really, is very -- has to be quite sensitive to those things.

CHAIRMAN PLESSET: Jerry, did you want to make a comment?

MR. RAY: No.

CHAIRMAN PLESSET: Any -- Jesse.

MR. EBERSOLE: I might make an observation I noted that the perimeters of measurement, of course, didn't include the instrumentation or follow the course of an accident, but I think that there would be plenty of room to put that in whenever that's sorted out.

CHAIRMAN PLESSET: Is that right?

MR. KERR: Well, someone did raise the question as to whether the staff as specifically looked at Reg Guide 1.97. And if I remember correctly the answer was that they had, although, there may not have been a 1 to 1 correspondence which were in the requirements.

Am I correct on --

MR. EBERSOLE: That was one of the -- studies.

MR. KERR: Yes.

CHAIRMAN PLESSET: Yes.

Chet.

MR. SIESS: The data to be transmitted following

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the two categories--one is essentially plant status, and parameters, and the other is radiological information from the surrounding area, I guess, as well in the plant. The second was mentioned sort of in passing as being something that would help the NRC decide on what protective actions to recommend. And in view of Mr. Gilinsky's question I tried to pursue that some in the subcommittee meeting, and I guess it never got beyond that one sentence. And I -- I'm not quite sure whether the staff was thinking of that function or just assumes that it's so obvious that it doesn't need anymore explanation. But much of our discussion was related to the operation of the plant rather than protective actions. I just thought I would mention that and see if it goes any different here. You might listen for it.

Any comment, Vic?

MR. STELLO: Well, let me ask first. Did you want the -- a very short briefing to the full committee, or we could just go to questions.

However, a couple of clarifying comments, I guess, are in order. Number one, the intent in my view of the letter you had from Commission Gilinsky was to look at whether or not a concept of the nuclear data link is right. We are preparing a paper for the Commission to

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make a decision as to whether or not to go forward. No decision has been made yet that we will have a nuclear data link. The issue is should we have one? Is there a reason for one? So, I think some of the early comments that speak to the point of why do you really want and need a nuclear data link are probably the most important subjects of the meeting. And I -- I propose that we certainly will want to get into that issue. And maybe it would be best if Mr. Bernie Weiss would get up and give a very short presentation and try to hold it to about 15 or 20 minutes. And then I'd like to come back to that very point because I think it is an extremely important point --

MR. KERR: I agree.

MR. STELLO: -- why do you want one in the first place.

MR. SEIS: Very good.

MR. KERR: Well, not only why do you want one, but what are you going to do with it?

MR. STELLO: Well, I think they're the one in the same to me. What am I going to do with it will explain why I want it.

MR. LEWIS: I hope that as it goes along because it is a -- time thing and one can imag -- you know, there will be a dedicated telephone line which is already a

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data link. And so there's an enormous continuous range of what is meant by nuclear -- gee, I nearly did it, data link. And I -- you know, I don't know what fit rate is in the --

MR. STELLO: Yes. We've looked at some of the questions you've raised.

MR. LEWIS: Okay.

MR. STELLO: What happens if you cut back on data and not have real time data but allow a delay and look at the sweep rates different -- for different sweep rates, how sensitive is it? Those questions have been asked and there are answers.

We've looked at all the extras that were on the system such as incription. I went out and met at Sandea and decided that all those other things that might be nice to have are not going to be part of the package that we're going to be looking at when we go to the Commission.

MR. LEWIS: What bid rate did you end up with just as a --

MR. BASSETT: We've got a single 4800 bought telephone line which allows a bid rate of essentially of 4800 per second.

MR. LEWIS: Okay. Fine. Thank you.

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CHAIRMAN PLESSET: Well, why doesn't Bernie go ahead and give that short presentation?

Do you want to come up here and -- oh, he's there.

MR. WEISS: I'm going to talk a little bit about, to set this up, what the role of the NRC is, or how we envision the role of the NRC in an emergency, and essentially why in general we think we need this; how it fits in. And then Sam Bassett will take over with a little more the details, if you want to go into that, of the nuclear data linkage as we envision it right now.

Essentially, as we've discussed with the Commission, we see the role of the NRC in emergencies not to be a single role but a spectrum of roles. And the most important one -- the underlying role for the Commission is that of monitoring. Essentially that of assuring that the licensee -- that the licensee is doing what he was supposed to do; what he has indicated that he will be doing.

Essentially it would be verifying and evaluating data from many sources to assure that there is proper operational and protective measures being taken and to keep the public informed of the situation.

Having -- doing the monitoring and evaluating

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the data that is coming in, it then follows that we may be in a position of providing some advice. That advice can go -- essentially the most important piece of advice is the question of advising government officials, particularly on what kind of protective measures are to be taken. We view that as probably one of the most significant things, or the most serious thing that the operational center and the NRC can be doing.

There is also the question of providing advice and assistance to the licensee, particularly if he requests that advice or we are in a position of having a different perspective of things, and can make suggestions and provide that to him.

And there is also the possibility that we foresee of having a completely different persp -- or not complete, but looking at things differently we may be in a position of directing the licensee, both requesting him to do something or if possible feeling strongly about something we could take -- give legal orders and direct him to take a particular position.

One of the constraints that we have on this whole thing in terms of directing the licensee is we do not see that the NRC would ever be in a position to physically operate the facility.

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And in addition the Commission feels very strongly that any direction would not really come from the operations center, but that would be from our people on site. A situation may be such that we don't have that luxury if our people have not gotten to the site, but where possible we believe that any direction should come to the site.

Now, it must be remembered that we will try to get our people -- NRC people to the site as soon as possible, but there will probably, in most cases, be a lapse of at least three to six hours before those people can arrive at the site. And during that period the information and the actions of the Commission will be from the operations center.

Now, to put this more in a kind of a graphical sense to demonstrate the point, these are what we look at as the basic roles of the Commission monitoring on the bottom, advisory and direction, they kind of overlap and interact with each other. But underlying all of those roles is the concept of monitoring. We constantly have to be obtaining information and evaluating that information to do anything else. And I think that is the position of -- the basic feeling of why we feel we need additional data that can only be obtained through a data link is that we have not -- as to the way things are now, we are not able

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to obtain sufficient information to do the kind of job we think is necessary with the way we are having to operate at the present time.

Essentially in the operations center we have a tremendous amount of data needs in order to do an appropriate evaluation. There are routine needs in emergency. And when I say "routine" I'm referring to the fact that we have a 24-hour duty officer now who is receiving telephone calls of any significant event that is going on in a facility. He obtains information, and it's usually a limited amount of information from the facility. And he or somebody on the staff has to make generally fairly quick decisions as to whether this is a really significant thing that ought to be followed up or we can just take the information and look into it later.

That information over the phone is usually quite limited. It would be extremely helpful in those situations to have additional data coming directly from the plant. But more important than that is generally the emergency situation where something is reported and we know that something is going on; we're trying to find out what is going on. The information, because of the activity in the facility that is coming in to us is quite limited, and we are completely at that point dependent

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upon the licensee whatever information he can give us by voice.

And even when we have assembled a rather large staff at the center, there is still essentially for the first several hours only one telephone line which is available, and that telephone line is staffed by an individual from the licensee staff who is supposed to be obtaining information. But the amount of information that can come to us during that period, which is the critical period, is rather a small amount of information.

There is a tremendous amount of information, obviously, that's available at the site--operational data, radiological and meterorological. But in the beginning it can only come to us through two people speaking to each other, and it's rather limited.

Yes.

MR. MOELLER: On the telephone, that's just voice. It doesn't -- you don't have one of these printers or, you know, where you can transmit -- run off a graph?

MR. WEISS: No.

MR. MOELLER: It's just a voice.

MR. WEISS: Just two people speaking to each other.

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To give you some idea, it's hard to give you a feeling for what goes on at the operations center, the atmosphere; this graph which is a description of the organization may give you some feel of -- for how the center is staffed and the amount of people there that are trying to do different tasks to understand the situation.

We have the executive management team who is the decision-making group. That's composed of the chairman as director of the EMT, the executive director of operations, the director of IE, Vic Stello, and one other member in a reactor incident would be Harold Denton.

They are the decision-making group. They are having to get their technical information from those four groups on the bottom. We have divided up the technical staff into essentially those people who are concerned with what's going on in the facility, the operations people, and they are to further -- further divided down into two groups. What's happening now? Trying to assess the situation, get a grasp on what's going on, and a second group which is looking at what are the possible problems that could be coming along later? Plus the protective measures group which are concerned with the

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onsite and offsite health physics; the possibility of making recommendations for protective measures. And they, too, are divided up into two groups--one, essentially, looking at what is happening? What is the current situation? And what is happening later?

MR. KERR: Is what you are describing what would be happening in an emergency? I'm trying to get the context of --

MR. WEISS: This is -- what I'm describing is that we have -- if we have a significant event where we activate the operations center that would be the organization. If there is a marginal situation, we're not too sure --

MR. KERR: So, the center has a geographical location.

MR. WEISS: That's right.

MR. KERR: And some space.

MR. WEISS: That's right.

MR. KERR: And what does activating the center mean? Does it -- I presume there are various levels of activation. The duty officer might call in three people; he might call in 30 or what --

MR. WEISS: No. There is only one level of activation, and that means that the executive management

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team is activated. They are now the decision-making; they are the ones.

MR. KERR: What does activated mean? Does that mean they come to the geographical location?

MR. WEISS: They come to the center, and there are essentially about 60 to 90 additional people that come to the center to be -- in different areas of expertise and different functions that have to be carried out in order to support the executive management team in any of the decisions.

MR. KERR: Okay. So, activation of the center means you collect almost a 100 people in this geographical location?

MR. WEISS: Right.

There are other conditions in which we're not sure; we've just gotten a limited amount of information; we will call together a limited amount of people to kind of watch it, and then it could go either way. We may decide to activate.

MR. KERR: Wait a minute. There is a different level of activation then.

MR. WEISS: It's not activation. It's just a kind of a standby.

MR. SHEWMON: That's called "half-cocked," I think.

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MR. WEISS: That's right. We're about ready to go. We're trying to collect enough information to decide whether we should make a decision to bring all these people in. So, we bring a limited amount of people to the center to do that.

MR. KERR: And that limited amount is five or fifty?

MR. WEISS: Generally, I guess ten or twelve people.

MR. KERR: Thank you.

MR. MOELLER: I don't understand the far left, the director, current status operations and the far right, direction, operations evaluation because the same components are listed beneath each of them.

MR. WEISS: That's right.

MR. MOELLER: And the -- I presume the operations evaluation group needs to know how -- or needs to have data analysis, and yet that's under the two center groups.

MR. WEISS: Okay. The two groups on the outside are essentially both concerned with the operations. The perspective is slightly different. The group on the left is concerned with getting a grasp on the specific details of what's happening at the facility right now.

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The other group has the mandate to look at possible problems.

MR. MOELLER: Look ahead.

MR. WEISS: Look ahead.

MR. MOELLER: To project.

MR. WEISS: Kind of say if they do this, what kind of systems -- what -- what are the possibilities of happening in an hour?

Now, these two groups -- all these groups, obviously, have to interact because what the operations evaluation group is looking at has to be fed into the protective measures group so they could look at the possibilities of protective measures.

MR. MOELLER: That helps me. Thank you.

MR. WEISS: So, although, they show a separate box, there is a tremendous amount of interplay between those. And we have gone to extreme measures in order to provide information to each one of those. There are several different systems in which each keeps the other apprised of the status of each. We've used electronic blackboards, so one group in keeping the status for themselves can show the status to the EMT and can show the status to the other groups at the same time. And there are some computer systems that have been developed so they

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can each keep track of the data.

MR. KERR: This organization was activated during the Crystal River --

MR. WEISS: That's right.

MR. KERR: -- incident?

MR. WEISS: That's right.

MR. KERR: So, about the 90 or so people were all called together --

MR. WEISS: That's right.

MR. KERR: And you went through a step where first you had about ten or so, and they looked at what was going on and decided to call in everybody else? Is that --

MR. WEISS: There was a very short period of time in which we got the information. The decision was made within two or three minutes after we had the initial information because of that, and we called people together. Within 15, 20 minutes the EMT was there. The staff was actually operating within three to four minutes after the situation occurred.

MR. KERR: Thank you.

MR. WEISS: Okay. The only pointed that I wanted to make with this is to note the different numbers of teams that are there; the number of people having to --

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looking at various phases of what's going on and which, keeping in mind, we have one telephone line now; talking to the control room trying to get information out of the control room. It's a -- and the atmosphere keeps building and building as we're trying to get this information and being unsure of the information, and once the information comes in it goes through the process of having to be verified. And I guess our basic point is that it would be extremely helpful, in fact, necessary that the people that are coming in to try and evaluate this situation have some hard data to quickly do that.

Now, we don't propose that if -- of those hundred points that would be in the system, that all of them would pertain to a particular incident. Most of those would, though, provide some information that other systems are not involved in that. And we can make at least some conclusions about those other systems that people are concerned about; and then concentrate our time on those things are significant to it.

And obviously in addition to those things we still are going to need those links. They are extremely vital, the voice links. Because as you get more information, you obviously raise questions. But as we get more of our own people to the site, and we have other telephone

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systems and more systems come in -- are dropped in by AT&T, then the need -- we can get a better handle on the thing.

But the critical point is probably those first eight hours into an evaluation.

Okay, are there any questions on this?

MR. SHEWMON: Are you through, Mr. Weiss?

MR. WEISS: I'm through with this part of it.

MR. SHEWMON: I read on to the next page in your handout that gives me NRC incident response organization, and I get kind of uneasy when I see things that suggest the NRC would direct operations there. And I wonder if this is flushed out some more, but before we get into that, let me ask a simpler question, maybe. One exampl down here is if, in your opinion, the licensee finds himself in a position where he can no longer get sufficient resources to manage all the problems, you could provide him with technical expertise and management expertise.

Another source of this expertise is the other utilities, and those groups got activated fairly quickly. How do you see them coming into this? And if there a comparable industry organization which would react to something like another Three Mile Island?

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MR. WEISS: Do you want to answer that or --

MR. STELLO: I think the short answer is there is such a proposal in industry to bring together their resources to respond in a manner similar to the way they responded at Three Mile Island. The answer is yes.

MR. SHEWMON: Okay.

Let's go back to the other of the conditions under which you would try to assert your management as opposed to their management. It says down here that when you don't think they have the facilities to do it right, then we should be in a position to do it.

MR. STELLO: If you reach the point where you didn't believe they were taking the correct action, at least, theoretically that's possible that you'd reach that conclusion.

A decision would have to be made as to whether you wanted to have the government step in and take over the management of the activity. But that in no way means adjusting or moving switches or turning pumps on or off, or valves. Not operating the plant. Managing and directing the next series of steps.

In terms of a nuclear plant, the limit would be in terms of management. If on the other hand, the activity were transportation accident, I could conceive of

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the government going in and taking charge of the entire operation, including the physical cleanup--the actual activity itself. So, it's a range depending on the particular circumstances. Management at least that -- yes, it's very real that you would have to go in and augment the management of the organization. They really had to do some of that at Three Mile Island.

MR. SHEWMON: To what extent is it spelled out when you have the legal authority or what the criteria are for doing that?

MR. STELLO: I guess I've never really shied away from answering the legal questions before, why start now?

My understanding is that the Atomic Energy Act provides the authority for the agency to go in and take over the management and the operation if it deemed it would be necessary to do so.

MR. SHEWMON: Who makes that decision?

The chairman or who?

MR. STELLO: The -- well, at the present time the commission could make that decision. The chairman or his designee would be the director of the EMT. There is a an issue that's yet to be resolved as to whether that authority can be delegated to that individual in an

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emergency. I don't really think there's a clear answer. I think the lawyer suggests that the commissioners cannot delegate the authority to another commission -- or another commissioner. So, at the present time I think it would have to be the commission -- But under the proposed reorganization that could be the chairman.

CHAIRMAN PLESSET: Any other -- Bill, you had a comment?

MR. KERR: In making this decision about taking over and managing, I -- I asked the question earlier, and I ask it again, you would -- would you make it on the basis of the information available in Washington, or would you want input from your local representatives as well?

MR. STELLO: I think it would be very difficult to make that kind of a decision without the input from the onsite people. I don't know if Bernie emphasized the point or cut the point. At thetime at the emergency center is activated, the regional director and a team of people are immediately dispated to the site.

The first few hours until they get there, I think the intensity which you would be looking at is actual data in the plant. In terms of the seriousness of the incident itself, it's the longer term -- the day's kind

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of time scale from which the overall management question, in my view, comes into being. I don't think the management issue is a issue the first several hours. So, by that time we will have onsite people looking at how well things are going.

MR. KERR: Now, at the point at which you -- and you have emphasize that you don't anticipate having NRC people going and operate the controls; do you anticipate a situation, however, in which you might be telling people who are operating the controls what to do?

MR. STELLO: Oh, very much so. It's very possible.

MR. KERR: So, that you anticipate emergency situations in which in your judgment the NRC would be better qualified to make decisions about the plant than the people who have been running the plant?

MR. STELLO: Well, I can answer your question without agreeing with the way in which you put it, I think, because I don't want particularly to say that we are more or less qualified than anyone. If on the basis of the information we have available to us, and our ability to understand that information, and it says a particular action is necessary, and then not taking it, and we know based on that information that that is incorrect, then I think it's incumbent on us to direct the licensee to

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take a different action.

Let me now be very specific with an example which maybe drives the point home, I think, a lot clearer. If we had data in which to confirm Three Mile Island superheat condition better than we had through the voice communications, if we had the hard data, and we had the plant system parameters to be able to conclude that in fact they were superheated, I think -- and I was arguing amongst my -- myself, I guess for a time, as to whether it was appropriate to order them to turn on the high pressure pumps.

MR. LEWIS: They would presumably have the same -- not talking about Three Mile Island, but the future, they would have the same data that you would have. So, this would be in a situation which -- in which persuasion didn't work, there was a technical difference between you and them, and you decided to prevail.

MR. STELLO: Because I think that is -- yes.

MR. LEWIS: Whatever the reason.

MR. STELLO: Right.

MR. LEWIS: That would be the only situation in which this would happen?

MR. STELLO: That's correct.

MR. LEWIS: Okay.

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MR. STELLO: All we would -- we would try to take the course where we would make them understand why we have the concern, and why we thought a course of action that they weren't taking was needed.

MR. LEWIS: I understand.

MR. STELLO: And I'd hope that in all cases that we would get to the point where we would persuade them. But if we didn't, then I think it is our responsibility to protect the health and safety of the public. And if an action is needed the fact that we didn't take the action is a decision. We must make the decision.

And I think in order to make that decision that's the -- the heart of the nuclear data link, the decision ought to be made on the basis of the best possible data available.

CHAIRMAN PLESSET: Paul, let's -- excuse me.

MR. LEWIS: You would have the same data as they in the event that --

MR. STELLO: Not in the event of a voice communication telling people --

MR. LEWIS: -- No, no. In the event of the data link.

MR. STELLO: In the event of the data link we would have -- if we are looking at a hundred parameters,

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we're going to have considerably more than that there.

MR. LEWIS: Yes. I understand.

I'm just trying to get through to the situation in which this would be necessary. It would be one in which everyone has the same information--you and they--and you, because you feel you are responsible for the health and safety of the public, unable to persuade them who feel differently about the action, would simply prevail. So, in the larger sense of the health and safety of the public what matters is whether you're better qualified than they are or not, not the legality, but in terms of what is really ultimately good for the public. The issue is whether you are better than they are; is it not?

MR. STELLO: How can I answer that question without getting in trouble?

MR. KERR: Did you hear my response for you? In other words, your perspective would be different from the plant owner's perspective, possibly.

MR. STELLO: Well, for sure that's -- that's an issue. I think we would have concerns that are different than the concerns that he might have. And the basis upon which we reach the judgment would be different than the basis upon which he reached it. He may not want to take an action because he knows that that action, for example,

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would damage equipment.

MR. LEWIS: That's one case.

MR. STELLO: But we think that action is necessary because of the health and safety issue, and we would not be concerned with damaging equipment, and therefore would have a different point of view.

But we have the responsibility.

MR. KERR: But Vic, you know, you --

MR. STELLO: And if we do not -- let me finish the point because it is very important. If we do not -- if we do not make the decision to take the action, that by itself is a decision.

MR. LEWIS: I understand that.

MR. STELLO: Okay.

MR. KERR: You see, as I try to expand on that I ask myself who is likely to be best qualified to operate the plant when it's not in an emergency, and I don't think I'm doing the NRC a disservice when I say that generally the people who are operating the plant will be better qualified than the people who are working for the NRC. After all, you don't employ people to run power plants.

Now, if I had an emergency develop, it seems to me that in the majority of the cases, maybe not all,

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the people I would want available for the emergency are the people who have lived with the plant, who understand its idiosyncrasies, who can do the regular things without thinking about them, and maybe the emergency things with a little bit of thought.

Now, it seems to me that you are hypothesizing a situation in which the NRC people who admittedly aren't as qualified to operate the plant in normal situations are better qualified to operate it in an emergency situation than the local group. And I just have some difficulty with that concept.

MR. STELLO: Well, I think, maybe, we've got to make sure we understand what we mean by operate and what --

MR. KERR: By operate I mean make the decisions on what will be done with the plant when it's in an emergency situation.

MR. STELLO: Okay. Operate --

MR. KERR: I don't mean handle the controls.

MR. STELLO: I mean handle the controls as operation. Who decides on the strategy that what ought to follow in recovering from an incident?

MR. KERR: That's operations as far as --

MR. STELLO: It is not the operators.

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MR. KERR: I didn't say operators. I said the group that is qualified to operate. And that, presumably is a group within the utilities.

MR. STELLO: Well, let me expand a minute. We talk about an incident, an accident. I think that we here in the NRC have people who are the best in the country, and perhaps the best in the world in understanding accidents, the course of accidents, and what that might mean. We have access directly to all of the laboratories and to people there, and can get the advice of the counsel that they also provide.

When you're talking about an accident or an event that strays away from the normal operation, the Three Mile Island kind of a scenerio, the engineering talent that is needed to take that basic information to digest it, understand it, and know what course of action might be the best under those now way-off normal conditions, I think is the engineering people, and I would include, I think, the vendors perhaps very qualified in also providing that assistance and guidance. But the crew that's in the plant actually operating the plant, I do not believe have those kinds of qualifications. It has to be outside of the shift's supervisor.

One of the reasons for wanting --

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MR. KERR: I'm not talking about the crew inside the plant. I'm talking about the group of people within the utilities who have the responsibility of operating a nuclear power plant. That includes more than the operators. And those -- that group will have exactly the same access to outside talent that you have.

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MR. STELLO: Why am I getting into this query? Why do I have to be better. I said that the people that are in the plant, in the control room, those people.

MR. LEWIS: You said better than anyone in the world, I think that is what you said.

MR. STELLO: I said I think that the NRC staff has expertise in reactor accidents equal to and perhaps I said better than anyone else in the world on the staff and I really believe that.

MR. KERR: Vic, we aren't talking about a reactor accirdent, we are talking about operating a plant in an emergency.

MR. STELLO: I'm talking about an accident.

MR. KERR: For studying accidents, for predicting accidents, calculating accidents you guys are tops. But that isn't what we are talking about. We're talking about operating a plant in an emergency situation.

MR. STELLO: Excuse me. Analyzing and understanding an accident that has not ever happened before or operating the plant given a situation that was postulated to occur and to know how to proceed on emergency procedures -- which one are we talking about? If it is something from which it has been pre-analyzed, where the procedures are all laid out, I don't think there is ever going to be a need for us to do anything.

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I have the confidence that the operators out there in I hope every case will never have to be directed by us. We're talking about an event that strays away, that gets to be more in the esoteric domain than the classical accidents.

MR. KERR: No, but you see if you do that then it seems to me that there is a fairly important distinction about whether you are ever willing to do this or not because if you are willing to do it then in each incident, you have to make the decision do I take over or not and you have to be equipped to take over if you have decided ahead of time there are situations in which I am going to take over and these are pretty dire situations as we both agree which means that you really have to have a lot of top talent available to make operational situations as well as strategy decisions. It is an awesome responsibility that you are undertaking I must say.

MR STELLO: You need not persuade me, I am well aware of it. It indeed is.

MR. SIESS: Would the nuclear data length have helped the staff to make the proper decision regarding the explodeability of the hydrogen bubble?

MR. STELLO: I don't know that you would have needed any data from the plant that made that decision. I think the hydrogen bubble was an unfortunate situation.

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MR. SIESS: Well, the second part of that was and Carson just said it but maybe you didn't hear him. If you had the best people in the world, why didn't they come up with the right answer? And, there were people at the site from what I have read in one of the two, three or four reports that have been out, apparently people at the site were working for somebody else that knew it couldn't explode.

MR. STELLO: That was my view. I was at the site.

MR. SIESS: We acknowledge that, you were there.

MR. STELLO: I don't know what happened here, I wasn't here. I was at the site.

MR. SIESS: Dammit, without NBL more things are going to happen here and not at the site.

MR. STELLO: I think I understand that theory. Too much knowledge is dangerous.

MR. SIESS: Maybe the MBL ought to work the other way.

MR. STELLO: Let me get to where I guess we are having this philosophical discussion we talked about at the beginning now. Let me bring up the subject that I think is the most critical issue.

I don't think the data link is going to help us make this decision to go and take over and manage a

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plant. I think it can be extremely helpful in terms of deciding whether a specific action different than the action being taken by the people at the plant might be appropriate from our point of view.

I think the overriding concern has got to be however is the plant deteriorating to a point where the hardest decision that one must come to is, is there a need to recommend evacuation as a protective measure?

You can make an assessment of the environmental conditions and their importance but whether or not tha plant is being controlled in a manner where you know t it has not gotten away from you and you need then decid to go ahead and make that recommendation, that kind of knowledge for that ultimate and I think most profound decision which I think will have associated with it, at least in my mind, the knowledge when you decide to evacuate that people are going to be harmed and have to be weighed that this reactor has gotten to the point where if you don't take those measures, people will be harmed.

MR. LEWIS: I agree, I'm sorry, or are you through?

MR. STELLO: I guess I was about at the end of the comment.

MR. LEWIS: I thought you were.

MR. STELLO: Yes, no, go ahead.

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MR. LEWIS: Agreed, that is a very important decision that has to be made. It is not clear to me why 4800 are necessary to make that decision because at the end, that is a diluted, fully filtered semi-political decision which will be made presumable not by NRC but by Civil Defense authorities or THEMA or somebody anyway and I don't know who makes the decisions. At whatever level the decision is made, it is a binary dichotomous decision to evacuate or not evacuate and it is going to be made on an assessment of a wide variety of information, not all the plant parameters but generally the prognosis for the plant which is based on all the plant parameters.

It's not clear to me that that's easier made here than there at the plant. Somebody is going over a period of time, it is not going to be made on a 10 second basis. It takes more than a few minutes to evacuate so somebody over a period of an hour, let's say, is going to be evaluating the status of the plant and I do not personally see it perhaps you can persuade me that that is more easily done here connected to the 4800 bog link to the plant than it is done by some responsible person at the plant observing what is going on.

MR. STELLO: It certainly, hopefully, will be done also at the plant. Again, there are interests at the plant that are different than ours, a point of view

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different than ours at the plant versus our point of view. Without getting too far into this difference in judgment, the people who would be at the plant for the first hour or several hours would be people who are used to operating the plant and responding to the emergency procedures.

I don't know the strength of the evaluative capability of all of those people but if I had to be given the choice again, I would think that our evaluative capability.

MR. KERR: Are you talking about the NRC people at the plant?

MR. STELLO: Yes, NRC people, no here. Now, the decision to evacuate for the first several hours, if that decision is to be made prior to having anyone from the NRC get into site for sure, can only be derived from the data wrich will be provided through either a data link or voice communications or prognosis somehow of the plant.

One of the fundamental things that were built into the parameters that are being monitored were parameters that can give you this overall assessment on the safety of the plant. The decision that we make is only a recommendation from this agency to a state governor. The governor ultimately has to decide. Our responsibility ends when we say we have evaluated what is in the plant

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and we think there is an eminent danger to the health and safety of the public and we recommend evacuation. If the plant corroborates and they too recommend evacuation, and those two sources recommend evacuation, it would be hard for me to believe that a governor would not accept those recommendations and go ahead and evacuate.

MR. LEWIS: I see, it would be easy for me to believe but only because I will believe anything when it comes to the body politic in crisis, not making a sensitive comment. But the point there is that the ultimate authority as distinguished from the accident management is not at the NRC, it is in the civil authorities and therefore, the thing has to, whatever the information is it has to be brought to be brought into a form in which it can be absorbed into the body politic and implemented in some action, some political action.

I really am hard pressed to see the importance of the 4800 bog data link in bringing a wise decision in that direction and just back to the accident, one more moment. I'm sorry I am talking too much, I'll shut up at this point. But, I am reminded of a situation which is not unlike the kind that we are talking about which is the case of space flight where we have people in space admittedly we don't have a hazard to thepublic, but we have a complicated system, we have a trained operating

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crew yet malfunctions can become sufficiently complicated so that the required diagnosis which is beyond the capability of the operating crew. The NASA experience has been to maintain data links to the ground, everything that is in the vehicle is also on the ground and the people in the vehicle when there have been emergencies, have depended very heavily upon the analytic capability on the ground to guide them in the right actions to take. In this case, they are saving their own necks usually but there is a little more at stake than that but there is no ambiguity that the ultimate authority lies in the cockpit, that's a tradition from aviation experience.

They draw from the experience on the ground. I am sorry, it is in the cockpit. The pilot has the control and he wants to save things too, there the other question of different motives comes in but the data link is there. It is there for providing advisory information, that is quite different as nearly as I can tell from what you have in mind, as an ultimate end and I would feel very comfortable about that role whereas I feel very itchy about NRC making a decision everywhere along the line about when and whether and to what extent to take over a plant. That is my personal view.

MR. STELLO: Well, I was going to get to the advisory significance next and then I had one more point

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beyond advisory. I can't emphasis that enough. I think to the extent that we have this talent for which whether it is better or not, we will not argue that it can provide that advice through the analysis of the data that is another purpose of the data link, to provide that advice and counsel.

I agree with you, the ultimate responsibility, what we rely on are those operators that are there, expecting that they will do what is right. That is our expectation. I've gone beyond that if we think that we are not taking a course of action necessary for the health and safety then we have to be prepared to direct them if we deem that necessary.

Now let me get then to what I think the last purpose and I think these are all reasons for the data link. I am not going to sit here and try to argue ranking except there is one that stands out in my mind. To get the data necessary to make that decision and recommend evacuation. If there is one purpose that seems to stand above the others, I probably put that and I think I've heard enough discussion on this, from the philosophical view where people differ to what they think is most impostant. But, the next point that I think is an important one is that the public at large will be looking to the NRC for authoritative statements on a particular

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accident and as it unfolds, so the need for accurate information so that this agency can come out and say here is what really is going on and make authoritative statements to the people who need to know. That's the public, news media, congress and anyone else that is trying to get an assessment of an event in a reactor.

I think that that is critical too. They will look to the NRC for that kind of information so that is the last point I wanted to make and I think you have said advisory very well, I won't go back through that.

MR. SHEWMON: I wanted to. The last point you have I think is a very central one. You took a fair number of hard knocks but my gosh, if you don't know what is going on out there how can you be doing what you should.

To change the subject some and maybe this was gone over in subcommittee but there will also be a information center outside the gate or one step removed and I am not too clear what the decision was as to what kind of decisions and resources should be there as opposed to trying to, you can either take the people to the data or you can take the data to the people but there is at least one decision to move it 100 yards or something so what do you expect going on there?

MR. STELLO: I guess my view of that was my experience at Three Mile Island and subsequent events said

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to me that there needed to be a place, a quiet place offside away from the hub bub of the activities in the plant where information could be looked at and digested by the licensee and his engineers and the kind of data that we suggested might be appropriate in there was I think the subject of the Eisenhof letter if my memory serves me right that that kind of information we're talking about that they might also too look to have it in this center if we're to have a nuclear data link then you would like to be able to make sure that the people that you would be talking with and their engineers at this center of theirs now had consistent information and they may want to have more.

A need to have a quiet remote place. There is further thought be given as to whether if again we go with this data link, would it be wise for the vendors to have a central place in their shop to have this data supplied to them so that they can make an assessment also of what goes on to provide that advisory role and help the licensee as well. So if you look down the road in terms of centers you have hopefully a data link, if that is what is decided. There is a requirement in the lessons learned to have this nearsight technical support center. We have been discussing with vendors as to whether or not they might see a need also built in that capability.

MR. KERR: I was interested in your comment about

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the quiet place removed from the technical center because I was discussing this problem with the NRC staff members recently and it had to do with the proposed technical center that TDA was propsing which would be located in Chatanooga and the NRC through its representative was insisting that it not be in Chatanooga but it had to be near the site and when I inquired as to do reason responsible I said reporters wouldn't come to Chatanooga they would come to the site and the technical center therefore had to be there.

Now, I didn't quite believe it either but I thought about and decided it must be logical or I wouldn't have been told that but there certainly is a need for reporters. I would expect in most cases the reporters would go the site even if you had the capability to tell them exactly what was going on in Washington but that's conjecture.

I go back to Hal Lewis' analogy which I think was a good one. I wonder if NASA would have chosen to take that data all the way back to Houston or wherever they took it if they had had the capability of an accompanying wagon or something in space with people who could get the data on that point who could look in the vehicle to see what was going on and give their advice at close range. It seems to me the difference between

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us and the space vehicle is that there does exist a possibility that the people who are giving the advice could be NRC people located at the site.

I don't know which is the better but it does seem to me that the alternative exists.

MR. LEWIS: You are certainly right that it is not an exact analogy.

MR. STELLO: Is that a question?

MR. MARK: No, I would stay with your last summary there that that answers Paul question. There is the control room and there is no disagreement that one needs other places than the control room in order to try to assemble thoughts.

There is to be a technical support center very close to the site. I've talked at the NRC at a center planned to be close to a site to which someone would be transferred who as soon as he got there would be free to cut the lines off to Washington except for those needed for answering questions to Congressmen because he would be in charge of responses.

MR. STELLO: I tried to cover that point earlier. At the time that the emergency center is activated, a regional director and a team of people immediately will be dispatched to the site and given an appropriate time when that team is up to speed, the anticipation being that the

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decisions-making process will be transferred from Washington to the site. We however believe that we might be able to provide considerable help and advice and counsel, it was our intent to keep the phones and wasn't advising that he cut the lines to Washington - I don't think that would be a good idea.

MR. MARK: No, you would still have people here with the pencils out looking at those orders.

MR. STELLO: I might add that when I was up at Three Mile Island, I requested and got considerable advise and counsel from people here in Washington doing specific calculations and analyses to help try to make decisions.

MR. SIESS: I wonder if once you get outside the control room, whether it makes any difference whether you are 100 feet out or 100 miles or 1,000 miles if you have adequate communications with the location? That support center is going to need to know a lot of things once it is outside the control room and if you have that information there, you have in Washington, does it make any difference?

MR. STELLO: It is reasonably clear to me that in the event of an accident or incident at a facility, most licensees would dispatch a large number of engineers to the site. I think it is important to have a place where they can go to do their work and not ascend on the

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control room and get that to where its confused with flocks of people. I think that they are going to be wanting to do their own evaluation analysis to decide what they believe is the correct course of action to take the plant through and I think that would be made from this technical support center.

MR. SIESS: But, if they had all the readouts that you would have on the NDL plus enough telephone lines, couldn't they do that at corporate headquarters?

MR. STELLO: I think you are asking us a TVA question. I don't.

MR. SIESS: PG&E's corporate emergency plan calls for a backup support with a lot of people in San Francisco and not at the site.

MR. STELLO: I guess I am not prepared to say that that might not be a very good idea. I want to think about it a little bit more. The TVA example that was used a moment ago where in Chatanooga they have got a large number of engineers that they can bring to bear on it, I don't know that I want to quickly say that let's go with somewhere else where you can only have a handful, I want to think about it some more.

MR. SHEWMON: If you did, you would be undercutting your whole argument for having this thing back in Washington.

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MR. STELLO: I recognize that. That wasn't the reason. I think it could very well be the right thing to do and it would vary with utilities and where their strengths are and how much of a staff they have near the site

MR. SIESS: I wasn't trying to undercut it because I'm not sure I agree cdmpletely with Vic that all his engineers are invincible but I think that having the kind of people NRC controlling the problem, get them together within a couple of hours at Bethesda and have a lot of information, they probably under certain circumstances, for certain accidents and time permitting could give good advice. I have a problem when it goes beyond the advice stage. And right now, I haven't seen anything in that hook-up that turns it off when they start going beyond that stage.

MR. MARK Would that say Ted that anything which would keep them from driving from one side of Florida to the other at 80 miles an hour would be a good idea?

MR. SIESS: One side of Washington is a good idea.

MR. EBERSOLE: I was going to say if we were to hear a call in 15 minutes and we had this system in being and what we heard was something like another Browns Ferry fire on the way, I think this system would have helped very much because the knowledge that is

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required which was not present by the way either in TVA or anywhere was whether I can walk up to a part of the plant and douse it with water and you haven't got any system that is going to tell you whether you can do that yet that you have told me about. I think that we should have it. And, it should be convenient and ready and this system doesn't tell us that.

MR. STELLO: That the water is putting out the fire.

MR. EBERSOLE: No, turn the water on without doing dire damage to the plant and making a situation worse. That was the big issue at Browns Ferry.

MR. LEWIS: He's saying there is lots of information not at your data link.

MR. STELLO: Oh, absolutely.

MR. EBERSOLE: The data link is based on the thesis that you have a question to extrapolate by looking at data and see what is taking place on a real time frame and you didn't have that at Browns Ferry. You never did know at what point in time you were going to lose the last bit of needed processes that you had running.

MR. SIESS: I'm not sure that they know now.

MR. EBERSOLE: They don't know now.

MR. SIESS: Don't now exactly what cables are in what trays either on very short notice.

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MR. EBERSOLE: The Browns Ferry fire had an interesting, the final assessment of it is this. There was no one who knew at what point in time the last function would have disappeared because that had a relation to where the fire front was as it ate into the cables and where the next critical cable was which would lose the last functin so although it was claimed by many people that there was a system in being serving the plant and another in redundant configuration behind it, nobody was ever able to say that you had more than, no number of minutes were known at which point you would have lost all the printer liquid.

MR. RAY: Jesse, I don't think they'll ever know because the way these cables are pulled in during construction you can give them minute information and details as to this one is going to be besides that one and so on. I mean you can have it camolized that way but you will never find them that way.

CHAIRMAN PLESSET: Let me say I think we have gone beyond the point of reasonable return and I think we have another short presentation so why don't we go to that.

MR. STELLO: But I've got to leave and if there were any more questions on this I think I could get to them. I guess I wanted to comment I think the committee

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has given me a choice between either putting on a Superman outfit or a clown hat and I guess I would rather go on record with the Superman outfit if that is the choice you are giving me.

MR. SIESS: In reference to something you said earlier about it not mattering where the data is and Jesse's comment, there is something mystical about information which I don't entirely understand but during Vietnam there was a massive flow of information from the theater to Washington that makes even NRC look like a piker in shuffling paper and yet it is so that most people in Saigon knew how the war was going, hardly anybody in Honolulu knew how the war was going and nobody in Washington knew how the war was going and why that is, I don't know. It has to do with propiquity you know, the fire wall, direct observation, whatever the hell it is the closer you are the more you know.

MR. LEWIS: Didn't we win that war?

MR. EBERSOLE: We ran it out of Washington.

MR. MARK: Could I get clear in one thing Vic? We have alluded to a straf 5 of a set of specs for the system. I understand there was something you said that some real improvements have been made in that by choping some things out. Is it still likely that that will continue, that you won't really need the atmospheric

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data 15 times a second because you can't possibly digest it or make any sense of it in that time frame?

MR. STELLO: Yes, every draft the number goes down and I suspect that will continue then as we get some of the new instruments installed that are considered to be important, those would be added in the future but I think you comment is a valid one.

MR. MARK: Well, it is under much review yet.

MR. STELLO: Yes, I think it was put, you had to start somewhere and we've got it out now and hopefully will get a lot of meaningful comments back on it.

MR. MARK: Well, I don't know that we were thinking of making comments in detail on these specs.

MR. STELLO: Well, if individual committee members could take the time to let me know whatever their comments I would appreciate them for just that.

MR. MARK: There was also a thing in here, a list of situations which would constitute an event alert. How many alerts would one have had in the last, since TMI had one in fact been using this list? Every time a pressure relief valve went off you would have had those 50 people headed out to Bethesda, I believe.

MR. STELLO: No. We have issued a new regulation.

MR. KERR: Is the event alert something that says to the man on duty go punch the computer and see what

is going on?

MR MARK: That's a little different.

CHAIRMAN PLESSET: Dave.

MR. OKRENT: If this was covered tell me and I will find out later. At the subcommittee meeting an interest was expressed that knowing that if one spent the kind of money that one was talking about at the subcommittee meeting how it would impact on other things that the NRC were doing, it might not be able to do. Are there things that are less important that you would propose not doing if that is necessary in order to get the nuclear data link and if so, what are they?

MR. STELLO: The funds for the nuclear data link if we were to go with the nuclear data link we would have to go back to Congress and ask for them. There are no funds in the budget that would cover this. It would be additional money to support it.

MR. OKRENT: Suppose the Congress said we have no objection to your doing it if you can do this instead of something. Would you for example, recommend $10 million less a year in loss to get it or what would you do?

MR. STELLO: I guess I don't feel prepared to answer a question of what would I cut, what $23 million would I cut out of the budget to do this which isn't the question you asked me, but I certainly would want to sit

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down and look at whether or not there are some things that I either can cut out next year or the following couple of years to get the funds to do this.

I certainly recommend that we have a data link. As I sit in the center I want the decisions that I make to be based on the best available information to me. I guess I am reminded in Crystal River when I was given the initial information which said it was 18 lbs. gauge and hearing that I decided it was necessary to activate the center.

Of course, it turns out that that wasn't right, it was 18 lbs. absolute. The thought that crossed my mind well, yes, it was wrong in the direction that it made it good, suppose it was wrong in the other direction? Suppose it was much higher than that and one had to question whether there was an accident beyond those we considered and the integrity of the container was coming into question and whether there was a need for evacuation.

Suppose it was the other way around. I want the decisions that I have to be faced with to be based on the best I can do.

MR. OKRENT: Well, actually, I don't disagree that it could be very easy to happen in certain circumstances like that. I am just trying to see if there are some things though that theNRC in fact would cut out.

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In other words, I think it is more important than some other things it is already doing or if it is less important.

MR. STELLO: I'd give you an answer very personally. I would but I don't know whether I could do it in one year or whether I would want to punt back and have to take several years to do it. I don't know.

I would want to go and try to persuade Congress to give me the additional funds.

MR. OKRENT: That is what the ECRS did when it wrote its safety research letter to so I understand your point of view. Was there any question about is this a real number or would it be twice or three times?

MR. KERR: There was not a question about is this a real number.

MR. OKRENT: But even in 1980 dollars, do you really think it is a real number. I mean I can remember when I worked with the people at Argon and whenever we got an estimate we wondered if the factor of two was enough.

MR. LEWIS: This isn't an equipment number. This is a manpower number.

MR. RAY: I've had an experience with an installation of this nature and believe me it was 100% overrun at the end even though there were expert estimators involved in the beginning of it and they knew what they were doing.

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The debugging at the end of the construction period, to get the kinks out of it. Even though the talent that is on the job is excellent, particularly when you are collating it with something back in your case 1,000 miles away maybe, really takes ver expensive personnel programmers and reprogramming and so forth so I don't think the 30% contingency you have explicitly indicated here is anywhere near where it should be.

MR. STELLO: My experience with every number I've ever seen says we're going to do something for a given cost. I am quickly trying to see if I can come up with one example where we were under and I didn't so I think my tendency would be to guess it probably would be more but we have been very conscious of that and tried to understand where you might have the soft spots and add the dollars to compensate for it.

CHAIRMAN PLESSET: Can we let Vic go, I think he has to go and we have one short presentation. Thank you Vic.

MR. STELLO: Thank you.

MR. KERR: Dave, I am not sure that you were also here when I discovered, perhaps you knew, that activation of this operation calls in about 95 people. I didn't know that before. That changes my attitude somewhat. If you have 95 people there with nothing to do it seems to me you

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almost have to have a data link.

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MR. BASSETT: I've got a hunch that this is going to be mightly stale political interest at this point because my purpose, my name is Sam Bassett, I work for Bob Budnits in research and we were told to conduct the scoping system study to find out what would be involved in the data link.

Our function has been one of attempting to scope out a service and in the process of looking at it from the start we realized we had very little in the way of finite guidance as to what the system should be.

I have had some experience in this field in the past and generally speaking, when you attempt to look at a link of this sort, there are two things you need to know right away. First, what is the data list. Can you get a handle on the total quantity and type of information involved and second, what are the functional requirements, what are you going to do with this data at the far end and I've been instructed in the political process quite amply because whenever we try to talk about the nuts and bolts of the link we always come back to the functional requirements but we view functional requirements from the system study viewpoint in point of view of what sort of arrangement of the data at the far end, how much will it be processed, manipulated, how will it be presented, what is the extent of the human factors in presentation so that it can be useful immediately to the duty officer

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first and then subsequently to members of the team.

So we took a few considerations in mind. These are motherhood lists of the sort of thing that you want in a clean minded system provided for a worthy purpose. However, some of these are directly applicable to the situation we were in.

Clearly, we had to offer in the absence of this link a single voice circuit. It is now supplemented to the extent that there are two voice circuits available. These voice circuits are extremely limited in data capacity considering that the question has to be asked, the question has to be understood, the information has to be gathered, then has to come back to the telephone and relay it and then there is immediately another question and so on.

The capacity of a single voice link for gathering a finite number of plant parameters is almost zero rate - very slow.

MR. LEWIS: The rule of thumb is that a person speaking at the rate you're speaking is about 50 bits per second.

MR. BASSETT: Yes, but that assumes that you know what the question meant. Did you mean the first loop or the third loop?

MR. LEWIS: I know.

MR. BASSETT: So, it was apparent that we wanted

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real time data, that we were anxious to have confidence in it. There was also a groundhole put on us that we were to realize this capability in a period of two years - to have it available by the first of January, 1982. A meaningful quantity of data was the phrase used.

This confined us to existing hardware, no invention, no development of any unique circuitry, catalog job of putting together existing modules to provide the capability which was requested. Now this in turn had a lot to do with the shaping of the data list. In the absence of any written requirements, we started with the team from NRR and from INE listing out the sort of thing that is needed to be followed in an emergency. The basic document was 1.97 and we rapidly drew together a list.

At the same time, in order to keep ourselves somewhere in the ballpark, we consulted with the user groups from the various vendors to see what they were doing and we discovered not to our particular surprise, that they were all working on data transmission as fast as they could go. Every single one of them was involved with their utilities in drawing up a list of the sort of data they would need to know and in each case, active plans were underway for transmission of this data either from the utility to its headquarters or from the utility

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to selected vendors and in some cases to ANEs. This activity being underway gave us a chance to check what our field for a vital round of data was compared to their field and we found to our considerable satisfaction that they were looking for far more points than we were and as we got together, we found that we could come down to what we considered to be a reasonable minimum that gives a comprehensive look at the plan so that items of interest will be at least identified and items that are not of interest can be spotted and dismissed as causes of concern.

So we drew this list together, we started SANDEA, who have had experience in comparable links for more specialized purposes, testing purposes and military purposes and asked them to draw up a systems concept using these as guides and to make this brief, the sort of system that evolves is very hastily described by this slide here.

There is a data list which has about 120, more or less plus perhaps 20 parameters on it, about slightly more than half of them are devoted to reactor plant conditions and the other other half are devoted to radiological and meteorological situations. The concept of the link is that a single dedicated telephone line using existing ANSE and telephone company standards for data transmission and accuracy and what have you would be employed

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from each plant to the headquarters operation center. The system concept would have these lines up and running, sending data whenever the reactor is operating, the grade of the system would not be such that the link is essential to reactor operation. If the link was down, it would not inhibit a licensee from operating his reactor but we would expect it normally to be up and to be running all the time into a monitoring situation at the headquarters operation center.

We would select a few conditions, perhaps five to seven in number, in which a significant deviation of those data points would create an alert situation at headquarters. We would also at headquarters continuously store the last half hours worth of data from each of the 80 lines in the nature of a cockpit recorder.

However, this material would not be displayed or would not necessarily be accessed by the duty officer. On receipt of an alert or upon receipt of a telephone call, on the dedicated phone line, the duty officer would be able to select a reactor and bring up a display which would show the parameters from the reactor in question.

Now, we had in there at one point a capability in the event of two reactors at one site suffering from some common casualty, we had the capability allowed to track two such reactors simultaneously. We have taken

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that out of our present requirement, it's a moot point. The initial implementation of the sytem would only provide for one such incident to be tracked at a time. In no case, would we be able to track more than two because the geometry of the thing tends to run away with you.

We have a provision for updating of the data, we will submit the present transmission mechanism would update the data between once a minute and once every five minutes, somewhere in that time region, we're not completely clear. It looks like once a minute is as easy as once every five minutes considering the capacity of the telephone line that we are selecting and it is useful in a way that lines come in quanta and one line gives you up to so much data and then the next step is another line and that gives you up to twice as much and so on.

This is assuming of course that we are using existing hardware and not going to any ingenuity or inventions for which we do not have time. I suspect that is about the extent of the system features. We propose to have stored at the headquarters operation center the plant parameters such that deviation from standard conditions can be detected by the duty officer. We would like to use a certain amount of human engineering in the way of displays so that the displays are readily understood. We would propose to have P&ID and other

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information at the headquarters operation center but that falls outside the perview of the data link itself but it would be useful background information for the guidance of whoever who is on duty there.

We will provide about two weeks worth of recording capability in the event we are following an incident such that we could have the hundred points stored for approximately a two week period if an incident should run that long and we wanted to have the historical record or we wanted to go back and see what was starting up yesterday after we were two days into some sort of tracking situation.

I suspect that that's about the extent of the features that would fit this amount of presentation and I would be glad to answer any questions that might come up as we go along.

MR. LEWIS: If it were to imprint the data, it should cost more than a few tens of thousands of dollars extra.

MR. BASSETT: Well, you can buy a package. New standards has been working on a package, one of the interesting things was that a great many of the operational people automatically thought right away. They were concerned about being spoofed and other such things. It develops that we operate in the sunshine, we'd have to go down and file the key to the code in the public

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document room so it's not exactly a straight forward situation that it would be worthwhile.

Also, we've taken the position with the vendors.

MR. LEWIS: That's really true.

MR. BASSETT: That is what I am told.

MR. LEWIS: I don't believe it.

MR. BASSETT: Bear in mind you see. We think that this data belongs to the utility, they have every opportunity in the world to ship it to their nuclear steam system vendors and every case we've looked at it in the implementation of the on-site technical support center, they have provided for data link including one to Washington. It is in the back of their heads, this is a useful and necessary thing to them. Under these circumstances, the code would have to be in the hands of the vendors, the ANEs of the corporate headquarters and it becomes a matter of dubious merit.

MR. KERR: Is it possible that some of these data might be proprietary?

MR. BASSETT: I do not think so. I would have to refer to INE because they are the experts in such matters but I believe that the operating conditions are a part of the license and the general plant conditions are in general submitted.

MR. KERR: There are a good many things that

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are part of the licensing process that are proprietary. You don't envision any of those parameters being classed as proprietary?

MR. LEWIS: Now a days it is becoming much cheaper to incript.

MR. BASSETT: It is a readily added feature and the cost is not astronomical. However, it does add complexity and we have what we think is a serious problem with software considering you've got what will hold about 80 plans, every one of which is different. Every one of which has some minor differences. And indeed a good bit of the money in this study contract as proposed would be to cope, visit these plants, we have already visisted 11 plants to get a feel for what the true situation is.

We have conducted this study from the start with the idea that we are completely open with the vendors, with the utilities, and with the various suppliers like TVA and to that extent we have had a lot of cooperation from them and we have the feeling that our data was considered entirely appropriate and I am not on the political side of this discussion.

We have the feeling that there is more concern about being scrutinized under normal operations than there is under an accident or incident condition. We have the feeling here that anybody that will help will

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be useful.

MR. LEWIS: Help them but not direct them, I would guess.

MR. BASSETT: We in research are always helpful.

MR. LEWIS: You just seek the truth, that is always helpful.

MR. BASSETT: Entirely correct.

MR. RAY: Memory modules and that sort of thing that are adjunct to the central processing unit are not the most reliable in the world. I was saying that the memory modules some of those modums and that sort of thing in an array of electronic equipment such as this, aren't the most reliable in the world and they will konk out on you once in a while. Are you putting in redundancy sufficiently so that you can be sure you've got the equipment rather the information.

MR. BASSETT: Yes, it is, I think what you are referring to is a plant reference conditions for a given plant. What is the pressure in plant no. 75.

MR. RAY: Yes, essential information.

MR. BASSETT: We are not in the definition phase to the point where I can tell you which drawer that would be in but I can tell you what the concept would be. We would expect that a tape or tapes reflecting up to date plant, and this is slow moving data, it might change once

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every year or it might never change, would be available and we would have them to check against an ROM, against a memory stack in the computer such that we could check that out as a matter of self test.

MR. RAY: So, you will provide redundancy so that you'll have a tape on the shelf of what you had stored in your active memory in any given time should it fail.

MR. BASSETT: That's right.

MR. KERR: Didn't your early chart show duplicate computers, I mean you would have two identical?

MR. BASSETT: Yes, sir. Well that situation goes to this. We first assume that we can's afford a system nor would it be sensible to have a system of weapons grade reliability, let's say.

We'll have to assume that a given reactor will go down, the data will go down now and then and our status is that it's not safety grade equipment, it's of the comparable grade of reliability as the computer which feeds the on-site technical support center. Data handling computer at the reactor site.

Now, that's one level of reliability. Now, at the headquarters, we've got 80 reactors feeding and if the headquarters go down we have no system whatsoever so it was our original concept that we would require one higher grade of reliability at headquarters and we felt that we

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could get that grade by having a redundant computer capability at headquarters and we priced out the system either way and the difference is about one-half a million dollars.

MR. RAY: But that redundancy is in a CPU, that you are talking about.

MR. BASSETT: No we are talking about redundant CPUs. So that we can have the whole thing crash and still be able to keep our system on the line and it appears to be sensible since you are looking at 80 reactors that appear to have a slightly higher grade of reliability at the central headquarters and that is the basis for the redundant capability.

I find to my dismay that I have frightened a lot of people by using the word computer. I want to emphasize that we are using the computer as a giant bookkeeper here. The analysis and manipulation of data is minimal, list making, cueing, arranging things in order, putting them up on the screen and so on, and identifying them as the function of the computer.

It can be done now a days quite cheaply because the price of this sort of hardware is coming down rapidly.

MR. LEWIS: In one of my other lives, I work on command and control problems for the military and there one of the principal problems there has been for decades and there probably will be for centuries into the future is

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that the people who design the links and the systems are relatively disjoint from the people who are going to use them and all to often are trying to fulfill requirements that have not been clearly expressed.

As I listen to Vic here, I wasn't all that clear that we don't have that problem here.

MR. BASSETT: Let me say Dr. Lewis that I am keenly sympathetic. The last time we talked about this subject a couple of days ago I mentioned the system that I regret that I am involved with. It is in its eighteenth year of being debugged.

DR. LEWIS: I see, so you know the problem.

MR. BASSETT: And I want to point out that we address this by immediately going to the utilities in question. Mr. Owen who is head of the response part of AIF has been cooperative, he has given us engineers, we have been , had present at our meetings observers from industry. We have had visits to TVA, Northeast, to several other utilities and we have had enthusiastic support. I am not talking about the question of what's done with the data but in terms of the actual technical problem, we have complete cooperation from the industry.

DR. LEWIS: Well, that's true in the military case too. The problem is at the level at which you have a commander trying to use the data provided through a link

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in whose design he had no role and which doesn't provide the data in a form or level that he can actually use it. I don't any good solution to the problem except to be much less precise in the design and leave for an evolutionary capability as people use the equipment in practice.

MR. BASSETT: I think we acknowledge this situation. I can only say that the most effective document that I've seen written and I worked for the NRC, but the most effective document I've seen written from the utility viewpoint is the emergency response committee of the AIF which was headed by Warren Owen of Duke Power and in that he provides for an on-site technical support center. He provides for data link not necessarily to Washington, but he provides for data link so that they can fan out and get the broad base of support and his committee drew up all these recommendations on the strength of their operator members, in other words, they used operators in their analysis. I'm not talking about the shift operator but the supervisory. I don't have too much more.

People sometimes like to know about the sort of thing that we worry about in the technical part of the system. I will just touch this very lightly. It is our idea to eliminate the software at headquarters that there will only be two sort of standard signals - one is a PWR signal and the other is a BWR signal that a given

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set of software will unscramble any PWR signal. All you need is a reel tape that tells you what the standard conditions are at that particular plant and the standard signal, wherein every given pressure will be at the same place in the signal from all of the different plants.

So, we are proposing two sets of protocol signals which will reflect only the basic difference in the data links between BWR and PWR. Otherwise, we will accommodate in the software the functional differences between the various plants.

We are basing it on the idea that we will have an event alert so that we will not be monitoring physically or humanly all the 80 signals that we will monitor them by automatic means. We have had some requirements on the data list and parenthetically the data list represents a compromise between the requirements of the people from INE who tend to be on their feet and emergency responsive, interested in theproblem as a developing incident and the people from NRR who have had considerable recent experience like in Three Mile Island in analyzing, tracking, trending trying to find out what's behind the various events.

These two demands or customers for the data link create some exotica. For example, we have had from NRR a requirement for transient monitoring which Dr. Mark addressed himself to. Specifically, they wanted to be able

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to track an explosion with 10 data points a second. Now, the ultimate need for that is going to be resolved but it is not going to be resolved by your system engineer.

It is going to be resolved by the conference between Harold Denton and Victor Stahl. If they want 10 points a second and if we can't persuade them to do it by data reduction at the site which is one way it can be done, the system could be configured to do it at the cost of some slow moving data.

DR. LEWIS: In a sense, the point of what I said earlier is that will be decided not by conference between Denton and Stahl but by experience among their successors and the system has got to be flexible enough to accommodate that.

MR. BASSETT: Well, as you're. Yes, sir.

MR. SEISS: If you put this in would there be any capability to use it to transmit data from the site other than the automatic transmission? Can you supplement a telephone line?

MR. BASSETT: We are looking at a system with a finite number of pulses per second. If we are confronted with a requirement for a given data point that requires a substantial number of those pulses, even if you allowed yourself some latitude to stretch it out in time, if we must transmit such a signal, what we would do is substitute

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it for certain pulses of the slower moving data. Where data is typically drifting a few degrees per minute we could slip in a few transient pulses and arrange switching so that we could accommodate it.

Perhaps a better solution would be so-called from the space program on-board data reduction where you would reduce the data at the site and determine the peak of the pulse, its duration, maybe the duration of its half power point and transmit them as individual items and reconstruct it to whatever degree you could do it that way. But there are two ways to do it.

The least desirable way is to size the entire system on a transient that might happen once every 10 years.

MR. SIESS: It would be possible for somebody at the site to send some additional data over the link.

MR. BASSETT: Indeed. the hundred item data list does not reflect the full capacity of one pair of telephone wires.

MR. KERR: You mentioned that the INE types were on their feet types. You didn't say what types the NRR were - what they were on?

MR. BASSETT: Well, they like a table to work on so.

MR. LEWIS: Can I ask one question, you just mentioned the data list and I just ran down the list and I

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wonder to what extent the people involved are pre-occupied with Three Mile Island. For example, I must be not reading this right but I don't see any electrical impression of this data link. I see thermal hydraulic information on this list.

MR. BASSETT: You mean bus status, that sort of thing?

MR. LEWIS: Well, for example, power supply, Crystal River for instance. I see only thermal hydraulic. I wonder if they are just pre-occupied with Three Mile Island?

MR. SEISS: There is very little status information on that.

MR. BASSETT: Generally speaking, that is a conscious decision on the part of the and we have two of the fellows that helped us put it together. But generally speaking, we got to thinking about plant conditions, valves open/close, steam not running and we found that that number of points tends rapidly to run away with you and so the decision was made I think more or less as a general feel that we would go toward reactor plant conditions, steam plant conditions and providing a list only for deducing provision valves.

Now I'm a control electrical type myself and I would very much like to see whether the three buses are

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up or not but I suspect that is something that will be looked at later.

DR. LEWIS: I'd hate like hell to freeze the system on the wrong list.

MR. BASSETT: Oh, we don't. God knows we don't we have never been accused of anything but an ephermeral system here. This is a developmental list, there is considerable flexibility in it.

MR. KERR: Now, remember there is this telephone that they call up and say what is the status of this bus.

DR. LEWIS: The phone line is going to be occupied with this data link.

CHAIRMAN PLESSET: It seems to me that one important function of a data link like this is to be able to project what is going to happen in an hour if I do something now and it seems to be that the best place to find this out is at the place where the plant was designed not at Bethesda because they have not only a lot of the intimate knowledge of the inner workings of the plant but they have all the analyses and all the codes, even more than they have ever exposed to NRC to make this kind of projection. Now what is your answer to that?

MR. BASSETT: My answer to that we agree with you completely and what's perhaps is more important is that the utilities are of a sinlge mind on this subject

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in that as they make their preparations to implement the on-site technical support center without I can't recall an exception, that they are not planning for automatic transmission of data to the NSSS vendors.

MR. SEISS: But that is not the complete answer. Do the NSSS vendors have that much knowledge of balance of plan for each of the plants?

MR. BASSETT: Well, the ANE of course is the place where you turn there and the ANE is also a factor in these plants.

MR. SEISS: But what I am getting at is that not so much at Crystal River but certainly at TMI it was balance of plant, and Browns Ferry was balance of plant. Of course the ANE was TVA there.

MR. KERR: In a way what Milt is discussing is the possibility of a faster than real time simulator so that you can put in the data you have and ask what's going to happen an hour from now and you get the information before it's going to happen. That's perhaps the next development in this.

CHAIRMAN PLESSET: It seems to me otherwise it has a relatively limited use. Would you agree with that?

MR. OKRENT: No, I don't agree.

CHAIRMAN PLESSET: I asked Dr. Kerr but I got one answer. can I get another?

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DR. KERR: I am feeling differently now that I know there are 95 people in that center.

MR. BASSETT: We have approached this with the idea that the diagnostic switch is one phrase that you could use for that sort of situation. It is not a phase 1 direct data link capability.

We are perfectly aware that such diagnostic and other capability could be used. We have in mind that we will have ports so that they can get into the data and transmit it but we don't picture that activity involving perhaps other computer operations going on at the headquarters operation center. We picture making the data available.

In fact, we think this signal should be available to anybody with a legitimate requeest in the price of the set of modums to tap into the bell system on a conference call basis and get the data.

MR. OKRENT: It seems to me one needs to try to put himself in the position of being the director of the section enforcement or the lead technical person for a couple of years responsible for providing advice to the commissioners and so forth for a range of events that may be no worse than Crystal River or Rancho Secco but may go well beyond let's say what happened at TMI and ask yourself if you have that kind of a job, whether or not you would

like to have a data link and I think when I put myself in that position there is only one answer, I would like to have it. The question arises only in my own mind, what does it cost to get this and what do I have to give up to get this, do I have to give up something that is worth more?

CHAIRMAN PLESSET: I think you can get some very wise men making some very stupid decisions. It was a wise man at TMI that said let's evacuate everybody within 25 miles and I would say that that would have been a very destructive thing to have had happen. Yet it was a wise decision.

MR. OKRENT: A lot of the things that I see in both the technical and the technical political area that were wrong, they were usually done with less information than would have been optimal, not with more information.

CHAIRMAN PLESSET: I think they would have not had any more information with this data link than they had at Three Mile Island.

MR. OKRENT: I don't expect it to be perfect for all situations and I think the point that Jesse raised is perfectly valid but there are some situations when in fact it would be damned nice to have.

MR. LEWIS: Wouldn't it be possible to consider, my concern is that the hardware has gotten ahead of the thinking of the NRC about how they are going to use this.

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That became quite clear listening to Vic and one could imagine alternate designs in which all the data that we're talking about here including other data perhaps the wall of the fire, you name it, theremal data, electrical data were multiplexed in the plant in such a way that a center here could tap into various data elements as needed as appropriate to the course of the accident, their own expertise and needs a thing like that which would be a little more complicated at the plant, there would be a simpler transmission problem although that is not a big deal, it would be a switching problem at this end which is again not a big deal.

It would be an entirely different concept with more flexibility, less rigidity and a little amenable to experience on the part of the people whose problems you are quite rightly concerned with as they get to use it as accidents occur.

I'm very concerned that, I agree with you, we make very few mistakes because we know too much. But, whether they are going to know the right thing is what bothers me.

MR. OKRENT: I think there is no guarantee but I am reluctant to believe I can anticipate what information I know I'll need for the next accident. I think you, this thing is not going to be perfect if you expect

acrs-m
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it to be perfect, forget it. If you think it might help under some circumstances I think there is a chance that that's the case.

MR. LEWIS: What I was arguing was that there was a way to make it more likely to provide the right information by transmitting less information.

MR. KERR: It is a rather large quantum jump to go from a single telephone line to a $60 to $90 million installation which I think this is going to be. I don't disagree with you that additional information would be available and if you look at my letter which I haven't mentioned before, I don't condemn the idea and it is possibly because we haven't given the people involved time enough to describe to us what they have in mind.

It is very difficult for me to understand how they are going to use this beautiful piece of equipment to do what I am not sure what. That may simply be ignorance but it's a tremendous quantum jump that puzzles me. It seems to me that one could do this in steps.

Now we heard at the subcommittee that they had looked at doing it in steps and they sort of concluded that this was about the minimum step that one could take to do what they thought had to be done. Maybe if I knew more about what it is that they think has to be done I would convinced. I just haven't seen enough yet to convince

acrs-psm
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me that that's the only possible step - from one telephone to this.

MR. OKRENT: I agree and also you have heard me express a question about how much will it cost and is it worth it and would you, do you think it is worth enough that you give up something and you don't really have that answer.

CHAIRMAN PLESSET: All of LOFT won't do it. Even all of LOFT.

MR. OKRENT: No, I'm sorry it will. I don't think the point is can it be useful because the phone line was the first thing. If they don't need information, why the phone line. Let's write a letter saying you know, cut that phone.

MR. SIESS: The stated purpose of this review at this point in time was to be able to respond to Commissioner Gallinsky's memorandum and I think the substantive part of it was the sentence that reads, "I am concerned of installing such a data link in display, however useful in improving the flow of information to support NRC's current role may at the same time shape NRC's role into something other than what is now intended."

It seems to me that that problem as he foresees it can be resolved to some extent, maybe a major extent by the commission deciding what is NRC's role in an

acrs sm
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emergency? And I would suggest that maybe we could help the Commission in that. I don't believe there is anything in the draft letter that addresses that particular thing, I'm not sure anybody can help the Commission in it but we might want to make a try.

I'm convinced that there are advantages in transmitting data from the site to Bethesda where there could be an assemblage of very knowledgeable people that not only know the NSSS but the balance of plant and have a lot of knowledge about accidents.

I am convinced that it would be nice to have, beyond that I think it would be desirable to have it and it not only could but would be useful. It would have been useful in connection with Three Mile Island. I don't think there is any question of that and I don't think that is the last accident we are going to see.

I don't share Hal Lewises concern about what data are transmitted at this stage of the game. I think there is plenty of time to look into that. The nature of this system would be very flexibile. It would require certain kinds of reprogramming to transmit different data or to manipulate the data for plotting and presentation.

We've got plenty of time to look at that if we agreed that this would be a nice thing to have, if it was used correctly as the Commission directed and then

acrs-psm

9-27

to work on what it takes to use it correctly so I think the question we have before us could be answered at this point reasonable well.

We've got plenty of time to continue to work with the staff and give them all sorts of advise on what the data should be and houw it is to be used.

MR. LEWIS: May I ask one point of information on the role of NRC in an emergency. In I think our NTOL letter or one of the mystical letters we have sent over recently, we had a comment about what the NRC's role in an emergency ought to be and in the staff response I believe it said this was resolved by commission action since our last letter.

There was some such cryptic comment and if so, I wonder what the resolution was.

MR. SIESS: The committee in one of the March 11, I think the one on NTOL said that the utility should be.

MR. KERR: It is quoted on the first page.

MR. LEWIS: Yes, that is correct and their response to this question was resolved by commission action. If you look at their responses to our letter and I just wonder, I may be the only one who doesn't know what the commission action was.

MR. FRALEY: We'll try to get that SECY or whatever it is they reference.

icrs-psm
9-28

MR. LEWIS: It is a SECY and we don't have it yet. So perhaps some of our discussion about what they are going to do in the event of an accident.

MR. SIESS: Might be the one that puts the Chairman in as head of the emergency management ticket.

MR.LEWIS: I see, in which caseit doesn't exactly resolve the problem. Simply a point of information Mr. Chairman.

CHAIRMAN PLESSET: Can we wind this session up? Are there any more.

MR. BASSETT: I have some information. I am scheduling some information on costs which I presented to the subcommittee and am available for any questions and I will respond to your needs.

MR. SIESS: Let me ask one sort of honorable question. You said a few minutes ago something that anybody could hook up on a conference call if they had the modums.

I was reading something about Crystal River, they got, for 10 or 15 minutes they couldn't use that dedicated telephone link because somebody from Chicago and somebody from Atlanta had gotten onto the line. Can we get the same trouble on that computer data link?

MR. BASSETT: We've had some stimulating discussions with the telephone company along these lines and we find that they assure us that even on Mother's Day a

acrs-psm
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dedicated line will remain connected up. Practical experience indicates that there might be some outage but we think it would be comparable to the outage at the plant anyhow in terms of computer reliability so we think its down in the noise with the unavailability of the data link sending in. Approximately the same degree of hazard.

MR. WEISS: The unavailability of that line for that particular time had to do with the inexperience of the operator on that telephone. The line was okay, he tried to hoop up too many people on a conference line which you couldn't do.

MR. SIESS: I thought that was a direct link from control room to Bethesda and you lifted up the receiver and there was no operator involved and that was it.

MR. WEISS: The line was hooked up immediately and that was open. He dropped the line inadvertently because he tried to hook up four people together when the limits were three.

MR. SIESS: He being.

MR. WEISS: The duty officer.

MR. SIESS: In Bethesda.

MR. WEISS: In Bethesda.

CHAIRMAN PLESSET: So it wasn't Ma Bell, it was a fellow at the site, okay.

acrs-psm
9-30

MR. BASSETT: We have had substantial discussions on the various types of link to use and we've come down on this as being the most cost effective immediately available with a tremendous backing of the telephone company behind it in terms of hardware and existing data modules and the like of that.

We have some concern about tornedo resistance. This is a separate issue and one we have to face up to.

CHAIRMAN PLESSET: Well, can we be satisfied with this much discussion?

MR. BASSETT: I would like to make one correction. We had a typographical error, the number that we gave you yesterrday for total system cost was in error because they overestimated, we had a typographical mistake in the cost of the h adquarters equipment which reduces the estimate to the value of $22-1/2 million. I would point out the contingency of 27% in there and I would share from my own experience that the substantial difficulties in implementing this system will be software at the 70 or 80 sites, that is a problem which we have only partially scoped by the amount of visits we have made thus far.

MR. SIESS: It won't be less than $22 million?

MR. BASSETT: I'll certify that.

MR. LEWIS: Again, one of the major causes of

acrs sm
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cost overruns in military equipment is that they keep changing the specs as the system takes place. I'll bet a nickel that will be here in spades.

MR. BASSETT: If we respond to you earlier comment especially.

CHAIRMAN PLESSET: Well, let's thank you again and we'll have a break and go into an executive session, it will be an open executive session in 10 minutes.

(Whereupon, the Committee was adjourned.)

Tape 5
Porter

RECOMMENDATIONS FOR WNP-1/4

A. CHANGES TO RETAIN THE ORIGINAL NSSS OPERATING CHARACTERISTICS

1. QUALIFY PORV

   STATUS: WILL PARTICIPATE IN EPRI PROGRAM; ALSO HAVE REQUESTED B&W TO CONSIDER OTHER VALVE TYPES. B&W HAS PROVIDED EPRI PERFORMANCE CRITERIA AND ACCEPTANCE CRITERIA FOR SINGLE AND TWO PHASE FLOW.

2. PROVIDE 1E CONTROL AND POWER TO PORV

   STATUS: DESIGN CHANGES UNDERWAY; WIRING DIAGRAMS AND CONTROL LOOP DIAGRAMS ARE BEING REVISED. NO MAJOR PROBLEMS ENCOUNTERED.

3. PROVIDE 1E PORV ISOLATION (BLOCK) VALVE(S) ACTUATED ON LOW (<1600 PSIG) RCS PRESSURE.

   STATUS: HAVE INVESTIGATED SOURCE OF ACTUATION SIGNAL. WAITING B&W RECOMMENDATION ON TYPE AND NUMBER OF VALVES - APPEARS TWO VALVES PROBABLY REQUIRED.

RECOMMENDED CHANGES FOR WNP-1/4 (CON'T)

C. CHANGES TO IMPROVE THE RESPONSE OF THE NSSS

1. PROVIDE FOR RAPID MFW FLOW REDUCTION FOLLOWING REACTOR TRIP

   SCHEDULE: PRE ENG COMPLETE - 6/15/80
   BEGIN PROCUREMENT - 10/15/80
   CHANGE COMPLETE - 10/15/81

2. ADD 1E LOSS OF ALL FW TRIP

   STATUS: PRELIMINARY WORK ON BOP CRITERIA UNDERWAY.

   SCHEDULE: PRE ENG COMPLETE - 7/1/80
   BEGIN PROCUREMENT - 11/1/80
   CHANGE COMPLETE - 11/1/81

3. ADD MFW OVERFILL PROTECTION

   STATUS: PRELIMINARY DESIGN UNDERWAY

   SCHEDULE: CONCEPUTAL DESIGN COMPLETE - 7/1/80

4. AFW OVERFILL PROTECTION AND RATE CONTROL

   SCHEDULE: PRE ENG COMPLETE - 6/15/80
   BEGIN PROCUREMENT - 10/15/80
   CHANGE COMPLETE - 10/15/81

5. IMPROVED ALGORITHM USED FOR AFW CONTROL

   STATUS: PRELIMINARY ENGINEERING IN PROGRESS

   SCHEDULE: SAME AS C.4

RECOMMENDED STUDIES FOR WNP-1/4

1. SECONDARY SYSTEM RELIABILITY

   STATUS: ARE FINALIZING IDENTIFICATION OF TRANSIENTS IN SECONDARY SYSTEM

2. CONTROL AIR SUPPLY SYSTEM

   STATUS: STUDY UNDERWAY. WILL IDENTIFY VALVES WHOSE FAILURE DUE TO LOSS OF AIR COULD CAUSE TRANSIENTS. MAY MODIFY SOME "FAIL" POSITIONS AND/OR PROVIDE ACCUMULATORS.

3. MINIMUM FINAL FW RESPONSE STUDY

   STATUS: PREVIOUS CALCULATIONS WHICH SHOWED ACCEPTABLE CONSEQUENCES ARE BEING REVIEWED TO ASSURE ASSUMPTIONS ARE STILL VALID.

4. AFW TURBINE RELIABILITY

   STATUS: STUDY UNDERWAY; STEAMLINE ROUTING BEING REVIEWED AND OPERATING DATA FOR GOVERNORS UNDER REVIEW.

5. NNI/ICS POWER SUPPLY RELIABILITY

   STATUS: TOTAL REVIEW OF POWER TO NNI/ICS AND OTHER NON-1E INSTRUMENTS UNDERWAY IN RESPONSE TO TMI, 79-27 AND CR-3.

6. HEATER DRAIN PUMP RELIABILITY STUDY

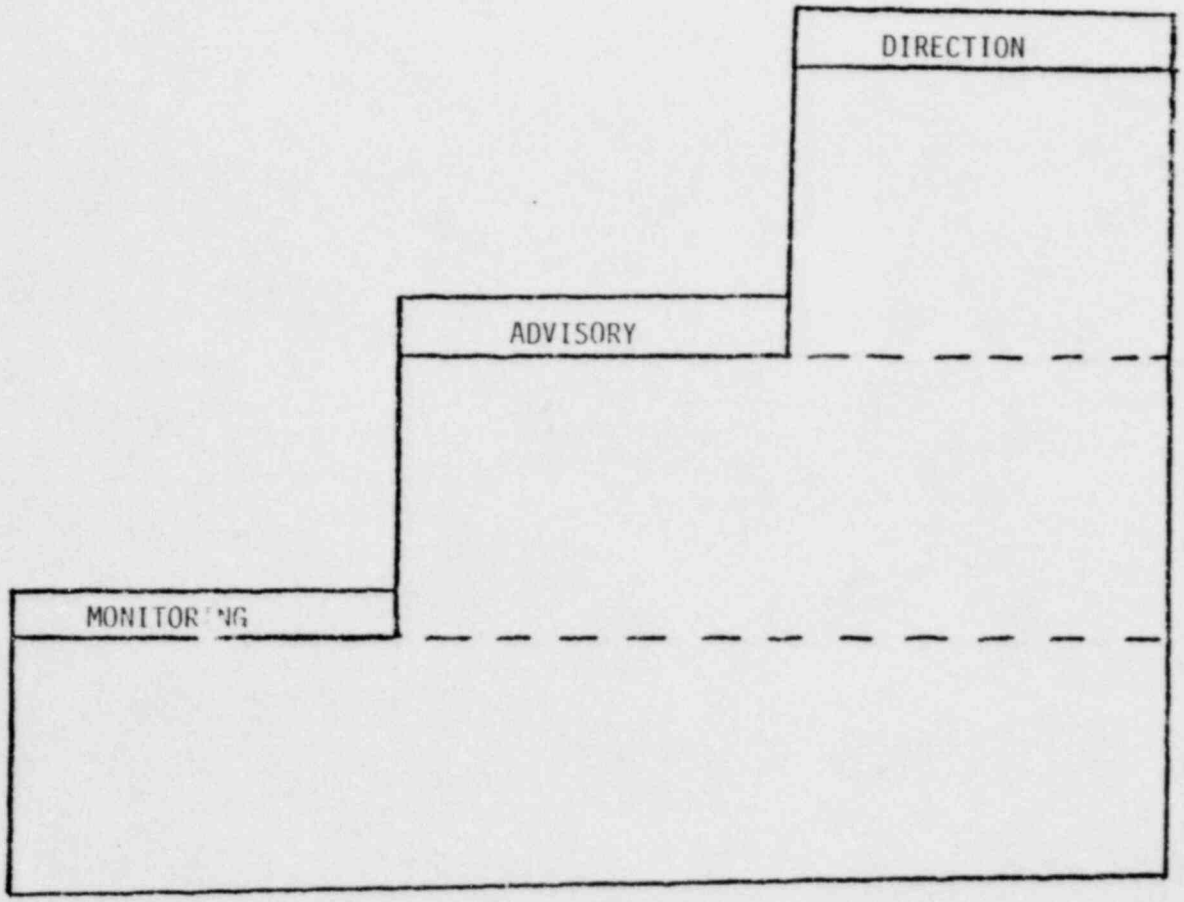
   STATUS: STUDY UNDERWAY. DESIRABILITY OF CONTINUOUS COLD WATER INJECTION BE STUDIED. ALSO STUDYING NEEDED FOR UPGRADE OF CONTROL SYSTEM.

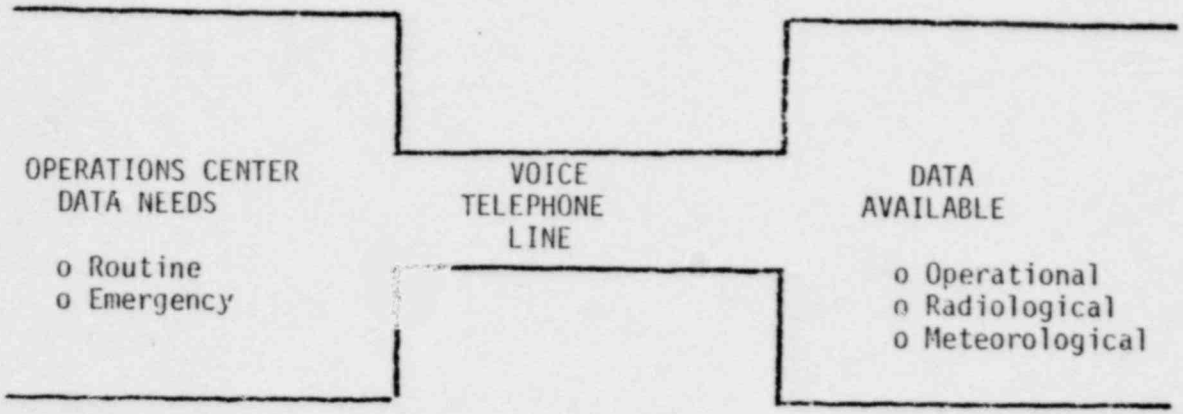
Tape 1
Mr. Weiss

ROLE OF NRC IN EMERGENCIES

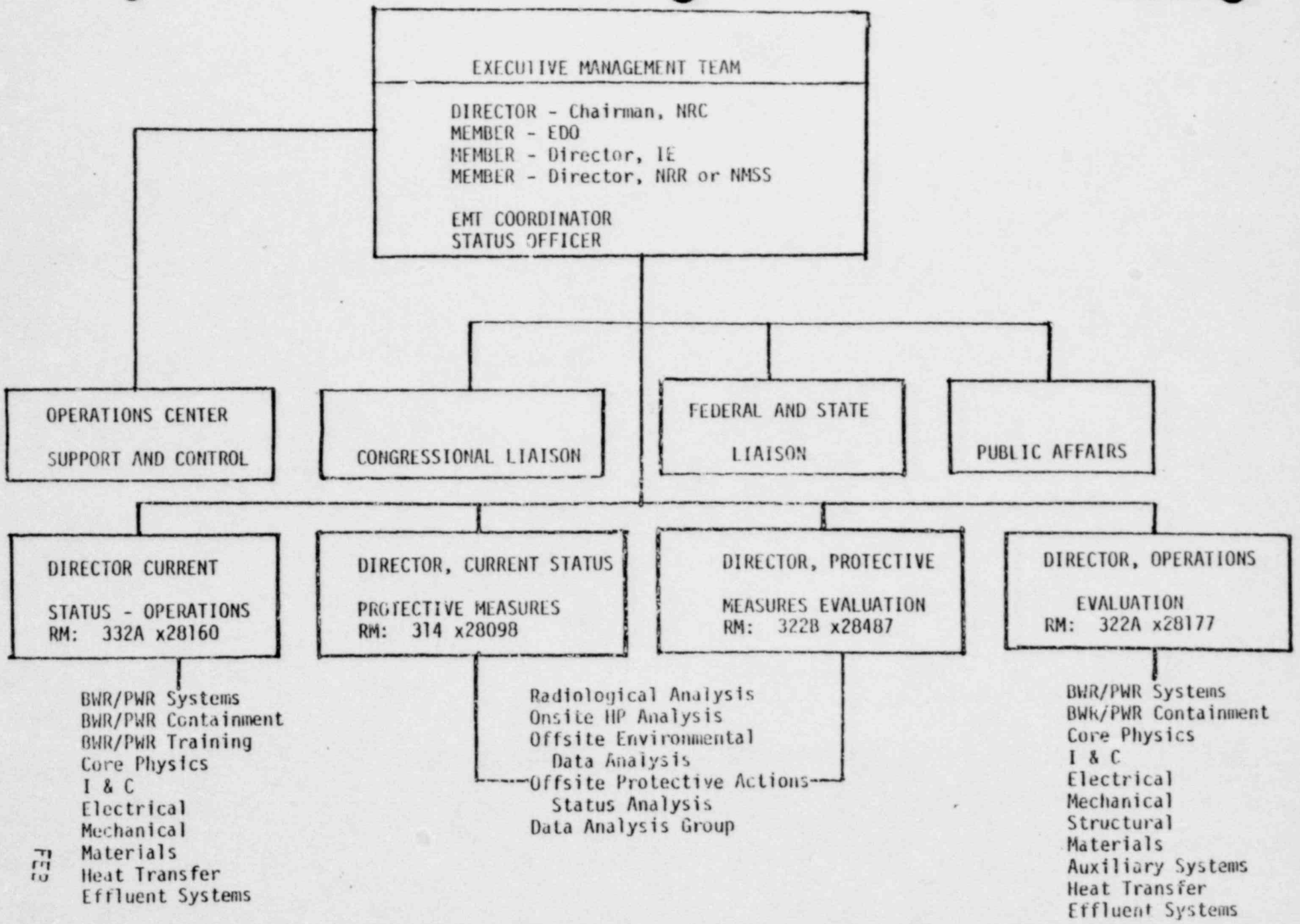
- o Spectrum of Roles
  - o Monitoring - Verify and Evaluate Data from Multiple Sources to Assure That Proper and Adequate Operational and Protective Measures Are Being Taken and Inform the Public.
  - o Advisory - Provides Requested or Volunteered Assistance in Diagnosing The Situation and Isolating Critical Problems.
    - o Protective Action Determinations - Advise Other Concerned Agencies.
  - o Direction - Assume Initiative in Making Operational Decisions Regarding Licensee Actions to be Taken.
- o Constraints - NRC Would Not Physically Operate Facility.

SPECTRUM OF NRC ROLES




OPERATIONS CENTER
DATA NEEDS
o Routine
o Emergency
VOICE
TELEPHONE
LINE
DATA
AVAILABLE
o Operational
o Radiological
o Meteorological

ENCLOSURE


EXECUTIVE MANAGEMENT TEAM
DIRECTOR - Chairman, NRC
MEMBER - EDO
MEMBER - Director, IE
MEMBER - Director, NRR or NMSS
EMT COORDINATOR
STATUS OFFICER
OPERATIONS CENTER
SUPPORT AND CONTROL
CONGRESSIONAL LIAISON
FEDERAL AND STATE
LIAISON
PUBLIC AFFAIRS
DIRECTOR CURRENT
STATUS - OPERATIONS
RM: 332A x28160
DIRECTOR, CURRENT STATUS
PROTECTIVE MEASURES
RM: 314 x28098
DIRECTOR, PROTECTIVE
MEASURES EVALUATION
RM: 322B x28487
DIRECTOR, OPERATIONS
EVALUATION
RM: 322A x28177
BWR/PWR Systems
BWR/PWR Containment
BWR/PWR Training
Core Physics
I & C
Electrical
Mechanical
Materials
Heat Transfer
Effluent Systems
Radiological Analysis
Onsite HP Analysis
Offsite Environmental
Data Analysis
Offsite Protective Actions
Status Analysis
Data Analysis Group
BWR/PWR Systems
BWR/PWR Containment
Core Physics
I & C
Electrical
Mechanical
Structural
Materials
Auxiliary Systems
Heat Transfer
Effluent Systems