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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

ACRS FLUID DYNAMICS SUBCOMMITTEE MEETING

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NUCLEAR REGULATORY COMMISSION

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

ACRS FLUID DYNAMICS SUBCOMMITTEE MEETING

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Holiday Inn
282 Almaden Boulevard
San Jose, California

Friday, July 30, 1982

The ACRS Fluid Dynamics Subcommittee Meeting of the Advisory Committee on Reactor Safeguards was convened at 8:30 a.m.

PRESENT FOR THE ACRS:

M. PLESSET, Chairman
H. ETHERINGTON, Member
J. EBERSOLE, Member
J. RAY, Member
P. BOEHNERT, Staff
K. GARLID, Consultant
J. CATTON, Consultant
V. SCHROCK, Consultant
S. BUSH, Consultant
Z. ZUDANS, Consultant

ALSO PRESENT:

Present for the NRC:
Mr. Fields
Mr. Kudrick
Dr. Butler

Present for the Industry:
Mr. Townsend
Mr. Davis
Dr. Sherwood
Mr. Smith
Mr. Cameron
Mr. Trickovic
Mr. Kochis

Present for the Industry: (Continued)
Mr. Richardson
Mr. McGaughy
Mr. Humphrey
Mr. Kant
Mr. Pender

P R O C E E D I N G S

8:35 a.m.

DR. PLESSET: Let's reconvene and continue with our agenda and I think we will call first on General Electric for a presentation on GESSAR II/STRIDE Containment Design and I think Mr. Cameron is going to speak. Mr. Cameron, would you begin?

MR. CAMERON: Good morning. I'm Charles Cameron with General Electric, Safety and Licensing Operation and we're going to discuss STRIDE today.

What I'm going to do is provide a brief description of what the STRIDE and the GESSAR programs are all about and then we'll get right into Hal Townsend who will discuss the specific action plan for some of these items.

(Slide Presentation)

The first goal is to define what STRIDE and GESSAR are. They are terms that were used yesterday and will be used at length today and it's good for everybody to understand what's what.

STRIDE is the Standard Reactor Island Design. It's an acronym based on some of those front letters and other terminology you'll hear will be Nuclear Island. Later in the evolution of the design we came up with a little bit more generic terminology which is Nuclear Island, but those are synonymous -- the Reactor Island Design and Nuclear Island are the same.

What it is just basically the detailed design for TVA, the BWR6 and Mark III containment as designed by GE and C.F. Braun. The scope of it -- I'll jump to the end of this slide first -- responsibilities being so I can define that -- G.E. basically defining the design basis and the licensing, providing the licensing of the STRIDE package. C.F. Braun has been our architect engineer for the detailed design and construction of the STRIDE, and TVA the utility was responsible for the overall construction and the BOP design.

The scope of the STRIDE -- a picture here -- the scope basically being all of those systems and structures that were required or that are related, that are safety related, excuse me, and those include the reactor building. Of course, they include the NSSS which is our normal scope of supply, the reactor building which is the containment, fuel building, diesel generator building, auxiliary building, radwaste building and control building, with the BOP being defined as all other, as the turbine building and the others.

So GESSAR II, which is the next slide, GESSAR II is the licensing document for this STRIDE scope, STRIDE being our extended scope of supply for TVA.

Now, a GESSAR program, GESSAR standing for G.E. Standard and Safety Analysis Report, GESSAR is just basically the FSAR or the input that GE would provide on the STRIDE scope for an FSAR to be used by TVA or whoever and the responsibilities in this case are still G.E. and C.F. Braun, C.F. Braun being responsible now for the detailed design of the safety systems and structures that are sufficient for the licensing of GESSAR. That's a little bit smaller scope than if you were going to provide construction drawings as they originally were and have.

Basically, we're still on -- we're on schedule here for GESSAR where we've had it docketed by the NRC in February of 1982 as you can see and GESSAR submittals began in February and are continuing through the year, the initial submittals being up through May. We've been meeting with the NRC Staff members since March and will probably go through later in the year and the target is to have the final design approval which is what a standard safety analysis gets at the end, in April of 1983.

So just as a summary, the last little slide is just showing you that the GESSAR is just -- even though the terms are somewhat synonymous, the STRIDE is the Standard Reactor Island Design which does include construction drawings, but the GESSAR is just the licensing vehicle for that scope of supply from G.E. And since that scope of supply does include the containment and containment related systems, that's why we're going to give this presentation.

Now with that, I'll introduce Hal Townsend who will go through our detailed action plan on the STRIDE.

MR. TOWNSEND: Good morning. Today I was going to talk about the action plan for the GESSAR design and how that fits in with the Grand Gulf responses.

(Slide Presentation)

First, let me start by trying to categorize the various issues that we've heard about yesterday into five main categories and our intent on GESSAR is to respond to those issues that are not covered by Grand Gulf. There are a large number of the issues that are generic in nature on Grand Gulf and the Grand Gulf plant is either typical or bounding of the other -- of GESSAR and in fact most the other plants and so we've identified Category 1 here as those issues where the Grand Gulf results will be representative or bounding and our intent is to confirm that indeed that is the case for GESSAR and then either resubmit or just reference the Grand Gulf responses in that first category.

The second category would be similar responses to the Grand Gulf but where we would redo analyses and use GESSAR specific input numbers in those analyses to give specific GESSAR responses. Again, that's a rather large block of responses and in fact, the first two cover most of the actions that will be taken in the program.

Category 3 is the case where the GESSAR actions will be somewhat different than Grand Gulf, either that we're trying to take a different approach because of things Grand Gulf has done, or whether Grand Gulf -- the issues are not the same for the two plants or the plants differ enough where that's not an issue.

Category 4 is issues that have been resolved for Grand Gulf and may not be resolved for GESSAR. The classic example in this case is the issues about containment vacuum breakers where Grand Gulf concrete containment -- they don't use vacuum breakers in the steel containment of GESSAR, does have vacuum breakers.

Category 4 is the category where these have been resolved for GESSAR and they also have been resolved for Grand Gulf or they may be specific to GESSAR and they're not applicable to -- wait a minute. I said it backwards. They may be specific to Grand Gulf and they're not applicable to GESSAR so we've categorized these into five different areas and what I will do is emphasize areas 3 and 4 where these are the places where we deviate from the Grand Gulf design.

DR. ZUDANS: These classification numbers are the same as for Grand Gulf, right?

MR. TOWNSEND: Yes, I believe there's one to one correspondence on these numbers.

DR. ZUDANS: One to one.

DR. ETHERINGTON: Do you distinguish containment between GESSAR and GESSAR II in this --

MR. TOWNSEND: No, we do not.

This would be GESSAR II for all practical purposes.

Okay, let me go through those then one by one starting -- my intent here is to cover categories 3 and 4 where that is the place where we're doing unique work. As I said, categories 1 and 2 are primarily Me Too (ph) responses to the Grand Gulf response.

Okay, the first item is the annular sleeve around the SRV discharge lines and I've indicated here on the slide that Grand Gulf is pursuing a seal of that annulus. I think you heard yesterday that they have not formally made that decision yet and in fact, if they don't go with the seal, they will end up with a program very similar to what we intend to do on the generic plant. But basically the approach is to look at the chugging and seal loads through the main vents and attempt to estimate what those loads will be in the seal annuluses. I think you heard some numbers yesterday that I think these are on the order of 2% or 3% and if we can show that indeed these loads are small on the order of 20% of the main vent loading, we will document that and in the program -- if not, we will take our best estimates of the load and do the structural evaluation and attempt to show that the responses are negligible. Again, if we're unsuccessful with that, we will ultimately have to go to some kind of a seal. We think that the success path of showing that the loads are negligible is highly likely. Yes?

DR. ZUDANS: Have you any idea how you plan to generate this information on loads coming from the annulus?

MR. TOWNSEND: Yes. We're primarily going to go back -- obviously we have a problem. We don't have annular data. But we do have a substantial block of data particularly from our Mark II test programs on small diameter discharges with different vent lengths. These are from straight pipes. And we're going to review that data. One of the issues here is amplification of the signals of the pressure signals due to resonance in the line. We think we can show by reviewing the data we have for circular geometries that indeed, that's not the case, and we will try to do that. I think you heard a lot of talk yesterday about the total size of these sources relative to the main vent which I think gives you a comfortable feeling that they're going to be somewhat smaller. And we will try to use the spatial attenuation characteristics of the pool to show that the loads on the walls are small. Again, we can show that that's appropriate purely from potential flow or from our experimental data from the Mark II program. That's clear.

DR. ZUDANS: Let's see. You said that you do have a large number of small diameter tests, but do you think that the concept of equivalent hydraulic diameter would work for this dynamic process?

MR. TOWNSEND: I think if anything it's very conservative. I think phenomenologically what I really think happens with an annular geometry is that you don't grow single bubbles in an annular shape. You tend to have the annulus start to form and break into small bubbles around that annular ring and these bubbles will break up and be de-synchronized and probably you'll get an awful lot of cancellation around that ring and I really expect that if we had the test data that these things would be completely negligible.

DR. ZUDANS: But you also have a potential of having bubbles from one side of that -- let's say it's

36" long, 3/8" wide --

MR. TOWNSEND: That's true.

DR. ZUDANS: You can have it on one side and condensation there and that will produce asymmetric loadings which you would not get in a single pipe diameter geometry.

MR. TOWNSEND: Well, even that's not quite true.

DR. PLESSET: You get asymmetric loads in a single pipe, too.

MR. TOWNSEND: Yes.

DR. PLESSET: Pretty big ones.

MR. TOWNSEND: In fact, in the Mark II program that's one of the very large load definitions. This is a lateral load on the side of the downcomers due to the asymmetry of the bubble formation.

DR. ZUDANS: So that phenomenon is not --

MR. TOWNSEND: Yes, I just think that what really happens is, in the annular geometry you get smaller bubbles.

The second issue is 2.2 which is the continuation of that same point. This is specifically that the condensation and chugging portion of that -- and we, and the loading on the side of the downcomers, we intend to use the Mark II data and try to adjust that down for the smaller hydraulic diameters and do a static load evaluation on the structures.

DR. EBERSOLE: May I ask a question about that? I don't understand what difference it would make if it failed anyway. It's not in use. It may well be.

MR. TOWNSEND: Well, the concern is it's a potential by-pass. I think the penetration through the wall is very near the pool surface.

DR. EBERSOLE: You're actually concerned with a failure of the sleeve.

MR. TOWNSEND: Well, that's the concern that was raised. No, I'm not concerned about that.

DR. EBERSOLE: This doesn't say sleeve. It says line.

MR. TOWNSEND: Okay, maybe I'm getting you confused here. There's two parts to that. Okay. This is the line.

DR. EBERSOLE: So what's the line for?

MR. TOWNSEND: Well, the line is the SRV discharge.

DR. EBERSOLE: So it's not in use at this --

MR. TOWNSEND: It could be in use during the blowdown. You have simultaneous SRV discharge and LOCA loads.

DR. EBERSOLE: But that was the whole purpose of this design, was to make it's failure inconsequential anyway, wasn't it?

MR. TOWNSEND: Yes, yes. If the line fails, you still are discharging steam into the pool.

DR. EBERSOLE: That's why you went to this instead of Mark I, too?

MR. TOWNSEND: Yes.

DR. EBERSOLE: But here you're having to fix it. So it did count.

MR. TOWNSEND: Yes.

DR. EBERSOLE: Why is that?

MR. TOWNSEND: Well, I don't think it needs to be fixed. I think I told you yesterday I thought these things were very conservative.

DR. EBERSOLE: Now you make me wonder if you've really fixed it.

MR. TOWNSEND: If you postulated you broke the line and you completely blew the 10" pipe out of that sleeve, then you've got a fairly large discharge into the pool.

DR. CATTON: You have another vent.

MR. TOWNSEND: Yes. It's an undefined load. That's the kind of thing we're into here. I don't think it's a serious concern but we're going to try to --

DR. EBERSOLE: Well, put it this way --

MR. TOWNSEND: Show that the loads on the line are negligible.

DR. EBERSOLE: Let me put it this way. Whereas, Mark I and II, you had better never fail a downcomer from this or these.

MR. TOWNSEND: That's right.

DR. EBERSOLE: I thought in this one you could.

MR. TOWNSEND: Oh, I think we can.

DR. CATTON: But you don't want to.

DR. EBERSOLE: No, you don't want to but then the odds --

MR. TOWNSEND: I think we probably could and not have a serious event. You know, we're discharging the water into the pool. I can be a little diabolical here and fail both the line and the sleeve which is the next issue, and then I've got a problem because I've got a discharge near the surface.

DR. EBERSOLE: Right, but I thought you'd structurally fixed that so that --

MR. TOWNSEND: Well, you've go the piping anchored and you've got this 7 foot long cantilever that's a schedule 80 pipe and a 12" schedule 80 pipe, that's a pretty heavy piece of equipment.

DR. BUSH: If I were going to expect this to fail, I would be more worried about cavitation, I think, than I would resonance phenomena. Not that I expect it to fail.

MR. TOWNSEND: Cavitation of what? Because the bubble collapsed?

DR. BUSH: The bubble collapsed. We have plenty of cases of failures, usually not in the straight geometries where they'll chew through in fairly short order. That's what I would be worried about if you operated this thing for very long.

MR. TOWNSEND: Even from a cavitation point of view, I don't think you're going to have in the few minutes that this thing can blow that you're going to --

DR. BUSH: I agree. It would have to be a repetitive type phenomena. As I say, I'm not really concerned but I think I would be worried more about cavitation than I would resonance.

MR. TOWNSEND: Yes, okay, so that's the line. This is the same, essentially the same response for the sleeve. I don't know that we need to go through that in any detail. But again, we're trying to estimate the loads in that annulus and apply them to both the sleeve and the line to show that the designs are strong enough to accommodate anything we can conjure up.

This is the issue of stratification in the pool, due to the arrangement of the discharge piping.

Our arrangement of causing both RHR systems to circulate in the same direction is quite similar to Kuo-Sheng's and our intent is just to document the stratification that wasn't there in the Kuo-Sheng tests and show that that's small -- I think I told you yesterday it was on the order of 9° and we don't really think there's an issue here at all.

DR. BUSH: Could I ask in the general sense, I asked the question yesterday about instrumentation on plants other than Kuo-Sheng and not just for temperature but other things. Are there -- is there an intent to instrument any of the Mark IIIs that are coming up, and I'm thinking of both, not just temperature gradients but pressure, etc.?

MR. TOWNSEND: Yes, are you talking about wall pressures in the suppression pool?

DR. BUSH: I'm talking about wall pressures or I'm talking about deflections of piping, things of that nature.

MR. TOWNSEND: I believe Grand Gulf has quite a set of instrumentation for that.

MR. RICHARDSON: This is John Richardson from Mississippi Power and Light. Grand Gulf will be running an in-plant, SRV in-plant test program similar to Kuo-Sheng but not as many tests as a result of the Kuo-Sheng testing.

The air pressure sensors, accelerometers and temperature monitors to measure, to accumulate some of the data --

DR. BUSH: Of course, I was thinking of a little more than just SRV loads. I was thinking of the possibility of some retained instruments, not safety grade -- let me hasten to indicate so that you don't get tied to that box, but in the context of seeing whether the RHR response was as anticipated. In otherwords, did it fall comfortably within the boundary?

MR. TOWNSEND: Are you talking about flow capability and that kind of thing?

DR. BUSH: I'm thinking more of unexpected amplitudes on the piping, things of that nature. Are they comfortably within that because -- of course this one is not going to be necessarily representative of the STRIDE design because I think the characteristics of the containment may be a very important parameter. Maybe I'll hear something of that from Clinton or somebody else.

MR. TOWNSEND: Yes, I can't answer that on a generic basis.

DR. BUSH: I haven't looked at the details of the programs in this instance and so I confess ignorance as to just exactly what you're going to do.

MR. TOWNSEND: I might say these were measured at Kuo-Sheng.

DR. BUSH: Yes, I've looked at some of those.

MR. TOWNSEND: Okay, the question of the suppression pool temperature sensors. Again, there are several things that we have done and can do here, I might say as far as the operator not knowing what's going on as far as suppression pool temperature. He does have alarms in the control room to tell him when sensors are uncovered. He can use the RHR system to reestablish level and well, I think the key thing here is probably the 4th issue -- is we are in the process of revising the emergency procedures as Grand Gulf is doing so that the operator is instructed to use the instruments that are underneath the water level and not rely on instruments that may be above the water. Again, the same kind of argument that I think we got into yesterday about averaging of the sensors, the thermo-couples in the suppression pool. There is a string down four feet below the pool surface that's available to the operator.

DR. BUSH: You know, I can't understand, unless it's buried in here, it would be the simplest thing imagineable to instruct the computer essentially to read off a set of thermo-couples at each depth and actually display this on the screen and you would know exactly where you stand on that situation, even on height matters.

MR. TOWNSEND: That is how it's done. That is how it's done, by computer, yes.

DR. BUSH: That's the way I think it should be done.

MR. TOWNSEND: Yes. I think Dr. Catton was concerned about the averaging yesterday by hand and that is done by computer.

DR. CATTON: It's only done by computer as long as those top ones are under water.

MR. TOWNSEND: No, I think your system actually recognizes which sensors are under water.

DR. CATTON: Oh, okay, if you'd said that yesterday I would have been satisfied.

DR. EBERSOLE: May I ask you a question about the operator procedures? In the event of a large LOCA your low pressure flooding system is intially started at full reflood to the reactor vessel, right?

MR. TOWNSEND: Yes.

DR. EBERSOLE: All right, if you find that this is a much smaller break than this, you ultimately find out that you've got to divide the flow to get pool cooling, because you don't get enough flow out of the break to do a full mass flow for pool cooling.

MR. TOWNSEND: You have three systems, three RHR systems and you assume one fails. You dedicate one to the reactor and one to the suppression pool, of the two remaining.

DR. EBERSOLE: Oh, you selectively put one then-- you don't put full flow to all of them until --

MR. TOWNSEND: Well, you initially start to.

DR. EBERSOLE: Well, I want to start at that point.

MR. TOWNSEND: You initially start --

DR. EBERSOLE: I think it's after that for a small break, require a division of flow to maintain full coverage and then the suppressive mass flow for the pool cooling?

MR. TOWNSEND: The first priority is to cool the core.

DR. EBERSOLE: Right and after that --

MR. TOWNSEND: At the restore level. Once you've got the level restored, then you're free to divert --

DR. EBERSOLE: What I wanted you to maybe just comment on is the complexity or lack of it, of metering the flow properly to the core versus the pool cooling process. Do you do this by valve throttling? Do you divide up flows a portion of which goes to the core and a portion to the pool?

MR. TOWNSEND: No, it's either on or off.

DR. EBERSOLE: Oh, you don't have modulation valves?

MR. TOWNSEND: No, no, it does not modulate. That's right, isn't it John?

MR. RICHARDSON: I'm not sure what the question is.

DR. EBERSOLE: The modulate --

MR. RICHARDSON: You use the same system to go to the core and the pool.

DR. EBERSOLE: Do you do any valve modulation? That's what I'm getting at.

MR. TOWNSEND: No. You don't throttle the flow, the partial flow into the RHR --

DR. EBERSOLE: It's either off or on.

MR. TOWNSEND: Yes.

DR. EBERSOLE: You have no valve modulation problems in this design, is that right?

MR. RICHARDSON: No.

DR. EBERSOLE: Thank you.

MR. TOWNSEND: And for smaller breaks you probably are on the, either the RIKCI (ph) system or the HPCS.

DR. EBERSOLE: Then if I look at your design, I will find no valves which are not committed to go full open or full shut in this RHR system? Is that correct?

MR. TOWNSEND: That's right.

MR. RICHARDSON: There are some valves that are throttle valves in the whole system.

DR. EBERSOLE: Well, I'm talking about the RHR low pressure flooding and core cooling.

MR. TOWNSEND: No.

DR. EBERSOLE: That's either open or shut.

MR. RICHARDSON: For the LPCI (ph) injection that's just open and shut.

DR. EBERSOLE: Okay, thank you.

MR. TOWNSEND: Okay, this is Category 4 issues which is I believe, the things that don't apply to MP&L.

The first question was the vent area above the suppression pool, and in fact above the HCU floor and a question that was raised, is there a significant pressure drop at that elevation?

We have specified a minimum open area at each of these floors to be some 1500 square feet and have shown in the past that indeed on GESSAR that this area is achieved at all floors and we'll document that or give the references in Appendix 3D. That one is really a non-issue at this point.

Okay, earlier General Electric had recommended that there was an interlock between the containment spray and the hydrogen recombiners. We're in the normal design change process on this to remove that interlock and I think that's just a matter of proceeding with the work we have ongoing to straighten the logic of that system out. Again, that's -- that becomes a non-issue.

Okay, the upper pool dump on small breaks. Originally in the logic of our solid state plants, this was a -- there was no seal in on that logic to assure that for small breaks that we would get a dump. Again, this is an issue that we have under review and we're in the process of making that modification.

Okay, we have a 90 second delay on the timers for the containment sprays to assure that the two sprays didn't come on simultaneously. The concern with this was negative pressures in the containment if inadvertently you did have both sprays come on simultaneously. We will submit a write-up on this to show that in GESSAR the negative pressure does not reach the negative design capability of the containment shell even if both loops do come on simultaneously. So again, we have done this analysis already and with 0.8 PSI capability, the containment and simultaneous spray actuation, we only drop the pressure about 0.2 PSI so we have a substantial margin here.

DR. CATTON: How is the negative pressure transient supposed to aggravate temperature stratification?

Does that negative pressure decrease in pressure above the suppression pool?

MR. TOWNSEND: No, it's -- this is -- the stratification part of that is when you -- because you have floors like the HCU floor and the steam tunnel above the pool, you're raining uniformally down from the spray system.

DR. CATTON: Isn't that cold water?

MR. TOWNSEND: Yes, it's cold water but it's dropping into specific parts of the pool so there are regions where there is no water falling directly on the surface of the pool. Now, you're taking suction out of the pools at the --

DR. CATTON: If you put cold water on the top of your pool, that's going to cause a decrease in the stratification, not increase it.

MR. TOWNSEND: Well, except -- it's a concern. I'm decreasing it over here but I've still got a hot region here. If you believe that the pool does not mix, then you've got a problem.

DR. CATTON: Wall, when there's lack of mixing in the pool, it's because it's hotter above than it is below, not in a horizontal direction.

MR. TOWNSEND: Yes, I agree. That's kind of a non-issue.

DR. CATTON: I think you're right.

MR. TOWNSEND: Okay, this is -- okay again, this has to do with the spray initiation in the -- primarily an inadvertent spray in the containment. You drop the pressure slightly in the containment and you're drawing air in through the containment vacuum breakers which take their suction in the shield building. We've calculated negative pressure in that building to be somewhere between 2 and 3 PSI and the building capability is about three, and to assure that we really don't have a problem with that building, we're adding a vent on the shield building to ensure that we do have suction. This is one of the things that evolved in the design. We originally started out with this system depending on the leakage of the shield building and as we've progressed to the design, we've tightened the building up to the point that you potentially have this problem with pulling a vacuum because you haven't got enough leakage through the building so we're going to put an actual vent on the building itself.

DR. EBERSOLE: Does this mean you're going to have to put reverse flow protection for the stand-by gas treatment clean up for that annulus flow?

MR. TOWNSEND: No, I don't think so.

DR. EBERSOLE: Won't you have a tremendous reverse flow through the filtration system? Or you do have a filtration system?

MR. TOWNSEND: No, the pump head on that stand-by gas treatment system I think is enough to pump through.

DR. EBERSOLE: Keep it going forward?

MR. TOWNSEND: Yes, I believe that's true.

DR. EBERSOLE: Oh, is that so. 2 PSI. I would be surprised.

MR. TOWNSEND: I would have to look at it. I think it is, though.

DR. BUSH: What type of valving do you use on your containment sprays, do you know?

MR. TOWNSEND: Valving on the sp. ay itself?

DR. BUSH: Yes, that controls the on-off, the actuation of the sprays. Not the electrical aspect, the valving type. Or hadn't you ever made a decision on this?

MR. TOWNSEND: I'm afraid I don't know that detail. It's an open and closed valve -- it's not a modulating valve.

DR. BUSH: No, I recognize that.

MR. TOWNSEND: And I don't know the specific type of valve that's used there.

DR. BUSH: The reason I ask is --

MR. TOWNSEND: Grand Gulf uses a gate.

DR. BUSH: Oh, it's a simple gate valve?

MR. TOWNSEND: Yes.

DR. BUSH: That solves my problem. Some of the more complex ones I know have had a very poor reliability record so far as actuation and I just wondered if you were using that type.

MR. TOWNSEND: Okay, the last issue that we'll be dealing with specifically is the debris question which we talked about yesterday.

Again, GESSAR uses mirror type insulation and I think I told you yesterday we had done a study on the 10% blockage of the strainers. We intend to resubmit that to the NRC as a demonstration that we have enough capability with our assumed 50% blockage in the strainer design for the RHR's to handle this problem.

You specifically asked me a question yesterday, Dr. Ebersole, about the --

DR. EBERSOLE: Johnson seals.

MR. TOWNSEND: The filtering of the pumps. I tried to check on that this morning and I haven't got a complete answer for you but the hole size in the strainers are specified as 3/32ds of an inch to prevent plugging of cyclone separators that are on each pump to -- there's a bleed flow off the discharge of the pump through a cyclone --

DR. EBERSOLE: You still have --

29 MR. TOWNSEND: To heat the seals.

DR. EBERSOLE: You still have cyclone or hydroclones?

MR. TOWNSEND: Yes.

DR. EBERSOLE: There's always a question whether these things are separating in the right direction. I'm not so sure but what the sedimentation that you're trying to prevent will not be lighter than water rather than heavier. The logic of that was always rather tenuous and I think it would bear re-looking. Certainly if you had light debris or one that approximated a specific area 1, these things would do no good at all.

MR. TOWNSEND: Of course, you know we're talking about metallic insulation here.

DR. EBERSOLE: I understand, but there's a lot of crud that comes off like paint and other stuff and there may still be some plants that have the old silkey (ph) and so the essence of the problem was the filters and seals turn out to be the so-called final filters like the gas pumps and they tend to be the residence, the terminal residence of whatever fine crud there is to their own detriment and probable failure.

MR. TOWNSEND: Yes. Okay, one other slide on the schedules of these things. We intend to have an action plan into the NRC by the first week in September for the final resolution of this block of work and it will in general follow the work that we're doing for Grand Gulf as a second follow-on block of work just from scheduling our own manpower.

Can I answer any more questions for you this morning?

DR. PLESSET: Oh yes, Jack?

MR. KUDRICK: We were just going through very quickly the various issues that we thought would be addressed by GESSAR and one of them we didn't hear and we were wondering whether it was inadverted or not, and that was the containment air monitoring systems applied for hydrogen concentration measurements at 6.4. I was wondering if that was just inadvertently left out or --

MR. TOWNSEND: I have to admit I don't know where that one is, Jack. Yes, that's inadvertent.

MR. KUDRICK: That would be part of your response normally?

MR. TOWNSEND: I have to tell you I don't even know what we're doing on that one. I didn't think it was much of an issue but I'll have to find out.

MR. KUDRICK: I think it's very specifically --

MR. TOWNSEND: Yes, I remember the question in the list and I don't know the response on that one.

I also have here -- I didn't bring a flimsy but I have the list of the nine issues I told you yesterday that we had previously under review and I'll leave you copies of that and work is ongoing on those nine.

DR. PLESSET: Mr. Davis, you have --

MR. DAVIS: We're ready for -- we're ready to go into the interface discussion now.

DR. PLESSET: Fine, fine, why don't we do that.

MR. DAVIS: Mr. Al Smith, Project Manager of Grand Gulf.

MR. SMITH: My name is Allen Smith from the General Electric Company. I'd like to address this morning with you the NSSS architect engineering interface. In some cases this is a general presentation and in all cases it's directly applicable to the Grand Gulf Project and I'll try to indicate that for you as I go through this.

(Slide Presentation)

There is a continuous process of the dissemination and communication of interface information between G.E., it's architect engineer and our utility customers. It begings basically with our proposal and our contract point in the time of the evolution of the job through commercial operation, so it's something that continues over the entire process of the job. On Grand Gulf, for example, that process has been ongoing for some ten years.

The nature of the interface information varies from mandatory requirements, recommendations and informal information.

What does it include? It includes all things from nuclear safety, personnel safety, plant operability, warranty considerations and naturally contract considerations.

I'd like to lead you through the G.E. interface documentation trail that we have. We have two basic categories, specifications and design drawings and other software and I think for the purposes of simplification of discussion that we can highlight ourselves into the specification area because it has most of our information.

In our specifications area, we have three basic -- a series of documentation that I refer to as A62, A42, and A22 series which are internal numbering systems in the General Electric scheme of things.

The first series is entitled Plant Requirements. It is a General Electric to the architect engineering community type of document. It has our mandatory balance of plant requirements within it and I'll give you some samples of that in a moment.

Our next series, our A42 series contains reports and data sheets. Again it's General Electric to the architect engineering community. It has general information in it and in some cases specific design information.

The next category is the A22 series which contains applications engineering information. Again, it's a General Electric to architect engineering kind of document. It has in it recommendations and informal kinds of information.

We have then another category of specifications which apply to all of the systems. This is under the NSS systems. Things like the ECCS systems, the feedwater control systems and so forth and inherent in that documentation from G.E. to the architect engineer are our mandatory requirements, criteria, general information and recommendation.

And then finally, of course we have design drawings and other software which additionally put forth requirements.

I'd like to go through with you some of the Grand Gulf Project containment related documentation. This is not an exhaustive list of all of our documentation but it is containment related since that's an issue that we're discussing here today.

In the A62 series of documentation we have containment isolation diagrams which contain the information required from a containment isolation viewpoint. We have the reactor containment requirements which in fact contain information, general information such as what must the containment do, how much did it function to perform the requirements. It refers us to mass energy information which occurs in a different document. It describes what the containment must do in the case of a DBA or other break incidents such as the smaller breaks and also hydrogen control function information.

The seismic design for NSS equipment is self-explanatory. That's the design capability of the NSSS equipment and requirements which the architect engineer must meet in order to provide the integrity for our equipment.

Another specification is the drywell cooling loads. This provides various heating loads from our equipment so that the AE can of course, design it's cooling system to handle this.

The next one is the BWR equipment environmental interface information. This has to do with the requirements for G.E.'s equipment to exist in certain portions of the containment and again the AE must design his system so that he can accommodate this in certain areas of the containment.

The suppression pool make up system requirements do specify any specific requirements. For example, on upper pool dump. The structural and mechanical NSS loading criteria -- this provides information on our piping systems -- what are the loads and acceptance criteria for piping, piping suspension, reactor pressure vessel support, our CRD housings, valves, pumps, etc., and electrical items and instrumentation. And finally, our reactor systems data drawing which includes detailed information on mass energy available for release, mass energy that is in fact released during the early portion of a break and it also includes the masses of steel and other materials in containment so that the architect engineer can do subsequent calculations on the containment response as an incident might progress.

In the A62 series, we have specifically with respect to Grand Gulf in the containment area, several containment loads reports -- so-called CLRs. These were generated over a various period of time and the document which specifies suppression pool radiological source terms.

And in the A22 series relating to the containment, again containment dose reduction study information and also containment information system document which has recommendations and various design bases in it.

And finally, and certainly very important to the Mark III containment is the GESSAR Appendix 3B on the Grand Gulf project. This in fact was referenced in the

FSAR as the containment loads basis.

DR. CATTON: Were your recommendations always followed?

MR. SMITH: No, they are not always followed. I would say in the most part they are followed but that's to the discretion of the architect engineer and the ultility as to whether a recommendation is followed. It is given in the context of advice, you know, not mandatory requirement.

DR. CATTON: What's the difference?

DR. ETHERINGTON: Do you monitor the extent to which the recommendations are followed?

MR. SMITH: Perhaps as I get into this discussion, I can answer your question better. I'll answer you in more detail but if you could look at the presentation.

DR. ETHERINGTON: No, tell me later.

MR. SMITH: Thank you.

DR. EBERSOLE: Let me ask you -- in all of these, do you have any requirements that you set forth to your, the AE and builders, that specify the quality level or reliability of the functions that you refer to up here in a safety context. I mean, you can say the same thing about a non-safety requirement, safety requirement, except you mean more when you're talking about a limiting set of requirements. A case in point, do you tell the AE that in any hypothetical accident which you have in the plant, redundancy of the mitigation function shall be preserved? Do you tell them that? You'd better be careful because I'm going to find out that you don't do that in the field. Do you tell them, if I have a hypothetical pipe failure or line failure or electrical failure or whatever, I must always retain redundancy to mitigate that accident if the accident is serious?

MR. SMITH: That would be a design basis of core cooling functions --

DR. EBERSOLE: Do you give that to the --

MR. SMITH: And we would -- excuse me. We would tell him what is required of a given system, the RHR system for example, what is required for that system must meet certain requirements. Must meet whatever.

DR. EBERSOLE: As a case in point, if I have an accident, do you require of me and this is a very simple thing redundancy in a mitigation complex which will mitigate that accident?

MR. SMITH: Our requirements on him are not that he come up with something that would provide that. It is the design of our system --

DR. EBERSOLE: You do that, then?

MR. SMITH: Yes, provides that, and he must in fact implement that design in the field as it is intended by our design engineers.

DR. EBERSOLE: In other words, you're prescriptive in this case?

MR. SMITH: Yes.

DR. EBERSOLE: Is that by the way one of your requirements?

MR. SMITH: Yes.

DR. EBERSOLE: Then we'll get into some details later. Okay, thank you.

MR. SMITH: The design interface process is comprised of several facets which I'd like to go through briefly with you. First of all and obviously we generate and distribute documentation during the entire course of the program. It's not something that happens early on and then we go into a vacuum. Obviously it continues through the total life of the plant. We have an activity which possibly is misnomered but nevertheless we call it a design freeze. That freeze should be in quotes. What that really is is to establish a baseline design early in the project evolution for the NSSS and the BOP systems to assure regulatory design and contractual requirements. It is not an absolute freeze. It is just to get yourself in a good benchmark situation early in the project where you can go on after you've had the opportunity to have discussions, rather exhaustive I might add, over a substantial period of time to reach understanding and agreement between the utility, General Electric and the architect engineer.

For example, in the Grand Gulf plant, this activity was conducted from late 1974 through early 1977 so you can see it occurs over a lengthy period of time to get the best design base that we can.

During the course of the plant, naturally we have continuous communication daily, telephone calls, that kind of thing, letters that come in again daily between the three principals, that is the utilities, architect engineer and General Electric. In General Electric's case and I'm sure in the other cases we have a formalized process where we track the letters. Some letters of course are only informational and others require action and those are tracked on a computerized basis to make sure that we close out the items.

Meetings are exhaustive. There are various types of meetings. We have of course, the important lower level working design level review which occur weekly and monthly and there are numerous -- in terms of quantity of these meetings that have occurred over the life of this plant in ten years.

We have from time to time, this is a general statement, not only unique to Grand Gulf but in general, General Electric does have technical information and technology update meetings with the community at large where we share, inter-share ideas back and forth.

On the Grand Gulf job and I'm sure this analogy relates to other projects, we have frequent senior level management meetings wherein problems are reviewed so that problems are not only aired at a working level, they are aired up to the highest level of management and on Grand Gulf we've had these meetings ongoing for several years so that management, top management does get the opportunity to hear some of the detailed problem issues.

One might ask, how about changes to all of your base-lined information? How do you get that into the system and who knows about what in terms of changes? Obviously we do have a very sophisticated change system. We have several levels of change documentation starting from the highest order -- an engineering change authorization which can apply to several documents and/or several systems. That's our highest order of change paper. We have an engineering change notice which is of the same order of importance but it applies specifically to a given document and then we mitigate away from the engineering community at the home office into items that are already delivered and installed in the field and we have things called field disposition instruction which is an engineering change that relates to something that's already in the field. It's generated normally by our home engineering office and then we have the other end of that communication bridge which is the working folks, the engineers and construction folks at the site. If they determine a change is required, they have a vehicle to feed that back into the system and that's our field deviation disposition request which is really an instruction from the field back to our home office to make a change. Of course, it must be approved by our home office engineering organization and if it isn't, then they work out together with the field, what the differences are.

All of these examples of our change process are communicated by a formal communication distribution system to the architect engineer and obviously to the utility for their review, comment and/or approval as is appropriate. And it's a constant feedback here in the loop of the changes.

All of these changes are in fact processed in accordance with 10CFR50, Appendix B as is required by G.E.'s QA program.

And finally, under design interface process, we do have a general and operational information kind of documentation. This is a much lower level kind of documentation. We have two of these document categories. One is called application information document. That's normally based on experience that comes from operating reactors in the field, but it's more of an engineering nature. It doesn't necessarily have to come from there, but it's more of an engineering nature and again it's the recommendation to the utility and the architect engineer to consider making some change. It does not affect nuclear safety. It's more in the area of operational -- of operational betterment, sometimes personnel safety, those kinds of things. If it's a nuclear safety item, of course, it has to go into the other category of the more precise documentation that I just mentioned before this.

And finally, we have the services information letter which again has informational kinds of things. Normally it is from an operating plant. Something has been observed. Again, it is not nuclear safety related. It has to do with operation or personnel safety and it's a recommendation for people to implement or not as they see fit.

DR. ZUDANS: On this bullet "D", what kind of a distribution you have of these documents? Is it only within the organization or selectively to AE's and utilities as required?

MR. SMITH: All of the items under item "D" and "E" for that matter, but under "D" and specifically because that is the quality control area, if you will, for design changes, by General Electric procedure and rule, all of those documents are sent both to the architect engineer and to the utility by requirement in our procedures.

DR. ZUDANS: Okay.

MR. SMITH: And as a matter of fact, at a certain point in the evolution of the design of the plant and we are there now in unit one, then all of the engineering changes require the approval of the utility. Of course the plant is now entering the operational mode.

DR. ZUDANS: That really implies AE as well or not?

MR. SMITH: That's the utility's function if he desires --

DR. EBERSOLE: Yes, that's correct. May I ask, where if anywhere do product improvement programs take place, such as improvement of the scram discharge volume concept? And other fundamental things to make the plant better than it fundamentally is? You can't argue that it's perfect or ever will be but it can be made better.

MR. SMITH: We think we have a very good product but you're right. There are from time to time changes that people do become aware of and they need to get into the system. How does that happen? There are several vehicles. Probably the most often used vehicle is a proposal by our engineering organization to my staff that some product improvement be made to this job and I communicate those kinds of proposed changes to the utility and to the architect engineer for their review and comment. Given that they choose to implement such a product improvement, then we provide to them one of these items in item "D", either an ECA or ECN which documents that product improvement change and so then it goes through the entire formal change process.

DR. EBERSOLE: Do the utilities ever act as a contributor to this process?

MR. SMITH: Yes, they do from time to time feed back to us changes that they would like to see. As a matter of fact, we have a system set up on Grand Gulf which is not unique, but nevertheless I'm familiar with the Grand Gulf system, wherein the utility and architect engineer suggest changes from their viewpoint on these field, FDDR documents and they submit them to us for our technical concurrence and approval and given that we have that mutual understanding, then it's implemented in the plant.

DR. EBERSOLE: In connection with an AE, you picked an AE which to my knowledge had never built and will probably never again build a nuclear plant. Is this correct?

MR. SMITH: No sir, not that I'm aware of. Number one, we did not pick the AE. The utility picked the AE for Grand Gulf. But it's my understanding --

DR. EBERSOLE: I mean Braun.

MR. SMITH: Oh, you're talking about STRIDE now. I'm sorry. I'm talking about Grand Gulf.

DR. EBERSOLE: No, I'm talking about STRIDE, right.

MR. SMITH: I really can't address STRIDE. Perhaps Mr. Davis --

DR. EBERSOLE: Well, I thought it would fold in -- I thought you were really talking about your whole process, not necessarily.

MR. SMITH: I am, with respect to the control process but you asked me a question specifically about that AE which I can't answer.

DR. EBERSOLE: I see; I was going to say, did in the case of STRIDE, is this pattern valid here?

MR. SMITH: Yes.

DR. EBERSOLE: Did you not act as a more or less supervisory influence over Braun, in view of the fact they never built a reactor plant before, to my knowledge.

MR. SMITH: I can't speak, Dr. Ebersole to the control process over C.F. Braun. I'm sorry, I wasn't involved in that.

DR. EBERSOLE: I see.

MR. SMITH: But, this program that I've outlined does apply to every General Electric plant.

DR. EBERSOLE: That's what I thought.

MR. SMITH: I just can't speak specifically to that architect engineer.

DR. CATTON: What specifically do you do to ensure that your mandatory requirements are satisfied?

MR. SMITH: Good question, Dr. Catton and I'd like to get into that in the next discussion.

DR. CATTON: While you're doing that, maybe you can tell me what you're doing differently now than you did before the scram discharge drain system problem?

MR. SMITH: I'm not sure we're doing anything differently other than being more aware of a problem like that and incorporating that kind of thing into our review process.

DR. CATTON: You can see why I asked the question. That ought to be one of your mandatory requirements and somehow a lot of things are missed.

MR. SMITH: I understand. Let me develop what we do with respect to these things and see if that doesn't get to your question.

There have been several interface programs that have occurred over the course of the Grand Gulf plant and again I'm sure that these kinds of interface programs apply to all of the BWR6 products. There have been special events which have caused a massive amount of interchange of information between General Electric and it's customers and the architect engineers. Specific examples would be the BWR owners groups and I think Mr. Richardson will give you some additional information on that. TMI issues groups, the work that has been ongoing between G.E. and all of the BWR 6 utilities with respect to the evaluation of our NSSS equipment under all of the dynamic loads that were addressed and discussed inthe GESSAR 3B and all of the CLR reports. The area of Atlas has had various groups interchanging information and also equipment environmental qualification groups and seismic qualification requirement groups. I'm merely pointing these out as being specific technical areas where there is a rather massive exchange of information that takes place between the principals and building a nuclear plant.

The next area, addresses I think, Dr. Catton, your question -- at least it attempts to, and that is the Grand Gulf project initiated a balance of plant interface review activity between General Electric and the architect engineer some time ago. The reason behind this program is to gain an understanding and ensure an interpretation on the part of the architect engineer of G.E.'s requirements. Do they really understand what's in our spec? And so, you know we have a dialog talking back and forth for several days about various G.E. requirements in the given specifications. It's not only in the mandatory specs but of course, those are the ones that we highlight on.

These have been conducted once per year. The most recent of my recollection are, in April of 1980 and in July of 1981. Our engineering management selects these systems which in their opinion must be reviewed during such a review. Our lead systems engineers then, as a result of their management having selected some specific systems for review, the lead system engineers and General Electric will provide detailed questions which should address those systems that engineering management has selected. Then there is a team, a review team from General Electric which will go to the architect engineering firm along with someone from my organization and that team selects at random which of the items will be looked at at any given time. The discussions of course take place and resolution is essentially nearly always achieved, however, as all human relations will show, there are always some open items and those open items are in fact then tracked by General Electric for final resolution. General

Electric's management requires that they be tracked and ultimately resolved and that they be kept aware of such a thing.

Does that address the concern that you had?

DR. CATTON: In a sort of broad way.

MR. SMITH: Can I help you with any other aspect of it?

DR. CATTON: I guess the second question is, something didn't seem to work right in this process when it came to the scram discharge drain system. Normally when something like that occurs, a change is made in how you do business and I was just curious and would like to know if any changes were made and if there were, what were they?

MR. SMITH: I think in that particular case, I'm not infinitely familiar with all the technical details of that case, but I think in that particular case it was a matter of engineering and the operations people, both from the utility and G.E.'s operations people not being fully aware that that could occur, and given that it did occur, having taken remedial design action to cure the problem. The process of interface control was felt to be adequate. It's one of those situations where engineering and operating people weren't communicating as well as they should have been, and that's my opinion.

DR. PLESSET: I think Dr. Sherwood would like to make a comment.

DR. SHERWOOD: I can help on that one.

On these service information letters that we were discussing here, we put out roughly 50 a year, put out something like 300 to 500 and these are divided into four categories, the first category being something equivalent to an emergency -- the exact name escapes me, and with regard to the scram discharge volume, we met with our utilities immediately after the Brown's Ferry incident, worked out plans and procedures and fixes and they were immediately sent to all of our customers on a service information letter. These included the fixes to the vent, to the drain lines, also the UT for the track, for tracking the water level in the scram discharge volumes. So I think that's probably a fairly good example where the utilities and G.E. worked together quickly to come up with a solution and get it out on an action plan.

DR. CATTON: I was more interested in what you've done to avoid the problem, rather than what you did with the particular problem because I'm fairly familiar with that. In this particular case there were things done that your household plumber wouldn't do and it seems to me that somehow that aspect of the design review didn't exist or just wasn't done or something. When

I see this list A through F, it doesn't tell me what you're going to do to avoid problems like that in the future.

DR. SHERWOOD: With regard to past experience we did give specification on the drain lines in those days. Perhaps it was not precise enough. Now with the BWR6, we give full details on the specification for the drain lines and their elevations and so forth. So it's true that years ago, that our interface specifications were not as precise and clear as they are today. Yet, we had them in those days and there were specs on the drain lines for those scram discharge volumes. They weren't clear enough.

DR. CATTON: Maybe I could try another way. You specified something for that discharge drain system. You had certain requirements. Does somebody actually go and take a look at the design and say yes, this particular design will meet those requirements and sign it off?

DR. SHERWOOD: No, in that case --

DR. CATTON: I'm talking about now, not that case. What are your other mandatory requirements?

DR. SHERWOOD: In that case, I think that Al Smith can address that.

MR. SMITH: I think I should address that. There's always the question of how do you know? How do you know about mandatory requirements. That, of course, addresses what you're asking. We depend upon the process, the quality control process in Bechtel's organization, for example, which has to be under 10CFR50, as well as our own QA process as well as Mississippi Power and Light's QA process.

DR. CATTON: QA does not address the question.

MR. SMITH: Excuse me. Let me develop this argument.

The process of quality control is not only some inspector looking at something, it is also a design review process and as I understand it, Bechtel certainly can address this from their viewpoint of Grand Gulf. As I understand that process, it requires also an engineering review and audit of requirements to determine whether in fact those requirements have been met in the exact design, you know, in the detailed design and we depend on that process.

DR. CATTON: Was that process in place before the scram discharge problem?

MR. SMITH: As far as I know that process was implemented.

DR. CATTON: So the scram discharge was just --

MR. SMITH: One can assume in that instance it slipped through.

DR. CATTON: Slipped through. It's not that the mechanism doesn't exist?

MR. SMITH: Right.

DR. CATTON: I think you've answered my question.

MR. SMITH: There's another category of interface information which I won't dwell on long but it does exist and it's worthwhile mentioning. That is, in the installation, pre-operational and start-up testing area, G.E. does generate and implement installation and construction and storage requirements and we interface with the AE and the utility on those, also of course, implementing of our test specifications and as a matter of fact, there's a definite feedback there in that we generate information to the utility and the AE for start up. They put it in their own form and then General Electric review and approves those procedures for the start up and pre-operational test process.

The final item that I'd like to discuss with you is a pre-fuel load site review that we conduct, have conducted on the Grand Gulf project. This is a review that was mandated by General Electric's management for the Grand Gulf project. The purpose of the review was to assure that the NSSS systems will be started up safely and that of course they'll be capable of safe and reliable operation in the future. Our quality assurance organization established the general and specific areas that we should be concerned with and looking at. There was an experienced review team that was put together to make this review prior to fuel loading. It was comprised of management and working level people who are specialists in their areas, nuclear chemists, piping stress people, all of the various disciplines and along with the quality assurance engineering specialists.

This review was conducted at Grand Gulf over the period of a week. The findings were then put together by this team. I accompanied that team, although was not part of it, merely to observe and help them find places in the plant. The utility was very gracious and cooperative in this review and allowed us free course in the plant.

The findings by the team were communicated then to the utility at the conclusion of the review. They were also communicated to senior General Electric management for their understanding and review and all of these items then need to be addressed by the responsible parties. When I say that, there are some that are internal to General Electric and some that are external and need to be addressed by either the architect engineer or the utility, and those in fact have been done. There are a few that still remain open and those have been given dates for resolution and closure.

That concludes the formal material that I have. I'd be happy to answer any questions.

DR. ZUDANS: Could I ask you one question?

MR. SMITH: Yes, sir.

DR. ZUDANS: In this design QA process, on your part you have listed a number of different documents where you define what's required of the balance of plant. Now assuming that AE designs the particular portion of balanced plant and I assume that he will channel his drawings and design information back to G.E., what would G.E. do to assure the QA that that particular requirement --- would you check their drawings, check their engineering calculations? To what extent do you go in that process?

MR. SMITH: There's a multiplicity of reviews that take place. Again, starting with the every day kind of correspondence that happens -- for example, Bechtel sends us their drawings with a commentary on their drawings for us to look into, of a various nature. Either it's some comment that requires us to feedback information to them or it's some lower level informational thing just for G.E. "good-guy" kind of information. G.E. in fact also as I stated before, conducts these reviews with the AE to go through the mandatory documents to determine whether they understand the criteria, etc., and have implemented it. On an audit basis, from time to time internally in our own house, we look over implementation of requirements. Our engineering people are given the various drawings to review and if they have any comments on the drawings, they feed those back to me and I feed those back to the utility. We do not redo their engineering calculations for example.

DR. ZUDANS: Do you get the copies of their engineering calculations for review?

MR. SMITH: In some cases yes, but not in general. In some cases we do. In particular in the new loads area, for example, we have received many of their calculations, mainly because of the inter-effect that it has on the NSSS new loads adequacy work that we were doing.

DR. ZUDANS: For example, in service water supply, you need a certain number of gallons per minute to be delivered and that is coming from some remote structure of the intake structure and they are hydraulic calculations that show that the system as designed will in fact deliver that. You don't do any of that. Is it provided on an acceptance test or something like that?

MR. SMITH: They supply us with information like that on data sheets -- the system that you mentioned, for example.

DR. ZUDANS: Right.

DR. PLESSET: Let me ask you a question of another kind. Certainly we realize the interface area is a very important one. I'm curious how it works with foreign plants. For example, there are a large number of boiling water reactors operating and being built in Japan. How does this interface problem work in that case? I think this is kind of an important question because there have been criticisms that plants take too long to build in the United States. They are built more rapidly in Japan. I think there are other reasons that enter into that and I'm looking in different directions now, but what is the interface relationship there between you and well, Hitachi for example and Tokyo Electric? How does that work? It's a long way off. Do you interface more or less or is it different?

MR. SMITH: The general rules of interface would apply as I've discussed them. The practical application of them does differ for several reasons. One, of course just the remoteness of the location. General Electric has local engineering offices, for example, in Tokyo so that there's an engineering arm stationed there, just to speed up the communication process. In many of our overseas plants relationships, also General Electric has had the responsibility of being the architect engineer on the job, if you will.

DR. PLESSET: Was that the case in Taiwan?

MR. SMITH: No, it was not the case in Taiwan but in Japan it has been the case in the past. That's a complicated relationship now, because also, of course, we have a licensee in Japan who is as of late, at least on the later plants has taken over much of that responsibility so we therefore, interface for example on many of the Japanese plants with Hitachi --

DR. PLESSET: I'm aware that there was at least one boiling water plant built by G.E. in Japan.

MR. SMITH: Yes, there have been many.

DR. PLESSET: I have to see this one. It looked very nice. That was Tokai-2.

MR. SMITH: Tokai.

DR. PLESSET: Yes. You say there are others that you have been the architect engineer?

MR. SMITH: Yes, Fukushima. There are several plants there. I believe there was a Tokai 1 and 2. There were others.

DR. PLESSET: Okay, I haven't been to Fukushima but now you're not doing that?

MR. SMITH: The Japanese have a unique idea of commerce, wherein they send their cars here and we can't sell reactors there unless they're brand new technology -- that's my own opinion. In any case, we have not been actively building plants in Japan since the completion of Tokai 2. We looked to the future for new technology to do that.

DR. PLESSET: You have no other comments about how the interfaces worked where you have say, Hitachi as an architect engineer?

MR. SMITH: Yes, I can expand on the Hitachi situation because I'm personally familiar with that.

DR. PLESSET: Mostly is it more efficient or less efficient or about the same?

MR. SMITH: Efficiency is I guess in the eyes of the beholder. If one looks at time --

DR. PLESSET: One straightforward example is the time it takes -- that's a pretty good measure of how things are going.

MR. SMITH: Right, I agree, being project manager. We would have to conclude that it's more efficient from the viewpoint of time. Why is that? Again, it's for various reasons, not the least of which I think their entire ethic there -- and of course, the regulatory process does seem to facilitate decision making more rapidly than perhaps here. The interface itself, though, on a technical level is basically the same. Hitachi for example, sends engineers here to our country constantly. We have people that live in our house, so to speak, in

San Jose where we constantly exchange interface information and develop ideas. So there's just a constant on top of it kind of process going on. That's not to say that it doesn't happen here, but it's expedited I think, mainly because of the Japanese ethic that they put on.

DR. PLESSET: Mr. Davis, do you want to make a comment or Glen, do you want to make a comment?

DR. SHERWOOD: My name is Sherwood. We don't have anybody here from the -- our Taiwan office but the architect engineer on the current Taiwan project was Bechtel up in San Francisco, so we had very close working relationships with Bechtel as we would for domestic plants.

The recent Kuo-Sheng is the first BWR6 as you well know, was constructed in 61 months which was I think truly, at least by the State's standard a record. But it was essentially a Bechtel design and the architect engineer work was integrated with G.E. in the same sense as it would be for a U.S. plant.

DR. PLESSET: So it wasn't really different from what you're doing here?

DR. SHERWOOD: No, no, it was not different.

DR. BUSH: Could I ask a different question? One thing I don't see on this listing is whether G.E. provides an audit function of the field and design QA, your QA, to establish that it remains in compliance because there are obvious examples where things have begun to slip.

MR. SMITH: Yes, Dr. Bush, there is in fact such a function and it takes place on a yearly audit basis. The head of our entire quality organization sends a team to various sites. It's my understanding it's on a yearly basis to look into the records. Are they in fact following the General Electric Quality Assurance procedures.

DR. BUSH: Now, is this a departmental or divisional or is it a corporate type of an audit?

MR. SMITH: We are at a somewhat higher than a division in our entire corporation and it's at that level. It reports to an executive vice president function.

DR. BUSH: So it isn't necessarily a corporate audit to establish compliance as such? Sometimes they're done, too, and I just was curious to know whether you might have expanded it so that it meets the corporate criteria.

MR. SMITH: It meets the corporate criteria in that the corporation of course, audits our San Jose group but the corporation to the best of my knowledge does not audit directly to the site.

DR. BUSH: Thank you.

DR. PLESSET: Maybe we should move on.

DR. SCHROCK: I just wondered if this review, experienced review team that you have on this last slide was a new innovation for the Grand Gulf project or is this something that has been the general mode of operation in the past?

MR. SMITH: General Electric has conducted similar reviews on other plants, not necessarily by the same team, of course, but yes, we have conducted similar audits.

DR. SCHROCK: This seems to me to be an excellent idea and I would think that you would accumulate experience from this as to how your project management is improving project by project if this were a well documented program.

DR. PLESSET: Can we go on then? Thank you, Mr. Smith. I think you have Mr. McGaughy -- is that the way you pronounce it? Bechtel is next?

MR. McGAUGHY: Right, Bechtel, yes. I'd like to introduce Bob Trickovic of Bechtel Power Corporation who is the Project Engineer for Grand Gulf.

MR. TRICKOVIC: Mr. Chairman, my name is Robert Trickovic. I'm an employee of Bechtel Power Corporation. I will attempt to be brief in my remarks and the objective is to provide you with our perspective of the NSSS supplier, AE interface and the related interface controls.

(Slide Presentation)

We view interface with any outside organization as a key element in our overall process of design and we control it rigorously under the umbrella of a quality assurance program and the implementing procedures.

Recently we had an occasion to address NRC Staff on the same issue when the questions arose about the adequacy of AE quality assurance programs, specifically the design controls and interface controls with other organizations. I believe that issue was known as Diablo Canyon.

A written report was submitted to NRC by our client, Mississippi Power and Light in March of this year, and for those interested, I'd like to give you a letter reference. It's AECM82/119. The date of that letter is March 26, 1982.

Recognizing the importance of design interfaces and design interface controls, we've had many many quality assurance and technical audits that again recently culminated in an independent design review conducted by Cygna Corporation. I believe it was a fall off of Diablo Canyon concerns and Mississippi Power and Light in their leadership role voluntarily agreed to subject our whole design process to an independent design review.

In the kick-off meeting with NRC, the objective of Cygna's independent review was established as follows:

Review all QA activities taking place during the new loads adequacy evaluation.

Review the technical adequacy of one system. It happened to be RHR Loop A. It might be of specific interest to you in the perspective of the interest placed into G.E./AE interest, that in the same kick-off meeting Cygna Corporation was directed by Mr. Denton to specifically pay attention to interfaces, not only with General Electric but with other participating organizations.

I'd like to provide you with several points that made me decide to bring this to your attention up front. New loads adequacy evaluation is one of the major design activities involving more than one organization, having taken place during the Grand Gulf negotiation design process which, by the way, covered a period of several years.

We have gone through the extensive re-evaluation. We have gone through extensive iterative process of exchanging information between General Electric and Bechtel. We have gone through extensive program of equipment requalification involving outside organizations such as valve suppliers. We have made significant numbers of plant changes, primarily in the area of hanger design.

Secondly, containment loads reports, or more precisely GESSAR II, Appendix 3B, was a basis for our activity. And I'm happy to report to you that as of today, I'm not aware of any findings that would indicate non-compliance with good interface control practices. I believe that Cygna Corporation is about to submit a final report to NRC here today or next Friday. They have, however, submitted an interim report to the NRC Staff.

Another significant point that deserves your attention I believe, in the perspective of this issue, is that in March of 1980, another independent design review took place. It involved NRC Staff and their consultans, EG&G Idaho, Inc. and reviewed all of our category one structures. The techniques that they used went beyond simply a quality assurance or an audit function. The techniques involved independent studies, independent calculations and the end result was full compliance with all applicable codes, standards, REG guides and General Electric Company interim containment loads reports. Details of this study or of this event could be found in the letter that I have reference previously.

DR. SCHROCK: Could I ask a question that's a little more general in nature.

MR. TRICKOVIC: Yes, sir.

DR. SCHROCK: Bechtel is a very large organization and there are different projects assigned to different parts of the organization. I had some experience a few years ago that indicated to me that the level of engineering quality in different organizations within Bechtel seem to be quite non-uniform. You have now established similar interface programs within the company that assure that your standards are the same for all projects managed by groups that are located in different offices?

MR. TRICKOVIC: Sir, I'm a little surprised that you have found significant differences in quality. However, I cannot comment on it having spent thirteen years in Gaithersburg.

DR. SCHROCK: Let me say that it was the experience that -- I won't go into detail on -- is now eight years old, but it was real.

MR. TRICKOVIC: We conduct our activities under the umbrella of the Bechtel Corporate Quality Assurance Program which has been submitted to NRC, has been reviewed and has been accepted. Obviously, there are -- Quality Assurance program provides an umbrella and various divisions developed their implementing procedures. I have a great deal of faith in the expertise within Bechtel Power Corporation.

DR. SCHROCK: Faith is one thing, but what I'm asking is, do you have a deliberate program to ensure that you use the right interface among different project groups that are handling similar product lines?

MR. TRICKOVIC: One of the items that I will show later will indicate the interest that our San Francisco Thermal Power organization has shown and to the process of interfacing with General Electric and they have audited us as such. It is my understanding -- I cannot confirm that they have done a similar function of other projects to assure uniformity in dealing with NSSS suppliers. In this specific case, General Electric.

I'm not sure if I answered your question, sir. I do have to state that my entire experience with Bechtel Power Corporations is limited to Gaithersburg Power Division in several capacities. I do know that we exchange information between various offices on a regular basis, that we have a system of problem alerts, sharing information of safety concerns between various projects and several other elements that one would deem reasonable within the overall perspective of the overall quality assurance program.

DR. BUSH: Now that you've been interrupted, let me ask a question on one of your earlier slides. To get a better feel for what comprises the audit, let me take the one on the reviewing of piping and pipe supports on the RHR Loop. I can visualize three classes of audits. One of them is for compliance which is simply an audit, essentially of the calculations and may or may not be worthwhile. Another one is to the adequacy of the design which in essence assumes an independent analysis and probably uses the NRC criteria. Now, I don't necessarily agree with NRC criteria on piping as I think the Staff knows from past experience.

The third would be an optimized design again requiring an independent analysis which cross-checks the original analysis with regard to response characteristics of the piping.

What type did Cygna conduct on this one? Was it simply a straightforward audit of the calculations or did they go beyond that?

MR. TRICKOVIC: I believe that they have gone beyond that, sir. They have started with the design input, seismic response spectra. They have started with the SRV discharge, chugging condensation loads. All the loads that typically play a part in the analysis of our structures, pipe supports, hangers, snubbers, etc., and with the appropriate load combinations they have reviewed the input process. They have reviewed our stress analyses, they have reviewed our hanger calculations, they have reviewed the appropriateness of the application of code (ph) sections. They have conducted a walk down, plant walk down to confirm the as-built configuration, has been properly reflected in our drawings, so from my viewpoint, they have covered all aspects of the design process.

DR. BUSH: That's basically the parallel path approach.

MR. TRICKOVIC: Yes, sir.

DR. EBERSOLE: May I ask a question? What you've said pertains to the seismic category one and safety equipment. If you are so comprehensive as this, do you have a QA program that confirms that the -- I guess I'll call it the influence factors or influence fields on seismic equipment from non-seismic?

MR. TRICKOVIC: Yes, sir.

DR. EBERSOLE: Qualified aspects of performance, not to mention simple random mechanical failures?

MR. TRICKOVIC: Yes, sir. We have a criteria two over one that has been extensively applied to this project resulting in stress analysis to make sure that the class one system or seismic class one systems are not impaired by non-class one systems.

DR. EBERSOLE: How do you verify that that's done other than by actual direct field evaluation of the completed installation? I don't know of any three dimensional drawings that show the full complement of equipment in given space.

MR. TRICKOVIC: We conduct walk downs. We have another system we are rather proud of. It's called an engineering review team that considers internally generated missiles, two over one considerations, field routed equipment. We conduct flooding, we conduct walk downs, we record any potential jeopardizing influences on our seismic class one structures. We return back to the office and conduct analysis.

DR. EBERSOLE: Do you conduct investigations over seismic performance of non-qualified equipment in the control and instrumentation context?

MR. TRICKOVIC: Yes, sir.

DR. EBERSOLE: As a case in point with fire fighting equipment, do you confirm that CO_2 injection common to all the diesel plants might not occur at a point when the diesel plants were badly needed? Or do you have carbon dioxide at this plant? I don't know.

MR. TRICKOVIC: It's only in the control building. We don't have it in the diesel building.

DR. EBERSOLE: You don't have it in the diesel plants.

MR. TRICKOVIC: Right, but I will tell you one thing, that the -- some of our fire protection systems, sprinkler systems are a typical example of, which I believe you are interested in -- they are non-Q in their nature. However, having to thread those pipes over and above seismic category one systems, trays, conduits, instrument lines and pipes, we've ended up designing support systems for fire protection systems as seismic category one, just to assure that we do not have the negative or jeopardizing influence.

DR. EBERSOLE: And you validate that if there is spurious performance of fire protecton apparatus under seismic influence, that will not inhibit the proper performance of emergency equipment?

MR. TRICKOVIC: I do believe so, yes.

DR. EBERSOLE: Thank you.

DR. CATTON: What does two over one mean?

MR. TRICKOVIC: Class one seismic structures are typically all safety related structures. Anything that is balance of plants was designated as Class Two, you know, in a seismic sense. So somebody decided sometime in the past to call it a two over one issue. If you have a balance of plant pipe or a tray or a conduit directly above a safety related pipe, instrument line, conduit or tray, you call that a two over one situation and the criteria is that you have to assure that under a seismic expectation that two, that balance of plant piece or equipment does not fall and impair the performance of the Class One system.

DR. CATTON: Thank you.

MR. RAY: This may be an unduly detailed question, but I would like it to serve as a test of the adequacy of your design review. It reflects experience with a plant you people were the AE's on back in the early 70's and it involves the installation of the wiring, the construction installation of the wiring of various control systems.

At that time, I found that the compatability of your wiring diagrams with the schematic diagrams which control the whole systems operation, of course, the audit on that was done by team members who designed the plant, who set up the schematics and the result was that quite a few gliches in your wiring diagrams reached the field. And that's an expensive point in a project at which to correct them.

I wonder what your policy is today. Do you have audit of the wiring diagrams comparing with the schematics done by members conversant with the designs, but not for that particular project? I assume from your communication of your responsibilities, you'd be in a position to assure me on this point.

MR. TRICKOVIC: I was intending during the remaining part of my presentation to review the project, the review process conducted on project and off project. At a cost of being redundant, I'd like to state that Bechtel

Power Corporation is organized in a matrix form. We have project personnel who are strictly dedicated to a client. I'm a project engineer on a project dedicated to Mississippi Power and Light. We respond to them, scheduling matters, day to day activities, etc.

On the side we have a group of people, chief engineers and their staffs. Each major discipline has a chief engineer who is a focal point for a technical adequacy of our efforts. They have staffs who conduct review function. The important point here is that those people are not responsible for job schedules. MP&L does not have a direct line to them and cannot complain about something having slipped. They do conduct those types of reviews on a sample basis. They do review all of the safety systems and those drawings are listed on what we call DCCL list, Design Control Check List which is a controlled document. It is approved by the chief engineer, approved by the engineering manager and those drawings, specifically schematics or elementaries and connection diagrams undergo the review process.

To expect a hundred percent review of schematics as opposed to the connection diagrams would, I think would lead us to a commercial death. Simply, sir, the number of terminations that we have on this plant, I believe is measured by hundreds of thousands, if not a million. We do conduct reviews on project by different people; people who design a schematic do not design a termination or a connection diagram also. Plus, the review process requires a checker of equal or higher competency, a group leader and a group supervisor.

In addition to this off project review process that takes place -- and I don't believe, and I'd like Mississippi Power and Light to comment on it, we are very close to the commercial--full power license and I certainly hope close to the commercial operation. I don't believe that in this specific case we've had an inordinate number of discrepancies. There are some, I have to say that.

MR. RAY: But the important point here to me is that your review by this independent discipline staff as it were --

MR. TRICKOVIC: Yes.

MR. RAY: Independent of the project, is made even on a sampling basis.

MR. TRICKOVIC: Yes, sir.

MR. RAY: The whole QA process is on a sampling basis so that from this viewpoint there is an entirely independent discipline that is independent of the project that does check in this review sense.

MR. TRICKOVIC: Absolutely, yes.

MR. RAY: For how long has this been in place?

MR. TRICKOVIC: Gaithersburg Power Division -- I won't give you a number that I would like to have confirmed.

MR. RAY: Approximately?

MR. TRICKOVIC: It's certainly more than five years.

MR. RAY: Thank you.

DR. EBERSOLE: May I take a rather pointed example like Jerry did. I'm going to pick, not arbitrarily, a point in the design where I have curiosity. The main feedwater system has reverse flow swing checks. Do you have a criterion from Westinghouse that says that these shall function in the event of an abrupt pipe break upstream thereof in a proper manner to permit no more than XTPM (ph) leakage?

MR. TRICKOVIC: From Westinghouse, you said sir?

DR. EBERSOLE: No, from G.E.

MR. TRICKOVIC: From G.E., I'm sorry.

DR. EBERSOLE: You I believe, must be responsible for those check valves as the AE.

MR. TRICKOVIC: Yes, let me ask Paul.

We do not have a criteria from G.E.

DR. EBERSOLE: Then it's your criteria. Then do you have a criteria that, for an abrupt pipe break upstream of said valves, your valves shall function properly and on schedule against the dynamic heads that will be developed in the course of that accident and do you validate by design or test or both that your valves will do what they have to do?

MR. TRICKOVIC: I believe that specific issue was raised by our nuclear staff which is an off project organization recently, via a problem alert route and we are presently --

DR. EBERSOLE: It's only 12 years old, that problem.

MR. TRICKOVIC: Well, I'm sorry that I guess I cannot specifically answer that question. Paul Kochis is the mechanical group supervisor.

MR. KOCHIS: One thing, Dr. Ebersole, we use two different types of valves to preclude common mode failure on the check valve.

DR. EBERSOLE: Well, that's fine if one of them will work but how do you know that they're both free of common mode failure?

MR. KOCHIS: Right now they're doing a dynamic analysis to prove that the valves will withstand the pressure associated with that type of hydraulic event.

DR. EBERSOLE: All right, does this imply that we have a bunch of valves not only at Mississippi Power and

Light but at other plants whose performance is questionable in this aspect?

MR. KOCHIS: I think it's kind of similar to the Humphrey Issues. It's -- we believe the valves will work. Our judgement says the valves will work and we're developing the calculations to demonstrate that they will in fact do the job.

DR. EBERSOLE: What's the Staff doing about this, if anything?

MR. KUDRICK: I hate to beg off on that particular topic because it's beyond the scope of people that we have present at the meeting but we will identify that and get back to you.

DR. EBERSOLE: There'll be another chance, right. Thank you.

MR. TRICKOVIC: Mr. Chairman, may I proceed?

DR. PLESSET: Go ahead.

MR. TRICKOVIC: At the initiation of the project, the General Electric/Bechtel design interface requirements were defined in the project procedures manual which is a controlled document. We cover interface requirements for such things as design criteria, final design, design review, procurement, start up services, safety analysis reports. At the same time, we developed another control document, a project design criteria manual. The purpose of this document obviously is to be made available to all personnel on the job, to conduct their design activities in accordance with the design basis established on the project. The manual in addition to reference code standards, REG guides, etc., references the key General Electric requirements which form the design basis for a particular system.

DR. ZUDANS: This document, is it kept only in Bechtel's offices or is it sent to say, G.E. for review?

MR. TRICKOVIC: I would like to defer the answer to that. I'd like to find out a precise answer whether it is sent to G.E. I would think so. I know it is in Mississippi Power and Light's house, and Bechtel Power Corporation Gaithersburg Office's house.

The process of design interface controls, the way we view it, consists of three main elements: document control, document review and coordination, interface control verification.

On the document control step of our interface control process, our project engineering procedures manual and other control documents and other auditable documents spells out detailed procedures for handling and tracking of all documents coming into our organization. As a part of this process, we have an automated document control register that tracks a given document from the day it enters our organization until the day it leaves our organization, either to the job site, to our client, start up personnel, to construction, as appropriate or as it goes back to the organization that had submitted a report with the appropriate comments.

Just to illustrate or touch upon the -- what's happened, I have a slide here that will demonstrate the mechanics of handling -- let me say -- the information we receive from the rest of the world. There are two stamps as you can see. The upper stamp deals with the vendors other than NSSS. The other stamp is specifically designed for our feedback process to General Electric. After we receive a document from General Electric, be it specification, drawing, we affix this stamp, go through a review process on project which involves many disciplines or several disciplines and after we compile their comments, we determine that the document is totally acceptable to us, we can proceed with our work and appropriately we check the block number one. It states no comment. If there are some comments and often there are, things that we think G.E. ought to clean up but are not essential for the Grand Gulf, we being the good-guys provide that information to General Electric under the code number 2. However, that code says no reply required. Take it for -- we think you ought to do a little better than that but there is not -- we don't have a specific need to see that information back.

The most important one, gentlemen, is the field number 3, that when checked indicates interface problems as far as our work is concerned. We send this back to General Electric properly signed, dated, on a transmittal form and that document remains open in our automated document control register until we get a response from General Electric, either in a letter form telling us why we are off base in commenting on that particular document and justifying the document, leaving the document as is, or a revision of that document will kick that automated document control system. There are several incidences of -- or occasions, rather of this happening. They are all documented in our files. There are several occurrences where the problems were resolved via Q tracked correspondence.

DR. BUSH: Do you stand pat all of your drawings of those that are in a transistant status so that it's clearly established that this is something that's proposed and not acted on?

MR. TRICKOVIC: We stamp all of our drawings, sir.

DR. BUSH: Stand pat, not stamp.

MR. TRICKOVIC: Stand pat?

DR. BUSH: Yes.

MR. TRICKOVIC: I'm sorry, I don't understand.

DR. BUSH: So the status is clearly established that this is a proposed change that has not gone into effect, is not a final drawing and is subject to review and approval?

MR. TRICKOVIC: Yes, yes, sir.

DR. BUSH: The status is clearly established on every drawing?

MR. TRICKOVIC: Yes, sir.

We track our written communications with G.E. and I'm specifically talking about letters. Any discrepancy or disagreement on a document received from General Electric that represents a significant technical point of disagreement, scheduling, licensing is not relied upon entirely on this little stamp business and the transmittal of documents in a form transmittal letter. We immediately utilize written communications with General Electric and address the issues as such. Those communications get a number assigned to them. They are part of our automated document control register. They do not get closed until a resolution has been achieved. W maintain an up to date file of General Electric documents for ready access by project personnel. Since during the process of our design several revisions occur or may occur to a given document, we have a system of clearly designating those revisions that have been outdated so that there is no possibility of somebody pulling a wrong revision out and acting upon that.

Finally, we receive a monthly status report from General Electric that we use. The particular document identifies all of the design documents applicable to Grand Gulf as well as the latest revision status of those documents.

Step No. 2 in this process, the way we view it deals with a document review and coordination. A minute ago I believe I addressed the reviews conducted on and off project which are proceduralized. I'd like to take you back to the 1972 era when Mark III containments became an attractive solution and General Electric and Bechtel formed a task force that over a period of several months collectively came up with the conceptual Mark III containment design. I view it as a responsive way of two organizations working together to come with something that will meet the requirements.

Over a period of several years, General Electric and Bechtel often with Mississippi Power and Light's participation have held over 100 design review meetings. Our files have 128 recorded design review meetings. Again significant interface issues are often resolved by Q communications.

Finally, I guess to give you an element of assurance that our corporation does not like to do things in a vacuum, we have established a policy of any deviations from General Electric requirements must be obtained in writing. And, we have followed that policy.

DR. CATTON: You're not going to show us that other slide that we have in our package?

MR. TRICKOVIC: Unless you feel it's necessary --

DR. CATTON: I'd like you to just put it up and then I'll ask a question. I'm sure you're --

MR. TRICKOVIC: Yes, this slide?

DR. CATTON: Yes. I'm sure you are familiar with the scram discharge drain system problem and there are a lot of us who are very interested in trying to figure out how the hell it could happen and since it did happen, what has been done to ensure that it won't happen in the future? You have a rather detailed diagram of how you do business here. You've also indicated that you have this independent design review. Could you sort of tell me how this kind of procedure could ensure that that sort of problem wouldn't occur in the future?

MR. TRICKOVIC: This particular slide shows the mechanics of handling the design interface inputs. It goes with the basic assumption that we receive a specification drawing from either NSSS vendor, turbine generator or other vendors.

DR. CATTON: Okay, and in this case you've received some kind of a requirement for a scram discharge drain system. Could you sort of walk me through there and tell me where the things could go awry and what you've done to change it?

MR. TRICKOVIC: The scram discharge problem -- do you wish to respond to that question?

DR. CATTON: Did Bechtel build any of the plants that have that problem?

MR. TRICKOVIC: I don't believe so.

MR. SMITH: Dr. Catton, Al Smith from General Electric. To my knowledge, that occurred on the TVA projects which I do not believe were being built or architect engineered by the Bechtel Corporation.

DR. PLESSET: But they had that problem with other plants in addition to the Brown's Ferry. The same problem. Brunswick was one.

DR. CATTON: Did Bechtel build Brunswick?

MR. TRICKOVIC: No, sir.

DR. EBERSOLE: Did Bechtel build any boilers?

DR. CATTON: Yes.

MR. TRICKOVIC: Yes.

DR. EBERSOLE: Then if they built any boilers, they had the problem. I should have specified Mark I's.

MR. RICHARDSON: If I'm not mistaken, it only involved about eleven plants. The Brown's Ferry plants and then the earlier plants beyond that. It did involve every boiler. From about the Hatch design on, I don't think any plant had that problem. They had a tightly coupled instrument volume and scram discharge volume.

DR. EBERSOLE: I believe you're right.

DR. CATTON: And Bechtel had nothing to do with any of them.

MR. TRICKOVIC: I'm sorry, I couldn't tell you.

DR. CATTON: Okay.

MR. TRICKOVIC: Are you still interested in this slide?

DR. CATTON: I'm interested in how something like that might be picked up.

MR. TRICKOVIC: There are several steps that take place. When a design input gets into our office organization, it goes to our document control, gets logged into this automated document control which is a computerized system for tracking a piece of information or a document through the various stages of review until it finally leaves, leaves our office. It is logged in and then passed onto the responsible engineer. I believe I need to explain responsible engineer and in the perspective of General Electric or NSSS, a mechanical discipline is a coordinating discipline of NSSS interface. They have several engineers who have responsibility for a group of systems. Depending on the system that is in question, he obtains the drawings, conducts the initial review and sort of passes along that drawing with a coordinating stamp fixed to it down to, down his discipline so that everybody that might have interest and that's a piece of information or a total information on that document, will have a chance to review it.

At that time he initiates incorporation of interface data into Bechtel calculations, specifications or drawings as appropriate.

After the review within a discipline is completed, he passes it along to electrical or instrumentation people. A simple reason is, often on the bottom of the page there is a little information about a power supply. It's an odd -- it's not 120 volts, it's 140 volts or something like. So to make sure that the other disciplines are totally informed about the new requirements or a change that's coming in, we go through the same process. They review, comment as appropriate and if there is a piece of information that is essential to their work they will revise their drawings, a schematic or a single line or a loop in the case of -- a loop diagram in the case of our instrumentation people, etc.

Finally it goes to the responsible engineer again who affixes this stamp, adds the total number of comments and through our document control ships it back to General Electric or Alice Chalmers (ph) as a turbine generator. Or, if we have activity one or two -- if we have activity one or two, that drawing gets issued to the people that need that information -- start up, Mississippi Power and Light, Bechtel Construction in this specific case, etc.

DR. PLESSET: I think what Dr. Catton is trying to get at is that there is a system like the discharge scram system for which General Electric imposes certain requirements, was not detailed by the architect engineer but by a third organization and could that do without the detailed check that one would ordinarily expect because if it had received that kind of detailed check by the architect engineer, it wouldn't have been built that way. Is that your point?

DR. CATTON: Yes.

DR. PLESSET: To put it simply in blunt terms, how do you prevent that kind of thing?

MR. TRICKOVIC: Well the --

DR. PLESSET: You don't design it. G.E. just gives you requirements or --

DR. CATTON: G.E. gives the third party requirements.

DR. PLESSET: If the third party meets them -- but in a way it won't work.

MR. TRICKOVIC: In our case, the third party that would have designed and had designed that system is reactor controls. We have incorporated G.E. requirements in our specification.

DR. PLESSET: Yes, the specifications are one thing but meeting them in a sensible way is the final test. This was not done in that particular incidence.

DR. CATTON: And I've been looking for which step in your procedures you would find that out.

MR. KOCHIS: This is Paul Kochis of Bechtel. In the case of reactor controls with the G.E. requirements, we require reactor controls to submit their design document stress analysis, drawings, what have you, to us and we treat that like a typical vendor piece of information. We review their compliance to our specification which includes the G.E. document and it receives again the category one through five stamp and return to record controls for their implementation if we don't feel they've adequately met like G.E.'s requirements or our requirements for that matter.

DR. PLESSET: It meets the requirements but it may not be a good design.

MR. KOCHIS: That is part of our review process.

DR. PLESSET: You do review that?

MR. KOCHIS: We review their design for implementation requirements plus we review it for -- if we consider it a solid design. If we don't consider it a solid design, it's sent back to them and they have to either revise their design or they have to satisfy us that what they have done is in fact correct.

DR. CATTON: Do you actually do independent calculations as suggested by Dr. Bush?

MR. TRICKOVIC: I don't believe that we have gone to the extent of doing independent calculations. However, we have on a sampling basis, reviewed some of their calculations and there were a couple of instances where we had found errors and made them go back and redo them.

DR. ZUDANS: Does the project office maintain a full contingent of technical capability to perform such review as you described?

MR. TRICKOVIC: Our project --

DR. ZUDANS: That's right, that's what I understood you do. In otherwords, if a control system designs something, are you -- do you have enough staff to review it? Do you have qualified personnel to review that work technically?

MR. TRICKOVIC: I believe so.

DR. ZUDANS: I'm not quite sure.

DR. PLESSET: Let's go on if there are no further-- go ahead.

MR. TRICKOVIC: Thank you.

The final slide I have deals with the third step of our interface control and deals with the interface control verification. We have been subject to several audits by our quality assurance, quality engineering departments. We have been subject to several audits by Mississippi Power and Light quality assurance organization. I mentioned earlier that our thermal power organization has performed an audit on us in 1978.

We have conducted interface review meetings with General Electric. Mr. Smith had addressed that earlier.

On top of all these programmatic things that we do as a matter of a daily business -- in 1978 through 1980, our mechanical discipline who is a coordinating discipline for NSSS contract, recognizing the complexities and the magnitude of information involved, had conducted a systematic review. This is a repeat of what we've done at various stages of our design process. They have performed checks, they have prepared check lists based on G.E. design specifications and then gone back to our design documents and made a one to one correspondence.

We have found it very useful. We do review General Electric's FSAR sections. That's another source of information of what G.E. is doing that might have direct impact on our work. I have addressed the independent design review by Cygna which I believe to be a more significant perspective of this discussion than anything that I have told you so far.

Finally, the results of our work, both General Electric, Bechtel and all of the organizations that have participated are shown during our systems check out process and pre-operational testing.

I'd like to conclude my presentation and answer any questions that you might have.

DR. PLESSET: Well, they've had their rash of questions, I think. I realize it will interrupt the continuity of this particular item. I was going to suggest we have a break. I've received some requests for this. So let's have a ten minute break.

(Whereupon, a ten minute recess was taken.)

DR. PLESSET: Let's reconvene and continue.

MR. RICHARDSON: Mr. Chairman, are you ready?

DR. PLESSET: Yes, please.

MR. RICHARDSON: Just to follow up on the interface relationship, from MP&L's perspective, we've been of course, actively involved in a project from day one to among other things, ensure that that interface relationship was good.

We were actively involved in the development of and approved the project procedures manual that was described by Mr. Trickovic which lays out very clearly and very specifically what those interface relationships are. And then during the critical phases of the project, MP&L had monthly management meetings to resolve problems and assure their proper interface.

(Slide Presentation)

As was already mentioned, there have been internal reviews and a review done by Cygna which we feel assures us that the interface was quite good on this project.

I'd like to mention very briefly another mechanism which provided an excellent interface forum and that was the Mark III owner's group. There have been several owner's groups and you've heard about many, I'm sure but there was one specifically developed and organized because the Mark III was a new concept in a design.

DR. PLESSET: Do you have a chairman for that group to run the meeting? Or are the groups so small there's no problem?

MR. RICHARDSON: No, there was always a chairman.

There was a rotating chairman between the utilities.

DR. PLESSET: I see.

MR. RICHARDSON: The Mark III owner's group formed back in December of 1976 and it is basically still under way and will continue until the NRC completes the GESSAR Appendix 3B review. The purpose was, it was a non-commercial group and what I mean by that was, they weren't really going out and actively pursuing doing some design type work or anything. They were developed as a forum for information exchange on containment related issues and the people who participated in these meetings were utilities with Mark III containment, AE's of Mark III containment utilities and then there was international utility participation and of course, General Electric participated quite heavily.

DR. PLESSET: What other AE's are involved besides Bechtel?

MR. RICHARDSON: There's Bechtel and Grand Gulf, there's Sargent and Lundy, Stone and Webster and Gilbert. I think I got -- and Abasco, that's right. Did I miss one? Gibbs and Hill.

DR. PLESSET: Each plant has it's own different architect engineer?

MR. RICHARDSON: That's correct. Over it's six years, we've essentially discussed every design related containment issue, every load definition in GESSAR II Appendix 3B, SRV, LOCA, chugging, etc. The design impacts of GESSAR II load definitions were discussed quite heavily and of course there were even visits arranged through the group to the test facilities. I'd just like to add that the interface relationship that was discussed with you previously on the Grand Gulf project, from Bechtel and G.E., was discussed with the Mark III owner's group and they all pretty much agreed that it was generally handled the same way on their projects.

That's basically all I have to say unless you have any questions.

DR. PLESSET: Any questions of -- it seems not. Well, thank you.

I think now it's G.E.?

MR. McGAUGHY: Right, Mr. Cameron will discuss STRIDE.

MR. CAMERON: Again, I'm Charles Cameron with General Electric and I hope I can answer your questions that you previously had on the G.E. and C.F. Braun interface.

(Slide Presentation)

G.E. and C.F. Braun, has had C.F. Braun as a contractor for the architect engineering work as I stated previously for the STRIDE Project. And what G.E. provides to Braun is similar to and to a great extent to what is provided to other utilities and architect engineers in that they get those same general design and interface documents, the A62 and A42 documents and they also get the same NSSS system design specs and a lot of these A62 document requirements are then imposed -- well, expanded upon and imposed in another set of requirements that are strictly for the STRIDE design which is the interface between G.E. and Braun, in that we have these balance of nuclear island specs. So that part of the nuclear island that's beyond the NSSS has specific specifications that are provided to Braun.

Examples of those would be in the area of, for instance, containment structural and configuration specifications. Where as an A62 requirement, the A62 containment specs may just define phenomenological type requirements whereas the actual balance of nuclear island specs would have specific requirements on the configuration, the lay out and also the fact that it would be a free standing steel containment for instance. So again, this whole other set of specifications that we provide to Braun is to allow G.E. to closely control the design.

Now, the last part of that bullet is that the design requirements or the design bases plus the specific design of the containment and associated systems are shown in GESSAR as part of the licensing basis.

The process itself is one in which instead of just a controlled communication system, we have very controlled management of the job in the STRIDE scope through a dedicated STRIDE project organization at General Electric, so that way the G.E. engineering group has direct input to the contractor, C.F. Braun.

G.E. winds up reviewing and approving C.F. Braun's document prior to their release for construction or for fabrication. And in many cases, we wind up with an iterative design where G.E. engineering has gone and iterated with C.F. Braun engineering to get to the point where they both agree that they have an adequate design.

Changes as far as document changes go, design changes required, wind up being implemented either by the engineering changes implemented, either by G.E. or C.F. Braun depending on who has that scope of the job. And then, in answer to one of your questions earlier, G.E. and also TVA when they were into it would audit and G.E. continues to audit the C.F. Braun design and especially the design process to assure that we wind up with a workable design. So the bottom line here is that G.E. does wind up with considerably more control over the STRIDE design, instead of just providing interface requirements.

That was short and sweet. Do you have any questions?

DR. EBERSOLE: I have a sort of a little route rationale question that I'd like to have you talk about. The Mark III containment introduces something I think that's novel to the business as far as I know. It introduces the idea of large vessels now subject to quite significant negative pressure loads. I don't know of any code requirements for validating the performance of these things in the negative mode. We ritualistically go through test requirements, ASME requirements approving positive loads presumably to prevent catastrophic mal-performance. We can have equivalently mal-performance in negative modes. What is the rationale -- and I guess I could ask Dr. Bush to comment on this, too, where one is progressively developing designs that employ substantial negative pressure loads with the attendant buckling performance without any significant physical test of such vessels.

MR. CAMERON: Well, I'm not really prepared to answer that. If one of my technical people would like to address that, that would be fine.

DR. BUSH: In the interim, the code does address this because after all, any vacuum -- any vessel that has a vacuum in it has exactly these conditions.

DR. EBERSOLE: Well, what about the tests on this? Do you consider them adequate, Dr. Bush? What are the tests, by the way, that you pull on these vessels?

MR. CAMERON: What are the tests -- like I say --

MR. TOWNSEND: Well first, Dr. Ebersole, I would say the only vessel that is subjected to a substantial negative pressure is the drywell.

DR. EBERSOLE: Yes.

MR. TOWNSEND: And it's an extremely massive structure. To my knowledge, there is no large vacuum test of that vessel, however.

DR. EBERSOLE: You don't test the structure. It's a little bit like the old partition wall.

MR. TOWNSEND: We do the positive pressure test but I don't think there is a negative pressure test specified.

DR. EBERSOLE: Do you seal the weir area when you do that?

MR. TOWNSEND: The positive test you're talking about?

DR. EBERSOLE: Yes. Right.

MR. TOWNSEND: Yes, it has to be.

MR. McGAUGHY: When the vents are delivered, the vent sections are manufactured I guess, different plants do it different ways. Ours is all steel. It comes as a fabricated section with three rows of vents in each section and there are caps on the vents and then after the pressure test of the dry well, the caps are cut off.

DR. EBERSOLE: So you do a pressure test with caps in place.

MR. McGAUGHY: A pressure test with caps in place, that's correct.

DR. EBERSOLE: The old containments, they usually never did test them at all. So far as I can recall. But are we in consensus then that we don't need to test in the negative mode against the kind of vessels. This is a steel vessel, this drywell, right?

MR. McGAUGHY: No, it's concrete.

DR. EBERSOLE: Oh sorry, concrete. Are any of them steel?

DR. PLESSET: Yes.

DR. EBERSOLE: All right, what about the steel?

MR. McGAUGHY: No, no, the drywell.

DR. EBERSOLE: All the drywells --

DR. PLESSET: Yes.

DR. EBERSOLE: Are structural concrete?

MR. McGAUGHY: Ours is. I think they all are.

DR. EBERSOLE: We really just invoke then the physical characterization of the building to argue. We don't need to test it.

DR. PLESSET: I think in the containment itself, there are some of those that are steel.

MR. McGAUGHY: Yes.

DR. EBERSOLE: Right.

MR. CAMERON: Free standing steel.

DR. PLESSET: Free standing steel.

DR. EBERSOLE: Okay, well, thank you.

DR. ZUDANS: And from previous conversation, we were told that the maximum negative pressure you can develop on containment is like 1/2 of PSI.

DR. EBERSOLE: It's some 20 --

DR. ZUDANS: There's really no problem. The bigger problems are, for example, an ice condenser. And all of these things are dealt with by the ASME code very accurately. There are lots of tests on small vessels but you can't conceive the test containment for external pressure.

DR. EBERSOLE: Could we feel confident that the penetrations would take the negative load very well in these concrete structure without testing? You have tested in the positive direction, right?

MR. McGAUGHY: Yes.

DR. EBERSOLE: But not in the negative.

MR. McGAUGHY: Not in the negative, right.

DR. EBERSOLE: Well, I guess I'll just sort of think on that. Thank you.

MR. CAMERON: Thank you. Are there any other interface questions?

DR. PLESSET: I don't think so.

MR. CAMERON: We'll have Glen Sherwood now make a few closing comments.

MR. SHERWOOD: I'm not closing, I'm just making a few summary comments for General Electric.

We recognize that you were here yesterday and today to look into essentially two areas, one of interfaces and the other is design issues. I won't say anything more about the interfaces. We hope that we've answered a number of your questions. What I'd like to do is spend a couple of minutes talking about four things. What we're doing to support the owners as well as on GESSAR, how we view the Humphrey issues and how we think that the Humphrey Issues should be handled.

First of all, as you well know from the meetings of yesterday and today, we are spending a fairly sizeable amount of effort supporting Grand Gulf and we feel that obviously that's the right priority.

In addition, we've had meetings with the Mark II owners and also a smaller but necessarily, but at least the first meeting with the Mark -- so Mark I owners on these issues as took place in the last few weeks. In addition, all of you know, I believe, that the Staff has now issued letters to various hearing boards and the Mark I and Mark II owners requesting action plans some 14 days -- some even 7 days on these issues.

On the face of it, all of this pretends a tremendous amount of work. I don't think that the Staff and I hope the ACRS doesn't really intend this to be the case and I wanted to chat a little bit about that. Certainly I hope that we all collectively don't want to reopen many many huge containment test evaluation programs. At least we don't think that they're warranted.

Now, in terms of how we view the process and the issues, I think you all recognize from our presentations yesterday that these issues were brought out as part of the normal G.E. design process. Our aggregation of these is a little bit different than there is today but in general, we were involved in all of these although some of them we had already decided needed no further work. Probably the most -- the best example of one where this agreement may not be also shared by the Staff yet is with encroachments. I'd like to discuss that again in a second.

Many have said and I think the Staff stated this themselves and I'm sure agree with us, that these are not safety issues but if they're not safety issues, well, what are they?

Well, we believe that they are design issues and as Mr. Townsend said from the point of view of the margin that we have in pressure in the containment, both temperature as well as ASME code, that these are well within the design limits of the Mark III.

Nevertheless, we recognize that the burden is on is to show that these are second order effects, and we indeed are working with Mississippi Power and Light and with the staff to try to do that. However, we ask and urge that there be some engineering judgement also applied to this because I think as you all know, that in work from the laboratory or from wherever you come that chasing 1% and 2% effects especially if you require systematic deterministic final analysis to show that those are 1% or 2% effects, they're very difficult to do as you all know. And therefore, we really hope that there will be moderation on the part of the Staff and hopefully that the ACRS will concur with this, that these are design issues, not safety issues and indeed, most of them appear to be second order issues and I think hopefully working together we can conclude that these are indeed in that category.

What we would like to recommend, we don't have this totally worked out with all of our customers -- what we'd like to recommend is a process for doing this, is one that wherein the basic Grand Gulf and GESSAR documentation over the next several months would act then as the basic package to close out these so-called Humphrey Issues at least on a generic basis, and then the rest of the projects, the Mark III, Mark II and Mark I would not repeat the total process that we're going through now, but would only reference the Grand Gulf and GESSAR submittal and then they would take exception as necessary because obviously we have different designs with the Mark III's, at least in detail and of course, fairly substantial different designs on Mark I and II.

Again, we recommend that we not have a project by project examination of each of one of these issues in detail and so, my point is today to is such that we might make, reach agreement on that with the Staff and hopefully get endorsement by the committee.

I guess mine is somewhat a plea for moderation on this. As you all know, the ACRS, the committee, as well as the NRC has a tremendous number of things that we're doing in starting up projects, getting submittals for FSARs and Atlas designs and so forth. So I hope that you all recognize that everything can't be a priority one and so what we're working hard to do is to show what the priority is and then work these off diligently on the Grand Gulf and GESSAR projects.

This summarizes my few remarks. If there are no questions, we'll go on then to the Clinton and Perry presentations.

DR. PLESSET: I don't see any questions, Dr. Sherwood.

MR. SHERWOOD: Thank you.

DR. PLESSET: Thank you. I might prepare the people up at this table, I'm going to ask them for comments on this situation after we hear from Mr. Humphrey who is going to make a brief presentation to us. Note, I said brief, regarding a requirement on us to make some kind of recommendation to the Grand Gulf Subcommittee first and second, to the full committee regarding these questions, so you might think about it in the back of your minds while he makes a presentation. With that, I'll ask Mr. Humphrey, do you want to make a few remarks?

MR. HUMPHREY: Yes, thank you very much, Mr. Chairman.

I don't have any slides so I'll just turn that off and I'll try to make this very short. I know people have probably had a long morning and people are probably getting a little hungry.

I said in my opening remarks that I thought an understanding of these interfaces was a key to a successful and well integrated containment design and I feel that this meeting has made a lot of progress in that area. I think that we've made progess both in understanding the various issues that have been raised and also progress in helping to quantify some of the margins that exist in design and I would concur with Hal that there are a lot of margins. I think that we do a very good job in designing nuclear plants and we put substantial margins into those designs but with good reason.

I was impressed by the thoroughness of the program that MP&L has come up with. I think they're trying to really grab ahold of these issues and wrestle them to the ground and I think it's very responsive and I think that's going to make a lot of progress in terms of resolving these issues. I think really some progress has already been made. As I understood, there's some changes or potential changes that have already been discussed and one of them I understood that 2PSI negative tech spec is going to be changed. That covers a number of issues; it's the problem of clearing before scram, leakage through the wall. Even if you didn't clear you would start at say a -2PSI and you don't scram until 2 so that would give 4PSI for it to pressurize the drywell and therefore a higher temperature at scram, so changing that tech spec and getting closer to initial OPSIG really addresses a number of issues that I raised.

Another one is restricting steam condensing mode until the issues of clearing through this RHR relief line have been properly evaluated and I think that's a very positive step in the interim to basically set that concern aside and not let it impact plant operation. I want to bring up a couple of points here. Now here, I'm going to maybe be a trouble maker again and I apologize for this but I'm doing this honestly. This whole process has been an attempt to play a constructive role. In engineering they don't teach us Politics 101 and if I've been a little clumsy, I apologize but my whole thrust has been to raise what I thought were significant technical issues so that the competent people in the industry can evaluate them for applicability to their individual plant.

I think Sam, where's Sam -- you presented yesterday, on this particular issue, you showed that Grand Gulf has a two inch line feeding into ten inch relief line with a couple of valves and I understood the idea here is when you go into steam condensing that these lines -- obviously people have pointed out -- it's a little tricky getting into steam condensing, feeding raw steam into a heat exchanger and I understood that these then help promote an easy transition from maybe pool cooling into steam condensing and potentially it was brought out that if these were open and steam was bleeding into the pool, then if the relief valve lifted, you wouldn't have a water clearing transient. That's certainly a positive effect. But something hit me when I saw those. It said I got a two inch line feeding into a ten inch line. That's a straight pipe now, terminating in the pool. It doesn't have a quencher on it. It doesn't have holes in it. Now this isn't in a failure mode. This would be every time as I understood what you said -- every time you go into steam condensing, you you potentially would be bleeding steam through that line. Well now, that steam is going to produce loads in the pool and the point was brought up that it may be there's enough steam flow to keep the line clear. Whatever mass flux is going through that line depending on the pressure and the heat exchanger, it will start out with a high air content because it's going to be bleeding the line and potentially the heat exchanger and of course there's a variety of pool temperatures. It could be a cold pool, it could be a relatively warm pool that you're looking at and maybe it will start out stably with some kind of a CO based on the size of that pipe, but if it's only a two inch line, your initial guess is that you could enter a regime where you go into a chugging mode where the flow is so low that ten inches is a bigger exit than is needed to condense that flow and really, that's what chugging load is, it says mass flux and the required area is less than the area of the pipe and so it comes out and condenses and goes back up in the line so just as a part of normal operation, I may have missed it but I wasn't aware that we had that provision in the standard RHR. I didn't get into enough of the details but that's something to check, whether STRIDE has these two inch bleed lines. I talked to Mike Mitchell about the design, but of course, it was his responsibility, not mine, but I thought I picked up all that and I thought I would have seen those but maybe I didn't, so there's a thing that one, has some benefits but it's a Catch-22. You've got to watch that maybe this two inch bleed line is going to create a situation where you're sitting there in steam condensing, chugging at the end of that vent. So, I just raised this for you know, trying to be helpful, but here's something that you might want to look at. Hal's chuckling.

Okay, I also was impressed with G.E.'s approach. I think you guys have taken the bull by the horns in trying to wrestle these things to the ground and I think that's a very positive approach.

One of the things that I wanted to point out, this issue of, you turn the sprays on, you reduce the pressure in the containment. It opens the vacuum breaker, it reduces the pressure in the shield building. Okay, that's one we've been wrestling with for awhile, one of the issues that I raised.

As I understood the tentative response was to put some kind of vacuum breakers on the shield building so that you preclude getting a large negative pressure in the shield building. Isn't that what I heard? Okay, well, now that's got some advantages but it's got some disadvantages and I want to point out some interfaces, again, just off the top of my head that occurred to me. First of all, as a little bit of an aside, it was stated that the negative pressure differential across the containment wall is typical of a couple of 10ths of a PSI. Well, number one, the vacuum breakers don't even open until .2 of a PSI so that's where you start the restoration process. I don't know if you -- you might talk to Doug. Doug, you and Yar, you know, might show Hal some of those calculations. Yar was into a lot of detail looking at those negative pressure transients. In fact, I thought some of those have even been shown in the owners group. Maybe it's still preliminary, and internal, but under low humidity conditions and/or high temperature conditions and/or cold service water conditions, we're getting negative pressures across that containment shell substantially in excess of .2, in fact, pushing .8 and .8 is the design value. Dr. Ebersole, you talked about buckling. Here is a case -- there are conditions that push that limit and of course there's no testing of what the shell can actually stand and there's code allowables for cylindrical shells and so forth.

So there are cases where you can push this .8 limit but one of the key things as was brought out, well, gee, if you turn on the sprays, you can crank the containment pressure down a couple of PSI and the response is why doesn't it collapse the containment shell, then.

The reason it doesn't collapse the containment shell is because the vacuum breakers on the containment are relatively large and they can feed air into the containment fast enough so that the two pressures track each other so that you start out and get a negative pressure. When you get to .2, it triggers the butterfly. The butterfly takes a minimum of 10 seconds to open fully and so then the shield pressure starts to chase the containment pressure and they go roaring on down, maybe a couple of PSI. Certainly I've seen transients that go like a PSI and a half, and then asymmtotically come together and it's this differential pressure as they're going down that you're worried about. You know, they both go down to a PSI and a half. Those analyses were done assuming little or no leakage into the shield building. Namely the shield building can chase the containment pressure because, stick vacuum breakers on the shield building and try to -- you know, that are big enough to minimize the shield pressure if you don't want it to go down to a couple of PSI, then you're going to try to hold it up and now the containment pressure is going to roar on down and instead of getting this where they follow each other minimizing this delta P, get yourself in a situation where in order to minimize the negative pressure on the containment, I mean on the shield building for maybe due to structural or equipment considerations, you've got yourself in a mode where the negative pressure in the containment won't be any worse but the differential across the wall could under some conditions be worse and potentially exceed this .8 of a PSI, so be a little careful there. You know, there's one interface that you might want to look into.

Another one is that the vacuum breakers on the containment very carefully go out through the shield building and back into the shield annulus. There are no valves outside the shield building, therefore all leakage from primary containment goes into secondary containment which is a controlled area for the stand-by gas treatment system. There's no direct by-pass to the environment. In fact, if I remember the work that Ned Horton did, the calculated leakage through those vacuum breakers was one of the largest sources of predicted leakage in the entire containment. It made up, you now, just those two valves made up a very substantial fraction. So now, if you're going to add valves to the shield building, do you go from shield building to the environ (ph) and if so, you've added another by-pass leakage path unfiltered and unprocessed that needs to be looked at. And if you go from the shield building to the auxiliary building, now you've just added really a complex design where you depressurize the containment, you pull down the shield building, it pops the vacuum breakers into the auxiliary building and start pulling it down, and now with the containment that's got 1.4 million cubic feet, that's not negligible. Something's going to pull it a couple of PSI -- you could pull down a couple of million cubic foot building, some fraction of a PSI and it's probably less capable of withstanding negative pressure than this great big thick shield building that's designed for telephone pole impacts and airplane crashes and everything else. So again, you may be creating -- you solve one problem and maybe creating another problem.

The last point in here that you might want to consider and I didn't bring up as an issue but something to keep in the back of our minds, when you pop the vacuum breakers, you draw air into the containment. Well, now you've increased the initial air mass in the containment, so if you're in a mode where you've got the recombiners on, you've got low relative humidity and you turn on the sprays -- of course you have the mixers on so you pre-charge the drywell with air, and now you drive the pressure down on the containment, open the vacuum breakers, you draw air mass into the containment and then when everything closes and the sprays turn off and things come back up again, you got more non-condensables in there than you started with, and of course, the containment's a leak type barrier -- what 2% a day -- no, less than that, 1% a day so the air's not going to get out. Now you aggravate that problem by putting vacuum breakers on the shield building. It pulls both the shield building and the containment down together -- you're going to get less air flow and if you have some nice large vacuum breakers in the shield building that keep the shield building and 14.7, it says you keep those sprays running, it will come down in the containment and then she'll come right back up to 14.7 because the air will keep coming into the shield building. It will come into the containment. If you have cold spray -- say you've got -- you happened to be lucky and you got 60° service water going that day, you could have some pretty cold spray, cool the whole thing off and you've got to pull all this extra air in, okay? Now true, as long as the sprays keep running, I think we'll be able to control containment pressure, but then this brings you back how often they would cycle and whether or not 9PSI would control it. So here we go again. It's a very inter-related system, okay? And you've got a problem and the initial solution is gee, we'll do this but you've got to think of all the little nooks and crannies that you can get into so that you don't create another problem by doing something else.

These are just some thoughts off the top of my head. You know, you may have already looked at them but these are things that I thought, you know, maybe should be considered in making a design change like that.

Finally, I guess on an optimistic note, as a veteran of the Mark I short-term program, really I was in your shoes six years ago defending issues that had been raised and demonstrating. We were very successful in demonstrating that the safety -- adequate safety margins were maintained and listening to the presentations that MP&L and G.E. has made, I'm personally optimistic that the results of that effort are going to be sufficient so that it will provide a sufficient level of confidence so it won't impact the licensing process. And honestly, that's my desire and I know that it's the desire of everybody in the room, so with that, I want to conclude and I want to thank the ACRS for inviting me here. Dr. Plesset, I certainly appreciate it and Paul, I want to thank Paul for all the hard work he's done in interfacing with me and helping me out in so many areas. So thank you again very much.

DR. ZUDANS: Mr. Chairman, I would like to ask a question.

MR. HUMPHREY: Yes, of course.

DR. ZUDANS: Either I am wrong or I detected a fallacy in your argument --

DR. PLESSET: It's brief, I hope.

DR. ZUDANS: Yes, when you said when the vacuum breakers out in the container building, and the shield building does not have vacuum breakers, the pressure in both will track each other essentially with a small differential required to keep the vacuum breakers open. That's the part of the argument. Let's take that as true.

Now, you add -- you say that you add the vacuum breakers in the shield building and that will no longer be the case. Why not?

MR. HUMPHREY: Because, let's assume we have large vacuum breakers. If I punch a ten foot hole in the building, the shield building will stay at 14.7.

DR. ZUDANS: And so will the containment building.

MR. HUMPHREY: The containment building will be limited by the flow that you can get through the containment vacuum breaker.

DR. ZUDANS: That's the point. If that flow rate through the vacuum breakers versus the speed at which the pressure drops in the containment due to condensation is the critical factor and you properly size the vacuum breakers -- you either track both pressures or else the pressure will stay at the outside pressure everywhere.

MR. HUMPHREY: Let me grab a blank flimsy and I think I can show this real easy.

(Slide)

The kind of analyses that we had done so far start out at some containment pressure and let's assume the shield pressure is the same, and then you get -- the spray comes on and the containment pressure starts to drop. Well, what typically happens after a few seconds then -- the vacuum breaker is open and that this pressure then starts to fall also. So you get a transient then that looks something like this. The two then come down and asymmtotically come together. Well, at any point in time, it's only this pressure difference that's important. It says what is the pressure difference across the containment shell. Now, these analyses were done -- we've looked at the effect of leakage but of course, leakage could be relatively small. If now we say we have a large vacuum breaker on the shield building -- let's say you know, just say infinite okay, so that the shield building pressure will stay here at 14.7. Now this pressure is going to change also -- naturally, square the delta P as you start to come down here and this opens up, that this is going to come down more slowly. Certainly, because with a larger pressure difference now between the shield building and the containment, you'll get more flow rate, that will try to fight the cooling and condensation effects of the spray, but this pressure difference will be larger.

DR. ZUDANS: Well, but what I'm saying is, by proper design and sizing of vacuum breakers you may not increase that pressure drop. You can design it to be exactly the same as before. There's no reason for it.

MR. HUMPHREY: The containment vacuum breakers exist, okay, and I believe we can show it analytically that any increase in this curve in the shield building will increase the maximum delta P. Now you're right, it may not be significant. That may not exceed .8.

DR. ZUDANS: If the vacuum breakers are not adequate to feed air fast enough to reduce the increase in the pressure, that's a different issue, but in general, you cannot make that this is a general problem. A plant specifically might exist like that. It's okay.

MR. HUMPHREY: Why don't we talk after -- that might be good.

The point I wanted to make is that there are a number of interfaces here that need to be looked and whatever, there's one of them that you might want to address.

DR. PLESSET: Well, I think we'll recess for lunch so let's return a little before 1:00 p.m.

(Whereupon, at 11:55 a.m., the meeting was recessed, to reconvene at 1:00 p.m., this same day, July 30, 1982, in the same place.)

A F T E R N O O N   S E S S I O N

1:05 P.M.

DR. PLESSET: Let's reconvene and the next item on our agenda is a presentation from Illinois Power so if they will proceed. Are they ready? Yes. All right.

MR. KANT: Good afternoon. My name is Eric Kant and I'm representing Illinois Power in these proceedings.

(Slide Presentation)

Please excuse the quality of my slides. They're not what you're used to seeing but I think they'll help in presenting what I have to say. Our initial involvement with the Humphrey Concerns started in the May 27th meeting in Bethesda during which John discussed some of his concerns with us and MP&L presented their first response to the issues and after that meeting, we received the transcript of the proceedings and went to work reviewing them and the applicability to our plant.

On June 23rd, we received a letter from Mr. Bernard requesting submittal of a program to address these issues for our plant. On July 6, we resonded to that letter indicating that we were pursuing forming an owner's group with the other Mark III people to address these concerns as generically as possible. We would be participating in a meeting July 22nd with Mr. Humphrey to further understand the issues and there have been some

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additional issues that we had a chance to look at at that time also.

The final item was that we were going to participate in this meeting to again get a better understanding of what some of the concerns were and be in a better position to respond to them.

Based on the participating in those activities, we agreed to provide a complete program by mid-August.

We feel at this point the majority of the work to address these concerns can be done generically and we intend to do it in that manner. Additional plant specific analysis is to be done by Sargent and Lundy. Current estimates indicate that we can complete this work in the first quarter of 1983.

We'd like to improve on that but I'm not in a position to make that commitment at this time.

A summary of the perspective that we have on these issues at this time is that the design margins are very large for Clinton and the other containment. We have a 95PSI ultimate containment pressure. CPS is a smaller reactor than some of the others and essentially the same size containment and as a result of this, the analysis being done will most likely bound us also.

We concur with the evaluation presented by General Electric and MP&L that the affects are second order effects, that these issues do not present a significant safety impact to the Mark III design.

That concludes my discussion this afternoon. Are there any questions or comments that I can address?

DR. SCHROCK: Will Sargent and Lundy do pool dynamic calculations for you or is that in the generic group?

MR. KANT: Sargent and Lundy will be doing the load applications, right. The pool dynamics load calculations. That's absolutely correct.

DR. PLESSET: Any other questions of Mr. Kant? I guess not. Thank you.

MR. KANT: Thank you.

DR. PLESSET: I think we're going to have a presentation by Cleveland Electric Illuminating Company. Mr. Pender, I believe?

MR. PENDER: Yes. My name is Richard Pender. I am the lead engineer in charge of mechanical design on Perry.

(Slide Presentation)

Instead of boring everyone with yet another chronological history of the Humphrey Issues, I think it would suffice to say that Perry has been following the, actively following the issues since they were first identified in a letter from MP&L -- from Mr. Humphrey to

MP&L dated May 8. A meeting was held with the Staff on June 17th to discuss Perry's preliminary evaluation of the issues. We have categorized those issues into generic and non-generic issues. Approximately 2/3rds of the issues are generic in nature and Perry will be working with the owners groups on these issues. The remaining one third are either plant specific or not applicable to Perry. For those issues that are applicable to Perry, we are presently performing in-house evaluation and analysis as necessary to close them out.

With regards to our schedule, we will be formally submitting our program to the Staff the first week of September. This program will be similar to the format of the program submitted by MP&L and will define the action to be taken by Perry in closing out both generic and plant unique issues.

In conclusion, we feel that our program is consistent with our licensing schedule and we anticipate a completion date during the first quarter of 1983. We fully expect that these issues that are applicable to Perry will be closed out prior to our fuel load.

Are there any questions?

DR. PLESSET: Who was the architect engineer on this plant?

MR. PENDER: Gilbert and Associates.

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DR. PLESSET: Yes, thank you. Any questions of Mr. Pender.

DR. SCHROCK: MP&L relied almost exclusively on G.E. analysis codes Are you going to do the same so that it will be essentially a carbon copy of their answers to the resolution of the problem?

MR. PENDER: Those generic issues that are applicable to MP&L and us, we will be relying on the G.E. analysis.

DR. SCHROCK: Yes, but even plant specific -- will they be analyzed --

MR. PENDER: No our plant specific will be done by Gilbert and Associates.

DR. PLESSET: Okay, any other questions?

DR. BUSH: One that is not necessarily just Perry. I understand in some of the hand-outs that there was a joint meeting the 20th of July about or what was it?

MR. KUDRICK: The 22nd.

DR. BUSH: The 22nd of July and I have been listening to see if there was anything productive that came out of that meeting. I don't believe I've heard anything. Was it just a kind of discussion of issues or what was the situation?

MR. PENDER: I think that meeting, the one you're referring to was just a meeting of all the utilities and

Mr. Kudrick to discuss exactly what we planned on doing with regards to an owner's group, forming an owner's group.

DR. BUSH: So it was really just a sitting down of the --

MR. PENDER: It was a kick-off meeting basically.

DR. BUSH: That answers my question. Thank you.

DR. PLESSET: Since there are no other questions, thank you again.

MR. PENDER: Thank you.

DR. PLESSET: Well, we're a little early but we do have schedules of discussion and I would like to lead it off. I'm going to call on the other members and consultants to express an opinion here and I might say that my remarks are directed primarily at Dr. Butler, Jack Kudrick and Mel Fields because I think that's the place where they might best fit.

You may -- I'm sure they know, but the rest of you may not appreciate that the ACRS letter report to the Commissioners on Grand Gulf talks about a low power license and they gave approval for this, and for Clinton and Perry they gave full power approval. Now, the reason I think that Grand Gulf got the low power approval in our report, was primarily it was the first plant that came in and there was still some concern on the part of some of the members that the impact loads on the HCU floor had not been proven acceptable as far as the integrity of that unit. I think since that time there is a little better understanding of this and I think that now it would be most likely accepted by the Committee, so that in a sense, those plants are all pretty much on an equal footing.

Then of course now, we've had the concerns raised by Mr. Humphrey and the question is, would this change the view of the -- first the Grand Gulf subcommittee and second, the view of the full committee? And I think that what this subcommittee can do is forward it's views to both of those -- the Grand Gulf subcommittee and to the full committee.

Now I'm going to call on the others for their opinions but not to influence them, give my own first.

My feeling is, that I see no reason why these plants and Grand Gulf in particular cannot go ahead and receive a full power operating license. There is nothing that's come forward since the reports that I mentioned have been prepared that would change my view on this question.

Now, it's true that there were some concerns raised by Mr. Humphrey that have occupied the Staff and the applicant. For example, things like encroachment. I'm very optimistic about that. I don't think it's going to make any difference to the safety of the plant, but that's just an optimistic forecast. I'm sure that the Staff will investigate this. And in my view, recommending that Grand Gulf in particular get a full power license doesn't mean that the Staff won't do some more work. I am sure they will but like other items in an application, there are usually many points, some of them generic that they have to straighten out to their own satisfaction. They have a responsibility in that direction and I don't see where there's anything new which really changes this picture. Maybe it's painted on a little broader horizon, but that to me is not a particularly essential item. So that's my view. I would recommend that the Grand Gulf subcommittee and the full committee accept this situation and proceed as usual with the licensing of the plant. We've already done that for Perry and Clinton. It's just a matter of Grand Gulf and that's a relatively small step in my mind from the 4% approval to the full power.

Now, there's a spectrum of people up here and they may give you other views so let me go down the table. Spence, would you like to --

DR. BUSH: Sure. Dr. Plesset knows that I don't influence that easily so his prior comments haven't really introduced a bias since I've already written my comments.

I would hope that the issues could be resolved generically rather than case by case for a variety of reasons, certainly Staff load and I think also as you see in the tenor of my remarks, I don't consider them as having that major an impact that we need to overload the industry.

With regard to a degradation of safety function which I think is the important thing, I see no significant losses in the Grand Gulf design and I suspect this to be true for the STRIDE design but I would reserve final judgement pending a little more information. Quite frankly, I'm not that familiar with the STRIDE design.

The preceding comments consider the effects of loads rather than the subtleties and thermo-hydraulics since I don't consider myself very expert in that area.

I have no reservations in permitting Grand Gulf to go to full power on the basis of these issues that we've been discussing. Obviously other issues may control this decision. That's been the case in other plants and I think that the decision of a 5% license on the first plant was a very logical one.

At this time I reserve judgement on the other Mark III designs simply because of -- I haven't had a chance to look at them and there may be some subtleties that would affect the plant specific areas, though I suspect this may not be the case.

With regard to Mark I's and II's, I feel that most of the issues are either inapplicable or insignificant with regard to safety margins. There may be a few applicable issues that need further examination and I hope again that these could be generic.

I go back to my original plea and feel that some level of instrumentations that measure a critical pressure temperature, stresses or strains could be valuable in a Mark III design and possibly in a Mark II to confirm the loads are comfortably within the design envelope which would hopefully minimize the continuous discourse on design margins in this particular area.

DR. PLESSET: Thank you, Spence. I didn't want to imply that you would be at all malleable. We know otherwise. A good metallurgical man.

Before I call on Dr. Schrock, I should mention that Mr. Ray, a committee member, indicated his concurrence with the views that I've expressed regarding this situation and Dr. Zudans did likewise. I'm going to make life easy for Virgil by letting him have the microphone.

DR. SCHROCK: I'll keep it only briefly.

With regard to the Humphrey Issues, my view is that I heard nothing that would lead me to have any misgivings about proceeding with a full power license for Grand Gulf.

I think that many of the things that were discussed here were certainly worth discussing. I have some severe reservations about whether we have set an unreasonable precedence for raising issues of this level of importance in the way that they eventually evolved in a meeting of the subcommittee of the ACRS. I think that there is some risk in our proceedings here in following this path.

With regard to the responses from the utilities and from the General Electric Company and Bechtel, I think it appears to me that the answers that are being sought will be obtained in a satisfactory way. I have no real concern that there will be serious questions remaining after all of the things that we've heard to be done will be accomplished.

One point I would make with regard to the assurance with respect to design margins is that I don't like to see design margins essentially misrepresented. I don't mean to say that they were intentionally misrepresented but I don't like to see them carelessly misrepresented. I think the question of what a design margin is is a serious question and it should be dealt with very carefully.

Frequently, usually, I think we do not know very well what our design margins are and to overstate them is not a good practice in general. With regard to the encroachments as a specific issue, it seems to me that we have had a lot of controversy in the hydrodynamics of the pool responses, and that it would be very desirable to have some of these calculations confirmed by other than the designer of the system and for that reason, I was pleased to hear that there will be some additional supporting calculations submitted to the staff that will be done by other AE's using different codes.

That concludes my comment.

DR. PLESSET: Thank you, Virgil. Mr. Etherington?

DR. ETHERINGTON: I think everyone is addressing these concerns in a responsible manner and I see nothing in the unresolved items that would warrant withholding a license, full power operating license.

DR. PLESSET: Dr. Garlid?

DR. GARLID: Well, I think the issues that were raised were real ones but were for the most part second order with respect to safety. MP&L has been responsive to the concerns that were raised, and that the Staff has developed a reasonable plan, although if anything it's on the conservative side of how to deal with them.

I don't think the issues should cause any delay and finally, I think the question of interface is whether they are interfaces between organizations or interfaces of problems between one discipline and another, that these are generic issues and not unique to these plants.

DR. PLESSET: Thank you. Jesse?

DR. EBERSOLE: Yes. May I ask G.E. a question about the containment structural design and the limitations on it? It's always concrete, I take it for N16 and other shielding purposes. Does it have a membrane liner on either side? Do you give freedom to the AE's to put liner skin on the structural wall? Do you know?

MR. DAVIS: This is Mac Davis from General Electric. We place no requirements at all on the AE as to whether he can or cannot put liners on.

DR. EBERSOLE: Are any of these equipped with liners? Membranes on either side?

MR. McGAUGHY: We have what's -- well it's not a Q type liner. We have concrete steel forms that are welded together. In essence, a liner but it's not a --

DR. EBERSOLE: Is it on both sides?

MR. McGAUGHY: It's on the inside.

DR. EBERSOLE: THen I would only ask one question. When that particular wall is subjected to negative pressure and therefore gas in-leakage, how do you retain that liner in the structural context? How do you keep it from peeling off?

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MR. McGAUGHY: It's designed to 3PSID, to withstand that pressure.

DR. EBERSOLE: In otherwords, it's anchored at sufficient intervals to --

MR. McGAUGHY: Yes. See, well, it's not Q, it's got to be seismic. We've got to show that it won't fall off in an earthquake and it will withstand the amount of 3PSID.

DR. EBERSOLE: I'm talking about due to in-leakage from the high pressure side. How do you keep it from peeling off and flying inward into the containment?

MR. McGAUGHY: It has anchors on the back of it, into the concrete.

DR. EBERSOLE: So it's periodically anchored?

MR. McGAUGHY: That's correct.

DR. EBERSOLE: On the inner face.

MR. McGAUGHY: Yes, sir.

DR. EBERSOLE: Is it designed to permit atmospheric penetration and to carry the structural load at the liner face? On the inner face of the liner, next to the concrete?

MR. McGAUGHY: I'm not sure I understand the question.

DR. EBERSOLE: Okay. The gas, the atmosphere on a reverse pressure mode will be carried inward through the leakage of the concrete and the pressure gradient will occur on the liner. Are you with me?

MR. McGAUGHY: Yes, I think so.

DR. EBERSOLE: Okay, the pressure gradient being almost all contained on the liner, how do you support it against the buckling load?

Somebody is holding their hand up.

MR. BROSE: I'm Tom Brose from Bechtel in Los Angeles. The generic Bechtel design of a liner plate is not a structural member.

DR. EBERSOLE: That's what I was afraid of. So now what's going to keep it from flying all over the place if you apply an external atmospheric load on it.

MR. BROSE: It is anchored to the concrete containment by three by two by quarter-inch channels spaced every fifteen inches. It's designed as a membrane only. Okay, your question as to the differential pressure across the liner through diffusion through the concrete would not occur because the liner is continous to the outside surface, and by that the liner is attached to the penetration -- you wouldn't -- I don't foresee a differential pressure occurring across the liner.

DR. EBERSOLE: You do not put any pressure in your design against the exterior face of the liner, that is the face between the the concrete and the steel?

MR. BROSE: No.

DR. EBERSOLE: You don't look at the permeation of atmospheric pressure against that face?

MR. BROSE: No, but the liner itself is designed for a negative load due to the other new loads which create such loads on the liner and it has the capability on Grand Gulf -- I can't give a specific number, but whatever the negative pressure is from SRV.

MR. McGAUGHY: He's not -- we're talking about inside the drywell.

MR. BROSE: No, no, he's talking about containment.

MR. McGAUGHY: I'm sorry.

MR. BROSE: He's talking about the containment liner and the containment liner is capable of withstanding the negative pressure from an SRV discharge which would suck on the liner in the order of magnitude --

MR. McGAUGHY: At least 5PSI.

DR. EBERSOLE: You follow me -- I'm just looking at the anchor mode to the concrete and hoping it won't scallop and come off.

MR. BROSE: It's designed for a suction load.

DR. EBERSOLE: In otherwords, you do then put atmospheric pressure on the back face?

MR. BROSE: Yes.

DR. EBERSOLE: You have to.

MR. McGAUGHY: That's the only way you can get it, I guess.

DR. EBERSOLE: And you put what, 5PSI?

MR. BROSE: Whatever Grand Gulf's design criteria are.

MR. McGAUGHY: The negative loads from the SRV actuation are at least five.

DR. EBERSOLE: So you're anchored at sufficient intervals per square foot to hold it together.

MR. BROSE: Yes.

DR. EBERSOLE: Okay, that's one question I had. Other than that, I have no reservations, Dr. Plesset about this containment. If I have any reservations about thermo-hydraulic loads in other contexts such as the drive, controller drive units -- sorry, not the CRU's but the tubes and instrumentation and other thermo-hydraulic loads that may be imposed on safety equipment which we haven't pinpointed here as we have the HCU's on this floor. But those will come up in another context rather than a containment context.

DR. PLESSET: Thank you, Jesse. Arthur?

DR. CATTON: I've been involved, I guess, with the Mark I, II and III in the suppression pool loads and so forth. And it's my view that the Humphrey Issues are receiving far more attention than they deserve by NRC, G.E., and MP&L. I have no reservations regarding the Mark III containment scheme. I have some residual questions that I've raised through the two day period. I've had some promises with respect to experimental data and answers and I'll just await receiving them.

DR. PLESSET: Thank you. Let me -- do you want to make another comment? I think we've heard from the wise men at this table and I'm not including myself in that category, but you see there's kind of a consensus here. I'd like to follow up on a couple of points that were made by Dr. Bush, Dr. Catton that one has only a certain amount of resource at one's disposal and one has to use this wisely. The question is, are you using these resources for the most efficiency for safety? And it's been indicated or hinted at that maybe you aren't by paying so much attention to these particular issues that we've been talking about the past two days. And this disturbs me as well as the other members up here, that you may be not helping safety by disregarding other items and concentrating on these and this I think, you have to think about and I think along this same line, the kind of a cost benefit approach to safety.

Dr. Bush mentioned his distress at Mark I and II being drawn into this and this seemed to me particularly non-productive. We indicated it was not productive for

Mark III's but to get the Mark I's and II's in it is really a little bit well, more than unfortunate and I wanted to stress those points to you, Jack in this connection.

Now, unless the people up here at the table want to make more comments, I'd be glad to have you respond to what we've just been saying. Jack or Dr. Butler, either one. Both maybe.

MR. KUDRICK: We appreciate your frankness in your positive comments relative to the concerns that have been raised. Since we have been informed of the Humphrey concerns, we have taken about trying to resolve those as quickly as possible and hopefully we have given the subcommittee the impression that we do not feel that the majority of the concerns are significant safety issues, and I hope that we have made that point earlier yesterday. We have, however, believed that there are one or two items that deserve our attention and that based on the information that we've gotten, we believe that we will be getting a satisfactory response. However, we will be awaiting judgement until we get those responses. In a similar fashion, we are waiting final acceptance of the response. Until we get the necessary background on which the judgements were made, that these loads were indeed secondary, I don't believe that we are that significantly differing from the subcommittee. We have asked the various elements of the industry to respond to those comments. The magnitude of effort that that industry responds to would be indicative of the magnitude of safety concerns that they feel those concerns justify. We are perfectly -- in fact we have indicated rather strongly that generic efforts be established wherever possible, so I don't believe that we are inconsistent in that manner.

DR. PLESSET: Thank you, Jack. I don't want to appear to abrasive in discussing the staff's work but evidently we do have a fair amount of agreement which is unusual between us and you. Dr. Butler?

DR. BUTLER: Let me just add a little bit more. I agree with Jack. We have pretty strong consensus with the views expressed by the subcommittee.

On the matter of margins that Dr. Schrock hit on, I agree with that, that many of the margins depicted during the presentation were relying on what I'll call margins generally looked at for degraded core considerations. When we're dealing with design basis accidents, these different margins have a specific function and we don't want to lean too heavily on them for these new areas.

The other point that I wanted to make is that many of these new areas are really design questions rather than safety questions. And if you delegate the responsibility to do a good engineering job, you would expect that these issues would be suitably dealt with. There are no real technological questions at hand associated with these issues.

To reinforce Jack's earlier statement, we intend to moderate the amount of resources obligated to resolving these issues. To the extent practical, we will push for generic treatment of them so as to minimize the utilization of resources. Thank you very much.

DR. PLESSET: Thank you, Dr. Butler. I appreciate that and I might say that all the members of the subcommittee received a lot of literature, reports, from meetings of the NRC and maybe we got a little bit of an exaggerated idea of what effort went into this. Jack nods his head indicating concurrence.

MR. KUDRICK: No, I believe that I will be supported by MP&L by saying that there has been significant effort to date on these particular issues.

DR. PLESSET: Yes, and they seem to be getting a little out of hand if I may say so in the amount of effort and report writing and communications and so on and I know you've got a lot of other things you have to work on, some of which you know, the ACRS thinks are very important that the Staff isn't pushing very hard. I don't need to mention them. You can think of them yourself.

Well, anyway, are there any other comments? Jesse, do you want to comment?

DR. EBERSOLE: No, I rest.

DR. PLESSET: Ivan, Virgil? Well, there's no use keeping you here any longer. We've found it very interesting. I was going to say profitable. I wouldn't go that far. And I presume that you will be meeting with the Grand Gulf subcommittee and with the full committee week after next, is that correct? Well, until then, let's let the subject go. We are adjourned.

(Whereupon, at 1:40 p.m., the meeting was adjourned.)

NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the

Advisory Committee on Reactor Safeguards

in the matter of: Subcommittee Meeting on Fluid Dynamics

Date of Proceeding: July 30, 1982

Docket Number: __________

Place of Proceeding: San Jose, California

were held as herein appears, and that this is the original transcript thereof for the file of the Commission.

DEBORAH LYNN EASLEY

Official Reporter (Typed)

Deborah Lynn Easley

Official Reporter (Signature)

GESSAR/STRIDE DESIGN

ACRS FLUID DYNAMICS SUBCOMMITTEE

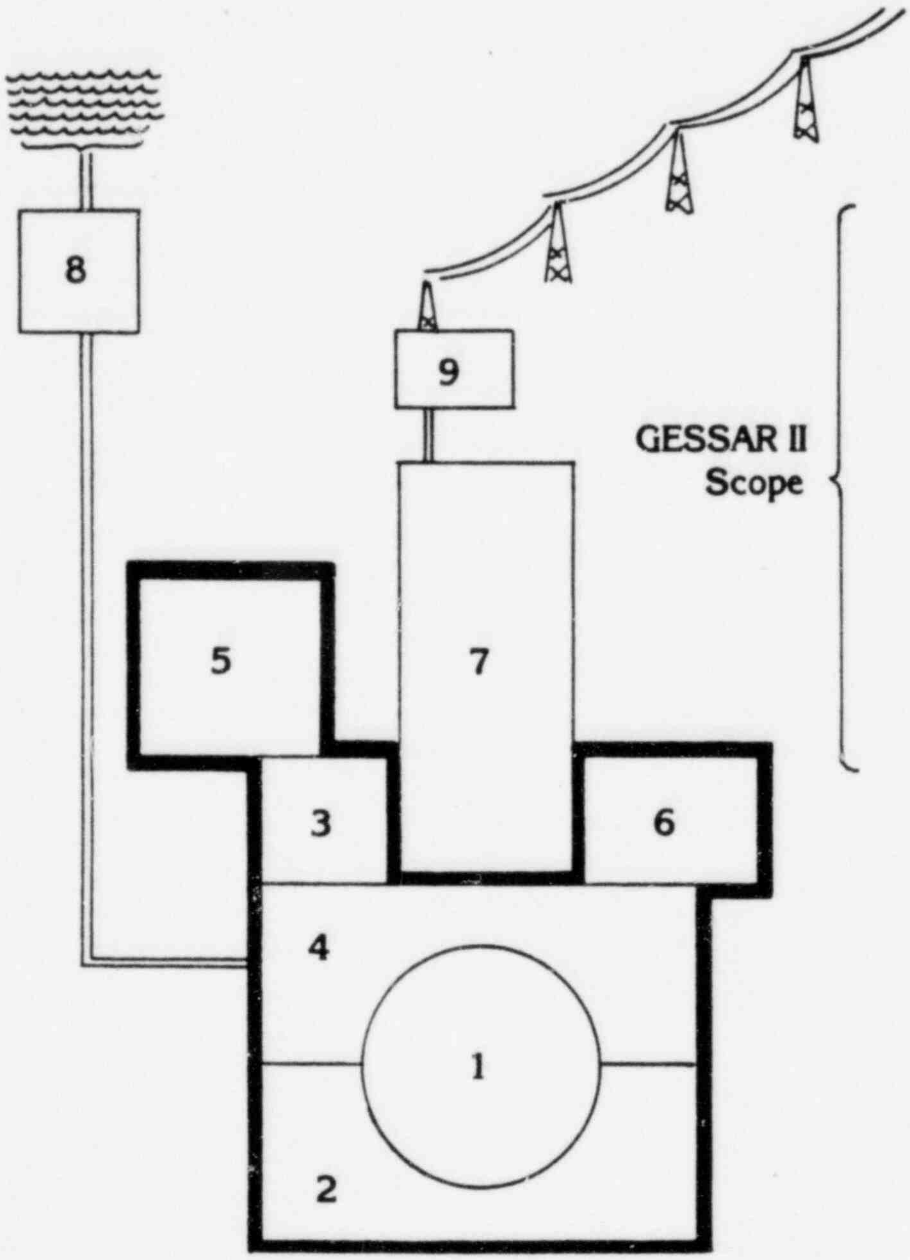
JULY 30, 1982

AM

1. DESCRIPTION OF STRIDE AND GESSAR II PROGRAM - C. CAMERON

2. DETAILED ACTION PLAN FOR HUMPHREY ISSUES - H. TOWNSEND

Scope of GESSAR II Submittal



Nuclear steam supply

(1) Reactor bldg.

Auxiliary nuclear system

(2) Fuel bldg.

(3) Diesel gen. bldg.

(4) Auxiliary bldg.

(5) Radwaste bldg.

(6) Control bldg.

Balance of plant

(7) Turbine bldg.

(8) Service water bldg.

(9) Switchyard

STRIDE PROGRAM

STRIDE - STANDARD REACTOR ISLAND DESIGN (NUCLEAR ISLAND)

WHAT IS IT? - DETAILED DESIGN OF TVA BWR/6-MARK III BY GE/BRAUN

SCOPE - BWR/6-MARK III SAFETY RELATED SYSTEMS AND STRUCTURES

NSSS	REACTOR BLDG.
AUX. BLDG.	FUEL BLDG.
CONTROL BLDG.	D-G BLDG.
RADWASTE BLDG.	

RESPONSIBILITIES:

GE - DESIGN DEFINITION AND LICENSING OF STRIDE

C.F. BRAUN - A/E FOR DETAILED DESIGN AND CONSTRUCTION

TVA - OVERALL CONSTRUCTION AND BOP DESIGN

GESSAR PROGRAM

GESSAR -	GE STANDARD SAFETY ANALYSIS REPORT
WHAT IS IT? -	FSAR FOR STRIDE

RESPONSIBILITIES -

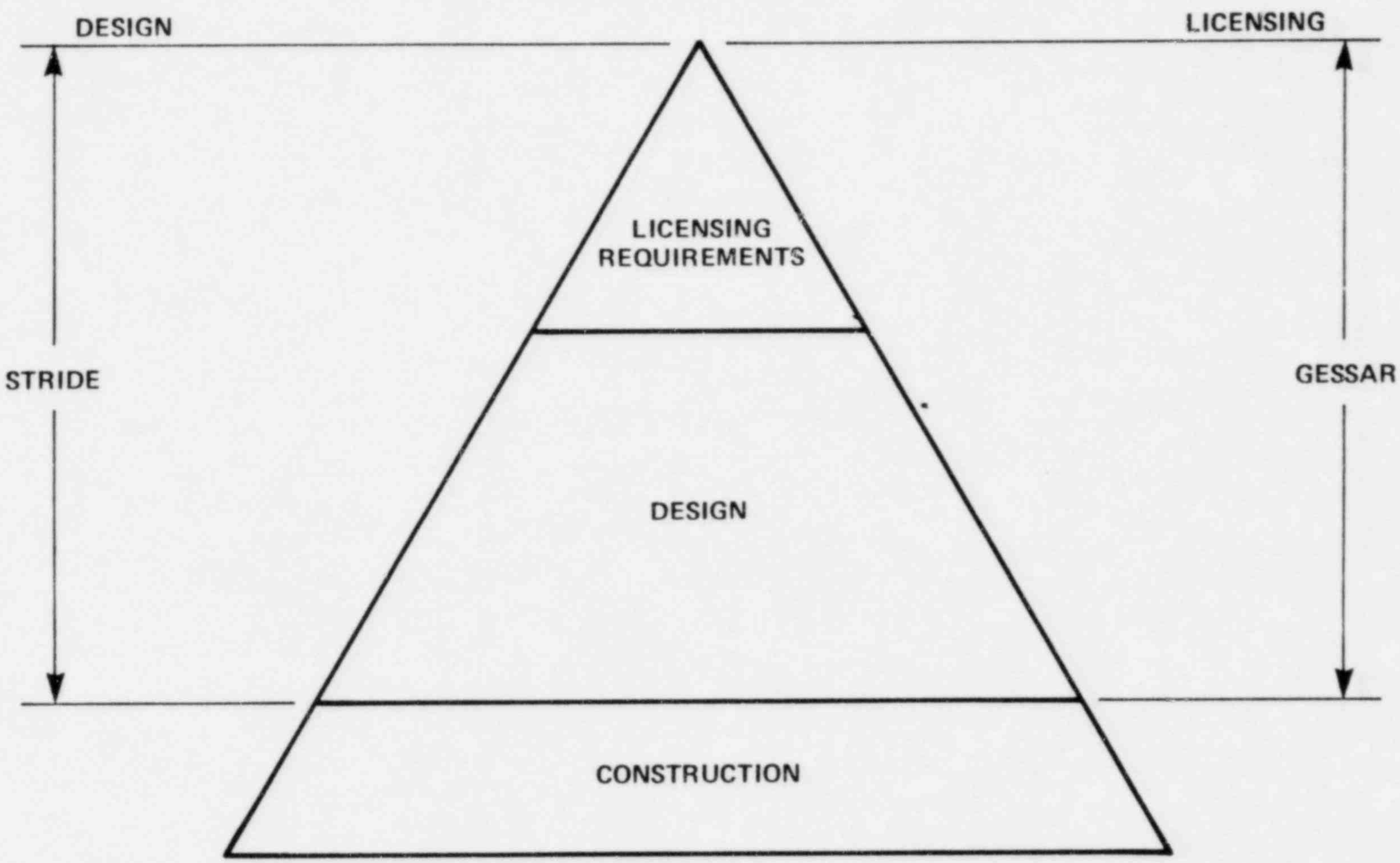
GE -	DESIGN DEFINITION AND LICENSING OF STRIDE
C.F. BRAUN -	DETAILED DESIGN OF SAFETY SYSTEMS AND STRUCTURES SUFFICIENT FOR LICENSING OF GESSAR

SCHEDULE -

DOCKETED BY NRC	FEB. 1982
GE SUBMITTALS	FEB.-MAY 82
GE MEETINGS WITH NRC ON ISSUES	MAR.-SEPT. 82
FINAL DESIGN APPROVAL	APR. 82

GE Standard Safety Analysis Report

GESSAR



RESOLUTION OF CONTAINMENT DESIGN ISSUES AFFECTING GESSAR

BASIC APPROACH

- CLASSIFY ISSUES
- RESPOND ON ISSUES NOT RESOLVED BY GRAND GULF RESPONSES
- ISSUES FALL INTO 5 CATEGORIES:

CATEGORY I — GGNS RESULTS REPRESENTATIVE OR BOUNDING

1.1, 1.2, 1.3, 1.4, 1.5; 1.6, 3.1, 3.2, 3.3, 3.6, 3.7, 4.1, 4.3, 4.4, 4.5, 4.6, 4.8, 4.9, 5.3, 5.4, 7.1, 7.2, 14.0, 19.1, 19.2, 20.0

CATEGORY II — GGNS ACTION PLAN APPLICABLE, WITH GESSAR-UNIQUE DATA USED IN EVALUATIONS

3.4, 3.5, 4.2, 5.1, 5.5, 5.6, 5.8, 6.3, 6.5, 8.2, 8.3, 8.4, 9.1, 9.2, 9.3, 10.1, 10.2, 11.0

CATEGORY III — GESSAR ACTION DIRECTIONS DIFFERENT FROM GGNS

2.1, 2.2, 2.3, 4.7, 4.10, 16.0

CATEGORY IV — (RESOLVED FOR GGNS.) NOT RESOLVED FOR GESSAR

1.7, 6.2, 12.0, 13.0, 15.0, 18.2

CATEGORY V — RESOLVED FOR GESSAR

5.2, 5.7, 7.3, 8.1, 17.0, 18.1, 21.0, 22.0

EITHER - RESOLVED GENERICALLY BY GGNS

OR - NOT APPLICALBE TO GESSAR

OR - DECISION TO CHANGE GESSAR MADE

CATEGORY: III

ISSUE NO.: 2.1

ISSUE STATEMENT:

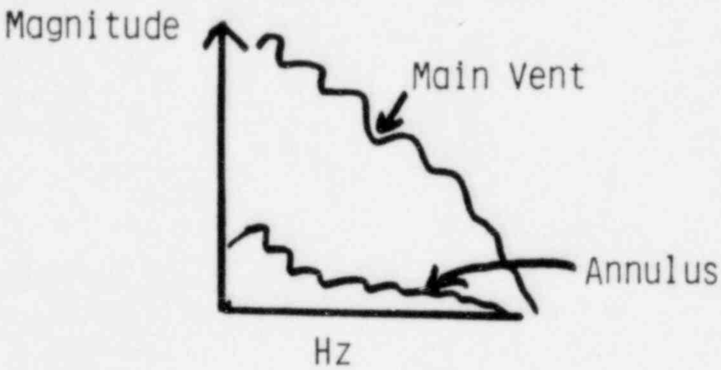
The annular regions between the safety relief valve lines and the drywell wall penetration sleeves may produce condensation oscillation (C.O.) frequencies near the drywell and containment wall structural resonance frequencies.

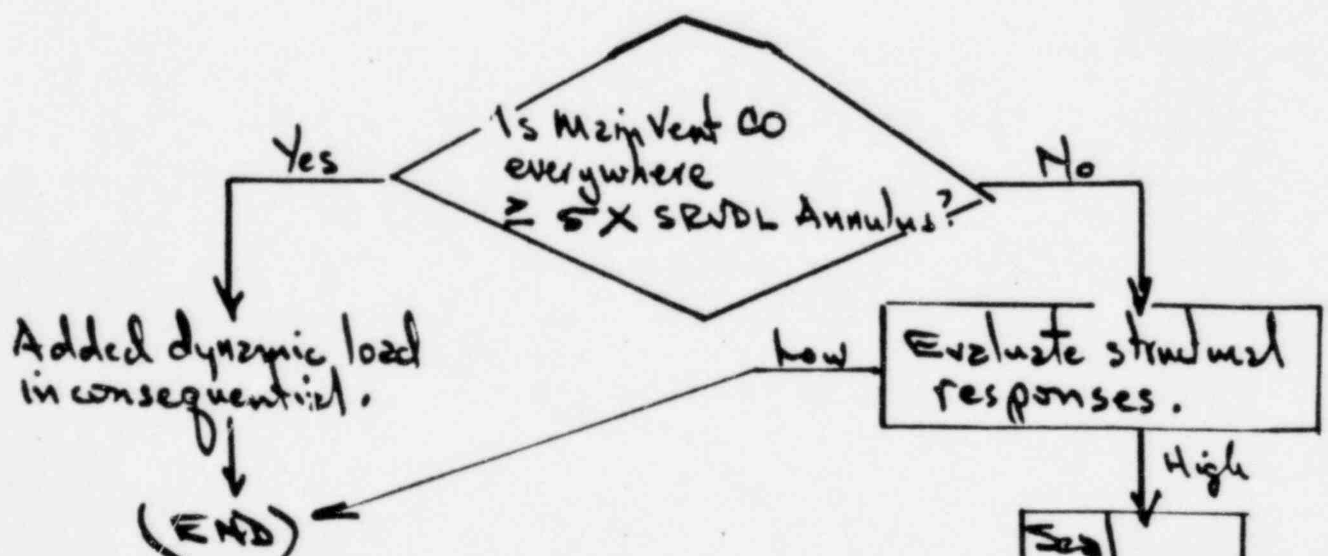
GGNS ACTION DIRECTION:

Seal SRVDL annulus

GESSAR ACTION DIRECTION:

- Estimate SRVDL annulus CO load definition
- Compare with main vent CO load definition:





CATEGORY: III

ISSUE NO.: 2.2

ISSUE STATEMENT:

The potential condensation oscillation and chugging loads produced through the annular area between the SRVDL and sleeve may apply unaccounted for loads to the SRVDL. Since the SRVDL is unsupported from the quencher to the inside of the drywell wall, this may result in failure of the line.

GGNS ACTION DIRECTION:

Seal SRVDL annulus

GESSAR ACTION DIRECTION:

CO: Use GESSAR 2.1 CO load definition:

- -Select dynamic amplification factors for cyclic load
- -Do static load evaluation

CHUGGING:

Adjust Mark II downcomer lateral load to reflect annulus D_{EFF}

- -Select dynamic amplification factor for impulse load
- -Do static load evaluation

CATEGORY: III

ISSUE NO.: 2.3

ISSUE STATEMENT:

The potential condensation oscillation and chugging loads produced through the annular area between the SRVDL and sleeve may apply unaccounted for loads to the penetration sleeve. The loads may also be at or near the natural frequency of the sleeve.

GGNS ACITON DIRECTION:

Seal SRVDL annulus

GESSAR ACTION DIRECTION:

-Apply same chugging lateral load definition (from 2.2) to penetration sleeve

-Select dynamic amplification factor for impulse load

-Do static load evaluation

CATEGORY: III

ISSUE NO.: 4.7, 4.10

ISSUE STATEMENT:

4.7: All analyses completed for the Mark III are generic in nature and do not consider plant specific interactions of the RHR suppression pool suction and discharge.

4.10: Justify that the current arrangement of the discharge and suction points of the pool cooling system maximizes pool mixing (pp. 150-155 of 5/27/82 transcript)

GGNS ACTION DIRECTION:

Perform analysis, or develop test program

GESSAR ACTION DIRECTION:

Provide writeups of findings gleaned from Kuo-Sheng in-plant pool mixing tests, which establish that GESSAR RHR system/pool arrangement yields rapid and acceptably complete mixing.

CATEGORY: IV

ISSUE NO.: 1.7

ISSUE STATEMENT:

The vent area above the suppression pool at the HCU floor is not evenly distributed above the pool. The PSTF tests which were conducted yielded results based upon the assumption that the vent area was evenly distributed. The non-uniform distribution may create unanticipated perturbations in breakthrough height, swell height, etc.

GESSAR ACTION DIRECTION:

Provide references to applicable portions of GESSAR Appendix 3B, specifying HCU floor open-area requirement.

CATEGORY: IV

ISSUE NO: 6.2

ISSUE STATEMENT:

General Electric has recommended that an interlock be provided to require containment spray prior to starting the recombiners because of the large quantities of heat input to the containment. Incorrect implementation of this interlock could result in inability to actuate the recombiners without containment spray.

GESSAR ACTION DIRECTION:

Pursue through normal change control process to implement the proposed change (removal of interlock).

CATEGORY : IV

ISSUE NO.: 12.0

ISSUE STATEMENT:

The upper pool dumps into the suppression pool automatically following a LOCA signal with a thirty minute delay timer. If the signal which starts the timer disappears on the solid state logic plants, the timer resets to zero preventing upper pool dump.

GESSAR ACTION DIRECTION:

Revise SPMUS logic to assure automatic SPMUS actuation for all accident events for which additional suppression pool inventory is required.

CATEGORY: IV

ISSUE NO.: 13.0

ISSUE STATEMENT:

The "B" loop of the containment sprays includes a 90 second timer to prevent simultaneous initiation of the redundant containment sprays. Because of instrument drift in the sensing instrumentation and the timers, GE estimates that there is a 1 in 8 chance that the sprays will actuate simultaneously. Simultaneous actuation could produce negative pressure transients in the containment and aggravate temperature stratification in the suppression pool.

GESSAR ACTION DECISION:

Submit write-up of the analysis performed that shows negative containment pressures in excess of GESSAR design value (-0.8 psid) were not reached.

CATEGORY: IV

ISSUE NO.: 15.0

ISSUE STATEMENT:

The STRIDE plants had vacuum breakers between the containment and the secondary containment. With sufficiently high flows through the vacuum breakers to containment, vacuum could be created in the secondary containment.

GESSAR ACTION DIRECTION:

1. Define limiting negative pressure due to VB operation.
2. Confirm shield building and equipment are qualified for negative pressure, and specify condition in documents.

CATEGORY: IV

ISSUE NO.: 18.2

ISSUE STATEMENT:

Insulation debris may be transported through the vents in the drywell wall into the suppression pool. This debris could then cause blockage of the suction strainers.

GESSAR ACTION DIRECTION:

Present for NRC review completed GE analysis that showed "mirror" insulation used in GESSAR will plug less than 10% of the suction area.

RESOLUTION SCHEDULE:

-Finalize detail action plan and schedule:
September 3, 1982

NSSS/AE INTERFACE

GRAND GULF PROJECT

I. GENERAL COMMENTS

- o CONTINUOUS INTERFACE BETWEEN GE, AE, AND PLANT OWNER
- o PROPOSAL/CONTRACT DOCUMENTATION THROUGH COMMERICAL OPERATION
- o NATURE OF INTERFACE INFORMATION
  - o MANDATORY REQUIREMENTS, RECOMMENDATIONS, AND INFORMAL INFORMATION
  - o COVERS NUCLEAR SAFETY, PERSONNEL SAFETY, PLANT OPERABILITY, WARRANTY, AND CONTRACT CONSIDERATIONS

NSSS/AE INTERFACE

GRAND GULF PROJECT

II. GE INTERFACE DOCUMENTS

A. SPECIFICATIONS

- A62 SERIES - PLANT REQUIREMENTS
  - GE TO AE
  - MANDATORY BALANCE OF PLANT (BOP) REQUIREMENTS
- A42 SERIES - REPORTS AND DATA SHEETS
  - GE TO AE
  - GENERAL INFORMATION
  - SOME DESIGN INFORMATION
- A22 SERIES - APPLICATION ENGINEERING INFORMATION
  - GE TO AE
  - RECOMMENDATIONS
  - INFORMAL INFORMATION
- NSSS SYSTEMS
  - GE TO AE
  - MANDATORY REQUIREMENTS, CRITERIA, GENERAL INFORMATION, RECOMMENDATIONS

B. DESIGN DRAWINGS AND OTHER SOFTWARE

GRAND GULF PROJECT

CONTAINMENT RELATED DOCUMENTS

- A62 SERIES
  - CONTAINMENT ISOLATION DIAGRAM
  - REACTOR CONTAINMENT REQUIREMENTS
  - SEISMIC DESIGN FOR NSSS EQUIPMENT
  - DRYWELL COOLING LOADS
  - NSSS EQUIPMENT CONTAINMENT ENVIRONMENT REQUIREMENTS
  - SUPPRESSION POOL MAKE-UP SYSTEM REQUIREMENTS
  - STRUCTURAL AND MECHANICAL NSSS LOADING CRITERIA
  - REACTOR SYSTEM DATA
- A42 SERIES
  - CONTAINMENT LOADS REPORTS (CLR)
  - SUPPRESSION POOL SOURCE TERMS
- A22 SERIES
  - CONTAINMENT DOSE REDUCTION STUDY
  - CONTAINMENT SYSTEMS INFORMATION - RECOMMENDATIONS, DESIGN BASES
- GESSAR APPENDIX 3B
  - REFERENCED IN FSAR AS GRAND GULF CONTAINMENT LOADS BASIS

III. DESIGN INTERFACE PROCESS

A. GENERATE AND DISTRIBUTE DOCUMENTATION

B. DESIGN FREEZE

- o ESTABLISH EARLY BASE-LINE TO ASSURE REGULATORY, DESIGN, AND CONTRACTURAL REQUIREMENTS

C. CONTINUOUS COMMUNICATION PROCESS

- o DAILY TELECONFERENCES
- o LETTERS - FORMALIZED TRACKING
- o MEETINGS
  - o WORKING - LEVEL DESIGN REVIEWS
  - o TECHNICAL INFORMATION AND TECHNOLOGY UPDATE
  - o SENIOR LEVEL MANAGEMENT PROBLEM REVIEWS

D. CHANGES TO DESIGN REQUIREMENTS

- o ENGINEERING CHANGE AUTHORIZATION - ECA
- o ENGINEERING CHANGE NOTICE - ECN
- o FIELD DISPOSITION INSTRUCTION - FDI
- o FIELD DEVIATION DISPOSITION REQUEST (INSTRUCTION) - FDDR
- o ALL CHANGES PROCESSED IN ACCORDANCE WITH 10CFR50 APPENDIX B

E. GENERAL AND OPERATIONAL INFORMATION

- o APPLICATION INFORMATION DOCUMENT - AID
- o SERVICE INFORMATION LETTER - SIL

IV. SPECIAL INTERFACE PROGRAMS

A. BWR OWNERS GROUP

B. TMI ISSUES

C. EVALUATION OF NSSS EQUIPMENT UNDER VARIOUS DYNAMIC LOADS

D. ATWS

E. EQUIPMENT ENVIRONMENTAL QUALIFICATION

F. SQRT

V. GRAND GULF BOP INTERFACE REVIEW - GE AND AE

A. UNDERSTANDING/INTERPRETATION OF GE REQUIREMENTS

B. CONDUCTED ONCE PER YEAR

C. ENGINEERING MANAGEMENT SELECTED SYSTEMS FOR REVIEW

D. LEAD ENGINEERS PROPOSED ITEMS FOR REVIEW

E. RANDOM SELECTION OF ITEMS FOR SPECIFICATION COMPLIANCE

F. OPEN ITEMS TRACKED FOR RESOLUTION

VI. INSTALLATION, PREOP, AND STARTUP TESTING

A. GENERATE AND IMPLEMENT INSTALLATION, CONSTRUCTION, AND STORAGE PROCEDURES

B. GENERATE AND IMPLEMENT TESTING SPECIFICATIONS

- REVIEW AND APPROVE OWNER'S PROCEDURES

VII. PRE FUEL LOAD REVIEW

A. MANDATED BY GE MANAGEMENT ON GRAND GULF

B. ASSURE NSS SYSTEMS WILL BE STARTED UP SAFELY AND BE CAPABLE OF SAFE/RELIABLE COMMERCIAL OPERATION

C. QUALITY ASSURANCE OPERATION ESTABLISHED GENERAL AND SPECIFIC AREAS FOR REVIEW

D. EXPERIENCED REVIEW TEAM EVALUATED PLANT PRIOR TO FUEL LOADING

E. FINDINGS BY TEAM

- o COMMUNICATED TO OWNER FOR INFORMATION AND ACTION
- o COMMUNICATED TO GE SENIOR MANAGEMENT
- o ALL ITEMS ARE ADDRESSED BY RESPONSIBLE PARTIES

GE/A/E INTERFACE

1. SUMMARY:

- DESIGN INTERFACE WITH ANY OUTSIDE ORGANIZATION IS RECOGNIZED AS A KEY QUALITY ISSUE AND AS SUCH IS RIGOROUSLY CONTROLLED UNDER THE UMBRELLA OF BECHTEL POWER CORPORATION QA PROGRAM.

  NOTE: DETAILED DISCUSSION OF DESIGN CONTROL UNDER BPC QA PROGRAM CAN BE FOUND IN MPB-82/0100 (3/1/82). THIS DOCUMENT WAS TRANSMITTED TO THE NRC VIA AECM-82/119 (3/26/82).

- DESIGN INTERFACE CONTROLS HAVE BEEN A SUBJECT OF MANY QA AND TECHNICAL AUDITS CULMINATING IN A RECENT INDEPENDENT DESIGN REVIEW (IDR) CONDUCTED BY CYGNA.

  THE OBJECTIVE OF IDR WAS:

  - REVIEW ALL QA ACTIVITIES TAKING PLACE DURING THE NEW LOADS ADEQUACY EVALUATION (NLAE).

  - REVIEW PIPING AND PIPE SUPPORTS DESIGN OF RHR LOOP "A".

  NOTE: NRC STAFF SPECIFICALLY DIRECTED CYGNA TO CONCENTRATE ON THE INTERFACE PROCESS WITHIN AND WITHOUT BPC AS GGNS A/E.

- SEVERAL POINTS DESERVE ATTENTION:

  - NLAE IS ONE OF THE MAJOR DESIGN ACTIVITIES, INVOLVING MORE THAN ONE ORGANIZATION, HAVING TAKEN PLACE DURING THE GGNS DESIGN PROCESS.

  - CLR, OR PRECISELY GESSAR II APPENDIX 3B, WAS A BASIS FOR A/E'S DESIGN IN THE CASE OF GGNS. THIS IS REFLECTED IN THE FSAR.

- THE EXTENSIVE REVIEW, CONDUCTED BY CYGNA RESULTED IN NO INTERFACE RELATED FINDINGS.

. IN MARCH, 1980, ANOTHER INDEPENDENT DESIGN REVIEW TOOK PLACE. EXTENSIVE REVIEW BY NRC STAFF AND EG&G IDAHO, INC. DEMONSTRATED COMPLIANCE OF ALL CATEGORY I STRUCTURES WITH APPLICABLE CODES, STANDARDS, REG. GUIDES AND GE CO. INTERIM CONTAINMENT LOADS REPORT. DETAILS MAY BE FOUND IN MPB-82/0100 (AECM-82/119).

SLIDE #1

DESIGN INTERFACE CONTROL

GE/BECHTEL DESIGN INTERFACE REQUIREMENTS DEFINED IN PROJECT PROCEDURES MANUAL (PPM) APPENDIX B

- DESIGN CRITERIA
- FINAL DESIGN
- DESIGN REVIEW
- PROCUREMENT
- STARTUP SERVICES
- SAFETY ANALYSIS REPORTS

PROJECT DESIGN CRITERIA MANUAL

Slide #3

DESIGN INTERFACE COMPOSED OF
THREE MAIN ELEMENTS

- Document Control
- Document Review and Coordination
- Interface Control Verification

SLIDE #4

DOCUMENT CONTROL

PROJECT ENGINEERING PROCEDURES MANUAL (PEPM) - CONTAINS DETAILED PROCEDURES FOR HANDLING/TRACKING DOCUMENTS

- AUTOMATED DOCUMENT CONTROL REGISTER (ADCR)
- LOG IN/LOG OUT PROCEDURE
- Q COMMUNICATION TRACKING
- UP-TO-DATE FILES OF GE DOCUMENTS FOR READY ACCESS BY PROJECT PERSONNEL

GE MONTHLY DOCUMENTATION STATUS REPORTS - IDENTIFIES DOCUMENTS AND LATEST REVISIONS APPLICABLE TO GRAND GULF PROJECT

c. Vendors Document Review Stamp - See Section 4.3.2.2

Note: For all Vendors except GE-NED

VENDOR'S DOCUMENT REVIEW

1 ☐ Approved - Mfg. may proceed.

2 ☐ Approved - Submit final dwg. - Mfg. may proceed.

3 ☐ Approved - except as noted - Make changes and submit final dwg. - Mfg. may proceed as approved.

4 ☐ Not approved - Correct and resubmit.

5 ☐ Review not required - Mfg. may proceed.

Approval of this document does not relieve supplier from full compliance with contract or purchase order requirements.

By .... Date ....
BECHTEL

JOB NO. 9645	BECHTEL POWER CORPORATION P. O. BOX 607 GAITHERSBURG, MD

d. GE-NED Drawing Review Stamp - See Section 4.3.2.2

APED DRAWING REVIEW

COMMENTS AS CHECKED BELOW

☐ 1. No Comments

☐ 2. Comments as indicated, for APED's information and use only. No reply required.

☐ 3. Comments as indicated, when directly affecting Bechtel responsibility. Reply required if not incorporated by APED.

By__________ Date__________
BECHTEL

BECHTEL Gaithersburg, Md.	JOB No. 9645

SLIDE #5

DOCUMENT REVIEW AND COORDINATION

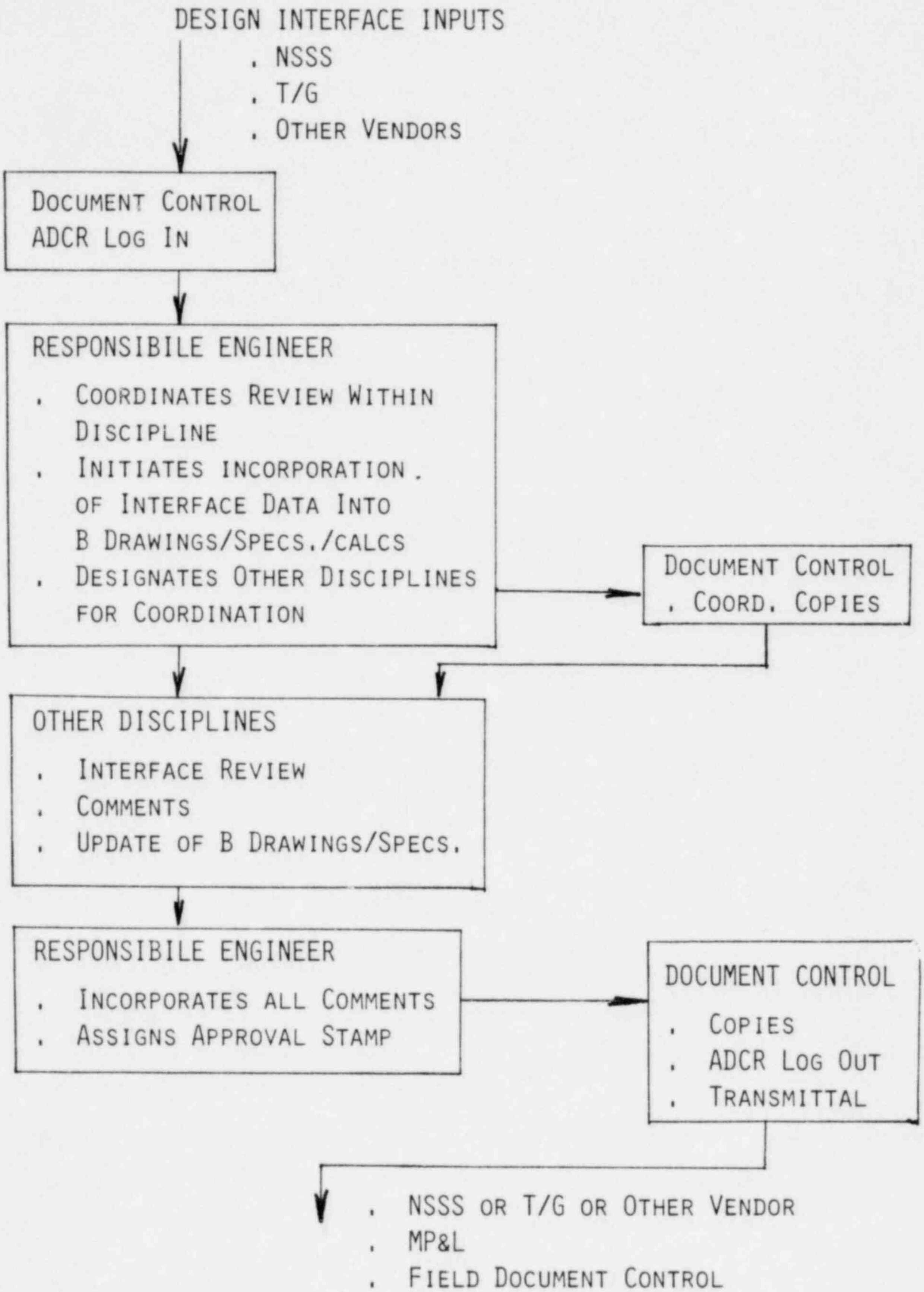
PEPM - DETAILED PROCEDURES FOR REVIEW AND COORDINATION OF DOCUMENTS

GE/BECHTEL CONTAINMENT CONCEPTIONAL DESIGN TASK FORCE

DESIGN REVIEW MEETINGS (MP&L/GE/BECHTEL) - 128 RECORDED MEETING NOTES

SIGNIFICANT INTERFACE ISSUES RESOLVED BY Q COMMUNICATION (TRACKING)

GE WRITTEN CONCURRENCE REQUIRED FOR DEVIATIONS FROM DESIGN REQUIREMENTS/CRITERIA


DESIGN INTERFACE INPUTS
. NSSS
. T/G
. OTHER VENDORS
DOCUMENT CONTROL
ADCR LOG IN
RESPONSIBILE ENGINEER
. COORDINATES REVIEW WITHIN DISCIPLINE
. INITIATES INCORPORATION OF INTERFACE DATA INTO B DRAWINGS/SPECS./CALCS
. DESIGNATES OTHER DISCIPLINES FOR COORDINATION
DOCUMENT CONTROL
. COORD. COPIES
OTHER DISCIPLINES
. INTERFACE REVIEW
. COMMENTS
. UPDATE OF B DRAWINGS/SPECS.
RESPONSIBILE ENGINEER
. INCORPORATES ALL COMMENTS
. ASSIGNS APPROVAL STAMP
DOCUMENT CONTROL
. COPIES
. ADCR LOG OUT
. TRANSMITTAL
. NSSS OR T/G OR OTHER VENDOR
. MP&L
. FIELD DOCUMENT CONTROL

Slide #6

INTERFACE CONTROL VERIFICATION

- BECHTEL GPD QA/QE AUDITS
- BECHTEL TPO AUDIT - 1978
- INTERFACE REVIEW MEETINGS WITH GE - 1979 AND 1981
- OPERATIONAL READINESS REVIEW BY GE
- SYSTEMATIC REVIEW OF KEY GE DESIGN DOCUMENTS - 1978 THRU 1980
- REVIEW OF GE FSAR SECTIONS
- NRC AUDIT - 1981
- INDEPENDENT DESIGN REVIEW (GYGNA) - 1982
- SYSTEMS CHECKOUT FOLLOWING CONSTRUCTION
- PRE-OPERATIONAL TESTING

NSSS/AE INTERFACE

- o MP&L RECOGNIZED THE NEED FOR A GOOD INTERFACE AND HAS MAINTAINED ACTIVE INVOLVEMENT SINCE THE BEGINNING OF THE PROJECT

- o MP&L WAS ACTIVELY INVOLVED IN THE DEVELOPMENT OF AND APPROVED THE PROJECT PROCEDURES MANUAL

- o DURING THE CRITICAL PHASE OF THE PROJECT, MP&L HAD MONTHLY MANAGEMENT MEETINGS TO RESOLVE PROBLEMS AND ASSURE PROPER INTERFACE

- o INTERNAL REVIEW TO SUPPORT IDR PROVIDED ASSURANCE THAT DESIGN CONTROL REQUIREMENTS WERE ADEQUATELY IDENTIFIED AND IMPLEMENTED

- o IDR BY CYGNA VERIFIED ADEQUATE INTERFACE

- o MARK III OWNERS GROUP FORMED WHICH PROVIDED AN EXCELLENT INTERFACE FORUM
  - HISTORY
  - PURPOSE
  - PARTICIPANTS
  - TYPICAL ISSUES DISCUSSED

WMD:LM/8Q-2
7/28/82

MARK III CONTAINMENT OWNERS GROUP

HISTORY

- o FORMED BY MK III UTILITIES DECEMBER 1976
- o CONTINUED UNTIL THE NRC COMPLETED THE GESSAR # APPENDIX 3B REVIEW

PURPOSE

- o A NON-COMMERCIAL GROUP FORMED AS A FORUM FOR INFORMATION EXCHANGE ON CONTAINMENT RELATED ISSUES

PARTICIPANTS

- o UTILITIES WITH MARK III CONTAINMENT (VOTING)
- o AE'S OF MARK III CONTAINMENT UTILITIES (NON VOTING)
- o INTERNATIONAL UTILITIES WITH MK III CONTAINMENT (NON VOTING)
- o GENERAL ELECTRIC (NON VOTING)

WMD:LM/8N-3
7/28/82

MARK III CONTAINMENT OWNERS GROUP

DISCUSSED

- o OVER THE SIX YEARS, ESSENTIALLY EVERY DESIGN RELATED CONTAINMENT ISSUE I.E.,
  - EVERY LOAD DEFINITION IN THE GESSAR II APPENDIX 3B - SRV, LOCA, CHUGGING, CO
  - DESIGN IMPACTS OF GESSAR II LOAD DEFINITIONS
  - VISITS TO TEST FACILITIES

WMD:LM/8N-4
7/28/82

GE/C.F. BRAUN INTERFACE

GE PROVIDES:

- SAME NSSS INFORMATION PROVIDED TO UTILITY/AE
  - GENERAL DESIGN AND INTERFACE DOCUMENTS
  - SYSTEM DESIGN DOCUMENTS FOR NSSS

- DESIGN SPECIFICATIONS FOR BALANCE OF NUCLEAR ISLAND
  - SYSTEM AND BUILDING REQUIREMENTS FOR NON-NSSS PART OF STRIDE
  - DESIGN BASES SHOWN IN GESSAR

GE/C.F. BRAUN INTERFACE PROCESS

- CONTROLLED MANAGEMENT
  - STRIDE PROJECT ORGANIZATION
- GE REVIEWS AND APPROVES C.F. BRAUN DOCUMENTS PRIOR TO RELEASE
  - ITERATIVE DESIGN OF SOME FEATURES
- CHANGES TO DESIGN REQUIREMENTS
  - ECAs IMPLEMENTED BY GE OR C.F. BRAUN
- GE AND CUSTOMER AUDITS OF C.F. BRAUN DESIGN AND DESIGN PROCEDURES