NUCLEAR REGULATORY COMMISSION

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

IN THE MATTER OF:

ZIMMER NUCLEAR POWER PLANT

Place - Florence, Kentucky

Date - Friday, 17 November 1978 Pages 1-213

Telephone:
(202) 347-3700

ACE - FEDERAL REPORTERS, INC.

Official Reporters

444 North Capitol Street
Washington, D.C. 20001

NATIONWIDE COVERAGE - DAILY

PUBLIC NOTICE BY THE

UNITED STATES NUCLEAR REGULATORY COMMISSION'S

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

Friday, 17 November 1978

The contents of this stenographic transcript of the proceedings of the United States Nuclear Regulatory Commission's Advisory Committee on Reactor Safeguards (ACRS), as reported herein, is an uncorrected record of the discussions recorded at the meeting held on the above date.

No member of the ACRS Staff and no participant at this meeting accepts any responsibility for errors or inaccuracies of statement or data contained in this transcript.

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

ZIMMER SUBCOMMITTEE

MEETING

Holiday Inn
8050 Highway 42
Florence, Kentucky 41094

Friday, 17 November 1978

The Subcommittee meeting was convened at 8:30 a.m.

BEFORE:

DR. MYER BENDER, Subcommittee Chairman.

DR. MILTON PLESSET, ACRS Member.

PRESENT:

DR. ZUDANS, DR. CATTON, MR. LIPINSKI and MR. DITTO, Consultants to the ACRS Subcommittee.

MR. I. PELTIER, MR. R. J. BOSNAK, MR. S. ISRAEL, MR. R. SCHOLL, MR. J. M. KOVACS, and DR. W. BUTLER, on behalf of the NRC Staff.

MR. J. D. FLYNN, MR. E. A. BORGMAN, MR. H. C. BRINKMAN, MR. J. R. SCHOTT, MR. W. W. SCHWIERS, MR. H. E. CRAIL, on behalf of the Applicant.

CONTENTS

P R O C E E D I N G S

CHAIRMAN BENDER: This meeting will now come to order.

This is a meeting of the Advisory Committee on Reactor Safeguards Subcommittee on Wm. H. Zimmer Nuclear Power Station, Unit 1.

I am Myer Bender, Subcommittee Chairman.

The other ACRS Member is Dr. Milton Plesset, on my left.

In addition to that we have a number of ACRS Consultants: Dr. Catton, Dr. Zudans, Mr. Lipinski and Mr. Ditto.

On my right, the Designated Federal Employee is Dr. Richard Savio. Next to him is Dr. Thomas Eaton, who is a member of our Fellowship Program, and Mr. Duraiswamy, who is another member of the ACRS Staff.

Mr. Duraiswamy and Dr. Savio will be taking care of the administrative parts of this meeting, so if any of you have difficulties please consult with them.

The rules for participation in today's meeting have been announced as part of the notice of this meeting previously published in the Federal Register on Friday, October 20, 1978, Wednesday, November 1, 1978 and Thursday, November 9, 1978.

The meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act and the Government in the Sunshine Act. The purpose of the meeting is to review the application of the Cincinnati Gas & Electric Company for a license to operate the Wm. H. Zimmer Nuclear Power Station, Unit 1.

A transcript of this meeting is being kept and will be made available as stated in the Federal Register Notice. It is requested that each speaker first identify himself or herself and speak with sufficient clarity and volume so that he or she can be readily heard.

We have received no written comments from members of the public, and we have received no requests to make oral statements from members of the public at this meeting up to now.

Consequently, we will devote the main time the meeting to an agenda which, hopefully, has been available to the participants.

Our plan is to hear presentations from the Regulatory Staff first, and then to hear from the Applicant's representatives concerning the status of the plant and the plans for operational use.

As I understand it, Mr. Peltier will be speaking for the Staff. Where is he?

MR. PELTIER: Right here.

CHAIRMAN BENDER: Good morning. And Mr. Flynn will be speaking for the Applicant.

Good morning, Mr. Flynn.

Let me ask whether everybody can hear me? Is there any problem?

If there's anyone who can't hear me, please raise his hand.

This room is a little crowded, obviously, and it may be a bit uncomfortable for people in moving in and out. We'll try to arrange for reasonable breaks between presentations, but recognizing the frailty of the human animal, anybody who feels he needs to get up and get out, just get up. Don't worry too much about whether we're interrupted.

The first portion of this meeting was planned as an executive session, and I will begin by soliciting my colleague to determine whether he has anything he would like to suggest about the conduct of this meeting?

DR. PLESSET: No, Mr. Chairman. I have a few questions of the Staff, but they'll come up later.

CHAIRMAN BENDER: Very good.

Let me ask the Consultants. I'll start at the far end. Steve, do you have anything that you want to say?

MR. DITTO: No.

MR. LIPINSKI: Nothing, specifically.

DR. ZUDANS: Later.

DR. CATTON: I can wait.

CHAIRMAN BENDER: Very good.

Under the circumstances, there's no sense in losing valuable time, so I suggest that we move right into the agenda of the meeting.

Mr. Peltier, would you like to begin by outlining your issues?

MR. PELTIER: I'm Irv Peltier, with the Nuclear Regulatory Commission Staff, Licensing Project Manager for Zimmer.

Mr. Chairman, Committee Members:

I'll try to be very brief during my early presentation here, and hopefully when we get further into the agenda we can go into some of the topics that I'll mention just briefly now in greater detail.

In the way of background, the Zimmer application was tendered in May of 1975. The Staff's acceptance review delayed docketing the final safety analysis report until September of 1975.

Zimmer is the first BWR-5 with the Mark II containment to be reviewed by the Staff at the final design stage. There were a number of systems which the Staff had not reviewed in detail on previous applications.

For example, the Mark II containment concept, the flow control valve and recirculation control system, the reactor manual control system with self-monitoring multiplex information transfer of solid state circuitry.

The major area of the comprehensive review was the pool dynamic load resulting from LOCA and safety relief valve discharge.

By January of 1977 Staff's scheduled review had been completed to the extent that 68 issues had been identified, and the Applicant was informed of those issues at that time.

Since that time, a concerted effort by the Staff and the Applicant reduced the number of issues to 17.

The remaining issues fall into what I've put into two categories.

The first category contains those issues for which the Staff has reached a position and is still in the process of reviewing the Applicant's responses to those positions.

The second category contains those issues for which additional information is required before the Staff can reach its final position.

(Slide.)

Now, I'll show these in Vugraph form here very cryptically, and we can discuss this later on or now, as you desire.

These are the issues which I feel the Staff has a position on. We do need some additional information in order to close the issues out.

Mr. Chairman, I'm prepared to talk about each one of these later on in the agenda --

CHAIRMAN BENDER: Before you do anything we need to get that thing so it focuses. It doesn't quite do what it's supposed to do. Why don't you just take a minute and see if we can get it to work. I think the screen is not normal to the projector.

(Pause.)

MR. PELTIER: I can read them off.

(Slide.)

The first one is the dewatering of compacted backfill.

Second is the reactor vessel supports.

Preservice and inservice inspection program.

Effects of recirculation pump trip in over pressurization analyses.

Protection of motor/generator sets in the reactor scram system.

Physical separation and electrical isolation.

Fire protection.

Plant and support staffing.

And industrial security.

(Slide.)

On the issues that fall in the second category, where the Staff has not reached a final position yet and needs more information in order to do so:

Design for pool dynamic loads.

Seismic qualification of mechanical and electrical equipment.

Conservatism in transient analyses.

Low pressure coolant injection diversion effects on ECCS and long-term cooling.

Pool dynamic loads and load combinations.

All other instrumentation required for safety.

And preoperational and startup test program.

(Slide.)

Now, the Staff also considers what we call the ACRS generic concerns, and what I have done here is I have listed the ACRS generic concerns and matched them up with our task action plan and the status of these in the SER. It takes a couple of Vugraphs to get them all on. I'll just show them now and we can come back to them later if you wish to discuss any of them.

In the left-hand column we have the designation of the ACRS generic concern. We have in the middle column the task action plan, Staff's task action plan, which embodies the scope of the ACRS concern. In the right-hand column we have the SER status of that concern. In many cases we reference our May 4 status report to the Committee on these items. And I understand that sometime in December the Staff is going to update that status for the Committee in a meeting in Washington.

CHAIRMAN BENDER: Is that all you plan to say about the generic items with respect to this application?

MR. PELTIER: I intend to touch on those which you have indicated in the agenda --

CHAIRMAN BENDER: All right, fine.

MR. PELTIER: Just to complete the list here --

(Slide.)

-- that's what the total list looks like, including the non-applicable ones. And then I have taken all the non-applicable ones out and put them on one Vugraph so it will be a little more convenient when we go back to this topic.

(Slide.)

CHAIRMAN BENDER: What do we know about the resolution dates for all these matters?

MR. PELTIER: I'm sorry, I didn't hear the question?

CHAIRMAN BENDER: What do we know about the resolution time for all these matters?

MR. PELTIER: The resolution time?

CHAIRMAN BENDER: Yes.

MR. PELTIER: I understand that we are going to update our status to you people in Washington in December. And at that time I think there will be some revision of the completion dates on the task action plans. I'm sure some of them are slipping.

CHAIRMAN BENDER: Thank you.

MR. PELTIER: I'd like to apologize for the draft SER. It just was not possible to get a complete product before this site visit and meeting. So we had to issue the draft and, as with all drafts, there are a number of topos, mistakes, and because of the overlapping between review groups there are also some inconsistencies in the draft. I hope that it hasn't been too inconvenient.

In the way of additional topics, I'd just like to point out that the Staff has completed its review of the design for protection of tornado missiles and finds it acceptable. Our safety evaluation on that topic is not in the SER draft.

Also, the Staff is concerned about the qualification of equipment for radiation exposure. We're looking at this generically for BWR plants, but since the qualification involves the calculation of exposure for 40 years of operation, plus a LOCA, we don't feel the resolution is of immediate concern. However, we are looking at that, and that topic was not included in the list of issues.

Unless there are any questions, I'll stop here and we can take up these in more detail later.

DR. CATTON: I have a couple of questions, and I'd like to raise them now to be sure that maybe you would touch on them later.

MR. PELTIER: Certainly.

DR. CATTON: As you know, during the reactivity insertion accident at PBF recently that found that the pin came apart at 240 calories per gram of energy. Is that an appropriate issue?

MR. PELTIER: Yes.

DR. CATTON: And I noticed in reading the acquisition withdrawal sequence report of G.E., that the worst case calculations showed an addition of 232 calories per gram. And it seems to me that's a bit close. Is this being considered?

I'll just go through these, and wherever they're appropriate you can address them.

Secondly, on the collet retainer tube, I haven't been able to find anywhere what's going to be done about the thermal stress problem, if anything. Or is it needed? This is the stress cracking.

On fuel bundle lift, I tried to put that together several times, and I can't seem to get it straight just how the problem is eliminated. This is during the LOCA, when you get a little bit more expansion in the fuel bundle boxes and they're pinching on the cruciform. I don't know where they get the force between the cruciform and the box.

Then a couple of things that came up yesterday on the tour, the control rod drive tubes are packed very closely together on either one side or the other of the shield wall, and between the drive tubes and the shield wall is the recirc pipe. And I'm wondering if any consideration is given to breaking of the recirc pipe close to the tubes. And if so, what damages can result?

Finally, while down in the wet well, the vent pipes are 36 feet long and there is no support at their ends. That means that if the lateral loads are at all high you're going to get some rather severe stresses at the top. I have not seen any -- maybe I've just missed it -- anything that discusses what the peak loads are going to be that allows you to eliminate the supports.

Thank you.

DR. PLESSET: You say you have a position on the reactor vessel supports, you have adopted a position?

MR. PELTIER: Yes.

DR. PLESSET: What is that position?

CHAIRMAN BENDER: Will it be discussed today later on?

MR. PELTIER: Oh, yes.

DR. PLESSET: Oh, okay.

One minor point, maybe you can tell us briefly, I understand that the Staff is requiring the downcomer ends to be modified. There's a flare there, and to have that cut off by the Applicant. Am I correct in that? That's what I was told yesterday.

MR. PELTIER: I heard that for the first time yesterday, myself.

DR. PLESSET: I wondered why that is.

MR. BRINKMAN: Would you like me to volunteer?

DR. PLESSET: Sure.

CHAIRMAN BENDER: Please do.

MR. BRINKMAN: My name is Herb Brinkman, the principal mechanical engineer with Cincinnati Gas & Electric.

The question concerns the flanges at the end of the downcomer pipes?

DR. PLESSET: Right.

MR. BRINKMAN: We were requested to remove those flanges, and we committed to do so, because during the pool swell testing the test facility did not have flanges at the ends of their pipes. And the idea was to make the plant as much like the test facility as possible.

DR. PLESSET: So that was requested by you of the Staff?

MR. BRINKMAN: Yes, sir.

DR. PLESSET: So my question is directed to the Staff. Why did they ask that?

MR. BRINKMAN: I'm sorry.

CHAIRMAN BENDER: No, no, we appreciate your offering that.

MR. PELTIER: I think the time to raise that question would be when Mr. Butler is here from the Staff, who will address pool dynamics.

DR. PLESSET: Okay. You can be thinking about it in the interim.

CHAIRMAN BENDER: The point we're trying to make is we don't want to be capricious about it, and if there's a good reason for taking them off, fine.

DR. PLESSET: If there isn't, maybe they shouldn't be taken off. That's really the question.

CHAIRMAN BENDER: We've got a lot of reasons for imposing extra costs on the Applicant, and we'd just as soon not force him unnecessarily.

But I'm sure the Staff is aware of that. Go ahead.

MR. PELTIER: Mr. Butler will be here this afternoon. I hope he can answer that question.

Well, if there are no more questions of me, then I will pass until --

CHAIRMAN BENDER: All right, if there are no more questions of Mr. Peltier why don't we go ahead with the presentation of the Applicant.

Mr. Flynn?

MR. FLYNN: Yes, sir.

To address the first topic of "Introduction, Organizational and Operational Plans for the Facility," with respect to the organization and Applicant's schedule for completion of construction, we will have Mr. Earl Borgman, Vice President of Engineering Services and Electric Production, address these topics.

MR. BORGMAN: Mr. Chairman, Committee Members:

My name is Earl Borgman. I'm Vice President of Cincinnati Gas & Electric Company responsible for Engineering Services and Electric Production.

I'd like to briefly review our organization, particularly since there have been some changes as of September 1.

(Slide.)

This particular slide is not too good, but I think I can describe it to you.

CHAIRMAN BENDER: That looks like some of the parts of the Zimmer plant we walked through yesterday.

(Laughter.)

MR. BORGMAN: That seems to be the story of the project.

Anyway, the way we're set up, this is the President of the Company, and I'm here, Vice President of Engineering Services and Electric Production.

As of the first of September the manager of the Electric Production Department, as well as the manager of the General Engineering Department, also report to me.

We broke up the functions of the General Engineering Department into three parts effective September 1. We have a manager of construction. That's Mr. Culver, who is permanently at the Zimmer site. A manager of nuclear fuel and advanced engineering projects. We have Mr. Flynn as manager of licensing and environmental affairs. And we have a manager of general engineering.

The manager of general engineering has various disciplines reporting to him. The principal structural engineer, the principal mechanical engineer for nuclear projects -- that's Mr. Brinkman. We also have a principal mechanical engineer for fossil projects. We have a chief draftsman. We have an administrator. And we have a principal electrical engineer.

This is the corporate engineering support who will be involved in supporting the Zimmer project.

We have a manager of production, station superintendent and, of course, the station staff.

That is sort of a capsule review of our

organization.

Are there any questions on the organization?

I think you'll find it's slightly different than what we had before, because up to September 1 the manager of production was reporting right to the President. Now the engineering and production is consolidated under me for better coordination.

CHAIRMAN BENDER: The operating superintendent of the plant then reports directly to you?

MR. BORGMAN: No, the operating superintendent reports to Mr. Salay, who is manager of electric production, who, in turn, reports to me.

CHAIRMAN BENDER: I see. This is the only nuclear installation you've got here, isn't it?

MR. BORGMAN: This is our first nuclear installation, yes, sir, that's correct.

CHAIRMAN BENDER: That's enough for now. Thank you.

MR. BORGMAN: Okay.

As far as numbers go, our engineering department has approximately 150 people. About half of that number, about 75, are graduate engineers.

The Zimmer staff currently is at about 117 people and almost fully staffed at this point in time.

We also get a lot of support from Sargent & Lundy, who are our AE and have been since the turn of the century, and they're only a few hours away from the site, in Chicago.

I think that pretty well gives you a capsule review of our organization.

CHAIRMAN BENDER: How many people on the operating staff have nuclear power plant experience?

MR. BORGMAN: Jim, can you answer that? How many people on the staff have actual nuclear operating experience?

MR. SCHOTT: If you define actual nuclear experience as that accumulated in the Navy as well, we have on our senior staff our operating engineer is a former Navy officer. Our health physics supervisor is a former Navy Chief with 20 years experience. Our quality engineer is a former Navy officer.

And then in our operating group, the hourly personnel that actually do the manipulation of controls, we have about seven operators who are former Navy enlisted personnel.

CHAIRMAN BENDER: With submarine experience?

MR. SCHOTT: Yes, sir, primarily. There are a few surface ship people.

And then in our maintenance department, we have maybe five machinist mate types.

Then in our rad chem group, radiation protection chemistry, there are approximately five individuals that have the ELT type experience.

And then in our instrument group we have only one former Navy man.

CHAIRMAN BENDER: Are there any people with boiling water reactor experience in that group?

MR. SCHOTT: Not actual experience, but all of the licensed personnel -- which I'll probably discuss in a few minutes -- have gone through the boiling water training course.

CHAIRMAN BENDER: Well, we'll wait for that.

MR. BORGMAN: That was James Schott, who is the superintendent of the main plant.

CHAIRMAN BENDER: Thank you, Mr. Schott.

MR. BORGMAN: Now, with regard to the schedule, we have been monitored very closely by the Staff for the past year or eighteen months, and we have done a complete project review about six months ago.

We were reviewed by a task force of the Staff to see if their fuel load date projections matched ours. At the time they came to the site, which I think was about three months ago, I believe they came up with a projected fuel load date of July and our schedule had indicated June 15.

Now, since that review the Staff representative has come back again, as of last Monday, to get a current update. And at the present time our critical path is showing approximately 49 days late on a projected June 15 fuel load date.

Now, a thorough review of the schedule and a discussion with our people indicate that everybody believes this negative 49 days can be improved upon. And I have been given commitments that the 49 days will not be exceeded and will, in fact, be improved upon.

As far as the corporation is concerned, we are prepared to dedicate ourselves to work a second shift, work overtime -- whatever it takes at least to get this fuel load date sometime within a month and a half or so of the projected June 15 date.

So we very much expect to load fuel sometime in the third quarter of 1979. We have released fuel shipments to General Electric. The fuel has been stored down in Carolina, and we expect to have the fuel shipped in May and June of 1979.

We think we've identified all of the mileposts on the schedule.

We think we've identified the work remaining.

And we believe we can go ahead and finish this plant as the schedule indicates.

So I think that's sort of a capsule version of the current status of the construction schedule.

CHAIRMAN BENDER: Are there any questions?

(No response.)

CHAIRMAN BENDER: Thank you, Mr. Borgman.

Can we proceed to the next item, then?

MR. FLYNN: The next presentation is the plant description with emphasis on the Mark II containment features.

To address this we have Mr. Herb Brinkman, who is the principal mechanical engineer, nuclear. He is also chairman of the Mark II owners' group.

MR. BRINKMAN: Good morning, gentlemen.

I am Herb Brinkman. I will discuss, as Mr. Flynn mentioned, the general overview of the plant with some attention to the Mark II containment issues.

(Slide.)

I just thought I'd introduce the discussion with some general information about the plant itself.

The Zimmer Station is located 24 miles southeast of Cincinnati, Ohio, one-half mile north of the small village of Moscow, Ohio. It's in Washington Township, Clermont County, Ohio. And it is on a site consisting of some 631 acres.

The unit is owned in undivided joint ownership by three companies: The Cincinnati Gas & Electric Company, The Dayton Power & Light Company, and Columbus and Southern Ohio Electric Company. Of the three companies, Cincinnati Gas & Electric has sole responsibility for the design and construction of the plant. The other two partners are financial sharing people.

The plant's capability and major equipment I've tried to identify here. We're looking at a 2436 MWt plant with 839 MWe gross production.

The unit does incorporate a General Electric boiling water reactor of the "5" vintage. It has a Westinghouse 4-flow condensing turbine. Condensing water is cooled by a natural draft cooling tower.

Our construction schedule is outlined here.

The preliminary safety evaluation report was submitted in April, 1970.

Our environmental report was submitted in January of 1971.

The Atomic Energy Commission environmental statement was issued to us in September of 1972.

We received our construction permit in October of 1972 and we've been working actively on the plant since that time.

I probably should note that the safety evaluation draft report was just recently issued. I do not believe that the official copy is out at this time.

As Mr. Borgman indicated, our fuel loading is officially scheduled for June. Mr. Borgman discussed that that is still a very reasonable date.

We're looking for commercial operation in January of 1980.

(Slide.)

I thought we might look at a couple of aerial photos of the plant to see some of these pertinent locations of the facilities discussed previously.

This aerial slide is taken looking north at the plant location. This is the small village of Moscow, Ohio, the Ohio River flowing past the plant, which is our ultimate heat sink.

Here is U. S. Highway 52, running adjacent to the plant. Cincinnati, Ohio is off in the fog.

Here we see our cooling tower, turbine building, reactor building, and various construction sheds.

The CG&E property itself includes a small parcel of land, actually in the State of Kentucky, where we have a railroad-to-barge transfer facility. This was used to move heavy components to the site.

Our property line on the Ohio side of the river starts with this row of trees and extends almost to this approximate area on the river side of the highway.

Additionally, we own the acreage on the hillside across from the plant.

(Slide.)

This is a little tighter view of the plant, looking from the opposite direction.

You see a barge unloading facility here, where shipments by rail have crossed the river, our barge shipments have been delivered, and we can transport up to the building.

The structure in the foreground is the service water intake structure. This is where the service water cooling pumps and the cooling tower makeup pumps are located.

The water is piped from the service water building via redundant piping up to the main reactor plant.

This, of course, is the cooling tower.

This is the cooling tower pump house, moving the water from the tower to the pump house, into the unit.

The tall structure in the background with the blue top is the reactor building.

The structure with the vertical stripes is the turbine building.

CHAIRMAN BENDER: Mr. Brinkman, could you identify the emergency heat sink location? It's some type of pool, I've forgotten the name of it.

MR. BRINKMAN: The Markland Pool? Yes, sir, that's the Ohio River.

CHAIRMAN BENDER: Yes, I . . . its orientation is not clear from just saying the river. I'd like to know what it is. What's the geographical location of it in the river?

MR. BRINKMAN: The Markland Dam is . . .

CHAIRMAN BENDER: It must represent some section of the river where there's a --

MR. BRINKMAN: There's a 90-mile pool of river with no obstruction in front of the plant.

CHAIRMAN BENDER: And that's what you call the Markland Pool?

MR. BRINKMAN: There's a structure which is called the Markland Dam, which is probably close to 90 miles downstream from the Zimmer Station. It backs up as a pool of the Ohio River.

CHAIRMAN BENDER: While we're just talking about it for a minute, there's been icing on that river over the years. Does it happen in that area?

MR. BRINKMAN: Yes, sir. It does happen in that area. And provisions are made to take the suction of the water down to the bottom of the river where, of course, it doesn't have ice.

CHAIRMAN BENDER: Okay.

MR. BRINKMAN: And we do have also facilities to pump warm water back to melt the ice on the surface.

CHAIRMAN BENDER: Thank you.

MR. BRINKMAN: Continuing on, here's a little closer shot of the buildings.

(Slide.)

This is the reactor building, blue on the top, concrete on the bottom.

The auxiliary building is located adjacent to the reactor building. This houses the control room and electrical auxiliary features.

The lower building, here, is the diesel generator building. This houses the three diesel generator units which are, of course, essential and available for power in the case of loss of off-site power.

The long building with the vertical blue stripes is the turbine building.

This smaller brick structure, here, is the service facility, which houses Mr. Schott's office, work shops, and that sort of thing.

(Slide.)

Here we see again the reactor building, the service building, turbine building -- of course the cooling tower.

I took this shot to show you that there is a building behind the turbine building which houses the heater bay -- low-pressure heater bay. The demineralizer building and radwaste processing.

In the background, this is the settling basin.

(Slide.)

This view was intended to show -- this is the Highway 52 from Cincinnati, that some of you drove out yesterday. You came out this highway and turned in to the site.

I wanted you to see that we have constructed this road, bridge, and additional road up the hill. The point being that this is used for flood protection, so that we have access to the plant in flooding conditions. U. S. Highway 52 does have low places which are flooded rather easily.

We have, of course, also flood protected all the essential components within the plant to an elevation of 546 feet, which corresponds to approximately the 1000-year flood. It's about 26 feet higher than any recorded history flood in the Cincinnati area.

We've also, of course, designed for tornado protection and seismic protection as well.

CHAIRMAN BENDER: As I understand it, the switchyard is down in the flood plain now.

MR. BRINKMAN: The switchyard is about elevation 520, which is higher than the maximum recorded flood, and is at an elevation above which we are committed to shut the plant down.

CHAIRMAN BENDER: Say that again.

MR. BRINKMAN: Our plans call for shutting down the plant at an elevation -- river elevation of less than the switchyard.

Let me give you some numbers:

This is about elevation 520. We are committed to shut the power plant down when the river is at elevation 517. So that before the water ever got up to this elevation the plant would already be shut down and secured.

CHAIRMAN BENDER: But all the off-site power comes in through that station?

MR. BRINKMAN: Yes, sir.

CHAIRMAN BENDER: Is there other off-site power?

MR. BRINKMAN: There are two sources of offsite power, a 69 KV line and a 345 KV line. But the transformers for both of those power supplies are located at about the same elevation.

We do have the diesel generators.

(Slide.)

Here's the main power transformer. Here's the auxiliary transformers. This is at about that 520 elevation. But we do have diesels in the building flood proofed at 546 elevation, the 1000-year flood, and the diesels would be available for power supplies under those conditions.

CHAIRMAN BENDER: But all the offsite power is at 520 or thereabouts?

MR. BRINKMAN: Yes, sir.

It's probably noteworthy that the City of Cincinnati would be in real bad trouble if the river were up to the 525 elevation. That's a very unusual event that we are talking about.

CHAIRMAN BENDER: I fully believe it. There are a lot of hills in Cincinnati, but it's hard to move the 69-KV substation to those hills.

Go ahead.

(Slide.)

This slide is intended to be a simplified plan view of the power plant.

I'll give you the handouts. It might be helpful with this slide.

I'm trying to show a simplified plan view of the power plant.

This structure here is the large reactor building that we saw on the photograph.

This is low in the plant, and I'm trying to point out here that the essential core cooling pumps are located in separate flood proofed cubicles around the outside perimeter of the reactor building, the point being that should there be a malfunction of one of these systems, it will not impact the other systems. Each of these rooms is flood proofed, and each of them has a separate, independent heating and cooling system.

Of course this circle represents the support for the reactor vessel itself.

This next building adjacent to the reactor building is the auxiliary building that we did see in the photographs. It contains the main control room, and we've tried to identify an operator's desk, some control consoles.

It also includes an auxiliary building which houses the essential electrical auxiliary components.

The diesel generator building is located here adjacent to the auxiliary. The main power transformer is outside the diesel generator building.

The 69 KV reserve auxiliary transformer is located here. The 345 KV reserve auxiliary is here.

Moving down to the next building, the turbine building, with the high-pressure turbine end located in this position, the two low-pressure turbine units on the same shaft, and the Westinghouse 840 MW generator on this end of the building.

The steam is transported from the reactor via piping to a tunnel in the basement, through the auxiliary building and over to the turbine. The feedwater lines, represented by the dashes, also move through that tunnel in the basement of the auxiliary building.

Moving further from the turbine, we have a condensate demineralizer room in the next lower building, and the low-pressure heater bay.

At the extreme river end of the building is the radwaste processing facility.

Then of course the river would be down at the bottom of the screen.

The service building and office area is located just behind the generator.

(Slide.)

Looking at a simplified section view of the plant you see the reactor building housing, of course, the reactor, the primary containment, and the various support systems for the containment.

Then a section view through the auxiliary building shows us the control room. Under it a cable spreading room. Below that a computer room. And the various auxiliaries are also located in here.

We see the steam coming from the reactor over the top of the sacrificial shield wall, down through isolation valves, through the primary containment, into the reactor building. It drops down, and then it enters what we call the steam tunnel -- which is just that, a tunnel in the basement of the auxiliary building, whose purpose is to transport the main steam and feedwater lines. It goes through the tunnel, comes back up again in the turbine building and enters the high-pressure turbine.

The condenser, of course, is immediately below the turbine. Here we are showing the reactor feed pump turbines which, of course, are returning the condensate through low-pressure, high-pressure heaters to the reactor.

The low-pressure heater bay is on the other side of the turbine building.

Clearly there are other features in the power plant, but this is intended to give just a general arrangement and a feel for where the various facilities are in the plant.

(Slide.)

This artist's rendering is intended to show the general configuration of the Mark II containment, which we do have.

Starting in the very center of course we see the reactor vessel which is housing the nuclear fuel, and is the source of the steam.

The reactor vessel is supported by a concrete pedestal which extends from the base of the reactor down to the very basement foundation of the plant.

The reactor is also additionally supported by stabilizers attached to the primary containment near the top of the vessel.

Moving out from the reactor, we see the sacrificial sheild wall which extends from the base of the reactor up to an elevation approximately equal to the top of the active fuel.

There is about a foot or fourteen inches of space between the reactor and the sacrificial shield. This is about a 10-inch thick concrete wall, intended for radiation shielding.

We see the main steam piping coming out the top of the reactor, dropping down, going through isolation valves, one inside the primary containment and one outside the primary containment, and then being transported in four separate pipes through the steam tunnel over to the turbine building.

We also see the two feedwater return lines coming through the steam tunnel.

There's a motor operated valve here, followed by a check valve outside of the containment, followed by a second check valve inside the containment, thence up to the feedwater spargers.

Moving further out we see, of course, the primary containment, which is this concrete structure here, approximately six foot thick, reinforced, prestressed concrete structure designed to take 45 pounds internal pressure, 2 pounds external pressure, and 340 degrees Fahrenheit in the drywell. This is adequate to accommodate any conditions which might exist after the unlikely event of rupture of piping in the drywell.

The structure is lined -- the entire containment structure is lined with a steel liner, which is leak tested, in order to furnish another barrier for radiation release.

CHAIRMAN BENDER: How thick is the liner, and how is it attached?

MR. BRINKMAN: How thick is the liner? It's about a quarter of an inch thick, and it's attached directly to the concrete by anchoring -- a welding and anchoring system.

CHAIRMAN BENDER: Thank you.

MR. BRINKMAN: There are a series of tendons, which are not shown in this drawing, but there are a series of steel tendons which form a belt at numerous elevations up the entire wall of the structure. These are, of course, pulled tight to prestress the containment.

There also is a series of tendons running vertically from the bottom to the top of the containment, again with features which allow them to be tensioned prior to servicing the unit.

CHAIRMAN BENDER: What kind of tendon surveillance program do you have?

MR. BRINKMAN: There, of course, is an inspection before the plant is ever started. It has been submitted to the Staff. I think a certain number of the tendons are checked at each outage, but I don't know the exact number.

CHAIRMAN BENDER: Who is responsible for that?

MR. FLYNN: We can get that for you. To assist Herb in this area I'd like to ask Mr. Crail, who is our principal structural engineer, to stand up and address that to the Committee.

MR. CRAIL: My name is Howard Crail. We have an in-service inspection program, and we'll have tests at 1, 3 and 5 years.

CHAIRMAN BENDER: Who is responsible in CG&E for implementing the inspection program?

MR. FLYNN: That will be implemented by the superintendent of the power plant. He will call upon other bodies, organizations, within CG&E as needed for that support.

For example, he could go to our engineering department and construction department for assistance in this area.

CHAIRMAN BENDER: Are there written procedures for carrying out that process?

MR. FLYNN: They are being prepared.

CHAIRMAN BENDER: Thank you. Go ahead.

DR. ZUDANS: You mentioned a number that I'd like to know whether somebody will come back to it. You said designed for 340 degrees, the drywell? You said that?

MR. BRINKMAN: Yes, sir.

DR. ZUDANS: And prestressed concrete drywell and one-quarter inch liner.

I would like to know whether you or somebody else will tell us later how do you maintain the integrity of the concrete at temperatures at this level. And the other question is whether or not you have looked into liner buckling, because first it's prestressed then it's heated. And it's very likely it will buckle to the inboard of the drywell.

Has that been considered?

MR. BRINKMAN: I think we have to clarify what we mean by 340 degree Fahrenheit design conditions first.

DR. ZUDANS: All right.

MR. BRINKMAN: First I'd just like to say that 340 degrees is the maximum loss-of-coolant accident temperature. The normal operating temperature of the drywell is maintained not to exceed 120 degrees Fahrenheit by redundant cooling systems located in the drywell.

So the condition is not normal during the operation of the plant, to have 340 degrees in the drywell.

I mentioned that because I think it puts the problem more into a less severe kind of category.

DR. ZUDANS: Yes. But your pressures are going to be seen in the drywell only if an accident occurs, and, therefore, the normal operations have no consequence under these conditions. So what are the concrete temperatures, specifically, that you designed for?

MR. BRINKMAN: I think I'd have to ask for some help in this problem.

MR. FLYNN: We would like to have Mr. Krishna Swamy address this.

MR. KRISHNA SWAMY: I'm from Sargent & Lundy Engineers.

The operating temperature for which it is designed is 140 degrees, and when you have an accident the maximum temperature is about 340 degrees in the atmosphere. And then we can find out the temperature in the concrete by-- and we are performing heat transfer analyses to obtain the temperature distribution through the thickness of the concrete and calculate the stresses in the concrete.

The thermal buckling of the liner is included and studied and reported in the FSAR.

DR. ZUDANS: Well, what is the concrete temperature?

MR. KRISHA SWAMY: The concrete temperature right behind the liner will be reaching around 190 degrees or so and remain there for a short time, because the temperature is a transient temperature. The long-term temperature increase is of the order of about 30 degrees average.

So that will take it up to about 160 degrees.

DR. ZUDANS: So you would have 340 for a very short duration, and the quarter-inch thick liner prevents concrete to be heated beyond 190 degrees.

MR. KRISHNA SWAMY: The liner will conduct at 340 degrees. We do have a temperature profile through the containment, including the liner, the concrete and everything, and we have presented a temperature profile in the FSAR which will give the specific temperature. The few inches of concrete, like the first inch or so, would see like 190 degrees, and then it drops off because of the conduct of the concrete.

CHAIRMAN BENDER: Has the Staff been examining this matter, Mr. Peltier?

MR. PELTIER: I don't have anyone here today that could answer any specific questions in that area. I believe this is in the structural area, and I just don't the answer to your question.

CHAIRMAN BENDER: Well, sometime will you make a note to get that information for us?

MR. PELTIER: Yes.

DR. PLESSET: Let me say --

DR. ZUDANS: Mr. Chairman, I have another question, if I may.

CHAIRMAN BENDER: Well, let's let Dr. Plesset get off his point first.

DR. PLESSET: I'm anxious to see how the temperature would drop from 340 to 190 through a quarter-inch of steel. That's part of my difficulty, and I think part of Dr. Zudans' difficulty.

Is that clear, what we would like to have clarified?

VOICE FROM THE AUDIENCE: Dr. Plesset, we can't hear anything.

DR. PLESSET: Well, we were told that if it were 340 within the drywell, that the concrete at the boundary of the steel would be 190. That's a little hard to see, right offhand, how that could be.

MR. KRISHNA SWAMY: We can make it easy to understand if we have time/temperature transient curves. The 340 degrees lasts for a short duration of time, so it takes a while for the concrete to react to that accident and pick up the temperature.

DR. PLESSET: That's true. Has the Staff looked at this? That's what I was wondering. Because it seems a little bit troublesome.

CHAIRMAN BENDER: Well, since there's nobody here from the Staff to --

MR. BRINKMAN: I would like to volunteer that this is discussed in our FSAR, and we have a copy of it out in the car. There just wasn't room in this room for it.

(Laughter.)

DR. PLESSET: I just wondered if the Staff has studied this particular item.

MR. PELTIER: I'll make a note about it.

DR. PLESSET: Fine, we can leave it at that.

CHAIRMAN BENDER: Fine. Go ahead, Dr. Zudans.

DR. ZUDANS: I just want to state essentially the same subject. You don't have to answer it now, but I'd like someone to think about it.

Also, we'd like to know what the temperature distribution that results in the floor that separates the suppression pool from the drywell. And specifically, sometime today, I'd like to see how you handle that built in edge of that floor into the drywell wall under consideration of actual temperature distribution that's experienced during the operation and during the transient.

MR. BRINKMAN: What was the question? The end connection from --

DR. ZUDANS: The drywell external perimeter is supposed to be rigidly attached. Let's say the floor external perimeter is rigidly attached to the drywell wall.

MR. BRINKMAN: Yes.

DR. ZUDANS: The drywell is afterwards prestressed.

MR. BRINKMAN: YEs.

DR. ZUDANS: Which puts the wall in compression, and later on the floor is heated on the inside differently from the suppression pool side. Therefore, a thermal gradient develops in that --

I would like to see how you design that connection.

MR. BRINKMAN: I have a slide of that connection in the FSAR. We could discuss it now or later.

MR. RURKA: Could I just comment? My name is Steve Rurka.

The construction sequence of the drywell floor was done in such a way that there was an annulus provided around the perimeter of the floor, and then the containment was prestressed. The annulus was then filled with concrete so the floor would not restrict the prestress.

In this way you accomplish your concern.

DR. ZUDANS: No, you don't. Only one part of it.

Is the drywell already prestressed now as it stands?

MR. RURKA: Yes.

DR. ZUDANS: Okay. We saw the annulus open space and we saw the rebars. But I also read in the SER that you will rigidly connect the drywell wall to that floor. And I'm now concerned about thermal gradients that are developed in the floor and how that affects that connection.

CHAIRMAN BENDER: And there are two gradients. One is the one that's under normal operating conditions, and the other is transient condition.

MR. KRISHNA SWAMY: Yes. Both und.. the transient conditions and the operating conditions the thermal gradient, the actual increase in temperature of the drywell floor and the containment structure, have been studied and reported in the FSAR. And, indeed, there is actual increase of the dimensions of the drywell floor, which has been considered in the design of the containment.

DR. ZUDANS: Well, will the concrete crack, will it develop leak paths, and things of that nature? Have they been looked at?

MR. KRISHNA SWAMY: As far as the drywell floor is concerned, because it is constrained by the containment against the thermal expansion and growth of the compression, and there is only surface cracking because of moment, while on one side it is cracking on the other side it's very compressed, because of the moment.

DR. CATTON: I just have one question:

Typically, in calculating maximum pressure in the drywell you're going to assume a low heat transfer coefficient. This is inconsistent with the questions that are being asked by Dr. Zudans, and I'm wondering if you make two analyses: one to get bounding temperatures in the concrete a[illegible] [illegible]et bounding pressures in the drywell?

[illegible]NA SWAMY: This relates to the design [illegible]? We do have the time/pressure transient [illegible] the time/temperature transient curve.

So we use the time/temperature transient curve to get the thermal gradient and thermal profile thr[illegible]gh the concrete.

DR. CATTON: But the heat transfer coefficient that you use between the drywell environment and the steel shell, is it the same one that you used when you obtained the pressure in the drywell?

MR. KRISHNA SWAMY: I'll have to defer to some mechanical engineers for this.

DR. CATTON: When you're obtaining the pressure, you obtain it conservatively by using a low heat transfer coefficient. That's not going to be conservative when you make calculations about the temperature of the concrete.

CHAIRMAN BENDER: Well, why don't we leave it, and Staff will work with the Applicant to establish what the computational procedures are, and hopefully we can have that prior to the time when we have to consider this at the full Committee.

If it turns out we need more information it's not impossible to have another Subcommittee meeting. But we'll see what comes out of it.

Could you clarify one other thing while we've got that diagram up there?

You're designing for the possibility of small bypassing of the suppression pool. Could you indicate what the possible paths are for bypassing? I'm not saying that they're going to happen, but we'd just like to know a little bit about what avenues have been of concern.

MR. BRINKMAN: Okay. Possible bypass areas would be cracks in this floor, or leaks adj cent to the downcomer pipes that penetrate the floor, or leaks in the downcomer pipes themselves. Or there are vacuum breaker valves which communicate from the drywell to the wetwell which could leak and serve as a b pass.

Now, we have tried to address those areas, but that's what we're talking about as far as bypass.

CHAIRMAN BENDER: Okay. I just wanted to get the spectrum identified. It makes it easier to talk about it.

Why don't you go ahead with the rest of your presentation?

MR. BRINKMAN: Okay. We were talking about the drywell. The primary construction is of reinforced, prestressed concrete, with a steel liner. It's designed to retain pressure and temperature which would result from the worst postulated pipe break in the drywell.

There is the floor that we're now talking about. The floor lies here in the photograph and it, of course, segregates the drywell from the suppression chamber.

The suppression chamber houses a large pool of water approximately twenty feet deep around the entire perimeter.

In the event of a loss-of-coolant accident, pressure would build up in the drywell and it would build up in the downcomer pipes, until sufficient pressure were built up to clear the water out of the downcomer pipes, at which time pressure would be relieved into the suppression chamber and steam would be condensed to water.

The suppression chamber, like the drywell, is thick concrete construction with a steel liner. The steel liner on the wetted surfaces of the suppression pool is stainless steel liner. Above the wetted surfaces is carbon steel and epoxy, special epoxy coating.

The suppression pool also serves as the source of quenching water for safety valve operation. Vessel pressure is prevented from exceeding allowables, of course, by some thirteen safety valves attached to the main steam piping. Discharge of those thirteen safety valves goes down through the drywell, through the floor, and is discharged in quencher devices into the suppression pool water.

These safety discharge valve devices are not shown on this sketch, but they are distributed evenly around the entire wetwell.

In this photo here we see a series of pumps, turbines. These are the essential core cooling components which are housed between the primary containment and the reactor building at the base of the plant.

I want to point out that although they're shown all together in this photograph, this is an artist's rendering. The real arrangement is as shown on the plan view that I gave you earlier, all in their separate cubicles.

Here we have the grade elevation, so we can see relatively where the suppression chamber fits into the grade level.

The next structure kind of wraps up the primary-- to kind of wrap up the primary containment, the next structure out is the reactor building or secondary containment. The reactor building's function is to house all of the support equipment, of course, for the reactor operation.

The refueling pool -- spent fuel pool -- I'm sorry -- is located here. And the steam drier separator pool is located here.

By removing the dome, the head, it's possible to move the fuel up out of the vessel underwater and transport it to the spent fuel pool. The same could be done, of course, with the drier or separator. They could be moved up, doors raised, passed over to the storage pool, and it all can be done underwater.

CHAIRMAN BENDER: Could you identify where the main steam isolation valves are on that?

MR. BRINKMAN: Yes. There's one outside the primary containment, one inside the primary containment, on each line.

CHAIRMAN BENDER: Is that the general philosophy for all lines, to have one inside and one outside?

MR. BRINKMAN: Yes, sir. That's one of the important design criteria.

CHAIRMAN BENDER: Any exceptions?

MR. BRINKMAN: Yes, there are some exceptions, and they are identified in our submittal.

Some exceptions would be, sir, things like the pumps which take suction out of the suppre sion pool. It's not reasonable to have a valve under the water where it couldn't be contained.

CHAIRMAN BENDER: Could I ask the Staff what their philosophy is in this respect? We noticed in the SER there were some exceptions.

MR. PELTIER: Could you repeat the question, sir?

CHAIRMAN BENDER: It has been normal practice in these containments for isolation to have one valve inside and one valve outside. There apparently are some circumstances where both isolation valves are outside the containment.

I don't necessarily think that's bad, but I wondered how the Staff decides when it has to require inside and outside isolation and when it doesn't?

MR. PELTIER: If I remember correctly, the only exceptions were where there were two valves outside for maintenance purposes.

CHAIRMAN BENDER: I don't think that's a good answer to the question I'm asking.

MR. PELTIER: I don't have a good answer to the question, because I don't have anybody here. Mr. Butler probably could address that this afternoon.

CHAIRMAN BENDER: Why don't you hold that and have Mr. Butler answer that question, if he can.

I'm not trying to make an issue out of it. I just want to understand it.

Go ahead.

MR. BRINKMAN: We're talking about the reactor building. This is a concrete structure up to the elevation of the operating floor. Above that it's a sheetmetal structure, but it's not your ordinary sheetmetal barn. It's especially designed to control in-leakage, because the entire building, of course, is maintained under a vacuum.

It's maintained under a vacuum for the purpose of assuring that even should some radioactive particles leak through the primary containment, they will not leak out of the building, because any leakage will be in-leakage.

I mentioned before the entire structure is designed for tornado loadings, seismic, and it's been re-analyzed for these new pool dynamic loads and has been found, with modifications, to be acceptable, capable of taking those loads.

CHAIRMAN BENDER: I assume when Mr. Butler comes here we'll hear the current event on how loads are summed?

MR. PELTIER: That's correct.

CHAIRMAN BENDER: Thank you. Go ahead.

MR. BRINKMAN: The drywell floor, we talked about the leak paths. There's only one feature I don't show on here. We have installed vacuum breaker valves which do communicate through the drywell floor and serve the purpose of avoiding excessive upward pressure loadings on this floor. There's a short pipe spool through the floor, with two valves in series on the outlet of the pipe.

DR. PLESSET: Just to be sure I understand, the reactor building is designed against tornado?

MR. BRINKMAN: Yes, sir.

DR. PLESSET: Thank you.

DR. ZUDANS: Could you bring back that previous slide?

(Slide.)

I will form a question, but I don't need an answer now.

There is this drywell head region, what is a bulkhead right on top of the drywell. That's the metallic closure. And above that you have a concrete plate that closes the drywell?

MR. BRINKMAN: Yes, those are removable, of course. Yes.

DR. ZUDANS: Now, sometime maybe someone would describe how the loadings -- what are these designed for, precisely, what kind of loadings?

MR. BRINKMAN: I can't . . . can you help us, Steve? Do you want it now?

DR. ZUDANS: Well, sometime, whenever you can.

CHAIRMAN BENDER: Well, if you can answer it quickly, yes. If not --

MR. FLYNN: We're prepared to address it right now, if you wish. Mr. Steve Rurka can address it.

CHAIRMAN BENDER: Go ahead.

MR. RURKA: Are you interested in the loading on the concrete slabs and not on the removable plug?

DR. ZUDANS: One on the steel dome and the other one on the plug, removable plug.

MR. RURKA: Well, the steel dome was designed for a break of a line -- there are two lines on the head of the reactor. It was designed to take the internal impingement load, based on just how they hit that steel dome. Also it was designed to take the pressures, the internal pressures of the containment, plus the thermal loads and how they interacted with the --

DR. ZUDANS: Designed for 45 psi?

MR. RURKA: Yes.

DR. ZUDANS: What about external pressure design?

MR. RURKA: The external pressure design on that dome, I believe, was . . . I'd have to look that up. I think it was somewhere like seven-some pounds, due to the suppression negative pressures in the containment.

I'm not sure of that number, but it was somewhere in that range. I believe somewhere around seven pounds external pressure.

CHAIRMAN BENDER: Are the slabs above intended to do more than shield and provide a way of carrying the dead load of personnel and equipment walking across the top?

MR. RURKA: It's primarily shielding, and they do have the capability of supporting whatever load is required or more.

CHAIRMAN BENDER: But they're not intended to carry any kind of accident loadings, are they, or anything like that?

MR. RURKA: Right.

DR. ZUDANS: Well, that's why I brought up the question, because I have here in the SER that there's a pipe postulated to be broken in that compartment, and there develops pressure. And the developed pressure is 3.2 psi. There's an indication that the slab is designed for 18 psi, and these numbers are so low that I wanted to confirm that that's not a typo.

MR. RURKA: Yes. The head was designed for all of the jet impingement loads that occurred due to the pipe break coming out of the reactor head.

DR. ZUDANS: Thank you.

CHAIRMAN BENDER: But that's the drywell cover, and not the slabs overhead we're talking about?

MR. RURKA: Yes, the drywell cover, the steel head.

CHAIRMAN BENDER: Go ahead.

MR. BRINKMAN: The only other thing we mentioned were the two vacuum breaker valves in series, which are designed to avoid excessive uplift on this floor should the pressure in the suppression chamber exceed the pressure in the drywell.

There are two valves there in series. There's four groups of such two-valve series. Any three of the four are adequate for the worst possible condition. Those valves are redundant. They are testable. And there are facilities to check them during operation and to detect if they're off seat.

CHAIRMAN BENDER: What size are they?

MR. BRINKMAN: I think they're about a 20-inch.

CHAIRMAN BENDER: Are they equivalent in size to the ones that are being used now on the Mark I?

MR. BRINKMAN: I can't answer what is used in the Mark I. Can anyone help me?

VOICE FROM THE AUDIENCE: Mark I's are bigger.

MR. BRINKMAN: Mark I's are bigger.

CHAIRMAN BENDER: Thank you. That's what I thought. Go ahead.

MR. BRINKMAN: This concludes my planned presentation.

CHAIRMAN BENDER: Are there other questions on the plant description?

(No response.)

CHAIRMAN BENDER: All right, I think that's adequate for our purposes.

Why don't we go to the --

DR. CATTON: Before you take that off, could you show us where the control rod drive tubes are located relative to your recirc pipe?

CHAIRMAN BENDER: Do you understand the question?

MR. BRINKMAN: I understand the question, but I can't really show it on this photograph.

This, of course, is the recirc suction pipe coming out of the vessel, down to one of the two recirc pumps. Discharge, then, is up into a header system, which actually communicates through five nozzles, evenly distributed.

DR. CATTON: Now, as far as elevation is concerned, where do those control rod pipes come from?

MR. BRINKMAN: The control rod drive tubing that I think you're referring to -- there's an access door. We walked into the plant at about this elevation yesterday, and I think you saw this recirc piping, and you also saw the control rod drive modules. They're actually out here.

You saw the tubing communicating through this base, through the pedestal, and up to the control rod drives which are located under the reactor.

So, it's at this elevation inside the drywell that you're closest.

DR. CATTON: It looked to me like it went from just where you just had your pointer to just above that recirc feed line, the one that goes circumferentially.

MR. BRINKMAN: Yes, they do run vertically downward, because the control rod drive modules are located on the floor down at this elevation.

DR. CATTON: And they looked like they entered right about -- a little bit above where your pointer is.

MR. BRINKMAN: Yes, they enter here, and move vertically downward and through the reactor pedestal support, and then up to the control rod drive.

DR. CATTON: Where they entered was above the pipe that runs circumferentially around the reactor vessel.

MR. BRINKMAN: Above this pipe, sir?

CHAIRMAN BENDER: Could we just leave it -- rather than indulge ourselves in a long line of discussion about things that aren't exactly perfect now, could we ask the Staff to look into the vulnerability of those control rod drive fluid lines from a failure of that recirc line?

MR. PELTIER: Yes, sir, I made a note to do that.

CHAIRMAN BENDER: Thank you.

CHAIRMAN BENDER: Gentlemen, it's almost 10:00 o'clock. Why don't we take ten minutes and then reconvene.

(Recess.)

CHAIRMAN BENDER: All right, gentlemen, if you will take your seats as promptly as you can, we'll try to reconv[illegible] the meeting, realizing it will take a little time.

[illegible] next speaker on the agenda is Mr. Schott.

MR. FLYNN: To address the next item on the agenda, Training Programs, Emergency Planning and Quality Assurance and Control Programs, we have Mr. Jim Schott, who is the Plant Superintendent.

Throughout most of the life of this project, since 1969, Jim has been designated as the Plant Superintendent, and in that capacity has followed the job from its inception.

Part of the time he was on temporary assignment to General Engineering, when he functioned for awhile as the mechanical engineer on the project.

CHAIRMAN BENDER: Go ahead, Mr. Schott.

MR. SCHOTT: Thank you.

Mr. Chairman, Members of the Subcommittee, my name is James R. Schott. I am the Station Superintendent for the Zimmer facility.

I'd like to briefly encapsulize the training program that we have in place for our plant staff.

The Zimmer Station training program was formulated to develop and maintain a plant organization fully qualified to assume the responsibilities for operation, maintenance and technical consideration of the facility.

As detailed in Chapter 13 of the Final Safety Analysis Report three separate programs are utilized to maintain positive control of the total plan, and to accomplish the given objectives.

(Slide.)

The initial plant staff program was designed to produce competent trained personnel at all levels of the organization. The guidelines of ANSI-N18.1 were incorporated into the training programs as appropriate.

The requalification program provides continuing training for all plant personnel commensurate with their area of responsibility.

The replacement training program is designed to supply qualified personnel throughout plant life due to attrition and turnover.

(Slide.)

I would like to focus for the next few minutes on the initial plant staff training program, since it is this phase of training we are most intimately involved with at this point in time.

As you can see, the initial plant training program is further divided into several sub-programs, specifically directed towards personnel responsibilities and functional job assignments.

First, the operations group.

In sub-item 1.A., the initial cold license training programs. We have further divided that into approximately six phases.

Our training program for the senior staff, which was myself and several members of the key senior group. The assistant superintendent, the maintenance supervisor, our operations engineer, our training coordinator, our instrumentation and control supervisor began with their particular assignment in about 1973.

That group was divided into two, and we participated in observation and preoperational testing at the Hatch plant.

The other group participated in a similar activity at the Brunswick Power Station.

The initial group of licensed operators was selected in late 1974, and their training program began with nuclear fundamentals. Then it went into Dresden technology, followed by a General Electric boiling water simulated training at the Dresden Training Center, followed by observation training at the Dresden site, returning to Zimmer for technical training on Zimmer facilities, and now they are participating in continuing review of Zimmer systems: technical specifications writing procedures, preoperational testing and routine operating functions, as necessary.

The supervisory staff has participated in various types of training, as you see listed. Not necessarily all persons have participated in the activities as you see, but depending upon their specialty area, that is the particular training program that they are focusing on.

The plant technicians are involved in actual on-the-job training. That has been supplemented with some of the programs that you see under item number 3.

In addition, you mentioned a concern, or you questioned before how much boiling water experience we might have on the plant staff. In addition to the Navy PWR experience, we have sent various other supervisors to actual operating facilities. For example, we have sent our maintenance foreman to the Hatch plant, and they participated in a refueling outage at that station.

They were involved in some Appendix J leak testing of valves.

They participated in some other maintenance activities.

We have sent instrumentation supervisors to the Monticello plant for observation and training at that facility.

We have sent rad chem, or radiation protection chemistry technicians, to the Monticello plant for actual supplementing of that Station's rad chem group. And we have two individuals there now who just went through a refueling outage at Monticello.

So we are accumulating some goodly experience from actual BWR facilities.

I will not touch in much detail on the requalification or replacement training program, unless you so desire, and I would like to just summarize the discussion by indicating that we feel we have an adequate training program, we have well qualified personnel, and we are ready to accept full responsibility for the operation of the power plant.

CHAIRMAN BENDER: Mr. Schott, could you make any comments about notable differences between the BWR-5 Mark II containment system and the Mark I BWR-4, I guess it is, systems that you've been using as a training vehicle?

MR. SCHOTT: Right.

Well, as you are well aware, we're the first Mark II, at least in the United States, and we'll probably go operational first. So our training program was slightly modified from what the generic General Electric approach had een.

In order to obtain senior license eligibility for the majority of our personnel -- I will use the senior license program, or the R.O. operations program as an example -- we obtained the senior license eligibility by participating at the Dresden Station, which was the Mark I. And then once that program was underway, and that training had been accomplished, we then began to concentrate on the Zimmer Station itself and Dresden was shoved into the background and the training emphasized those differences.

Actually, our people grew up with the construction of the Station, so to speak, our senior people, as well as the top group of the Operations, Instrumentation, and Maintenance people. They actually saw the construction and have participated in certain testing activities since that time. So they are aware of the differences and, as time goes on, they become more and more acquainted.

CHAIRMAN BENDER: Is any attempt made to address the character of the transients that you might see in the Mark II BWR-5 system, the changes in power control, for example?

MR. SCHOTT: Yes, sir, that is part of the training program itself. And some of those transients are actually simulated on Mark I, and then we try, by virtue of computerized printouts and so forth, we try to present those in a simplified form to our operating personnel.

I don't know if I've answered your question.

CHAIRMAN BENDER: Probably as well as you can. Thank you.

Are there other questions?

(No response.)

Thank you, Mr. Schott.

The next item is the Quality Assurance/Quality Control Experience for Zimmer -- excuse me -- the Industrial Security, I skipped that.

MR. SCHOTT: What did you want to do? I have also Emergency Planning, I have Quality Assurance for Operations, and I also have Security.

CHAIRMAN BENDER: All right. I'm sorry. Go ahead. Why don't you just go through the whole situatic . as rapidly as you can. I just misread my program here.

(Slide.)

MR. SCHOTT: I will address the Emergency Plan.

As discussed in the Safety Evaluation Report, the Emergency Plan for the Zimmer Station exceeds the requirements specified in 10 CFR 50 Appendix E, and has extensively utilized the guidance of Regulatory Guide 1.101 throughout the preparation of the Plan.

The concept for coping with emergencies has been built around the use of existing organizations, facilities and equipment to the fullest extent practicable.

The line of organization or communication that you see before you is the relationship between the cognizant groups that we have made personal contact with.

We have discussed, we have planned, we have exchanged ideas and information, and final agreements as documented in the form of agreement letters from the participating agencies and groups are part of the plan.

We are at present finalizing our procedures that are necessary to implement the various portions of the emergency plan.

As previously noted, we have been and continue to work actively with local and state groups and agencies responsible for public health and safety.

For example, planning sessions with the States of Kentucky and Ohio, Campbell and Pendleton Counties in Kentucky, Clermont County, Ohio, and Washington and Monroe Townships in Ohio, are an ongoing activity.

Plans are being formalized and finalized with mobilized local support groups, for example, the township and county police and fire departments, for resident notification.

Our Company Communications Engineer is finalizing design and procuring radio equipment that will be used to communicate with offsite support agencies during emergency situations.

Arrangements have been made with all groups involved in immediate action to install tone-actuated radio equipment.

We have worked with and consulted Dr. Eugene Sanger of the Cincinnati General Hospital Radioisotope Lab throughout the preparation of this plan, and have incorporated his suggestions as appropriate.

The Station First-Aid and Personnel Decontamination Rooms have been laid out and equipped using Dr. Sanger's input and suggestions.

The Cincinnati General Hospital has agreed to accept contaminated injuries for treatment, and a special decontamination suite at the Cincinnati General Hospital has been extensively modified and reserved for this purpose. This suite consists of several treatment rooms, special consideration for levels of contamination, capability to perform minor surgery, use of the radioisotope lab equipment, and post-care hospital space.

We have worked with Dr. Sanger and his staff throughout this modification.

Working arrangements and agreements with St. Luke's Hospital in Fort Thomas, Kentucky assure that adequate provisions for accommodating injured personnel in Kentucky have been made.

In summary, the Zimmer Emergency Plan provides a comprehensive plan that includes adequate organization, communications procedures, monitoring information, training, first aid, transportation, assessment, review, drill, critique, decontamination and offsite support to adequately cope with and assure that measures can and will be taken to protect public health, safety and property.

CHAIRMAN BENDER: With regard to the relationship between the Kentucky and Ohio emergency response organizations, are they two independent entities, each one responding separately, or is there a way to coordinate the two groups?

MR. SCHOTT: If I would have answered that question several years ago, it would have been two separate entities. At the present time the gentlemen who are responsible at the State level for the various disaster and emergency training groups are working in close cooperation with one another, as well as with the States of Pennsylvania and Indiana, in order to perform and provide coordinated response groups, coordinated protective action guides, and things of that nature.

So there is a positive effort that is now ongoing in order to coordinate at the State level.

CHAIRMAN BENDER: You haven't said anything about fire response, except in the most general terms. What arrangements have you got for fire protection? That is, off the plant site?

MR. SCHOTT: Would you be interested in the off-site type fire response, or what we're doing in fire protection in general?

CHAIRMAN BENDER: Well, I think a little bit in the total context would be helpful, without going into it in great detail.

MR. SCHOTT: We have begun actual training of our own in-plant personnel.

We are utilizing the services of professional fire consultants to provide the initial training for these people, so they have the theory of fire and those types of fundamental basics.

And then we are actually beginning fire brigade training. We are now formulating our fire fighting plans and procedures for handling contingencies within the plant itself.

We have made arrangements with the Washington Township Fire Department, which is located in Moscow, Ohio, as the initial offsite response agency that would respond to a fire call.

They further have mutual agreement pacts with local neighboring fire departments. For example, the New Richmond City Fire Department is located about 10 miles towards Cincinnati. They are the first backup for

Washington Township.

So all of these arrangements have been made, and we have had excellent arrangements and working agreements with these organizations throughout the years, because of the close proximity of our plant which is right down the stream.

CHAIRMAN BENDER: Do they all have professional firefighting groups?

MR. SCHOTT: No, sir. For the most part, they're volunteer organizations. In New Richmond -- well, the Chief is normally full time, but the response is strictly volunteer.

CHAIRMAN BENDER: What is the nearest professional firefighting group? By that I mean a paid fire department will full-time people who are accessible?

MR. SCHOTT: Well, naturally, the City of Cincinnati, has --

CHAIRMAN BENDER: Is that the nearest one?

MR. SCHOTT: We have several other -- well, fully, totally professionally manned, I would say yes, the City of Cincinnati.

CHAIRMAN BENDER: Have you made any attempt to deal with them in the event that they --

MR. SCHOTT: No, sir, we have not, because we feel that the response that we obtain from the nearby volunteer groups would far exceed the response that we would hope to obtain from the City of Cincinnati.

CHAIRMAN BENDER: You may very well be right, but I recall one or two fires where professional firefighting organizations provided very good advice to non-professional staff groups.

MR. SCHOTT: I might point out that the professional consultants that I spoke of are three gentlemen who have retired from the City of Cincinnati fire organization, and they have formed their own fire consultant group. And those are the gentlemen that we have engaged to assist us in our initial planning and training and formulating of firefighting procedures.

CHAIRMAN BENDER: That only emphasizes the point I make. It's nice to have some professional people who can be drawn on. It's true, they may not arrive at the instant of a fire, but sometimes a fire goes on for awhile and having access to them is helpful.

I'll leave it there. Go ahead.

DR. ZUDANS: Can I ask a question, just for curiosity? Who is responsible at the present construction stage for fire in the power plant?

MR. SCHOTT: I'm not quite sure I understand.

DR. ZUDANS: There's some fire protection during construction, right now. Who is responsible for fire protection at the present time?

MR. SCHOTT: The constructor, who is Kaiser Engineers, are the primary response organization. And they have a well trained, fully staffed group of fire brigade persons who would respond initially.

They also have the same arrangements with the Moscow Fire Department nearby as backup.

DR. ZUDANS: Do you plan to retain the same people to maintain a continuity after the plant is finished?

MR. SCHOTT: No, sir. It would be the plant staff that would be the fire brigade initial response teams.

CHAIRMAN BENDER: At what time does your plant staff take over responsibility?

MR. SCHOTT: There's really not a clearly defined point. It's an overlapping arrangement. We are responsible, certainly, for certain areas that have been turned over to us for operation, and it's a phasing in and a phasing out process that is very -- well, it's almost impossible to try to describe, but it does work.

CHAIRMAN BENDER: Will you be fully in charge when the fuel is brought to the site?

MR. SCHOTT: As far as the fire protection on the refueling floor we will be responsible for the fire protection in that area, yes, sir.

CHAIRMAN BENDER: Well, I'm not sure that I recall all of the fire protections there, but if there's, for example, fire fighting equipment, like a water spray system that's installed, who would be managing that?

MR. SCHOTT: As far s the fuel floor is concerned, we are administratively valving closed the water fighting facilities in the region of the fuel vaults, and we have purchased special chemical extinguishing equipment to use during that period of time, before the fuel becomes flooded.

CHAIRMAN BENDER: I see. Okay.

MR. SCHOTT: To avoid inadvertent criticality.

CHAIRMAN BENDER: I assume the Staff is paying attention to this aspect of the transition from construction to operation?

MR. PELTIER: I'll have to check into that.

CHAIRMAN BENDER: Thank you.

Go ahead with the next phase of your presentation.

MR. SCHOTT: This is Quality Assurance for Operations. I'll briefly try to summarize this.

The primary elements of the Quality Assurance Program for Station Operation are administrative control, reviews, audits, reporting, management review and training.

Structure systems components, activities and procedures have been reviewed to evaluate their safety-related functions.

The QA program consists of managerial, administrative and operational controls and procedures used to assure the safe operation of the facility.

Appropriate administrative directives are being prepared and implemented to adequately cover the activities shown on the Vugraph. These activities have been selected to cover the broad spectrum of nuclear plant activities, and are aimed at administrative responsibility and/ or their functional nature.

I think with that I just might close my formal presentation, and see if you have specific questions on operational quality assurance.

CHAIRMAN BENDER: Well, a few points that perhaps are worth addressing.

Where does the quality assurance manager report?

MR. SCHOTT: The organizational arrangements that exist at CG&E are that we have a principal quality assurance and standards engineer, Mr. Schwiers, who will be making a subsequent presentation. His primary responsibility has been in design and construction. He reports to Mr. Waymeyer, who is the ma nger of the engineering department.

I h ve on my staff what we call a station quality engineer, and he reports directly to me for operational aspects of the program, and he has an open line of communication with Mr. Schwiers.

CHAIRMAN BENDER: Is that the situation that will exist when the plant is in operation?

MR. SCHOTT: That is the intent at this time.

CHAIRMAN BENDER: Mr. Schwiers will continue to have some kind of quality assurance responsibility?

MR. SCHOTT: Quality assurance as it pertains to an overview of the station operation. Perhaps we might call him the eyes and ears of the operations review committee, corporate type, and he would be responsible for certain audits and surveillance activities during the operational phase. Strictly a quality assurance auditing type function.

CHAIRMAN BENDER: Has the Staff been through this aspect of the organization yet?

MR. PELTIER: Yes, it has.

I would like to point out, though, that I think there have been some changes made in the organization since the draft SER, which we have not looked at in detail.

CHAIRMAN BENDER: All right. Well, I think it's proper that the Staff is sure what's being done is consistent with current practice.

You said little about your safety review committee. Does one exist, and what is it made up of?

MR. SCHOTT: The station review board, as we call it, is a station safety committee. We also have an operations review committee, which is at the corporate or the headquarters level. The station review board is chaired by myself and consists of the prime first-line supervisors of the plant staff.

We have organized, we have had innumerable meetings, and we have reviewed quite a few of the safety related procedures, and have recommended approval of those procedures.

And then I am the final approving authority.

At the corporate level Mr. Borgman is the chairman of the operations review committee, and it consists of important management personnel at the engineering level. The manager of electric production is represented on that committee, and the manager of nuclear fuels and advanced engineering projects is represented on that committee, as well as cognizant electrical - mechanical type engineers.

CHAIRMAN BENDER: Thank you.

MR. SCHOTT: Would you loke to go right ahead into Security?

CHAIRMAN BENDER: Yes, why don't you go right ahead into Security?

MR. SCHOTT: I'll just briefly summarize the Security Plan as it stands today.

13.7 of the Safety Evaluation Report summarizes the status of the security plan as it exists today.

We have prepared and submitted with the FSAR a security plan that was subsequently amended and was in conformance with Regulatory Guide 1.17.

A totally revised plan responsive to 10 CFR 7355 was submitted in May 1977. We have responded to Staff questions, met with the security review team, had a Los Alamos consultant team visit the site, and we have amended the plan to respond to NRC positions and concerns.

The Staff has not, as of now, completed their review of the evaluation.

We have specified and procured equipment that meets the requirements of Part 7355. It is our intent to comply with that regulation.

As you are well aware, the stringent requirements of Part 7355, and the unique features of a security plan, dictate that this plan and accompanying drawings are proprietary.

We have the security plan as presently filed and all accompanying drawings with us today. We would be most pleased to discuss them with you in whatever detail you care to go. We rather feel that it should be a closed session, however.

CHAIRMAN BENDER: Well, we're not planning a closed session here, and this is not the world's greatest place to have one, as you can imagine.

(Laughter.)

We'll probably have to hear about it in more detail in a location where we can hear in some detail how you plan to manage this thing.

There are a couple points, though, that I'd like to raise now:

I guess the Ohio River is patrolled by the Coast Guard?

MR. SCHOTT: They have the primary responsibility for river traffic.

CHAIRMAN BENDER: Do they have a role in your plant security?

MR. SCHOTT: They do not have a role in security, no, sir.

CHAIRMAN BENDER: Do they have a role in the emergency planning?

MR. SCHOTT: Yes, sir, they do.

CHAIRMAN BENDER: I forgot to ask about it before:

Would you mind just commenting quickly on what their role is in the emergency planning?

MR. SCHOTT: Their prime responsibility has to do with patrol of river traffic, and, depending upon the emergency classification and the sectors that are impacted, we would notify the Coast Guard, either through telephone or we have arrangements with them to provide wireless communication, and indicate to them what portions of the river have been affected. It would be their responsibility to effect, essentially, river blocs and clear the zone of all traffic. Again, depending upon the accident classification.

CHAIRMAN BENDER: I see.

With regard to security, again, I would assume that, like the fire protection, the local security organizations, at least in the Townships, are probably small and not very strongly organized.

What is the principal State or local security organization to draw on?

MR. SCHOTT: You were correct in assuming what you did.

The local police group, which is the local Moscow sheriff or police chief, is essentially a small organization. We can call upon them in certain contingencies.

However, the basic responsibility lies with the Clermont County Sheriff for offsite security support, and we do have arrangements with the Sheriff, and he has constant roving Sheriff's patrol cars that are in the area.

We have radio communication with the Sheriff's dispatcher, and he has assured us that he can respond in a very short period of time with at least one car, and possibly two, in ten minutes. And that could be backed up with further assistance, as he calls in patrolmen from outlying regions.

Now, in addition to that there is a nearby Ohio State Patrol facility, and we can call on the Ohio State Patrol for backup as may be required.

CHAIRMAN BENDER: How about the jurisdictional boundary across the river? Have you done anything about trying to work out anything with that?

MR. SCHOTT: The security plan, as it is presently written, does not encompass any portion of Kentucky.

CHAIRMAN BENDER: Well, the river isn't all that wide, and boats travel back and forth and from one side to the other, with some ease, as I gather.

Wouldn't it be wise to determine whether Kentucky also might provide some security support, if needed?

MR. SCHOTT: The State boundary of Kentucky is at the low water mark of the river on the Ohio side, but Kentucky security forces have no jurisdictional responsibility on the Ohio shores.

And these law enforcement agencies rather jealously guard their jurisdictional rights. So we have not found it necessary to include Kentucky in our security arrangements. We feel that we are adequately covered with the provisions that we have made arrangements for.

CHAIRMAN BENDER: Tom, do you want to comment?

MR. EATON: Yes. Is it not true that all the water is in the State of Kentucky, then? Isn't the Kentucky State line the northernmost shore?

MR. SCHOTT: The low water or pool is.

MR. EATON: So most of the river is in the State of Kentucky?

MR. SCHOTT: The river is in Kentucky, that is a fact.

CHAIRMAN BENDER: Well, I don't think we can go very far in this direction today, but I really believe the Staff needs to -- it's been sometime since we've looked at these relationships between State borders, and the proximity of Kentucky in this case is quite close.

And while I don't think we envision any active kind of intrusion on the plant, there's no reason for ignoring the possibility.

Thank you. Are there other questions on security?

(No response.)

The next item, I believe, is the Quality Assurance/Quality Control Experience for the Zimmer plant, and Mr. Schwiers, I believe, is going to make that presentation.

Thank you, Mr. Schott.

MR. SCHWIERS: Mr. Chairman, Subcommittee Members, honored guests:

At this time I'd like to make a presentation on the quality assurance/quality control.

I have broken my presentation down into three segments.

First, I'd like to define quality assurance and quality control. I'd like to give you an overview of the quality assurance and quality control activities at the site. And then I'd like to relate some of the experiences.

In accordance with ANSI-N45.210, quality assurance is defined as those planned and systematic actions necessary to provide adequate confidence that an item or facility will perform satisfactorily in service.

This same standard defines QC as those QA actions which provide a means to control and measure the characteristics of an item, process or facility to established requirements.

Now, most of the activities of Cincinnati Gas & Electric Company at the Zimmer project have been involved in quality assurance. However, there are certain departments within CG&E who form and perform quality control activities.

Our construction section, which is located at the site, provides the initial surveillance to assure that specifications and design documents are complied with.

After the installation, our electric operating test department functions to test all of the electrical installations. They check the electrical equipment, they verify continuity of circuits, they do other electrical construction tests.

The electric production department functions to provide calibration for all of the instruments that are supplied to the project initially.

Kaiser Engineers is delegated as constructor for the project, and basically most of the quality control activities are performed by Kaiser Engineers. They are responsible for the installation of approximately 85 percent of the project.

They also have subcontractors, who function to provide specialty services to assist them in the completion of construction work.

It is estimated that 40 percent of the work activities performed by Kaiser Engineers and their subcontractors are safety related. The remaining 15 percent of the project is performed by subcontractors who report directly to Cincinnati Gas & Electric Company.

The purchase orders, the quality assurance requirements, the quality control requirements are spelled out in specifications provided by our architect-engineer, Sargent & Lundy, and it is our responsibility, assisted by Kaiser Engineers, to assure that these requirements are complied with.

The KEI quality assurance division, and the Cincinnati Gas & Electric Company quality assurance section work very closely together. We occupy a common office building at the site. We are constantly communicating in any areas of quality control deficiencies or other quality assurance requirements.

We have prepared a combined audit schedule, and this is to ensure that the important elements of the QA program are addressed, not redundantly, by Kaiser performing an audit, and we immediately performing a duplicate audit. So we have this combined schedule, which assures that all elements of the program are audited.

Region III of the NRC has conducted approximately 70 inspections at the site. Through these inspections they have identified approximately 65 non-compliances. At no time were we saddled with a non-compliance designated as a violation.

A majority of our non-compliances are considered infractions. The balance of them are considered deficiencies.

At present almost all of these infractions have been addressed, resolved satisfactorily in accordance with followup audits conducted by the Region III inspectors. However, there are still a few unresolved items which were recently documented but have not been addressed and closed out.

To date, the CG&E QA organization has performed 205 field audits and 112 vendor audits.

KEI has performed 312 QA audits and in excess of 500 surveillances.

In addition, there have been 12 management audits of the KEI program, and 16 management audits CG&E QA program.

Based on the above, it is felt that the Zimmer project has a viable QA program, and that it is implemented to a high degree of acceptability.

However, we have encountered several experiences which at this time I'd like to relate to you.

The first one occurred in late February of 1976.

A former employee of Kaiser Engineers alleged that Class-I nuclear materials had not received proper inspection by CG&E prior to installation.

He also alleged that materials purchased as Class-II materials were being occasionally installed in Class-I areas.

This incident received a lot of publicity. Television stations came in, and the individual was interviewed, and it was felt that in some cases many of the things that he had stated were misinterpreted or blown out of proportion by the news media. As a result, he was inclined to resign as the quality assurance supplier QA engineer.

The NRC then conducted special investigations in which they reviewed all these allegations. In each case, both the one concerning qualification of the materials, and also the use of Class II material in a Class I area, it was found to be not in non-compliance with NRC requirements.

In 1976 the GAO decided to perform an audit at the Zimmer project. Zimmer was chosen because of the percentage completion that existed at the time. It was a BWR, and also it was in Region III.

The GAO provided a team of three auditors, who came in for a period of seven days, and individually interviewed construction personnel at the site. The interviewed quality assurance personnel, management personnel, and they did, at the completion of their audit, decide that there were various areas that they identified as being QA concerns.

These were then turned over to Region III, since it was felt that they were the most qualified to investigate any allegations concerning QA, and they made a thorough investigation and found that a majority of these either did not cover safety-related equipment, or were not construction deficiencies.

There were a couple others that the NRC was concerned about, and they, in turn, at a subsequent inspection came in and assured that the allegations or the items identified by the construction people were not of a generic nature.

These were closed out, and we feel that there were no problems that were identified by the GAO.

Recently a former employee of a supplier of our cable trays made an allegation in which he sent a letter to the NRC. The letter was drafted and sent to architect-engineers that may or may not be concerned, and various other interest groups.

He alleged that the materials that were being used in the fabrication of the cable trays were out of specification, they were inferior, they did not meet the requirements of the specifications.

He further alleged that the welders who were performing welding on the cable trays were unqualified and that they had supplied within those trays many weld defects.

The NRC, in conjunction with ourselves, made a special investigation in which we went into the manufacturer's facilities, reviewed all of his records concerning the materials, and we found that he had independently had a materials analysis company make tests on all of the materials, and they exceeded, in all cases, the specification requirements as far as structural strength.

We also reviewed all of the weld records, the qualifications of the welders. On our cable trays most of the welds are done with resistant spot welding, and in accordance with Section 9 of ASME it is not necessary for the welders to be qualified.

To further assure that there was no validity to the allegation, CG&E took it upon themselves to extract samples from cable trays at the site, and we took a total of seven samples which represented different configurations and different vintages of shipment.

From these samples we extracted materials samples and sent them to an independent material analysis company located in Cincinnati, and in all cases all of the seven samples that were analyzed far exceeded the specification requirements. In fact, they were anywhere from 30 to 35 percent higher than spec requirements.

To validate that the welds were satisfactory, we then took seven samples from these same pieces, and destructively tested the welds in accordance with American Welding Society requirements. There were a total of 32 welds that were destructively tested, and all of them demonstrated that the welds were satisfactory. In all cases the material, as opposed to the weld, the base material is where the failure occurred.

We have had several other incidents at the site, three in nature, some of which are not at the site. However, these are still under investigation, and we have complete confidence that when these allegations are investigated that it will be proven, similar to the others, that there's no validity to the allegations.

We feel that we have a strong QA program that complies with 10 CFR 50. We have complete support of our management. And we are interested in safety as well as anyone in the whole Cincinnati area.

This concludes my presentation.

CHAIRMAN BENDER: Mr. Schwiers, I understand that in the last month or so the motors for the recirc pumps were taken out and a cleaning operation was conducted on them.

What was the nature of that work?

MR. SCHWIERS: That's correct. This was a generic problem that was identified by the supplier of the motor. The bearings had failed at another site, and it was decided that these bearings in our recirc pump should be replaced.

There was complete surveillance during the operation. The whole operation was performed by Kaiser Engineers assisted by the supplier of the motor. He provided the surveillance as well.

CHAIRMAN BENDER: What control did CG&E exercise over that operation? Did it have any responsibility during that time?

MR. SCHWIERS: We felt that we had responsibility, because the motor had been shipped to us and we had taken custody of it. So we provided quality assurance at that time, in addition to Kaiser Engineers, Kaiser functioning to do the repair work.

As a complete quality assurance program, procedures were developed and the quality assurance inspectors of Kaiser Engineers assured that the procedures were complied with and that there was proper documentation. And we, ourselves, since we had an interest in these motors, also made audits and surveillance of the whole work activity.

CHAIRMAN BENDER: As I understand it, you are presently revamping and redesigning some of the structural restraints for the piping system.

MR. SCHWIERS: That's correct.

CHAIRMAN BENDER: What quality assurance actions are being taken in those areas?

MR. SCHWIERS: In those areas we have procedures which, as there are additional materials being added to the structural supports within the containment, we are verifying by inspection that the procedures are complied with. We are assuring that if any components are removed, that the balance of the components are properly supported. We have surveyors who, prior to the time of a component's removal, they identify and shoot the elevation at which that component is, record it, and provide temporary supports. And after the component is removed and replaced by some other component, we in turn then verify that there has been no degradation in the quality of the original installation.

CHAIRMAN BENDER: Is this solely a function of CG&E, or is Sargent & Lundy involved in it too?

MR. SCHWIERS: No, it's a --

CHAIRMAN BENDER: What organizations are involved?

MR. SCHWIERS: Sargent & Lundy is involved because they have the design requirements.

Kaiser Engineers is involved because the drawings that are submitted by Sargent & Lundy are implemented by Kaiser Engineers.

And we control the drawings as they come in. We assure that the proper revision is being used. We then have our quality control people of Kaiser providing surveillance as all of the work activities are being implemented.

And, again, we have quality assurance over and above this.

We have all of this documented as to what work is being done and assurance that there's no detrimental effect to any other components during this work activity.

We attempt to independently review at Sargent & Lundy that the design is being properly documented, and that there is backup documentation.

CHAIRMAN BENDER: What action is there for the designers, who are Sargent & Lundy's engineers, to examine the finished product?

MR. SCHWIERS: They have no responsibility to review any of the finished product. Their function is strictly one of design.

It is our responsibility at the site to assure that the design documents are implemented and are completely complied with. Sargent & Lundy prepares the specifications and the design drawings.

CHAIRMAN BENDER: So the end interpretation of whether the design has been satisfied is determined by CG&E, is that correct?

MR. SCHWIERS: In conjunction with Kaiser Engineers. Kaiser Engineers has the quality control.

CHAIRMAN BENDER: I understand that. But Kaiser Engineers is a constructing organization.

MR. SCHWIERS: That's correct.

CHAIRMAN BENDER: For some reason or other that strikes me as kind of an odd situation, that you would put such great trust in the constructor to be sure that the design is satisfied.

MR. SCHWIERS: The constructor has no responsibility in the design effort. It's the constructor's responsibility to implement the design that is presented in the design documents that are prepared . d completely reviewed at the architect-engineer's offices.

CHAIRMAN BENDER: Well, I understand that. But I've spent enough time with engineering work to know that every now and then it's important for the engineer to see the results of what he designed.

How is that dealt with?

MR. SCHWIERS: We do have Sargent & Lundy engineers at the site, who are constantly, as minor problems occur during this redesign and installation, they are consulted to address these.

They also have their engineers who are interested in all of these items coming down and providing review.

CHAIRMAN BENDER: How often do the engineers come down to provide review?

MR. SCHWIERS: At a minimum they come once a month for a construction meeting. At the construction meeting they do tour the site and look at various areas.

There are other occasions where, on request from our construction group, they are requested to come down concerning maybe problem areas. And while they are addressing these they further tour the site and assure that the design is being properly interpreted.

CHAIRMAN BENDER: Well, that's enough for now.

Is this normal for the Staff, to see this kind of relationship between construction and engineering in one of these plants?

MR. PELTIER: I don't think I could answer that question.

CHAIRMAN BENDER: Would you mind having your quality assurance people tell us how the organization of this plant compared with others -- from that standpoint?

MR. PELTIER: Certainly.

CHAIRMAN BENDER: It seems to me that the relationship between the engineering and the owner is fairly loose and not as disciplined as one might expect. But that may be in the telling, and perhaps is an unfair criticism. I think we probably don't understand it as well as we ought to.

MR. SCHWIERS: Well, Mr. Chairman, if there is any other representative of CG&E -- Mr. Flynn, if you would like to add anything more to this which I have not addressed -- or Mr. Pruski?

MR. PRUSKI: I'm Dick Pruski, project manager for the Zimmer project.

We do provide surveillance during installation, through our visits, as Mr. Schwiers has summarized. We come out there monthly at a minimum. We have engineers coming out there to survey problems as they occur. We are providing startup assistance and preop testing assistance when the systems do get turned over for operation, to assure that the systems are behaving as predicted in the analysis.

CHAIRMAN BENDER: You're the CG&E --

MR. PRUSKI: No, I'm the Sargent & Lundy representative.

CHAIRMAN BENDER: Thank you.

MR. SCHWIERS: There's one other thing that the architect-engineer does. All of our preoperational tests are conducted and the results of these preoperational tests are reviewed by Sargent & Lundy. And this should assure that the system has been installed and does meet design requirements. That is one of the functions of the preoperational tests and the documentation in that area.

CHAIRMAN BENDER: All right. Thank you very much.

DR. ZUDANS: Just for a little clarification, isn't Sargent & Lundy responsible at the end of installation and after the acceptance to prove to you as an owner that the components are the ones they designed for?

(Pause.)

CHAIRMAN BENDER: To ask it another way: Are they required to show that the system is performing as the design intended it to perform?

MR. SCHWIERS: Well, the tests, the preoperational tests that are conducted on it, themselves, assures that. And Sargent & Lundy does review those.

In addition, we review those same test results. Prior to the time they're submitted to Sargent & Lundy, there's an in-house review by the station staff to assure that the test results do meet the design requirements as set up in the test specifications. The test specifications are also reviewed. They're prepared initially by Sargent & Lundy, but they are reviewed by the engineering group of CG&E.

So that we have an input, and we do verify that the test specifications do meet the requirements.

DR. PLESSET: Is there anybody from Sargent & Lundy more or less continuously at the site?

MR. SCHWIERS: There are presently people at the site almost on a continuous --

DR. PLESSET: More or less one engineer who would be responsible?

MR. SCHWIERS: By disciplines. But as far as responsible for the overall engineering, no. In most cases this individual is assigned on a discipline basis, although he has immediate contact with the people at Chicago if he finds any problems.

DR. ZUDANS: Come back to the same question:

Who has the ultimate responsibility for the components to perform as designed --

DR. PLESSET: After installation.

DR. ZUDANS: -- after it is installed. It doesn't matter who supervises installation, who takes care of quality assurance. The component is designed to do certain things.

MR. SCHWIERS: The ultimate is probably combined responsibility between the operations group who have tested it, our own personnel who have reviewed the test results, and also Sargent & Lundy.

DR. ZUDANS: But this is independent of your test results. This is a very simple thing:

I design a pump to deliver so many gallons per minute. When I install that pump and test it and it's found that it delivers half of it, who has the responsibility in the chain? Isn't that Sargent & Lundy?

MR. SCHWIERS: I think we're getting into an area of responsibility --

DR. ZUDANS: That's what I want to know.

MR. PRUSKI: Sargent & Lundy has responsibility. We reviewed the data to make sure that it met our requirements.

DR. ZUDANS: And if they don't meet the data, what --

MR. PRUSKI: We have to initiate changes to accommodate the fix.

DR. ZUDANS: Okay.

MR. SCHWIERS: Well, in most cases if we had procured those and had taken custody of the items that do not meet the specification requirements, we would probably have to pursue, based with Sargent & Lundy's assistance, rectifying whatever the deficiency was that was so identified.

CHAIRMAN BENDER: We're not trying to raise questions about whether the owner will or will not implement things. We know that if something has to be done, the owner is going to have to get it done. That's an obvious thing.

The point we're really addressing is that in other plants -- not in this one, and I don't want to suggest that it may occur -- there have been occasions when the results of tests have indicated that the design was erroneous for some reason, or the equipment was deficient for some reason, and it usually turns out that the engineering organization has to make that determination, because the operating people are not that well informed about the basis for design, on occasions, and we wanted to be sure that that mechanism for review was not ignored during this evaluation of the quality of the end product.

MR. BORGMAN: Mr. Chairman, I'd like to say something here.

CHAIRMAN BENDER: Yes.

MR. BORGMAN: There's sort of an implication here that perhaps we're not closely attuned to our architect-engineers.

CHAIRMAN BENDER: Well, the message isn't coming across, let me put it that way.

MR. BORGMAN: But we are. And there are procedures established whereby each test has to be verified by Sargent & Lundy before that system is going to be operated. All the test specifications are written by Sargent & Lundy, and the results of the test specifications we turn back to Sargent & Lundy for review before the system is actually turned over for operation.

Sargent & Lundy is not a constructing AE. And I don't think there's any utility that's any closer to their AE's than we are. In fact, there's some strength, I think, to have another party really be doing their design. There are a lot of questions raised. And we feel that we have good quality control by virtue of having another party really looking at their drawings and raising questions.

We have scheduled monthly meetings. We have free access to and from the site. And while Sargent & Lundy does not have one man who is at the site saying they have the design responsibility, there's a constant flow of

Sargent & Lundy engineers in and out of the site. We have I guess half a dozen Sargent & Lundy people at the site right now, reviewing hangars, reviewing block wall construction, things like t[illegible]

So we have very c[illegible]son with them.

Sargent & Lundy do[illegible]t have, though, the day to day inspection to see that the installation is in accordance with their drawings. Kaiser is doing that, reviewed by CG&E QA people.

But in the final analysis, Sargent & Lundy is always on the job in some form as liaison. But we don't have one man there. We have a constant flow of people with the different responsibilities and expertise as required.

And they also do review the test results to make sure that their design has been correctly installed and correctly implemented.

So I think we have very close liaison.

CHAIRMAN BENDER: Well, we won't belabor the point.

MR. BORGMAN: I just wanted to clarify that.

CHAIRMAN BENDER: Are there other questions of Mr. Schwiers? If not, Mr. Peltier, you're up again.

MR. PELTIER: Mr. Chairman, Committee Members, I have with me now Mr. Ray Scholl, who is our electrical reviewer on this project, Mr. Sandy Israel, who is from our

Reactor Systems Group, Bob Bosnak, and John Kovacs, from Mechanical Engineering -- and I think I saw Walt Butler. Did Dr. Butler come in?

DR. BUTLER: Yes.

MR. PELTIER: Way in the back.

So I hope that we'll be able to respond to many of your questions in their areas as we go through the presentation, which will have to be quite rapid.

Walt, could you come up front, maybe, so you could get at a microphone and be a little more --

CHAIRMAN BENDER: You'd better bring your own chair with you, Walt.

(Laughter.)

MR. PELTIER: Well, you can take my seat until I have to sit down again.

I'll try to walk through these as quickly as possible.

(Slide.)

The first issue that we have up there, dewatering of compacted backfill, the Staff's position on this matter was stated in a letter to the Applicant dated April 24, 1978.

The Applicant has committed to and is implementing the Staff's position on this matter with the following exceptions:

The position essentially calls for dewatering of the compacted backfill under the seismic category-1 structures if it is necessary, and provides equipment for doing that.

The exception -- the Staff's position stated in part that the water level in the compacted backfill should be maintained at or below the 457 foot mean sea level elevation. The Applicant feels that the CP agreement was that 480 feet mean sea level is adequate to prevent excessive floor pressure in the compacted backfill, which is the problem here, and, therefore, that the 457 foot level is overly restrictive.

The Staff has had contact with its consultant, Dr. Alfred J. Hendron, to re-review this matter, and we do not have his response yet. We hope to be able to clear this matter up in the very near future.

CHAIRMAN BENDER: Is the Applicant worried about pumping the Ohio River?

(Laughter.)

MR. PELTIER: I think that's what the Applicant is concerned about right now, pumping the Ohio River.

On reactor vessel supports, the Staff has asked the Applicant to provide enough details to allow it, the Staff, to independently verify the forces and moments on the reactor vessel resulting from a LOCA. Now, this effort is underway, and we expect that this issue will be resolved in the near future. We met with the Applicant just last week to discuss the needed information. We don't anticipate any problems with a BWR plant in this area.

Now, a question was raised earlier as to what our position was, and I may have misunderstood, but I think that--Bob, would you address that as far as what we look for mechanically as the acceptance criteria for vessel supports on BWR's?

MR. BOSNAK: Bob Bosnak, NRC Staff, Mechanical Engineering Branch.

The position is really that the Applicant perform the analysis and meet our acceptance criteria. The acceptance criteria are those that are established in the Code.

Now, we've gone through the analysis, and we're doing this independently for the Zimmer plant. This is our--we're doing a check of these support questions for all of the vendors, and Zimmer is the one for the BWR plants.

So we have used the Applicant-generated loads. We intend later on, when the Staff has completed its generation of the loads, to repeat the analysis with our own loads, the Staff-generated loads.

Right at this point we are in good agreement with what GE has provided with respect to their loads, but this has been done independently.

I think that's the status of where we stand with respect to the BWR plants. They have been addressed before Dr. Plesset's subcommittee.

DR. PLESSET: Are you becoming sympathetic to the GE method of dividing loads? For example, seismic and pipe breaks and LOCA loads?

MR. BOSNAK: We are using the combination methodology as expressed in our NUREG document, which is for anything that has to do with a LOCA and a seismic event, to use the SRSS methodology.

DR. PLESSET: That's what I was wondering, if that's the procedure.

DR. ZUDANS: You said you used loads generated by the Applicant. Can you quantify whether these loads that were originated by the Applicant did take fluid/structures interaction into consideration, and whether or not the ones that you originate yourself will do so?

MR. BOSNAK: This is being done by our Analysis Branch, and it's a matter of agreement on the blowdown code that's being used.

I don't think at this point GE has considered fluid/structure interaction. Perhaps the Applicant can comment on that, if anyone can.

MR. BRINKMAN: I think here we're talking particularly, sir, about the annulus pressurization loads that are imposed on the reactor vessel skirt. I'm not sure if we are all together on that, but --

MR. BOSNAK: As far as the PWR plants are concerned, this was the asymmetric pressure distribution on the internals, where one of the vendors took into account fluid/structure interaction.

Not all the vendors have done that, and we're talking about inside the reactor vessel.

CHAIRMAN BENDER: This is blowdown at the time -- if there is a break at the juncture, between the vessel and the --

MR. BOSNAK: The annulus pressurization is the external effect.

DR. PLESSET: And that's what you've been looking at for the most part, right?

MR. BOSNAK: Well, we have two groups within the Staff. One is looking at the annulus pressurization, the cavity effects, the external effects. The other group, the blowdown and the internal.

DR. ZUDANS: Well, the answer to my question is either yes or no.

CHAIRMAN BENDER: Well, but it's different, depending on which loading you're talking about. That's what we're --

DR. ZUDANS: That is correct, but as far as the asymmetric supports are concerned, both loadings have to be taken into consideration.

MR. BOSNAK: As far as we're concerned, Staff is concerned --

DR. ZUDANS: The rigid boundary, correct?

MR. BOSNAK: The rigid boundary.

DR. ZUDANS: Okay.

CHAIRMAN BENDER: You got a satisfactory answer, Dr. Zudans?

DR. ZUDANS: Yes, I expected it to be rigid boundary. I just wanted to make sure that there might be something that I didn't know about.

CHAIRMAN BENDER: Even if the rest of us aren't totally clear, Dr. Zudans is satisfied. Let's go on.

DR. ZUDANS: Well, the point, that I think the Staff recognizes, is the fact that in addition to the cavity pressures that apply to the supports, you also have to consider the internally-generated loads. And that's being done by two different groups, I understood you to say?

MR. BOSNAK: That's correct.

DR. ZUDANS: Okay. I'm satisfied.

MR. PELTIER: Preservice and inservice inspection program, we've not quite completed our review in this area. 10 CFR Part 50 paragraph 50, Section 5.A.(g)(2), requires that any exceptions to the rule be justified and, therefore, to review the exemptions requested.

The Staff is reviewing the exemptions requested and the justifications supporting those exemptions at this time.

In addition to that, the Applicant has not presented the Staff with an acceptable augmented inservice inspection program for the detection of cracks in feedwater and control rod drive return line nozzles and the plant radii. We're waiting for this program to come in.

The Applicant plans to submit his revised inservice inspection program required by Part 50, 5055(a)(g)(4) six months prior to commercial operation, and we will look at it at that time.

The effects of recirculation pump trip in over-pressurization analyses, in the earlier over-pressurization analysis by the Applicant the effects of the ATWS pump trip were not included. Now this is the pump trip where he gets his signal from the turbine building.

The Staff has asked the Applicant to include the effects in their analysis. Included in the request was a request for sensitivity analysis for the effects of initial operating pressures in the vessel dome, since technical specifications do not limit dome pressure to 1020 psig assumed in the transient analysis.

The Staff has also requested more pertinent data on the operating experience and safety relief valve qualification testing for the valves in the operation and the safety and AES modes. This information has not been received yet.

DR. PLESSET: Does this include some consideration of failure to scram?

MR. PELTIER: No, this is not related to that problem. This problem arises from the fact that the ATWS scrams are included -- or the ATWS pump trip is included in the Zimmer plant, but it was not included in the analysis, and in some instances in the Staff's experience these trips have made a difference in the results of the over-pressurization analyses.

Could you add anything to that?

MR. ISRAEL: This analysis just deals with the simple over-pressure protection leading from transients, to wit, that they have to meet 110 percent of the ASME design code.

Previously they had not included in their analysis, in the simplified transient analysis, the ATWS pump trip. And our previous experience has indicated that this will increase the peak pressure for this type of transient with scram probably 10 or 20 psi.

DR. PLESSET: I was interested in whether, in connection with the Mark II, you're following the pressure and temperature in the drywell and the wetwell if you have a failure to scram?

MR. ISRAEL: I'm afraid I'm not able to address that.

DR. PLESSET: Well, maybe we may hear --

MR. PELTIER: I'm not sure I understand the question. This is an abnormal transient situation we've been talking about here.

CHAIRMAN BENDER: Let me try to clarify the point. I suspect it's a little premature, but, nevertheless--

DR. PLESSET: Yes, it is.

CHAIRMAN BENDER: But the question has to do with the matter of, if, in the end the BWR's go to a concept in which the ATWS occurs with a recirc pump trip and the blowdown is allowed to go into the containment suppression pool, what temperatures will develop in the suppression pool, and how will they be monitored?

Is that the question?

DR. PLESSET: That's really it.

CHAIRMAN BENDER: And I suspect it's premature to answer that question.

DR. PLESSET: It may well be.

CHAIRMAN BENDER: As a matter of fact, I think that's not necessarily the generic solution. So I don't want to aggravate the problem at this point.

MR. ISRAEL: While we're on the subject of ATWS, I believe the Staff is planning to make recommendations to ACRS in December as to what our final position is.

CHAIRMAN BENDER: We look forward to it with bated breath.

(Laughter.)

DR. PLESSET: I might say, Sandy, that GE has made some calculations on this question that I raised a little bit prematurely, but I don't know if they apply to Mark II's. That was what I really --

MR. ISRAEL: I'm not aware of that.

DR. PLESSET: Okay. We'll pass it.

CHAIRMAN BENDER: Go ahead, Mr. Peltier. We are running behind schedule.

MR. PELTIER: Protection of motor/generator sets. This is the Hatch-2 problem.

On August 11, 1978 the Staff advised the Applicant by letter that the motor/generator sets for the reactor protection system power supply may not satisfy criterion 2 of the general design criteria. A seismicly induced failure of voltage regulation, accompanied by a single failure in the motor generator set could cause a sustained over voltage, causing ultimately loss of the capability to scram.

The Applicant has committed to the generic resolution of this concern, but may have to request an exemption to the rules if the corrective measures are not implemented by fuel loading date.

Physical separation and isolation. During the Staff's review and its site visit, several problems were disclosed with respect to physical separation electrical independence between redundant safety circuits and non safety circuits.

The Staff reviewed this matter against the construction permit commitment. The Applicant has committed to modifying circuits in the field in a manner satisfactory to the Staff.

He has also committed to a program for the qualification of electrical isolaters used in circuits between safety and non-safety systems.

Staff is in the process of reviewing these matters, but will not be able to complete its review until the issue of the use of non safety grade systems for mitigation of abnormal transients is resolved.

Fire protection. The Applicant has responded to all of the Staff's position with respect to fire protection. The Staff is reviewing those responses to assure that the positions have been met.

In a few areas, such as floor, ceiling and wall barrier penetration seals, the Applicant has proposed methods that are not yet supported by test data to substantiate the fire resistance ratings required. We hope to be able to clear this matter up in the very near future.

Fire protection, as a question of emergency planning, I think was mentioned this morning. There was a question on that. The Staff has completed its review of fire protection as part of the emergency planning, and I believe that's contained in Section 13 of the SER.

CHAIRMAN BENDER: Have all of the changes that the Staff believed are needed been agreed upon between the Staff and the Applicant?

MR. PELTIER: Except those ones that I've just mentioned. The implementation is nearly complete, I believe. But the Applicant is proposing in some areas some penetration seals, using materials whose fire barrier rating has not been substantiated by adequate testing, in the Staff's opinion.

So we will have to go over that again with them, and they'll have to take some corrective action to get the data or use something else.

Plant and support staffing. During its review and in discussions with I&E, Region III, the Staff became concerned about the adequacy of the Applicant's plant and support staffing, particularly for preoperational and startup test programs.

In addition, the Applicant has not shown the position of maintenance supervisor, and minimum qualifications have not been met for the position of reactor engineer.

We have discussed the matter with the Applicant, and he has an effort underway to upgrade his plant and support staffing, and to fill the open key positions.

We will continue to follow this program, particularly with regard to the preoperational testing and the startup test program.

Industrial security. The Applicant has submitted a complete revised industrial security plan, and the Staff is reviewing it, as Mr. Schott mentioned this morning. There are a few minor exceptions to the Staff's position.

For example, the Applicant's approach to protection against the insider is weaker than the Staff's position and is not acceptable.

Staff plans to make its site visit in December, and hopes to resolve any remaining issues shortly thereafter. The Applicant's plan, however, is basically acceptable.

(Slide.)

Design for pool dynamic loads. The Applicant has reassessed his structural and piping and equipment systems to accommodate pool dynamic load. These systems fall into three categories:

The first one is those which meet Code stress limits when dynamic loads are combined by the absolute sum method.

Second are those which meet Code stress limits when dynamic loads are combined by the SRSS method where applicable, but not when combined by the absolute sum method.

The third category are those which do not meet the Code stress limits when dynamic loads are combined by either method.

Now, for case 3 the Applicant is modifying the system to meet Code limits when dynamic loads are combined by the absolute sum method.

For case 2, the Applicant has asked the Staff for relief on a case-by-case basis. Just last . . . I guess it was the 19th --

VOICE FROM THE AUDIENCE: A week ago.

MR. PELTIER: Was it a week ago? -- the Applicant made his presentation to us with regard to those areas where he would be requesting relief, and he's completed his reanalysis by a very high percentage -- I don't know exactly what the numbers are. But we are expecting to be able to look at these areas where he has requested relief, and reach our final position on those matters by the end of the year, I should hope.

DR. ZUDANS: May I have a question on this point?

CHAIRMAN BENDER: Go ahead.

DR. ZUDANS: As I read in another report, it is Staff's position now that you will allow SRSS combination of SSE and LOCA loads.

What is your position with respect to SRV loads, combined with the others?

MR. BOSNAK: Currently, we are requiring -- if someone came in and asked today, such as you're doing today, our current position is the absolute sum.

DR. ZUDANS: On SRV?

MR. BOSNAK: On SRV.

DR. ZUDANS: With SSE and LOCA?

MR. BOSNAK: We're talking about SRV and the pool swell and an OBE. For instance, a seismic event.

These are more probable, and we haven't completed our position on it. We are continuing to look at it. We expect -- we hoped at one time to be able to say that our position will be SRSS, but it is not yet at this time.

That's why we've asked the Applicant to look at the absolute sum. In other words, to evaluate it for responses combined absolutely.

DR. ZUDANS: Your group is headed by Mr. Huntling? That's the same group, the working group?

MR. BOSNAK: No, that group is no longer in existence. The group that prepared the NUREG document has not really been dissolved, but they're not meeting as a group as it was previously constituted.

We do have within the Staff people that were on that original group that are looking at the overall problem. We have the consultant, Brookhaven National Lab, which is providing on a technical assistance contract basis, some additional information.

We don't expect this to be in place for several months.

CHAIRMAN BENDER: Thank you, Bob. That's enough on that. We need to move along.

MR. PELTIER: I should add that in the structural area the Staff still does have some outstanding questions on the closure report, which deal primarily with fluid/structure interation, and we have not received Applicant's response to our request for information in that area.

(Slide.)

Seismic qualification of mechanical and electrical equipment. This is another big area. The Staff is still in the process of reviewing the qualification of mechanical and electrical equipment for seismic and operability under faulted conditions.

The equipment qualification tests and analyses for both the nuclear steam supply system and the balance of plant equipment are being reviewed against our current acceptance criteria to determine if any equipment or components need to be requalified, retested.

The nuclear steam supply system equipment is being reviewed on a generic basis with the General Electric Company, and the Staff has made one on-site visit to review the balance of plant equipment.

MR. BOSNAK: Irv, for the benefit of the Subcommittee I think I ought to add that seismic is really a misnomer. What we're really doing is qualification for the vibratory loads that the equipment is going to have to operate under. We're talking about not only seismic, but the hydrodynamic vibratory loads.

CHAIRMAN BENDER: We are pleased to see that you have finally recognized that that's the right way to qualify equipment.

Go ahead.

MR. PELTIER: Conservatism in transient analyses.

In a letter dated December 7, 1977 the Staff requested that the Applicant provide analysis of the Peach Bottom transient turbine trip test performed in April of 1977, and to provide a description of any additional confirmatory tests planned to assess the conservatism of the transient analysis methods.

The Applicant responded on February 21, 1978 saying that he preferred to commit to the General Electric Company generic resolution of this problem.

The General Electric Company approach involves the development of a new analytical method, namely the ODIN code and in some planned future turbine trip transient test.

The Staff is reviewing this generic effort.

Low-pressure coolant injection diversion effects on ECCS and long-term cooling:

In order to increase the allowable bypass of the suppression pool during a small break LOCA, the Applicant's design automatically diverts the low-pressure coolant injection flow to the wetwell sprays after ten minutes.

The Staff has requested by letter dated October 10, 1978, that the Applicant analyze the effects of the LPCI diversion on ECCS and long-term cooling to show that core temperature increases, if any, are acceptable.

The Applicant has not responded as yet, although informal discussions have disclosed that increased core temperatures are probably acceptable.

CHAIRMAN BENDER: Let's see if we understand the issue:

The problem here is that when the cooling is diverted temperatures tend to go up? What is the issue?

MR. ISRAEL: Yes. The very small breaks -- when you have LPCI diversion with a break in the high-pressure core spray line, you tend to get an increase in temperatures, probably around a couple hundred degrees.

Now, for this specific plant the peak clad temperature for the large break is something like about 1800 degrees F., and peak clad temperatures that the Applicant has calculated with LPCI diversion of 10 minutes for a .02 square foot break is something like 1725 degrees F.

We have requested additional information of the Applicant to justify that, yes, he has analyzed the worst set of conditions as far as a LPCI diversion is concerned.

CHAIRMAN BENDER: But you're measuring this against a 2200 degree limit?

MR. ISRAEL: Yes, we're significantly below the 2200 degree limit.

CHAIRMAN BENDER: Thank you.

MR. PELTIER: I might add here that when Mr. Brinkman was asked about the possible bypass paths around the wetwell -- or I should say around the suppression pool, he left out the hydrogen recombiner, which also has a potential bypass. The Applicant has analyzed that and the Staff has analyzed that particular bypass path.

Pool dynamic loads and load combinations:

The Staff issued its Mark II containment acceptance criteria to the lead Mark II owners on September 14, 1978. The load evaluation report was given to the Committee on September 27, 1978, in draft, and I understand that now has been published as a NUREG and is between covers.

On October 19, 1978 --

CHAIRMAN BENDER: Does that report have a number yet? The last report I saw didn't have a number.

DR. BUTLER: NUREG-0487.

CHAIRMAN BENDER: 0487?

DR. BUTLER: Right. It's dated in October.

CHAIRMAN BENDER: If it were final, it might become the most discussed document in all the NRC history.

MR. PELTIER: On October 19 the Staff met with the Mark II owners and agreed to review a very limited number of criteria on the basis of new information. The Staff hopes to reach its final position by the end of the year.

The generic Mark II program will be discussed with the Committee, I believe, in San Francisco at the end of this month.

Safety-related display instrumentation:

The Staff has identified some unacceptable designs in the area of safety-related display instrumentation. For example, the rod display power source.

The Applicant has proposed acceptable modifications in most areas, but the Staff cannot complete its review in this area until the issue of use of non safety grade equipment for the mitigation of abnormal transients is resolved.

All other instrumentation required for safety is in that same category. Until the Staff reviews and final position is reached on the use of non safety grade equipment for the mitigation of abnormal transients, the Staff cannot complete its review of all other instrumentation required for safety.

It will be necessary to identify the systems in this category completely prior to completing the Staff review.

Preoperational and startup test program:

The Applicant has not concluded tests in his preoperational test program to demonstrace the capability of the essential loads to operate at the DC system's design basis minimum voltage level. The Applicant has tried to justify this omission, but the Staff finds the justification deficient.

That is the only area that is open in the preoperational test program.

However, the startup test program, the Applicant has just recently submitted all of the revised abstracts for the startup tests resulting from a late revision to the startup test program by General Electric Company. The Staff is in the process of reviewing the startup test program now.

CHAIRMAN BENDER: One question. Is the startup test program for this reactor likely to be grossly different than that for Hatch, for example, Hatch-1?

MR. PELTIER: It is my understanding that it has undergone considerable revision, and I don't know whether that revision is more form than substance.

I could not answer that question now, but perhaps the Applicant could shed some light on that.

CHAIRMAN BENDER: Mr. Flynn, without going into detail -- you're going to have an opportunity to respond to these things -- could you state quickly? You've been looking at what Hatch has done, and it would be interesting to know how your plant might differ in a general way.

MR. FLYNN: Yes, sir. I'd like to have Jim Schott address that.

CHAIRMAN BENDER: Short, Mr. Schott.

(Laughter.)

I just want to get a feeling for it.

MR. SCHOTT: I'm not quite familiar with the total Hatch design. I don't think our plant differs that greatly, but we have I think one feature that that plant does not have, in that we have three redundant electrical divisions, each supplied by a 125-volt separate DC system. We have two 250-volt DC systems, and two 2448-volt DC systems.

So from the point of view of basic design, I think we have a superior plant.

CHAIRMAN BENDER: Well, that's not quite the point I was trying to make. I was just trying to establish that, considering the fact that there's already precedent for a startup program, is there something radically different between what you might be planning and what was planned for Hatch?

MR. SCHOTT: To my knowledge our program is not radically different.

CHAIRMAN BENDER: So if there are any differences they're probably minor? Is that a fair assessment?

MR. SCHOTT: That is a fair assessment.

CHAIRMAN BENDER: And the debate might not be all that important, then.

Go ahead, Mr. Peltier.

MR. PELTIER: I'm at the end of my summary of the Staff's situation on the open issues at this time.

CHAIRMAN BENDER: When are you going to tell us about -- oh, Mr. Butler is going to tell us about whether it's a good idea to cut off the downcomers.

MR. PELTIER: Yes, we're going to get to him --

CHAIRMAN BENDER: Okay, we'll wait for Mr. Butler.

MR. PELTIER: -- as soon as I get a chance to talk to him at lunch, I hope.

CHAIRMAN BENDER: All right. We won't impose upon him unfairly.

Let's see, it's 11:51 now. How much can you cover before lunch, Mr. Flynn, and how much after lunch?

MR. FLYNN: You have lunch now scheduled for 1:00 o'clock. With luck, and few questions from the Subcommittee, we can be finished by 1:00.

CHAIRMAN BENDER: Well, let me say that I had thought we would break around 12:30, because some of us have not yet checked out of the motel and we're imposing on the hospitality of the place.

So, do you want to go until 12:30 and then break?

MR. FLYNN: That's agreeable to us.

CHAIRMAN BENDER: Why don't you go ahead, then?

MR. FLYNN: All right.

Basically, we're in agreement with the Staff's positions, but we do want to make a few clarifying remarks.

Let's look at the first one, backfill and dewatering. The only difference we have there is the level at which we begin pumping.

Unless the Subcommittee has additional questions or wants clarification of the differences in our positions, we're prepared to move off that one onto the next item.

CHAIRMAN BENDER: No, just go ahead. We'll assume you'll work it out, and we think you will.

MR. FLYNN: All right.

On the containment design and vessel supports, I'd like to ask Mr. Brinkman to address the Staff's position on that.

MR. BRINKMAN: I think Bob Bosnak fairly well summarized the situation. I would like to point out that the analyses have been done on the reactor vessel support systems, the results have been submitted, and the values calculated have been accepted.

The techniques used in making the vessel support analyses have been reviewed, and I think it's fair to say that the techniques used have been demonstrated to be conservative. Particularly the mass release rate, which is the primary input to this whole function, has been demonstrated to be more conservative than the NRC acceptance criteria itself, considerably more conservative.

I don't think there's any disagreement between us and the Staff with what we've done. I think --

CHAIRMAN BENDER: You think it's just a matter of getting it reviewed?

MR. BRINKMAN: I think it has been reviewed and accepted, because it's stated as accepted in the SER. I think what we're trying to do -- I think what's being done is the NRC is trying to develop independent calculations for confirmation of what we've done.

CHAIRMAN BENDER: Well, you may very well be right. But you don't want to pursue that any further? You think --

MR. BRINKMAN: No, I just want to make the point that I don't think, from our point of view, this is an is to delay our plant over.

CHAIRMAN BENDER: Well, we're not doing more than just trying to define the circumstances.

DR. ZUDANS: Mr. Chairman, there was a statement by Staff just a few minutes ago that they do not have the information yet to evaluate the vessel supports.

MR. BOSNAK: We have not generated our own loads based on the Staff's mass energy release calculations and based on the Staff's generation of the asymmetric external pressure loads.

CHAIRMAN BENDER: As I understand it, the point is that the Staff is planning to do its own analysis?

MR. BOSNAK: That's correct.

CHAIRMAN BENDER: -- as a way of evaluating independently what the Applicant is doing.

MR. BOSNAK: We've done it independently, using our own computer codes with the Applicant's input, and we're going to repeat it --

MR. PELTIER: Let me see if I can clear this up, Mr. Chairman.

What the Staff is looking at now is the method by which you convert the pressures in the subcompartments, and so on, to moments and forces on the reactor vessel. So it's the mechanics of walking through the analysis.

There are no further questions with regard to mass energy release or the acceptability of the subcompartment pressure analysis. It's just how do you get to forces and moments on the vessel.

CHAIRMAN BENDER: The loading model?

MR. PELTIER: The loading model, yes.

DR. CATTON: I believe when GE made the presentation at Los Gatos a year or so ago there were some questions about how the pressure buildup in the annulus was calculated, and I've not seen any documentation or answers to the questions that were raised at that time.

Maybe you could refer me to one of the reports, and save time at this Committee meeting.

CHAIRMAN BENDER: Well, why don't we leave it that you'll try to?

MR. PELTIER: Yes.

CHAIRMAN BENDER: Go ahead.

MR. BRINKMAN: If you're interested in how the pressure traces are done within the annulus, that's done by Sargent & Lundy. It's not done by General Electric. The techniques used on Zimmer were reviewed in considerable detail. Please tell me if I'm wrong, but it's my impression that Sargent & Lundy techniques used to calculate the pressure matrix were found acceptable. Sensitivity studies were done by Sargent & Lundy to demonstrate that the technique used by them was not sensitive and was conservative.

DR. PLESSET: Well, I think we want to see that report, if we could.

MR. BRINKMAN: Okay.

DR. PLESSET: So that can be done, then?

MR. BRINKMAN: Yes, it can be. That information has been submitted.

Ray, do you have the report title for that?

VOICE: I think it was a series of questions, but I don't have the question numbers. Do you remember, Marv, what those question numbers were?

CHAIRMAN BENDER: Well, let's leave it that you'll look it up. We can't -- having that information now won't help us much, anyway.

MR. BRINKMAN: Question 110.28 I'm told.

CHAIRMAN BENDER: Go ahead, Mr. Flynn, with the next item.

MR. FLYNN: The next two items, qualification of electrical and mechanical equipment and component operability, we have had the NRC review which conducted an audit of the qualification reports for the balance of plant equipment this past August, between August 14 and 17.

The team completed the audit for half of the reports which were selected, and another meeting will be held to complete the audit for the rest of the reports.

The electric equipment and instrumentation constituted the completed half of the reports.

The qualification reports of mechanical equipment are available, and constitute the unaudited half.

The qualification reports were found to be satisfactory by the team and no measure of disagreement of outstanding items were pointed out.

We believe that the rest of the audit will result in a similar conclusion.

We asked the Staff point-blank when they had completed their review if they were satisfied, and their answer was yes.

CHAIRMAN BENDER: Very good.

MR. FLYNN: The next item, effects of recirculation pump trip, I'd like to ask Mr. Dick Johnson from GE to make a statement on that.

MR. JOHNSON: I'd like to just clarify that when Mr. Peltier was reviewing this issue he mentioned that it was the recirc pump trip from the turbine building. This is not the one that we're analyzing. It's the ATWS --

CHAIRMAN BENDER: We can't hear you. You'll have to get a mike, and repeat a certain amount of what you've said.

MR. JOHNSON: I'd just like to clarify that when Mr. Peltier was talking about this particular item, he indicated that the trip that we were looking at was the one from the turbine building. As a matter of fact, we're looking at the ATWS scram - - the high pressure scram from the MSRV closure.

CHAIRMAN BENDER: That's the usefulness of this meeting. The Staff and Applicants talk to each other once in awhile.

MR. PELTIER: I acknowledge my mis-statement. It is the ATWS trip we're talking about here.

MR. JOHNSON: That's right, to evaluate the effects of this particular event on the vessel pressure.

CHAIRMAN BENDER: All right. So this is when the reactor is not scrammed, and you're determining the pressure that it will rise to initially --

MR. JOHNSON: That's right.

CHAIRMAN BENDER: -- when the recirc pumps trip?

MR. JOHNSON: Yes.

CHAIRMAN BENDER: Very good. We're on the right wavelength again.

MR. JOHNSON: Now, there was just one other item of clarification, and that is with regard to ' e RPSMG sets Mr. Peltier also indicated that the Applicant ! adopted the GE generic position, and we have submitted that for Staff review. We are expecting them to review that and approve it before we get to the detail design, but we believe it could be completed prior to operation of the plant.

CHAIRMAN BENDER: Thank you.

MR. FLYNN: In that regard, we're waiting for the Staff's review, and we will make a commitment, one way or the other, to that GE generic letter.

The next item would be the Peach Bottom test, the conservatism in transient analysis. Mr. Brinkman will address that.

MR. BRINKMAN: I think the report presented by Mr. Peltier was, again, -- we generally agree with it.

I would like to clarify a few additional points.

We have discussed this with General Electric Company, who is providing the generic ODIN code analysis. They inform us that all the test data from the Peach Bottom tests and all of their ODIN documentation has been submitted, is actively under review in the Staff, and that a final SER issuance on the ODIN code is anticipated now for November.

If this is issued in November per the current schedule, there will be adequate time to double check it with the Zimmer calculations prior to startup.

MR. FLYNN: Would you like to address in-service inspection while you're on Beach Bottom?

MR. BRINKMAN: Again, we acknowledge that the in-service inspection final program has, indeed, not been submitted. I did want to clarify that we have had repeated meetings with the Staff, we have discussed what we are doing, what we intend to do, the writeups are under active preparation now, and are scheduled for submittal prior to the end of the year.

We are committed to do these inspections in accordance with ASME Section 11, with various Reg Guides which require augmented inspections, and in accordance with 10 CFR 5055 requirements.

We have already submitted our preservice inspection plan. In fact, preservice inspection programs are well underway at the plant. I don't foresee this dragging out to become a startup delaying problem.

MR. FLYNN: If there are no questions, we'd like to ask Herb, then, to address the comments on the Mark II acceptance criteria.

MR. BRINKMAN: We have had meetings on the Mark II generic program with the Staff, as was pointed out. We are under the impression that the Staff is considering acceptance of SRSS for those cases which can meet certain selected criteria, including safety valves.

The Mark II group was requested to respond to the Staff, identifying which of the criteria would be acceptable to them if SRSS were approved by the Staff.

That information has been furnished, and it does result in a situation where the Mark II owners group is able to accept the bulk of the criteria.

There are active programs underway with the Mark II owners group to resolve and bring to conclusion those areas which have not been fully accepted by the owners group.

There are, in fact, meetings going on by the Mark II owners group this week with the Staff in an effort to resolve those remaining items.

CHAIRMAN BENDER: Have you seen this NUREG report that's been identified here today?

MR. BRINKMAN: No, sir, I have not.

CHAIRMAN BENDER: It would be wise to get a look at it.

MR. BRINKMAN: I sure would like to.

The Zimmer Station is prepared to go possibly further than the generic program in accepting these criteria, and I'd like that point to be understood by the ACRS, that we are not relying solely on the generic acceptance of Mark II c eria. We are prepared to go further.

CHAIRMAN BENDER: You're saying that you may decide to go your own way? Is that a way of interpreting it?

MR. BRINKMAN: We may decide to be more agreeable than the generic program.

(Laughter.)

MR. BRINKMAN: And we will probably do that under the pressure of schedule. We recognize that the Staff is hard-pressed to come to a decision, and we want to make that decision easier by being more cooperative.

Our plant in many cases has the capability to take loads which we may quarrel with from a technical point of view, but we're simply saying let's don't quarrel with that and delay licensing, let's be agreeable.

CHAIRMAN BENDER: We understand the pressures of time.

DR. ZUDANS: Sometime today someone would be able to address the question that actually Ivan placed, and I want to supplement that question:

Those 36-foot long downcomers than hang in the water by about 10 feet, in accordance with the design criteria they're subjected to lateral loads. There's a static lateral load of 8.8 kips and dynamic loads with various frequencies.

The question is: Has anybody analyzed the response of this long, slender downcomer and shown that it will stay in place as needed?

MR. BRINKMAN: Yes, sir, it has been analyzed. That particular downcomer arrangement was designed by Sargent & Lundy. They did an analysis of both the static and the dynamic loads. Those loads were all within the capability of the downcomer, when analyzed in accordance with the criteria of the Staff.

Both the dynamic and the static loadings were applied in a variety of ways in an effort to maximize loadings on not only the columns but the floor.

DR. ZUDANS: Is there a separate report where this is discussed?

MR. BRINKMAN: That is documented in the Zimmer Station closure report, which discusses the analysis that was done.

DR. ZUDANS: The specific point I want to make is that a partially submerged structure like this reduces its natural frequencies. In other words, the more you submerge, the slower it will vibrate, and you may come into a synchronism where there's some excitement pulsation due to chugging or some other effect.

This is the particular thing that I'd like to see, or have somebody tell me about.

MR. BRINKMAN: Do you want to have the discussion now, or --

DR. ZUDANS: No, it's all right. At some --

CHAIRMAN BENDER: Let's hold it for the time being.

MR. BRINKMAN: It has been considered and it has been documented in our closure report, and we do have the people with us today who can discuss it with you.

DR. PLESSET: I think you'll be at the San Francisco meeting --

DR. ZUDANS: Oh, that will be there?

DR. PLESSET: I think we'll have a chance and they'll have a chance to tell us more specifically.

DR. ZUDANS: Okay.

CHAIRMAN BENDER: It is a generic problem. Your solution may be unique, but it's a generic problem.

MR. BRINKMAN: Yes, sir, it is a generic problem.

CHAIRMAN BENDER: Can we go on?

MR. FLYNN: The next item, physical separation and electrical independence, the only reason we believe this is open is for an NRC field audit to take place, and we've described in pretty much detail in the FSAR our commitment in this area.

The next item, safety-related display instrumentation, I'd like to have Mr. Joe Seibert, electrical engineer with CG&E, address this point.

CHAIRMAN BENDER: Before we go on, Mr. Scholl wanted to comment on the previous matter.

MR. SCHOLL: Yes. We, of course, have had a long discussion with Cincinnati Gas & Electric. They are presently qualifying some isolation amplifiers for the star trek monitoring system, which is a startup monitoring, which they are also going to use later on as part of their in-plant testing system.

They're considering using it for response time testing -- parts of the system, not the whole star trek system.

We also have another problem, an issue which has been raised in the review of plants like Zimmer and LaSalle with regard to isolation devices between the General Electric supplied nuclear instrumentation system and non safety indication, and we're having some experience -- or experiencing some difficulties there also.

With regard to the third area, where we were having a problem, the auxiliary trip units. We have decided in Staff that these trip units are acceptable -- the bundling and the wiring of the non safety and safety wiring across the hinge assembly is acceptable. It's acceptable for the same reasons as we accepted the situation in the Westinghouse design for Diablo Canyon. And operating experience with this equipment has demonstrated you don't have an induced noise problem, you have relatively low-energy circuits involved, and you have suitable electrical insulation.

So, in closing, to summarize, we're talking about two different problems. Both involve isolation amplifiers.

CHAIRMAN BENDER: Okay. Go ahead.

MR. SEIBERT: I'm Joe Seibert from CG&E.

Safety-related display instrumentation. We have provided the Staff with a modified design for the power sources for the rod display system. Other than that, I believe that we owe the Staff a little information, but we're really waiting on the Staff to complete their review.

CHAIRMAN BENDER: Okay.

MR. FLYNN: The safety-related display instrumentation -- rather, the use of non safety grade equipment, I'd like to have Mr. Dick Johnson of GE make a statement.

MR. JOHNSON: Mr. Chairman and Members of the Committee, you may recall previously on other dockets there were some questions raised regarding the use of non safety grade equipment in a turbine building that perhaps wasn't qualified seismically, and its use in transient mitigation.

The use of this equipment we have historically taken credit for during these abnormal operating transients because there is nothing to tell us that the equipment will not operate. The equipment has some degree of reliability, and we believe it's appropriate to take credit for it.

The subject has just recently been raised on the Zimmer docket within the last couple of months. We had not had any outstanding questions until the meeting held in August, and then we learned that the Staff had this concern about the use of this equipment.

So we have been trying to get with the Staff to work this problem out and to give them some assurance that the equipment is reliable and will be available during these abnormal operating transients.

There will be a meeting next week between the Staff and General Electric to try to come to some resolution of this matter.

CHAIRMAN BENDER: When this matter has been discussed -- there were two areas of concern:

One was the matter of whether the seismic qualification was needed.

The other was, setting aside that, was there some kind of way of proving that there was adequate quality in the equipment if it wasn't specified as safety grade.

I presume you're going to make the latter point?

MR. JOHNSON: We're actually going to make the latter point, yes, sir.

CHAIRMAN BENDER: Okay, thank you.

MR. JOHNSON: One other item:

Mr. Scholl did mention the isolaters between the nuclear instrumentation and some class non-1E instrumentation.

We are in the process of qualifying these isolaters and we owe the Staff this qualification data.

MR. FLYNN: The next item, fire protection, we agree with the Staff's statement. So unless any member of the Subcommittee wanted to question the Applicant further --

CHAIRMAN BENDER: No.

MR. FLYNN: Plant and support staffing, we'd like to have Mr. Borgman address the issue of support staffing.

MR. BORGMAN: I would like to comment and perhaps elaborate on the Staff's position.

A few months ago the Staff contacted us, both at the construction site and down at our corporate offices, about some questions on staffing, both from the corporate support standpoint and from a staff standpoint at the plant.

We have been doing something about it on the corporate level. We made some reorganization, we've defined Mr. Brinkman as being responsible for the design support at Zimmer after the plant is in operation. His staff will be augmented, certainly in the instrumentation and control area.

One of the complaints from a corporate standpoint was a lack of system engineers. We're bringing three system engineers into the downtown staff, two of which have already been hired. And from the plant level, the maintenance engineer position and the training supervisor position are both vacant at the present time. Both those gentlemen resigned a few months ago to accept better positions elsewhere, and we have been in the process of trying to get replacements ever since.

We've been pursuing this very diligently through advertising in national magazines, we had people at the ANS booth up there in Washington, and we made a commitment to have these people hired within six months of the fuel loading date, and we're actively pursuing that and we will get the people.

The reactor engineer I think was questioned, and in the revision to the SER there was a commitment made that we will have a man fully qualified to ANSI-18.1 to work with him for at least six months. The man we have is a well-qualified man except for the fact he does not have operating experience, and I think that's what Staff is alluding to.

But he will be backed up for at least six months. So I just wanted to let the Committee know that from a corporate standpoint we intend to fully staff both the plant and the downtown office with qualified people in sufficient quantity and quality to fully implement the operation of the Zimmer Station.

Thank you.

CHAIRMAN BENDER: I'm not very close to your staffing problems, but your commentary leads me to think somewhat about the matter of how much backup exists within the parent organization. It's clear that at any time one of these plants could find one important individual ill or some such thing, and the plant might be without experienced personnel just because of limited backup.

I would hope that's also being looked into.

MR. BORGMAN: It is, both from the engineering standpoint and from the operating standpoint. We feel we have enough younger people coming -- I think the problem is when you start a plant everyone wants experience, and it's hard to get a staff with complete experience. So you have to start someplace.

We have a mix of experienced and inexperienced people. But we feel once we get going, some of the inexperienced people will be able to fill the slots and will be experienced as the plant goes into operation.

And from the corporate standpoint, I think we have depth behind every position in the engineering department.

CHAIRMAN BENDER: Thank you.

MR. FLYNN: The last two items, industrial security and preoperational test startup program, we agree essentially with the Staff's status report of this item.

CHAIRMAN BENDER: Any other items, Mr. Flynn?

MR. FLYNN: That's it, sir.

CHAIRMAN BENDER: Dr. Zudans?

DR. ZUDANS: Okay. I have three questions, not related to each other, directed to Applicant.

One, I read in the SER that after you cast the foundation mat you made settlement measurements, and there was one number quoted as settling by some .6 inches.

The question is: Have you measured relative settlement at different points in that mat, and are you continuing to measure these settlements?

MR. CRAIL: My name is Howard Crail, and we're continuously measuring the settlement at various points throughout the plant, throughout the reactor building, the aux building and the turbine building as well.

DR. ZUDANS: And is this information available as to how much the relative settlement is at different points in the mat?

MR. CRAIL: Yes, we have this documented. I don't know whether we've submitted it to the NRC or not.

DR. ZUDANS: It would be of interest.

MR. PELTIER: I believe it states in the SER that we do require a report of the settlement progress periodically.

DR. ZUDANS: The only thing is that the SER reports one point, it does not report how different points settle on the mat. And I think that's the only thing that's of real importance.

But it's okay.

Now, the next question:

When walking through the plant yesterday, we looked at the pipe whip restraints. The question is:

Have these restraints been qualified as to their energy absorbing capability, or if they are just a brand new design that's now being implemented by you?

MR. FLYNN: I'd like to turn that question over to Steve Rurka.

MR. RURKA: Well, your question is: Is it qualified by tests, is that it?

DR. ZUDANS: Well, either test or analysis, or anything?

MR. RURKA: Well, they've been qualified by analysis, yes.

DR. ZUDANS: I see. And how are they oriented? What makes you believe that the orientation is exactly where a pipe would want to go? Or you do not consider it...

MR. RURKA: Well, those locations have been determined and the restraint has been put in an offset position, so that when the pipe is heated up, why, it will center itself into the restraint.

Then, of course, when they do the -- I believe it's a hot balance, there will be a check on the pipe and shims will be provided where necessary.

CHAIRMAN BENDER: Let me try to turn the question around a little bit:

If I understand what you're telling us, you're saying that the design is such that the pipe eventually is to be centrally located in the restraint with the anticipation that the restraint will take a load in any direction?

MR. RURKA: Well, the gap in the restraint will be controlled so that it doesn't exceed a certain distance.

CHAIRMAN BENDER: That limits the amount of whip it gets before it hits the pipe.

MR. RURKA: Yes.

CHAIRMAN BENDER: And that, plus the --

MR. RURKA: That is part of the design criteria, that gap be maintained to a required --

CHAIRMAN BENDER: But it requires a loading model, again, a subject which we've heard here before. And there is a question about how you verify that the analytical process that you're using to establish the acceptability of the design can be accepted with what I would call design comfort.

At the moment how sure are you that you're right? That's all.

MR. RURKA: Well, the material was very well controlled and tested. They've made tests on the material to make sure that it has the right yield, and a cross-section was verified.

CHAIRMAN BENDER: But it's not the properties of the material that we have in mind. It's the forces that are being applied to it.

DR. ZUDANS: Correct. Let me tell you what the concern is -- if any. There may not be a concern. Don't misinterpret me.

If the analysis was done under certain assumptions of certain characteristics for the support, non-linear characteristics, to absorb the energy, you get one set of forces on the structures that you support these things against. If the actual system is much stiffer than the assumption that was made in your calculation, then you get that much bigger forces. And the rest of your structure may not be able to take it.

So normally one would have to have some tests to show what the characteristics of this type of a restraint is, not just an analysis. In all other cases I have seen test results.

And you do not operate in the linear range.

Unless you design your restraints in such a way that you said, once the pipe hits the restraint it stops. Then you have a very conservative system, and then, of course, I would have no concern at all.

MR. RURKA: Now, of course, these restraints have been designed for energy absorption.

DR. ZUDANS: Well, that is what we want to see.

MR. RURKA: We have those calculations.

DR. ZUDANS: Not calculations.

MR. RURKA: Oh, you want the test results? I believe there have been some tests made of these.

MR. BOSNAK: GE has conducted a series of tests, and we've looked at the tests. These restraints are part of that test program. This is a generic program.

DR. ZUDANS: This is of a GE design?

MR. BOSNAK: This is a GE design that we're talking about.

DR. ZUDANS: Of course, these support restraints-- or restraints would react quite differently in different directions.

MR. BOSNAK: We have a 50-percent ultimate uniform strain criteria that we --

CHAIRMAN BENDER: Well, let's not try to resolve that problem here.

Would the Staff make a point of trying to get the technological basis for this design presented to us -- in written form, preferably, because it would give us a chance to see what it is?

MR. PELTIER: We'll do that.

DR. ZUDANS: My last question is very simple:

What is the foundation elevation of the cooling tower?

CHAIRMAN BENDER: Do you understand the question? What's the foundation elevation of the cooling tower?

MR. RURKA: The foundation elevation of the cooling tower is at 515, and it's sitting on pilings.

DR. ZUDANS: Okay. Now, has the cooling tower been analyzed for loads induced by flood? Because it's obviously below the maximum recorded flood level, and quite a bit below the switchyard.

MR. RURKA: Well, the flood of record was 517. Now, that was unregulated. Due to regulation we don't expect the floods of record to be over 508, and we really haven't analyzed it but --

DR. ZUDANS: Would this then mean that it's not really a safety-related issue?

MR. RURKA: Well, we don't really . . .

CHAIRMAN BENDER: Well, okay. Any other points, Mr. Flynn?

MR. FLYNN: No, sir.

CHAIRMAN BENDER: I suggest we break for lunch now and plan to come back at 1:25. I expect we can't feed ourselves in less than an hour. So we'll pick up at that time with the status of the Mark II containment.

For the purpose of planning, some of the Subcommittee have to leave at 3:00 o'clock, but I and some of the consultants will be able to stay here after 3:00. So we'll try to organize the afternoon meeting to satisfy those who have to leave early.

(Whereupon, at 12:25 p.m., the meeting was recessed, to reconvene at 1:25 p.m., this same day.)

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

(1:30 p.m.)

CHAIRMAN BENDER: Gentlemen, can we reconvene?

Mr. Flynn, are there any loose ends you want to clean up?

MR. FLYNN: Yes, sir.

With the Chairman's permission, we would like to address four items that came up this morning.

CHAIRMAN BENDER: All right.

MR. FLYNN: The first one we'd like to address is the relative locations of the control rod drive tubing and the recirculation piping, and Herb Brinkman will address that.

MR. BRINKMAN: This morning a question was raised:

What if one of the recirculation pipes should rupture and damage the control rod drive tubing, by either direct impingement of the pipe upon the tubing, or by steam discharge against the tubing.

We discussed this morning the fact that the pipe is restrained by pipe whip restraints,prevented from slinging about. We did not really discuss the problem of jet impingment out of the pipe onto the tubing.

I had one of the fellows from the office at lunch review a report we had in house from General Electric, which was actually done on the ATWS docket. But at any rate, the evaluation that's presented in this report indicates reactor shutdown is accomplished when two conditions are met with regard to control rod drive failures.

The first condition is that at least 50 percent of the control rods must be inserted.

The second condition is you can't have more than five control rod drives in a cluster fail to go in.

So, if you recall, when you looked at the power plant -- maybe I should draw it on a flimsy here . . .

(Pause.)

(Slide.)

If we look at a plan view of the reactor building, we see in the center a circle representing the reactor. Then outside of it, the drywell. And the concern is when the reactor piping comes down, moves horizontally through the building, and all the tubing -- these lines are supposed to represent the tubing -- the control rod drive tubing, what if this recirc line would break, and break off a whole bunch of these tubes?

I think the answer is that there are actually two banks of control rod drive modules out in the reactor building, 180 degrees apart. So the tubing from -- let's call this bank "A" and this bank "B" -- they have one half of the tubing coming from "A" and one half coming from "B". This tubing is arranged in a lattice pattern such that there's an even distribution of the "A" and "B" tubes. So if we fail all of these, we still get 50 percent of them to go into the "B" side, and we also avoid a cluster-of-five problem because of the cross hatch.

Now, in addition to that, there is a backup system that was mentioned this morning, that you do have the boron injection systems which can shut the plant down, even without the control rod drive.

That's the end of my explanation.

CHAIRMAN BENDER: That's a good explanation. We thought that was the answer you'd give, but it's always good to have the Applicant know what his backups are.

(Laughter.)

MR. BRINKMAN: I think I'll sit down.

MR. FLYNN: Mr. Chairman, we'd like now to address the concrete temperature during the accident, and Mr. Krishna Swamy will address this one.

MR. KRISHNA SWAMY: I'm sorry? What's the item I'm supposed to be talking about?

(Laughter.)

MR. FLYNN: Concrete temperature in the event of an accident.

MR. KRISHNA SWAMY: Yes.

Concrete temperature in the event of an accident was raised this morning. There's a figure in the SAR, the

FSAR --

CHAIRMAN BENDER: How about coming up to the front? We can't hear you. Take the microphone at the podium.

MR. KRISHA SWAMY: Figure 3.8-30 is a typical temperature distribution to the containment drywell wall. The maximum temperature that you see --

CHAIRMAN BENDER: What are you reading from?

MR. KRISHNA SWAMY: This is a figure from the FSAR, Section 3.8, Figure number 3.8-30.

CHAIRMAN BENDER: Thank you.

MR. KRISHNA SWAMY: The maximum temperature one hour after the accident is about 140 degrees, and then the maximum after 20 hours is about 175 degrees. And then at 40 hours, it comes back down to 160 degrees.

The integrity of the concrete is preserved, because the containment core permits a temperature of about 350 degrees, permits a value of about 350 degrees, for an accident. And a local area during an accident can go to about 600 degrees C., preserving the integrity of the concrete.

During operating conditions it permits 150 degrees for the concrete. The operating temperature in the drywell of the concrete is about 130 degrees.

DR. ZUDANS: The temperatures you read out, are they the average to the wall, or the interface between the liner and the concrete?

MR. KRISHNA SWAMY: The second one, the interface between the liner and the concrete wall.

DR. ZUDANS: And the liner temperature at the same time --

MR. KRISHNA SWAMY: The liner temperature at the same time, the maximum reaches about 190 degrees.

DR. ZUDANS: And the drywell temperature is 340?

MR. KRISHNA SWAMY: 340 degrees for a short duration. I really have to say that it's a transient curve. It lasts for a short duration -- I have only the picture in my mind, but I think the transient curve is given in Section 6.2 of the FSAR. It lasts for a few seconds, and then the rest of it . . .

DR. CATTON: How do you couple the environment -- the containment environment, to the liner, thermally?

MR. KRISHNA SWAMY: The inside atmosphere -- you want to know how they interface?

DR. CATTON: I want to know what the heat transfer coefficient is.

MR. KRISHNA SWAMY: I don't know the exact value for the coefficient, but I can give the layers that are involved in the analysis, because the atmosphere temperature is maintained as per the transient curve, for the heat input.

And then there is a film between the atmosphere and the liner.

DR. CATTON: I understand that. I'm asking: What is the film coefficient?

MR. KRISHNA SWAMY: I don't have that number right here. I think I can supply the number.

DR. CATTON: I would appreciate that.

MR. FLYNN: Okay, if there are no further questions on that topic, would you address the lateral load on downcomers?

MR. KRISHNA SWAMY: Yes.

The question of the effect of submergence on the frequency of the downcomer was raised.

As I mentioned, the downcomer was designed for the 8.8 kip load, static load, so the question of frequency doesn't come into the picture.

Also, for the dynamic load, where the loading is given as lasting within 3 to 6 milliseconds, we did consider the radiational frequency of the downcomer because of the submergence.

The frequency of the downcomer is about 4-plus, less than 5 hertz, when it is empty. If we add the additional mass because of the water, then the frequency will be only lower, and that takes it away from the short duration load that we have for the lateral load, which gives lower response.

In the closure report, which is Appendix I to the FSAR, Section I.2.3.5, we give the comparative results of an analysis of the downcomer and the maximum moment and shear in the downcomer point where it is attached to the drywell floor for the static coolant load, and also for the dynamic load.

The static load produces a maximum mome it of 300 foot kip, and the dynamic load produces about 120.

So the dynamic load produces smaller effects compared to the static, which is more conservative.

DR. CATTON: Do you have temperature/time and mass flux/time history?

MR. KRISHNA SWAMY: For --

DR. CATTON: For the pool, the steam in the pool, pool temperature? And at what time does the pool reach what temperature?

MR. KRISHNA SWAMY: That's not my expertise. Maybe I should --

DR. CATTON: That's what's going to determine your load.

MR. KRISHNA SWAMY: Mr. Crawford will address that question.

MR. CRAWFORD: I'm Ray Crawford, from --

CHAIRMAN BENDER: Mr. Crawford, would you come up and use one of the microphones?

MR. CRAWFORD: Ray Crawford, from Sargent & Lundy.

I'm not sure I heard your question, entirely.

DR. CATTON: I'll repeat it:

I would like to see the pool temperature as a function of time, and the downcomer mass flux as a function of time; and then to have this related to the chugging phenomenon, so that I can be assured that when you develop your dynamic load from the downcomers, that it's being done properly. And I have not seen this put together.

I was wondering if maybe you could refer me to where it is done, or who has done it, and where do the numbers come from?

MR. CRAWFORD: For the dynamic load?

DR. CATTON: The chugging loads, right. Chugging loads are a function of pool temperature and mass flux, as we all know, and I've not been able to find this kind of information; namely, the pool temperature as a function of time and the mass flux as a function of time, mass steam flux into the pool.

MR. CRAWFORD: Let me comment on how we do the analysis.

The design controlling load is 8.8 kips applied to the tip of the downcomer, which is considered as a static equivalent load. This value was based on tests that were performed primarily overseas.

We did a full-scale test with a single vent in the 4T test facility, simulating the break condition for both the steam break and liquid break, and this was an attempt to simulate all of the characteristics of the steam mass flux and the pool temperature that you menti~ned.

DR. CATTON: But, as we know, in the 4T test the temperature never exceeded 60 degrees C., right? That's why I'm asking you about the temperature.

MR. CRAWFORD: The final temperature?

(Dr. Plesset and Dr. Catton conferring.)

MR. BRINKMAN: If I may, I think the problem is related, really, to the fact that the ultimate pool temperature gets up to 160 degrees water temperature, as reported in the FSAR.

DR. PLESSET: Under what conditions, though?

MR. BRINKMAN: This is under long-term LOCA cooling, whereby the energy being dumped into the pool is in the form of hot water.

DR. PLESSET: Do you still have chugging at that time?

MR. BRINKMAN: No, I think that's the point. But I think perhaps Dr. Catton's question is directed to at what time do you stop having chugging, and at that time what is the water temperature?

DR. CATTON: Right. That's exactly my question.

MR. BRINKMAN: I volunteered that to try to be helpful in supplying you a good answer.

DR. CATTON: Fine. Fine.

CHAIRMAN BENDER: Can you answer that question?

MR. CRAWFORD: The final temperature?

CHAIRMAN BENDER: Well, let me try it:

I think it's stated right, but repetition, now that we agree on the question, will make the issue more clear, maybe.

What we recognize is that the pool temperature rises, but we are concerned about the pool temperature at the time when steam is passing through it. After the reactor stops steaming, it doesn't make any difference.

What we'd like to know is what the temperature is while the reactor is steaming, because that's where the chugging phenomenon comes from.

Do you have a correlation between those two things?

DR. PLESSET: Should I restate it?

CHAIRMAN BENDER: If you think you can do it better than I did, go ahead.

(Laughter.)

DR. PLESSET: What the question is directed to, I think, is when this chugging essentially is nearing completion, what is the pool temperature? Has it gone up very far beyond 60 degrees, 60 or 70 degrees C.?

MR. CRAWFORD: I can't answer your question as to what that final temperature is.

I would like to point out that the controlling flow that was used is the 8.8, which is based on zero percent air at the maximum pool temperature, although I don't remember what that pool temperature is.

The 4T test was performed as nearly as we could to simulate both the mass flux and the pool temperature. There's no external cooling in the pool. The steam is dumped right into the pool.

I can provide the mass flux data or temperature transient data, if that's of interest. But I don't have that information with me.

DR. PLESSET: Does the Staff perceive what the question is?

DR. BUTLER: Yes, sir. I understand the question, but I don't have at my fingertips the pool temperature at the end of chugging.

But recognize that what we would normally do is postulate that the LOCA event occurs at the maximum pool starting temperature.

DR. PLESSET: Right, that's the beginning.

DR. BUTLER: There is a tech spec limit as to when you must shut down the plant if the suppression pool temperature exceeds a certain temperature.

DR. PLESSET: There's no question about that.

DR. BUTLER: So you postulate the LOCA there, and then dump all the energy in the primary system into the pool, and you arrive at a maximum temperature.

I suspect that the 4T test had to have been, and probably should have been, at that pool temperature corresponding to the maximum pool temperature following a LOCA event.

DR. PLESSET: Well, we'll leave it at that, then.

DR. BUTLER: And we'll look into it for the November 28 Subcommittee meeting.

DR. PLESSET: I think we all agree as to what the question was.

DR. BUTLER: Yes.

DR. PLESSET: Thank you.

MR. FLYNN: If there are no further questions on that topic, we would like to now address the drywell head load.

MR. KRISHNA SWAMY: Let me get my papers on that.

(Pause.)

(Slide.)

It's a little sketchy, but here's an idea of the pressure that is considered when one of those four lines break at any one time. The maximum pressure is about 161psi and varies up to the top. It acts over a local area here. The width of that radius as it goes along the meridian at any one time, only one of these breaks are considered, and these pressures are acting on the drywell head, in addition to the 45 psi design accident pressure load.

And after the condensation it is assumed that in the external corridor negative pressure of about 8 psi for the design of the drywell head.

And these are the jet impingement loads on the drywell head.

DR. ZUDANS: What was the controlling factor in the design, the external pressure or the internal?

MR. KRISHNA SWAMY: It's a matter of balancing them all, or both of them. The internal pressure causing tension and the external pressure trying to make it unstable because of buckling.

DR. ZUDANS: Which one was the controlling factor in the design?

MR. KRISHNA SWAMY: The combined -- stresses to the venting was slightly higher than the external pressure.

DR. ZUDANS: Well, how did you compute your buckling load?

MR. KRISHNA SWAMY: How did we compute the buckling load? We calculated the buckling load for this section with the fixes as given on the basis of empirical formulae which are at least having a safety margin of three more analytical calculations would provide for a shell of this shape, in the sense there are no definite analytical expressions which would predict the buckling strength of this, considering the geometric eccentricities for this -- imperfections.

DR. ZUDANS: Well, you hope to have a factor of three, at least, so you did compute the linear bifurcation point on this one here?

MR. KRISHNA SWAMY: That's right.

DR. ZUDANS: And what was the factor against which you designed it for?

MR. KRISHNA SWAMY: The factor against that I think was 4.8 or so.

DR. ZUDANS: Thank you.

MR. FLYNN: If there are no further questions on that, Mr. Chairman, this concludes the responses that we put together at lunch.

CHAIRMAN BENDER: I think we took lunch at the right time.

(Laughter.)

Can we then go to the status of the Mark II containment issues? We had planned on a presentation by both the Applicant and the Staff. I'm not sure which one should go first, and we'll leave it to your good judgment.

MR. FLYNN: We would graciously step aside and allow the Staff to go ahead.

(Laughter.)

CHAIRMAN BENDER: Okay, Alphonse.

Walter, we'd like to be sure you tell us why you want to cut the flange off the downcomer.

(Laughter.)

DR. BUTLER: Maybe, so I don't forget that, why don't I try to indicate my understanding of that issue.

CHAIRMAN BENDER: I hope it's something more than just, "That's the way we test it."

(Laughter.)

But that may be the answer.

DR. BUTLER: I think there may be a little bit more to it than that, but, again, I'm not certain. I recall discussions on this point, and it was my understanding that the Staff is concerned when you change the configuration of the bottom of the downcomers, and this concern, I believe, was tied to some experimental data which indicated a sensitivity to the configuration; that is, the flange was changed with respect to the end point in some test that I can't really pinpoint at this time. But I'll be happy to discuss it in a couple of weeks when we go to San Francisco.

CHAIRMAN BENDER: Okay.

DR. PLESSET: That's fair enough.

CHAIRMAN BENDER: Don't forget it two weeks from now, Dr. Plesset.

DR. ZUDANS: Mr. Chairman, we observed that these downcomers are relatively closely spaced where they come together in bunches.

Now, are there any tests that you know that replicate any such close spacing of a fairly large number of downcomers?

DR. BUTLER: What I'd like to do on that question is defer to the other Subcommittee meeting, because I'm not that on top of the tests that are available on this subject.

CHAIRMAN BENDER: Fair enough, Walt. Thank you.

Why don't you go ahead and try, as well as you can, to identify the Mark II containment issues that are relevant to Zimmer, because that's really what we're after. What do we need to know about it in order to get Zimmer through whatever licensing process it expects to go through?

DR. BUTLER: I think if I tried to summarize in a nutshell where we stand, I would sort of simply state the following:

The Staff feels that the state of the Zimmer application at this time with respect to the dynamic loads is that we are prepared to go forward with the licensing proceeding. However, this is contingent on satisfactory resolution of the manner with which the loads are combined.

If in a couple of months the Staff concludes that the SRSS approach is an acceptable approach, then the Zimmer applicant's approach to analysis of these pool dynamic loads would generally be acceptable.

The Staff undertook a major program of review, generic in character, with respect to these pool dynamic loads and reported its results in the NUREG document we referred to this morning, NUREG-0487.

This is a report that addresses the lead plant program. There was a need for the lead plant program because the work involved in the long-term program could not be completed in time for lead plants such as Zimmer, LaSalle and Shoreham. For the licensing activities to proceed on the lead plants, the Staff and the owners group contrived the lead plant program, wherein all sub-elements of the pool dynamic loads are resolved to that point where available data will allow the issues to be resolved.

Where information was not adequately abundant on an issue, the Staff took a position that was bounding in character, to assure that the actual loads will always be less than the bounding loads.

These bounding loads are carefully prescribed in this NUREG report.

As Mr. Brinkman indicated earlier, the Mark II owners were requested to examine all of these bounding loads, assuming that the SRSS approach of combining them would be acceptable, and to determine whether the plant as constructed could withstand the loads associated with the criteria so prescribed.

That examination led to a conclusion where the Mark II owners felt they needed to take exception in about six or seven specific areas.

Zimmer being a more advanced plant with respect to construction schedule, found that it could proceed with fewer exceptions, to the point where -- what I would like to do at this point is identify those that remain with respect to Zimmer itself. And some of these that continue to be outstanding appear imminently resolvable.

The first one that I would identify is the issue of asymmetric pool swell loads, which is identified as item 1.B.5 of Table 4-1 of the Staff's NUREG report.

I think it would be helpful at this point to give the numbering system.

There is a summary loads given in Table 4-1 of the Staff's report. These loads are associated with the acceptance criteria in Appendix D of that NUREG report.

Table 4-1 provides all the correlations between Appendix D, the loads in question, and the section number and page number of the load evaluation report where it is addressed.

Just as an example, with respect to the issue considered earlier on lateral loads, dynamic lateral loads, that is in Table 4-1 identified as item 1.C.1.A. And that is addressed in Section 3.B.4.A. of the load evaluation report.

In that section is discussed the static and dynamic loadings of the downcomer and the associated acceptance criteria.

DR. ZUDANS: Is that summary table similar to the summary table that was reproduced in the document which says, "Mark II Generic Acceptance Criteria for Lead Plants?"

DR. BUTLER: That may be Appendix D. I believe that is Appendix D, which is an element -- I think it's important that when you get the NUREG report the key element is Table 4-1, and it gives a road map of where to find subsidiary discussions.

Now, then, back to the listing of items that at this time are unresolved or open issues on the Zimmer application.

As I indicated earlier, one was the asymmetric pool swell loads. It is my understanding that Cincinnati Gas & Electric Company will perform analyses as prescribed by the Appendix D acceptance criteria. It is conceivable that they could find those criteria acceptable.

However, the Staff is prepared to work with the Applicant here, and contrive a reduced set of loads for asymmetry and yet still have these loads conservative. But we believe that we can wait until the Applicant continues his analysis to demonstrate whether or not he could accept the degree of asymmetry we prescribed in Appendix D.

The second area that requires some additional work between the Staff and the Zimmer Applicant involves the SRV bubble phasing and frequency issue. Even here, as in the first item, we believe that some further work with the Zimmer Applicant could lead to a resolution of this issue.

The third and last item, where there appears to be need for some further discussion between the Staff and the Zimmer Applicant, deals with the LOCA SRV submerged drag load. Just this past week we met with the Mark II owners to consider certain additional information they had which indicated some reduction in the loads prescribed by the Staff is in order.

The Staff's preliminary assessment of that presentation was very favorable, and I believe that the Staff will find this matter to be resolved in the near future as well.

So, in summary, what I'd like to do is simply reiterate that, subject to resolution of the SRSS load combination method for the SRV and OBE loads, we believe that the issues associated with LOCA pool dynamics can be found resolved in the near term.

That's all I have to say.

CHAIRMAN BENDER: That was a good summary, Walt.

One point that I would like to understand better:

The agreement on the way of summing the loads, what are the actions being taken to resolve that? Who is working on it, and what kind of effort is involved?

DR. BUTLER: This would be Jim Knight, and I believe Bob Bosnak's group.

MR. BOSNAK: We have a group that involves Jim Knight, a member from our branch, from the structural branch, and people also from the Division of Operating Reactors.

It's essentially the same people that worked on the original document, with the exception of the original task leader.

CHAIRMAN BENDER: And the square root of the sum of the squares applies mainly to the seismic part of the loading, or is there something associated with the loading increment from the lead valves as well?

MR. BOSNAK: We're talking about all the various dynamic loads that can be associated with the hydrodynamic aspects of it, and then also the seismic aspect, particularly when we're talking about a level-B load limit.

CHAIRMAN BENDER: Okay. Well, I've asked enough and we'll look for more.

I wouldn't be surprised if the Committee wouldn't want to learn more about the status of that. What's the timing on that?

MR. BOSNAK: There will be a report at the San Francisco meeting.

DR. PLESSET: Oh, there will?

MR. BOSNAK: Of at least where we are at that point.

DR. PLESSET: Okay. Fair enough.

CHAIRMAN BENDER: So you can decide.

(Laughter.)

Mr. Flynn, how smart were you?

MR. FLYNN: Smart enough.

(Laughter.)

We would like to respond to Dr. Butler's presentation. Herb Brinkman will address that, again.

BRINKMAN: I think as it turns out, it doesn't really matter who goes first.

I had a detailed list of all the issues here to show exactly where we were on each. Almost all of them, as Dr. Butler indicated, we're in agreement, and I don't think it's necessary to go through seven pages of --

CHAIRMAN BENDER: I wouldn't go through it, unless you want to show some disagreement. We wanted to be sure that we understood where you thought you were going.

MR. BRINKMAN: This is my copy of the slide I'd like to show you. It is in agreement with what Dr. Butler said.

The only thing we did different is we took them in reverse order.

(Slide.)

Drag loads, which Dr. Butler mentioned -- and in both cases I mentioned here we did review this with the Mark II group and the NRC this week. A followup detailed review with the NRC is planned, and early resolution is expected.

The same thing with the SRV phasing and frequency. These were considered in the design of the Zimmer plant, but that analysis was done before the detailed NRC criteria was received.

But we do believe that the Zimmer addresses the intent of the NRC criteria, if not the letter, and we are going to have followup meetings with the Staff to review that.

The asymmetric load criteria, I agree exactly with what Dr. Butler said. We agree that the load definition is extremely conservative. Nevertheless, we are trying to evaluate the plant. Right now we expect the containment will be able to accommodate these loads, and when we get the results certainly if we can accommodate the loads we'll just not argue about it.

DR. ZUDANS: You gave us the wrong page.

MR. BRINKMAN: Did I?

DR. ZUDANS: You gave us the changes made, not the issues.

MR. BRINKMAN: Okay. Well, you can have that page if you want it.

CHAIRMAN BENDER: Maybe we'll read it and find something we shouldn't know.

(Laughter.)

I hope you all don't take me seriously.

MR. BRINKMAN: I had my two piles of papers shuffled. I really do have copies of the slide I just showed. And here are the real copies. I'm sorry for that confusion. I had the wrong slide on the wrong pile of papers.

(Slide.)

Well, so much for what are the open issues, and I have one more slide which I would like to show, which will try to summarize the Zimmer situation.

(Slide.)

The approach taken by Zimmer, as mentioned before, was to use a bounding loads approach.

Another step taken was to replace the ramshead safety valve discharge device with a quencher device, with the intention to mitigate the safety valve loads.

Although we replaced the ramshead with the quencher, we are continuing to use the ramshead load as the design basis, the point being that we're taking no credit for load mitigation of the quencher.

This is a point which appears to be -- but is not -- a contradiction of Walt Butler's presentation. We did combine all the dynamic loads absolute sums, and we are presenting the results to the Staff.

We are saying that our official design basis is SRSS because, in fact, there are specific examples where we're going to ask for case-by-case exceptions to this rule.

We did have a meeting about a week ago with the Staff, and we identified some specific areas. But by and large, the great majority of the plant is taking absolute load combinations, and we are committed to do that in our closure report. We are using very conservative stress allowables. I'm talking about the ASME A,B,C,D, stress allowable criteria, and there we are again in agreement with the NRC criteria.

We have implemented significant plant modifications.

We have a list of the modifications. We have committed to do in-plant safety relief valve testing to confirm that our safety valve loads are, indeed, less than the design basis.

My conclusion was that the containment issue was adequately addressed.

CHAIRMAN BENDER: All right, if there are no questions of Mr. Brinkman on this subject I think we are at a point where we can lay the containment Mark II issues to rest, until the San Jose meeting.

DR. PLESSET: San Francisco.

CHAIRMAN BENDER: Excuse me, San Francisco. You really pick good sites for those.

Let's see, the next item on the agenda is the status of the ACRS generic items.

Mr. Flynn, I believe you're going to go through those in some fashion.

MR. FLYNN: It was my understanding that the Staff was going to --

CHAIRMAN BENDER: Oh, excuse me. I think the Staff was going to attack this one first.

MR. PELTIER: We got to go first last time.

(Laughter.)

This is not my favorite subject. It sometimes boggles the mind. But with your permission, I would like to just, while I'm here, touch upon two questions that were raised this morning.

One of them had to do with the fuel pin rupture --

CHAIRMAN BENDER: Excuse me, could you move the mike a little closer to you? It's not carrying too well.

MR. PELTIER: Is it all right if I address those two subjects?

CHAIRMAN BENDER: Oh, sure.

MR. PELTIER: Of course the Staff is finding out about the results of these tests at about the same time as you gentlemen are, so we have had about one afternoon to really look into the subject and come up with some kind of a preliminary assessment.

In recent PBF tests there were four rods that were exposed to conditions of the rod drop, or a rod ejection accident. And the preliminary results show that one unirradiated rod fragmented severely at an energy below the assumed coolability limit of 280 calories per gram.

A companion irradiated rod swelled up and filled the shroud in the test rig. About 160 percent, I think, of the original area.

These preliminary results indicate there was more severe damage than was apparent in the earlier squirt test, on which the 280 calories per gram limit was based. So we'd like to point out here that there are several comments or cautions that are relevant here.

The preliminary estimate of 250 calories per gram for the RIA 1-1 may be in error, and the energy could be as high as 350 calories per gram. In that case, the licensing limit would be exceeded and fuel fragmentation would be expected.

The investigators, however, believe that their preliminary estimate was close to the true value and burnup measurements are being made to confirm this value at this time.

More severe fuel damage is expected with flow shroud than without the shroud. The shrouds were used to simulate the effect of adjacent rods and fuel bundles.

The Japanese tests in the NSRR show a reduction in the structural integrity limit of about 30 calories per gram. This would be consistent with a reduction of 280 to 250 calories per gram when the shrouds are used. But the degree of damage was less severe in the NSRR than in TGF.

The Japanese bundle tests show a reduction in the structural integrity limit when compared with single rod tests.

The swelling in the irradiated rods is not understood.

DR. PLESSET: Irv, could I ask you a question? I thought that was with a pressurized water reactor type fuel. Am I wrong?

MR. PELTIER: This is Saxton fuel, it's my understanding.

DR. PLESSET: That's PWR fuel. So it's not really entirely pertinent, even though the instrumentation might have been in error, as you point out, right?

MR. PELTIER: That's right. A 1 to 1 correlation.

So we conclude that the use of 280 calories per gram to assure coolability may not be adequate. There are, however, some extenuating circumstances in the rod drop BWR and the rod ejection PWR analyses.

The rod drop and rod ejection accidents are very unlikely events, and the need to even analyze these events has been questioned. The physics analysis of the rod drop and the rod ejection accident is very conservative. Fuel rods may not be capable of attaining 280 calories per gram.

The loss of fuel rod geometry for the affected rods would probably not challenge core coolability, since the accident was very localized. Our method of acceptance, however, would have to be reexamined since we presently rely on the more conservative position.

On balance, we believe it is unlikely that the rod drop or rod ejection accident could produce consequences worse than presently predicted.

We, therefore, believe that this item can be resolved as a scheduled NRR generic activity for which a task action plan is being prepared at this time, and the plant schedule need not be affected.

With respect to Zimmer, Zimmer has the bank position control system, and analysis based on correct scram shapes we presently estimate that the rod drop accident at Zimmer would result in a maximum fuel rod energy deposition of less than 170 calories per gram. The worst case is the worst situation for inoperable rods all grouped on one side.

So we think that at Zimmer the maximum is 170 calories per gram under the worst conditions.

Are there any questions?

CHAIRMAN BENDER: That may make the other information sort of irrelevant, if it doesn't make any difference what the heat input was in the PBF test. If you only have to deal with 170 calories.

MR. PELTIER: Quite possibly.

On isolation valves, this morning a question was raised about the Staff's criteria for acceptance of the two isolation valves outside of the containment. I threw out the answer that I thought maintenance was one of the considerations, where actually the Staff's criteria has to do with the severe environmental conditions and inspectability. In those situations where the isolation valve inside would be subject to a very severe environment, then we find it acceptable outside.

CHAIRMAN BENDER: Let me try the other avenue.

In the past, the reason why the valves have been designated one inside and one outside was to allow for the possibility of something shearing off the line at the containment wall.

Now, are we saying that for these particular circumstances we think it's a reasonable risk to ignore that criterion? I'm not bothered by it, but I'm just wondering whether that's the logic behind.

MR. PELTIER: Well, I think that's implicit in the acceptance. Whenever you have a situation where the extreme environmental conditions would affect the operation of the isolation valve itself.

CHAIRMAN BENDER: I'm sure it's implicit, but I just want to know whether the Staff is consciously thinking about a relaxation, which is making its own safety philosophy when it does that.

Maybe you don't want to answer that question.

MR. PELTIER: I don't believe I could answer that.

MR. SCHOLL: I don't know if there is a situation in Zimmer where we have that.

CHAIRMAN BENDER: Well, I thought the SER said there were a few places where they did, and that's why I'm asking the question.

MR. SCHOLL: One of the issues in Section 7, one of the areas of discussion in Section 7, had to do with the feedwater isolation valve, which is a motor operated valve outside of the drywell, wherein there are two check valves in series, one inside the drywell, one outside the drywell, and then you have these massive feedwater valves with a 40-second stroke time on them, which are manually initiated. And they're provided to provide long-term leakage control of leakage through the check valves.

This is, understand, a traditional design for the boiling water reactors. I sort of questioned it the first time I'd seen it, Zimmer being my first operating license, first boiling water operating license.

There are relatively few situations in a boiler in which you have lines penetrating the drywell which are not involved in the emergency core cooling process itself.

For instance, you have the valves in the lines that are associated with the suction from the suppression pool. These are valves which are normally open and which, indeed, must be open to provide for emergency core cooling.

You have the main steam lines which have automatic isolation valves, both inside and outside.

You have the shutdown decay heat removal line, which is isolated both inboard and outboard by normally closed motor-operated valves.

You have some -- we've discussed the feedwater line.

And these are the major lines. Other lines you have going in are in contact only with the containment atmosphere such as your hydrogen control system, you have a pneumatic line which provides service air for charging your accumulators for the AES valves, and the relief valves.

MR. PELTIER: I thought the question dealt with the Staff's acceptance of two isolation valves outside of containment.

CHAIRMAN BENDER: That's what the question was.

MR. PELTIER: And I don't know what the specific instance is where there is the two isolation valves outside the containment, or on what basis the Staff might hav accepted it.

CHAIRMAN BENDER: Well, I don't have time to it through the SER.

MR. SCHOLL: You've got some motor-operated valves in the ECCS lines where you've got check valves inboard, and then your motor-operated valves outboard.

MR. PELTIER: We'll look into that further.

CHAIRMAN BENDER: I'm not really trying to do more than just find out what the logic is. I'm not all that concerned about it. But generally speaking, the practice has been to have one inside and one outside.

MR. SCHOLL: For the pressur[illegible]r plants, that's true.

CHAIRMAN BENDER: Go ahead, Irv.

MR. PELTIER: On the ACRS generic concerns, this table, as I explained earlier today --

(Slide.)

-- describes where the Staff has embodied the scope of the ACRS concern into its task action plan, and also refers to our May 4 status report to the Committee. We have not updated that report since May 4, and it's my understanding that that might be done in the next month.

Now I guess I've got the wrong slide up there. It's not the one I want.

CHAIRMAN BENDER: Well, I'm hoping that you're going to address the items that are listed in item VII of our agenda, which selected a few specific things that we wanted to know what was happening as they apply to this plant.

(Slide.)

MR. PELTIER: Yes.

Well, the few areas where we have addressed the specific concern to some extent on this specific plant are indicated with the SER section number up there.

So I'll now start in on those items which I believe you listed in your agenda, and I'll probably need a lot of help.

The ACRS concern about stress corrosion cracking:

The Staff issued NUREG-75067, which was a technical report on the investigation and evaluation of cracking in austenitic stainless steel piping in boiling water reactors.

That report came out some time ago, and the Staff had considered that problem resolved for the BWR plants. More recently, July of '77 and October of '77, the Staff issued NUREG-0313 and NUREG-0312 as guidance on the -- these are technical reports -- on material selection and processing guidelines for BWR coolant pressure boundary piping, and interim technical report on BWR feedwater and control rod drive nozzle cracking.

We have asked the Applicant to respond to these NUREG guides, asking them how they are implementing them at the present time. In various meetings we have had the opportunity to discuss this matter with the Applicant and feel that their implementation, up to a point, is acceptable to us.

However, they have not formally responded to us, to my knowledge, on NUREG-0313.

Now, recent events, however, in the BWR plants have kind of opened up the door here a little bit more with regard to intergranular stress corrosion, and we may in the future be asking some more questions of the BWR plants.

Included in those questions are questions about this collet retainer ring and control rod drive, which I believe was a question asked this morning.

The resolution of the routing of the control rod drive hydraulic return lines I believe is an error in the SER. In that respect this application is not rerouting the control rod drive return lines. They are letting the water return to the reactor vessel through the control rod drive seals, but they are valving the return lines off.

Now, as a consequence of valving the return lines off and having a stagnant line, they will have to take additional measures to assure that problems aren't developed due to stress corrosion in the stagnant lines.

So that whole area requires some further discussion.

We also -- I think I pointed this out earlier -- have asked the Applicant for his augmented in-service inspection program, so that he could detect cracks at these nozzles and the plant radii, and he has not provided us yet with a satisfactory program in that area.

I think the Applicant can probably tell you better than I can just exactly what plant modifications were made in the implementation of this fix. I know he has removed the bypass line on the recirc system. He is valving off the control rod drive returns. The safe ends, I believe, were carbon steel originally. I don't know whether I've hit all of the changes or not.

CHAIRMAN BENDER: There are a number of items listed in the SER. Are all of them listed there?

MR. PELTIER: I believe so, but I'm not sure right at this point.

CHAIRMAN BENDER: If they're listed there, I don't think we need to hear them again.

MR. PELTIER: I think that section needs to have some work done on it, because I don't think it's current or 100 percent accurate at this time.

CHAIRMAN BENDER: Well, we don't need to know them now anyway. I think sometime in the future if we could have them we could save people the pain of trying to count through everything now.

DR. ZUDANS: The things that you named are listed.

MR. PELTIER: That's the advantage of having read it in the last few hours, I guess.

DR. ZUDANS: Last few minutes.

MR. PELTIER: ATWS, I don't know what I could say about ATWS, other than the fact that I think we are anticipating the Committee responding to our ATWS report, NUREG-0460, which was issued in April, I believe, and it's my understanding that the Committee is going to give us some feedback in January.

CHAIRMAN BENDER: Well, I think maybe we'd better get you in phase.

I think at the moment we're waiting for the Staff to respond to what amounts to the last evaluation by GE of ATWS.

MR. ISRAEL: Could I just --

CHAIRMAN BENDER: Yes, Sandy, go ahead.

MR. ISRAEL: I believe the Staff has scheduled a meeting with the Committee on December 8 to come forward with our final recommendations dealing with both new plants and old plants at that time.

Hopefully we'll come to some resolution as a result of that meeting.

CHAIRMAN BENDER: Well, since the operating license for this plant is imminent, it seems to make rather good sense to try to settle the issue as fast as possible.

MR. PELTIER: Loss of on-site and off-site AC and reliability of direct current power systems.

Ray, do you think you could address that subject?

MR. SCHOLL: You have several considerations with regard, first of all, to loss of all alternating current, not the least of which is the boiler design provides for the reactor core isolation cooling system which is a turbine driven system. The speed controls for the turbine system come off of an inverter which is, in turn, driven by a DC bank.

So in effect the plant is capable of operating for a period -- quote -- operating -- being shut down, safely shut down, operating, maintaining an adequate vessel level, for approximately 30 minutes or so, as a minimum, only on DC power and stored steam in the reactor vessel.

When you start looking at typical lengths of time that we have seen power blackouts of large central stations in this country that are provided with emergency diesels, this is a significant period of time. I think the greatest loss of time that we've seen in a nuclear power station where they'd lost off-site power has been on the order of something like 17 minutes.

CHAIRMAN BENDER: I'm sorry, I don't think I -- I don't know the context in which you're saying that, but I know of more than one plant that has had no off-site power for of the order of a day. So let's be careful what we're saying.

MR. SCHOLL: Well, like I said, the one I was aware of was on the order of 17 minutes.

We have on this plant, in addition to the two off-site sources, we have a situation with the boiling water reactor in which you have three full-size diesel generators, any one of which could supply the necessary electrical power, but is not, in the case of the HDCS diesel, is not necessarily hooked up in a manner which could provide all the power needed for long-term shutdown.

With regard to the DC systems in this plant, again we have the three divisions of DC -- not two divisions. We are not in the traditional problem area that one worries about, in that the protection system is not derived from an inverter from a DC bank. We are talking about a protection system which is being powered from a pair of motor generator sets off the AC.

So loss of a DC bank will not create a situation wherein you scram and immediately need some form of engineered safety feature.

There have been no formal reliability studies of the DC systems in this plant, as the Committee requested be done on Perkins and Cherokee before they come in for an OL.

The last thing I'd like to say, in closing, is that there is something unique about the DC systems for the Zimmer Station, in that they have been provided battery monitors which will determine whether or not the battery is, indeed, connected to the DC bus. That is to say, if the battery is there physically and capable of delivering electrical power to the bus, by measuring the differential voltages between the bus and the battery, so you won't be operating for a long period of time on the battery charger and think you have the battery, and indeed not have the battery connected to the bus -- which certainly gets rid of one of the problems that one has with a high-current system wherein you think you've got the battery there, but when you call on it you end up with a high-resistance path and you can't get any energy out of the battery.

That's about all I can say with regard to the question of loss of off-site and on-site AC. We recognize that with the transformers down in a flood plain, that given the design basis flood you are going to lose all off-site power.

I have nothing else to add.

CHAIRMAN BENDER: Recognizing that last point, that there is still, of course, the possibility of running the diesels for a long time, until the 69 KV power could be restored, the SER says you could run for 200 days --

MR. SCHOLL: Without maintenance.

CHAIRMAN BENDER: What is your objective? How soon would you want to have -- would you set as a minimum time for restoring off-site power subsequent to a flood, as a matter of safety philosophy?

MR. SCHOLL: The problem comes up with how severe the flood is, but we --

CHAIRMAN BENDER: I'm going to inundate the 69 KV station, and I want to know what you're going to do.

. SCHOLL: Well, our concern was -- and my concer when they took me up on the roof of that buildi e refueling trunk that they have on the t can barge in oil to refuel those diesels, f. feet up off of grade level. That was very impressive.

And I became worried, if they're going to have a flood of that magnitude, where literally they were going to go in with a design where they were going to barge oil to the plant, the ground would be so soft how would they ever get a heavy transformer, replacement transformer, in to the plant?

It was conceivable that the water might not recede around the plant grade level for almost 30 days under a situation like that. I'd be looking for Noah and his Ark, quite frankly.

I became concerned about it and we discussed it with Cincinnati Gas & Electric.

The answer to your question of restoration of power is really one of how big the flood is and how much damage has been done to Cincinnati's distribution system. I just can't put a time on it.

DR. BUTLER: Let me comment on that, because I was familiar with one of the Category-A tasks that we were working on in DOR, and that had to do with the grid stability issue.

One of the things that they're concerned about there is what kind of guidance should we be giving industry with respect to dedicating available power to the nuclear plants. And if it appears that you can island a nuclear plant, and have AC power available, if that power is limited and cannot supply the entire market, the first market it probably ought to supply is the nuclear plant needs.

I think this is something that might come out of that grid stability Category-A task Number A-35.

CHAIRMAN BENDER: Well, the Ohio River being a navigable river, I suspect that if worse came to worst you could probably bring in some kind of a floating power plant to provide some supplemental power in some way, if that were important.

Our interest at the moment is in knowing that there's a rationale for the circumstance.

DR. ZUDANS: Even if you did do that you could not restore the operation, because your cooling tower would be down.

CHAIRMAN BENDER: We don't need the cooling towers. All we need --

DR. ZUDANS: To operate?

CHAIRMAN BENDER: No, we're --

MR. SCHOLL: It wasn't a question of running the plant. The question was maintaining the core sufficiently cool.

DR. ZUDANS: Oh, I'm sorry.

CHAIRMAN BENDER: Well, I think that's enough for now on the subject. But we're continuing to give some attention to that matter, and while this area hasn't had a flood of that magnitude in a very long time, floods have a way of doing strange things in these areas.

Go ahead, Irv.

MR. PELTIER: Instruments to follow the course of an accident:

Reg Guide 197, Instrumentation for Light Water Cooled Nuclear Power Plants to Set Plant Conditions During and Following an Accident, is not, of course, applicable to Zimmer at the CP stage. It's only applicable to plants after September 30, 1977.

Ray, what can you tell us about the status of our review in that area?

MR. SCHOLL: First of all, the plant is providing what has become a traditional suite -- or suit, if you wish -- of instruments. The ICSB is not responsible for determining the adequacy of the parameters measured, but merely the adequacy of the instrumentation to cover those parameters.

And I have been given no indication of any need for any additional instrumentation beyond that which GE and the Applicant have reported in Section 75.

However, there is a minor problem with regard to the design of the suppression pool spray system, in that they're going to have to provide additional instrumentation to initiate the containment spray when you get above 35 pounds.

It's not clear to me at this time whether or not the Containment Systems Branch will require additional indication to go along with that high-range switch. I don't know, quite frankly, at this time.

As you indicated also, we are entering into some generic discussions with General Electric with regard to the use of non Class-1E instruments to handle transients. Whether you would consider a transient which would be potentially large enough to cause core damage to require post-accident monitoring or not is a matter of semantics, perhaps.

But the fact is that we are going to be looking at that area as additional instrumentation required as the result of these transients. And we'll know more when it comes time to write the SER. Satterfield, and Charlie Miller and Dale Thatcher from our group, and some people from RSB are flying out to San Jose Sunday night.

CHAIRMAN BENDER: Well, we know that you're working very hard on the Mark II containment questions, of which that is one.

MR. SCHOLL: Yes, sir.

CHAIRMAN BENDER: That's not what we had in mind. We've had a long and continuing discussion with the Staff about instrumentation following the course of the accident, and it's not very satisfying to know that the Instrument Controls Branch has not been apprised of the need to look into the matter.

MR. SCHOLL: We have not been required -- and I want to clarify that --

MR. ISRAEL: Ray, can I try to shed some light on that?

MR. SCHOLL: Yes.

MR. ISRAEL: I believe you're talking about the implementation of Reg Guide 1.97. The implementation is in limbo right now.

As you recall, several months back we had proposed looking at it on I think four typical plants. That implementation scheme has fallen by the wayside. It's in limbo now, as to how we are going to go about it.

CHAIRMAN BENDER: Well, does that mean that Zimmer is also in limbo?

MR. ISRAEL: No, I don't believe it was intended to be implemented on Zimmer.

CHAIRMAN BENDER: Well, are you saying that nothing is going to be done with plants that are under construction and that are already operating?

MR. ISRAEL: I believe --

CHAIRMAN BENDER: I don't think the Committee ever agreed to any such thing. The Committee has not been aware of what the Staff's position is, but I know the Committee has never said that it would accept the position where all existing plants would have no further monitoring.

We don't know what you're planning to do, but I think the Staff ought to look at what it plans to do. We've told them that a number of times, and somewhere along the way one of these plants is going to have to face the issue squarely in the matter of when a letter is received from the Committee concerning licensing.

I don't know whether it should be this one.

Go ahead.

MR. PELTIER: Recirculation pump overspeed during a LOCA:

The Staff is still reviewing this subject. The Applicant's position is that parts of the impeller cannot be destructive missiles because of restraints on the broken pipe.

When we finish our review we will require decouplers if it's deemed desirable at that time. However, we do not have a position on that at this moment.

CHAIRMAN BENDER: Are you going to settle that before the Zimmer operating license?

MR. PELTIER: I don't believe so.

Do you know what's going on there, Bob?

MR. BOSNAK: No. I know it's under review, and I don't expect that it will be settled by the time of the Zimmer --

CHAIRMAN BENDER: Are you planning to grandfather the Zimmer plant?

MR. BOSNAK: I can't answer that question.

DR. ZUDANS: I have a question in relation to that.

It appears to me not clear why would decouplers help?

MR. PELTIER: I don't think I know the answer. I don't know the technical details.

CHAIRMAN BENDER: Well, it's been a generic item for some time. The Committee has been trying to get it settled, and the Staff has been sitting on it for a long time.

MR. ROBARE: May I say something about that?

CHAIRMAN BENDER: Sure.

MR. ROBARE: My name is Dave Robare from General

Electric.

I work on the generic problem of the decoupler.

There are two aspects: One is the pump motor overspeed, for which a decoupler would help. We submitted a report in May of this year, showing that a decoupler would not be needed, and pump overspeed, even if it were to occur, would still not be a problem in that the pump would contain-- or the motor would contain the missiles, the rotor burst missiles.

The matter of the pump impeller missile coming out of the break in the pipe is a little different concern. We look at that on a plant-by-plant basis and determine the break locations per the Reg Guide 1.46 and evaluate possible trajectory targets of such a missile.

And I'm not sure of Zimmer. I assume we've done that evaluation there and have concluded that the pump impeller missile is not a hazard.

DR. ZUDANS: Would the missile be able to penetrate the casing of the pump?

MR. ROBARE: No.

DR. ZUDANS: Just the open end?

MR. ROBARE: Just the open end of the pipe.

CHAIRMAN BENDER: Why is it that the Germans have put in a decoupler?

MR. ROBARE: There was a period a few years ago from a previous study when it was concluded that a decoupler would be required and advisable. Perhaps they took the advice at that time.

CHAIRMAN BENDER: Well, they haven't changed it, the last time I talked to anyone there, they were still plumping for a decoupler which they thought was workable.

I would think that you would know about it. You people are experts on boiling water reactors, I'm told.

MR. ROBARE: You say they have a decoupling device? Or are they anticipating putting one in?

CHAIRMAN BENDER: They are putting them in, as I understand it.

Is there someone from the Staff here that knows a little about the subject?

Well, they're putting one in, and I think you'd be well advised to look into the matter and determine what it is the Germans are doing, and we'd like to know whether it's a good idea or not. And whether it's a convenient solution to a sticky problem that has a lot of subjective judgment in it.

MR. ROBARE: It's clearly our advice right now, our recommendation, that a decoupling device is not needed, and we have the report submitted in May that provides that justification.

CHAIRMAN BENDER: I think it would be surprising if GE didn't try to encourage that position.

Go ahead, Mr. Peltier.

MR. PELTIER: Loose parts monitoring:

The Applicant has committed to provide loose parts monitors, and says he will have two sensors at each natural collection region in the primary system capable of .5 foot pounds within about 3 feet of the sensor.

Vibration monitoring:

We have no approved task on this as yet, and there isn't any more I can say about vibration monitoring. There is none on the plant, and we do not intend to require any.

CHAIRMAN BENDER: Does the loose parts monitor that GE is planning to put in have adequate sensitivity to find the kind of loose parts that are relevant to boiling water reactors?

MR. PELTIER: Well, as I just mentioned, it's a .5 foot pounds within 3 feet of the sensor, and I'm not sure how that compares with the experience.

DR. ZUDANS: It's not an acoustic emissions device?

CHAIRMAN BENDER: No. It's a sound pickup device, as I understand it, coupled through the water system, if it's like all the others I know about.

MR. GIVAN: Dick Givan, Sargent & Lundy. The system which we have planned is not a GE system. It's a system which we have specified for the plant. It is an acoustical type pickup.

We do have plans to look at the capabilities of being able to detect where the loose part is and the size of the loose part.

CHAIRMAN BENDER: Is it a new system, or one that has been used in other places?

MR. GIVAN: We haven't procured the system yet. The requirements are pretty much the type that have been utilized previously in other locations.

CHAIRMAN BENDER: In pressurized water reactors?

MR. GIVAN: BWR's and PWR's. Basically, two companies in the United States provide this, B&W and Atomics International.

CHAIRMAN BENDER: Thank you.

MR. PELTIER: I believe that's the end of the list that was on the agenda.

DR. ZUDANS: I have one question on an item that wasn't called out.

In your submission you say water hammer, specific designs to reduce water hammer. What can you design that you're sure that water hammer will not occur? What specific design?

MR. PELTIER: The Zimmer plant is provided with jockey pumps, I believe, to keep the critical lines filled with water at all times for the emergency core cooling system. So that the water to the lines are kept full, and these systems are monitored for their continuous operations.

DR. ZUDANS: Of course, if the water is empty you don't have water hammer, you have some other thing that shows like water hammer. If the line is full, that's the only time you can have water hammer. And water hammer is generated at valves when you close them or open them, this type of thing.

So we're really not talking about water hammer of this type, we're talking about something else.

MR. PELTIER: Sandy, will you talk to that?

MR. ISRAEL: Yes. Let me address that, Dr. Zudans.

There's a generic activity, of course, dealing with water hammer that's been going on now for about a year.

In reviewing the LER's in operating plants, one of the recurring causes of water hammer in boilers is voided lines in ECCS systems.

Periodically, when the lines are voided they get water hammer as they accelerate the water and it gets up against the check valve.

Jockey pumps have been installed in plants now for five or six years, with varying degrees of success in keeping the lines filled.

As part of this generic activity on water hammer, the Staff has been trying to determine the most effective jockey pump system that should be installed.

We will also be looking at other forms of water hammer in this generic activity. However, those have not appeared -- valve closings, pump starts, and those other types of water hammer -- have not appeared to be a problem thus far.

CHAIRMAN BENDER: Let me ask the consultants whether they have any items they would like to raise.

Steve?

MR. DITTO: No.

CHAIRMAN BENDER: Walt?

MR. LIPINSKI: No.

CHAIRMAN BENDER: Dr. Zudans, do you have other things?

DR. ZUDANS: I've had my share.

CHAIRMAN BENDER: You've had enough for now?

Well, I think we've pretty much covered the agenda, and most of it I think has been done quite well.

What the Subcommittee will do henceforth I think to some degree depends upon the results of the meeting in San Francisco on the Mark II containment. We may have to have another Subcommittee meeting, and we may not. I think the Subcommittee will have to think about that some. If we do, it probably will be largely associated with the status of the Mark II containment.

I think we do have some interest in one or two of these generic items that seem to be floating around loose, of which the instrumentation following the course of the accident seems to be one that has, in my opinion, taken a reverse turn. And I think we're not likely to be too happy about that. We may want to hear more about it before we bring this application to the full Committee.

Whether other generic items need to be dealt with that way, it would be premature to judge at this time.

The Committee is having a Subcommittee meeting on generic items in December, and at that time we will take a look at the status of some of these things. Perhaps that will shed some light on the current circumstances.

Does the Applicant have any things that it wants to bring up at this point?

MR. FLYNN: We can, at this time, address the generic items from our point of view, if you wish to go into that.

CHAIRMAN BENDER: Well, I think we'd be pleased to have anything that you might want to add to what the Staff has already said.

MR. FLYNN: All right.

For the first two items, stress corrosion cracking and the ATWS, I'll ask Herb Brinkman to comment.

MR. BRINKMAN: Well, I think Irv Peltier pretty well covered that situation.

We have discussed inspection programs with the Staff. I think that we do have general agreement that what they're proposing would be acceptable, and it is our intention to document that in an upcoming FSAR amendment in the very near term.

On ATWS, the folks on the Committee seem to be as knowledgeable as anybody. We're following the generic program and we have proposed some solutions and if accepted we're proposed to go through with the proposed solutions.

DR. ZUDANS: On stress corrosion cracking, GE recommended a number of different procedures how to make these welds so that you remove the residual stresses and what not.

Is there one of these methods that you will follow in making up your pipe?

MR. BRINKMAN: All of our pipe is made up. The piping for the Zimmer Station has been investigated and is found to be a very low carbon content, some number like .03.

MR. SMITH: Yes, and on the safe end for the recirc it's less than .03.

CHAIRMAN BENDER: Will you identify yourself, please?

MR. SMITH: Walt Smith, General Electric, Project Manager for Zimmer.

On the safe end for the recirc piping the certified material report indicates less than .03 percent carbon. Now, the carbon content on the piping is higher than .03. I think it's up in the range of .06, .07.

CHAIRMAN SMITH: Is Zimmer unique in having this low carbon content?

MR. SMITH: Zimmer was ordered at the time we started realizing the importance of specifying low carbon, during a transitionary period. And then after that some of the plants went to inconel safe ends, which I think you have on some of the plants like LaSalle, Brunswick and Duane Arnold.

We lucked out.

CHAIRMAN BENDER: We hope.

Go ahead.

MR. BRINKMAN: I'm finished.

CHAIRMAN BENDER: Dr. Zudans?

DR. ZUDANS: Well, I guess inconel had a bigger problem and you had to stress relieve the residual stresses out, and so forth. On this one you don't have that.

That means you are using now an ultimate material. That's one of the solutions.

MR. SMITH: On Zimmer we use 304. On the fixes on the plants that have inconel now, I believe, should they be modified or replaced, I think they're recommending 316L.

CHAIRMAN BENDER: Okay.

Do you want to cover the rest?

MR. FLYNN: Our next one, loss of on-site and off-site power, we'll refer you to question 221.363 which we responded to in the FSAR, which addresses the loss of the 69 KV.

The next item, instruments to follow the course of the accident, Jim Schott will address that.

MR. SCHOTT: I don't believe I'll be able to satisfy the Committee's concerns, but I would like to point out for your information an additional system that you may or may not be aware of.

We have at Zimmer what we call the post-LOCA monitoring system, which consists of -- the radiation monitoring portion of that system consists of redundant ionization channels that read out in the control room. It is a system that is seismicly qualified. It is redundant and diverse. And it is designed to withstand the effects of the LOCA.

It continuously samples containment atmosphere and returns the sampled volume back to the containment. We also have that reading out to the operator on two indicator recorders in the control room.

We have continuous meteorological information feed to a mini-computer that is printed on demand or routinely, on a typer in the control room.

We have in process charts, graphs, and procedures are under development now such that given the radiation dose that the post-LOCA radiation monitoring system sees, the meteorological conditions and the duration of the release, the operator or the person responsible for calculating the downwind dose can do so, and he can continuously plot the course of any radiation release at any point in time that he desires.

We have the capability of being able to immediately assess the accident classification that our emergency plan categorizes, and we also are able to predict what radiation doses are at the site boundary, low-population zone boundary, or any point downwind out to 50 miles.

So I just would like to point that out to you.

CHAIRMAN BENDER: Well , that is a supplemental capability that is not available in many places that I know of.

You're right, it doesn't satisfy all of our interests, but I think our real concern is that the Staff has not yet reached the point of knowing what constitutes a suitable complement of instrumentation to put on a plant. I don't necessarily see it as a unique problem of the Applicant. It seems to me that the Staff has some obligation to come to a position on what it thinks is adequate, and we're anxious to hear them bring that point to some satisfactory resolution.

Do you want to go ahead with other points?

MR. FLYNN: Yes. Point 6, the loose parts monitoring, Dick Givans has already indicated our position on that.

The remaining two points, recirc pump overspeed during a LOCA and vibration monitoring, Dick Johnson, from GE, will address those.

MR. JOHNSON: On the recirc pump overspeed problem, Dave Robare of course did cover that earlier. I just would like to add that in foreign plants they usually wait until the NRC has passed judgment on something before they will adopt it. And this may be the case there where they're waiting to see if the NRC agrees with GE's recommendation that there's no need for decouplers.

CHAIRMAN BENDER: Well, that's quite possible. I'm not trying to downgrade your position. But I just said it didn't surprise me that yours was what it was.

MR. JOHNSON: Right. And we will look into that further. But we understand that the NRC is about to reach a conclusion on that. During the Hatch ACRS meetings we were told that they were about to submit an answer to us, and we hope to get that pretty soon.

On the last part, vibration monitoring, which is separate from loose parts monitoring program, Zimmer, of course, is of the same type of reactor system as the PWR-4, and we are using the Fitzpatrick reactor as a prototype reactor at this point.

In addition, to cover all the minor differences, we are monitoring recirc system piping because we have a five-fold jet pump instead of a single pump, and we're also monitoring for vibration in the shroud.

So those things will be done for Zimmer, and will be evaluated.

CHAIRMAN BENDER: Very good.

DR. ZUDANS: I think I have one more question, because I feel uneasy.

Can you, from GE, explain to me why do you feel that there is no intergranular stress corrosion problem on this plant? I heard some comments at --

MR. JOHNSON: I'm not saying that there's no problem. I'm saying that Zimmer has taken positive steps --

DR. ZUDANS: Such as?

MR. JOHNSON: -- to minimize the problem.

DR. ZUDANS: Such as?

MR. JOHNSON: Such as valving out the CRD return lines, which --

DR. ZUDANS: That's only one location.

MR. JOHNSON: We have removed the recirculation bypass. They have advanced materials that are used, such as the welded feedwater sleeve and the low carbon content that we talked about earlier.

So there are certain things that we're trying to do. And in Zimmer's case, almost having completed construction, it's very difficult to incorporate a lot of the new advantages of plants that are just beginning construction.

DR. ZUDANS: But you are not recommending anything like stress relieving, or things like that?

MR. JOHNSON: Well, it's quite possible. I'm sure that Cincinnati Gas is using -- well, maybe Herb can elaborate further on that kind of implementation.

MR. BRINKMAN: I think you're probably referring to the work that's going on now out at EPRI. There's a developmental program out there. Such heat treating programs are being considered.

It honestly seems kind of premature to commit to do that or not do it on the Zimmer plant until we more fully understand what the procedure is all about.

It may, of course, not be required because of the chemical content of our pipe. Anything that is that good must have some drawbacks.

DR. ZUDANS: Is this method that GE is in the process of developing for measuring the sensitization level applicable in this case or not?

MR. BRINKMAN: Measuring the sensitization . . .

CHAIRMAN BENDER: This is the corrosion testing, is that right?

MR. BRINKMAN: We have investigated and come up with the carbon content which, in effect, indicates --

DR. ZUDANS: That's all right. Thank you.

MR. SMITH: I think there might be one thing we could clarify. The only stainless steel piping of any size we have on the Zimmer plant is the recirc system.

The control rod drive return line is carbon steel. The core spray lines are carbon steel. And so on.

DR. ZUDANS: Okay. So you have selected other materials.

CHAIRMAN BENDER: Well, we, too, are hoping that you are making the problem go away. I think we have see enough of it.

Are there other questions from the Subcommittee?

MR. FLYNN: Dr. Bender, that concludes our presentation.

CHAIRMAN BENDER: Thank you, Mr. Flynn.

Mr. Peltier, does the Staff have anything further to add to this meeting?

MR. PELTIER: No, I believe we're done.

CHAIRMAN BENDER: Very good.

Well, I want to thank Cincinnati Gas & Electric for getting together all these knowledgeable people for this session. It's been very helpful.

As I said, we will do the best we can to get to some point where the full Committee can hear your presentation, as soon as the Staff says it's ready to bring it to the Committee.

At the moment we are not controlling the regulatory process. The Staff has not yet reached the position where it says it's ready to present its final SER.

But we thought it was timely to find out the situation. I think it's been very useful to hear this. I'd like to thank the Staff for coming out on a rainy day.

MR. FLYNN: Mr. Bender, I would like to raise one question:

It is my understanding that the Staff has indicated the SER will come out in final form the first of December, in order to support a January full Committee meeting. I'd like to get that verified or denied.

CHAIRMAN BENDER: Well, let me say this: I don't know. The Staff has a way of predicting dates that don't come to fruition, so I won't try to predict their results.

Maybe Mr. Peltier would like to say.

MR. PELTIER: Well, from where I sit, I think I would have to caution that it's going to be a major undertaking to get the report out by December 1. It is our goal, it's our target. But, as you say, sometimes these things don't materialize on schedule.

CHAIRMAN BENDER: If the report came out in time, we would try to bring it to the Committee in January, provided that we don't uncover a lot of uncertainties associated with the Mark II containment. We really think that's a major uncertainty, not because we think the containment is bad but because there are a lot of technological questions that are still being massaged, and sometimes it takes awhile to bring them to fruition.

But we'll do the best we can.

MR. FLYNN: We'll appreciate it. Thank you.

CHAIRMAN BENDER: If there's nothing else, this meeting is adjourned.

(Whereupon, at 3:15 p.m., the meeting was adjourned.)

- - -

Brinkman P.M. ①

STATUS MKII

CONTAINMENT ISSUES

SUMMARY OF CHANGES MADE:

1. FILLED INNER CORE OF REACTOR SUPPORT WITH CONCRETE.
2. REMOVED PLATFORM FROM SUPPRESSION POOL.
3. ADDITIONAL STEEL ADDED JUST UNDER DRYWELL FLOOR TO SUPPORT PIPING.
4. SUBSTANTIAL UPGRADING OF STRUCTURAL STEEL IN DRYWELL TO TAKE ABS LOAD COMBINATIONS.
5. REROUTED ALL SRV DOWNCOMER PIPING.
6. RELOCATED VACUUM BREAKER VALVES FROM DOWNCOMERS TO ABOVE DRYWELL FLOOR.
7. SUCTION STRAINERS WERE RELOCATED.
8. ONE RHR RETURN LINE WAS RE-LOCATED TO IMPROVE MIXING IN THE POOL.
9. TWO EQUIPMENT DRAINS WERE RELOCATED TO AVOID POOL SWELL.
10. LOWER FLANGES ARE BEING REMOVED FROM ALL 88 DOWNCOMERS.
11. ALL PIPING RESTRAINTS IN THE SUPPRESSION POOL WERE RE-DESIGNED.
12. ALL PIPING SNUBBERS WERE RE-DESIGNED AND RELOCATED. ADDITIONAL SNUBBERS WERE ADDED.
13. SEVERAL EQUIPMENT FOUNDATIONS/ANCHOR BOLTS WERE REVISED.

PM 2

STATUS MKII

CONTAINMENT ISSUES

MKII CRITERIA UNDER REVIEW ON ZIMMER

A. DRAG LOADS ON SUBMERGED STRUCTURES

   A. LOCA

      1. LOADS ARE BEING EVALUATED

      2. MKII REVIEWING WITH NRC THIS WEEK

   B. SRV

      1. LOADS ARE BEING EVALUATED

      2. TEE QUENCHER GEOMETRY NEEDS TO BE CONSIDERED

      3. PRELIMINARY DISCUSSIONS HELD WITH NRC

      4. FOLLOW - UP DETAILED REVIEW WITH NRC PLANNED

B. SRV PHASING & FREQUENCY

   A. BOTH WERE CONSIDERED IN DESIGN BEFORE NEC CRITERIA WAS ISSUED

   B. ZPS ADDRESSED THE INTENT OF NRC CRITERIA

   C. FOLLOW-UP DETAILED REVIEW WITH NRC PLANNED

C. A-SYMETRIC LOCA LOAD

   A. CONSIDERED EXTREMELY CONSERVATIVE

   B. PLANT EVALUATION UNDERWAY

   C. EXPECT CONTAINMENT CAN ACCOMMODATE

   D. FOLLOW-UP DETAILED REVIEW WITH NRC PLANNED

Brinkman PM 3

SLIDE #0

SUMMARY MKII
CONTAINMENT ISSUE
ZIMMER UNIT 1

ZIMMER APPROACH:

1. USED BOUNDING LOADS APPROACH

2. REPLACED RAMSHEAD WITH QUENCHER (MITIGATES LOADS)

3. USED RAMSHEAD FOR DESIGN BASIS LOAD (TOOK NO CREDIT FOR LOAD MITIGATERS)

4. COMBINED DYNAMIC LOADS ABS

5. USED VERY CONSERVATIVE STRESS ALLOWABLES

6. IMPLEMENTED SIGNIFICANT PLANT MODIFICATIONS

7. COMMITTED TO IN-PLANT TESTS (CONFIRM LOADS LESS DESIGN BASIS)

CONCLUSION:

CONTAINMENT ISSUE ADEQUATELY ADDRESSED

CATEGORY I ISSUES

(STAFF HAS POSITIONS)

- DEWATERING OF COMPACTED BACKFILL
- REACTOR VESSEL SUPPORTS
- PRESERVICE AND INSERVICE INSPECTION PROGRAM
- EFFECTS OF RECIRCULATION PUMP TRIP IN OVER PRESSURIZATION ANALYSES
- PROTECTION OF MOTOR/GENERATOR SETS - REACTOR SCRAM SYSTEM
- PHYSICAL SEPARATION AND ELECTRICAL ISOLATION
- FIRE PROTECTION
- PLANT AND SUPPORT STAFFING
- INDUSTRIAL SECURITY

CATEGORY II ISSUES

(STAFF DOES NOT HAVE FINAL POSITION)

- DESIGN FOR POOL DYNAMIC LOADS
- SEISMIC QUALIFICATION OF MECHANICAL AND ELECTRICAL EQUIPMENT
- CONSERVATISM IN TRANSIENT ANALYSES
- LPCI DIVERSION EFFECTS ON ECCS AND LONG TERM COOLING
- POOL DYNAMIC LOADS AND LOAD COMBINATIONS
- SAFETY RELATED DISPLAY INSTRUMENTATION
- ALL OTHER INSTRUMENTATION REQUIRED FOR SAFETY
- PREOPERATIONAL AND STARTUP TEST PROGRAM

ACRS GENERIC CONCERNS

ACRS	Task Action	SER
II-1	A-32, 37	3.5
II-2	C-10	NA
II-3	A-11	May 4, 1978
II-4	Proposed C	May 4, 1978
II-5A	B-60	4.4.1
II-5B	B-73	May 4, 1978
II-6A	A-9	May 4, 1978
II-6B	A-35, B-56	May 4, 1978
II-6C	A-30	May 4, 1978
II-7	B-22	May 4, 1978
II-8	B-68	May 4, 1978
II-9	O-1	May 4, 1978
II-10	Long range	May 4, 1978
II A-1	B-54	NA
II A-2	B-68	NA
II 1-3	A-3, 4, 5	NA
II A-4	Policy	May 4, 1978
II B-1	A-19	NA
II B-1	B-22	4.2
II B-3	B-10	NA
II B-4	Resolved	5.2
II C-1	B-8	NA
II C-2	A-29	May 4, 1978

ARCS GENERIC CONCERNS (CONT'D)

ACRS	TASK ACTION	SER
II C-3A	A-15	MAY 4, 1978
II C-3B	B-64	MAY 4, 1978
II C-4	A-2	5.2.1
II C-5	A-1	6.3.2
II C-6	B-34	12.3
II C-7	A-6, 7	NA
II D-1A	RESOLVED	NA
II D-1B	A-17	MAY 4, 1978
II D-2	C-1	MAY 4, 1978
II E-1	A-40	MAY 4, 1978

ACRS GENERIC CONCERNS

ACRS	Task Action	SER
II-1	A-32, 37	3.5
II-3	A-11	May 4, 1978
II-4	Porposed C	May 4, 1978
II-5A	B-60	4.4.1
II-5B	B-73	May 4, 1978
II-6A	A-9	May 4, 1978
II-6B	A-35, B-56	May 4, 1978
II-6C	A-30	May 4, 1978
II-7	B-22	May 4, 1978
II-8	B-68	May 4, 1978
II-9	O-1	May 4, 1978
II-10	Long range	May 4, 1978
II A-4	Policy	May 4, 1978
II B-2	B-22	5.2
II B-4	Resolved	5.2
II C-2	A-29	May 4, 1978
II C-3A	A-15	May 4, 1978
II C-3B	B-64	May 4, 1978
II C-4	A-2	5.2.1
II C-5	A-1	6.3.2
II C-6	B-34	12.3
II D-1B	A-17	May 4, 1978
II D-2	C-1	May 4, 1978
II E-1	A-40	May 4, 1978

Shott

STATION ADMINISTRATION

CHEMICAL/RADIOCHEMICAL

DESIGN AND MODIFICATIONS

DOCUMENT CONTROL

EQUIPMENT CONTROL

EMERGENCY PLAN

SPECIAL TESTS AND EXPERIMENTS

FIRE PROTECTION

HOUSEKEEPING & CLEANLINESS CONTROL

INSTRUMENT MAINTENANCE

MEASURING AND TEST EQUIPMENT CALIBRATION

MECHANICAL AND ELECTRICAL MAINTENANCE

NUCLEAR ENGINEERING

OPERATIONS

PROCUREMENT CONTROL

QUALITY ASSURANCE

RADWASTE OPERATIONS

RADIATION PROTECTION

RECORDS MANAGEMENT

RELIABILITY

REPORTS MANAGEMENT

SECURITY

SPECIAL PROCESSES

TRAINING

Short

A. INITIAL PLANT STAFF TRAINING PROGRAM

B. REQUALIFICATION PROGRAM

C. REPLACEMENT TRAINING PROGRAM

A. INITIAL PLANT STAFF TRAINING PROGRAM

1. OPERATIONS GROUP
   - A. INITIAL COLD LICENSE TRAINING PHASES I THRU VI
   - B. NONLICENSED OPERATOR TRAINING
2. SUPERVISORY STAFF
   - A. INTRODUCTION TO NUCLEAR POWER
   - B. ACCELERATED NUCLEAR POWER PREPARATORY TRAINING
   - C. STATION NUCLEAR ENGINEERING
   - D. BWR CHEMISTRY
   - E. BWR MAINTENANCE
   - F. NUCLEAR INSTRUMENTATION
   - G. PROCESS INSTRUMENTATION AND CONTROL
   - H. BWR OPERATING FUNDAMENTALS
   - I. OBSERVATION AND TRAINING AT OPERATING FACILITIES
3. PLANT TECHNICIANS
   - A. ZIMMER ORIENTATION
   - B. NUCLEAR FUNDAMENTALS
   - C. RADIATION PROTECTION
   - D. SPECIFIC COURSES
     - I. - ELECTRONIC FUNDAMENTALS
     - II. - NUCLEAR INSTRUMENTATION
     - III. - DIGITAL LAB
     - IV. - SYSTEMS TRAINING
     - V. - GENERAL MAINTENANCE (CENTRIFUGAL PUMPS, VALVE LAPPING & PACKING, RIGGING & LIFTING, ETC.)
   - E. PARTICIPATION IN PREOP & STARTUP TESTING: LAB & SHOP SET-UP; ON-THE-JOB IN THEIR SPECIALTY.

B. <u>REQUALIFICATION PROGRAM</u>

1. LICENSED (RO OR SRO) PERSONNEL

A. PRE-PLANNED LECTURES

I.- THEORY; PRINCIPALS OF OPERATION

II.- GENERAL AND SPECIFIC OPERATING CHARACTERISTICS

III.- INSTRUMENTS & CONTROLS

IV.- PROTECTION SYSTEMS

V.- ESF

VI.- PROCEDURES

VII.- RADIATION CONTROL AND SAFETY

VIII.- TECH. SPECS

IX.- QUALITY

B. REACTIVITY MANIPULATIONS

I. -REACTOR STARTUP & SHUTDOWN

II. -CR SEQUENCE CHANGES

III. -SD MARGIN CHECKS

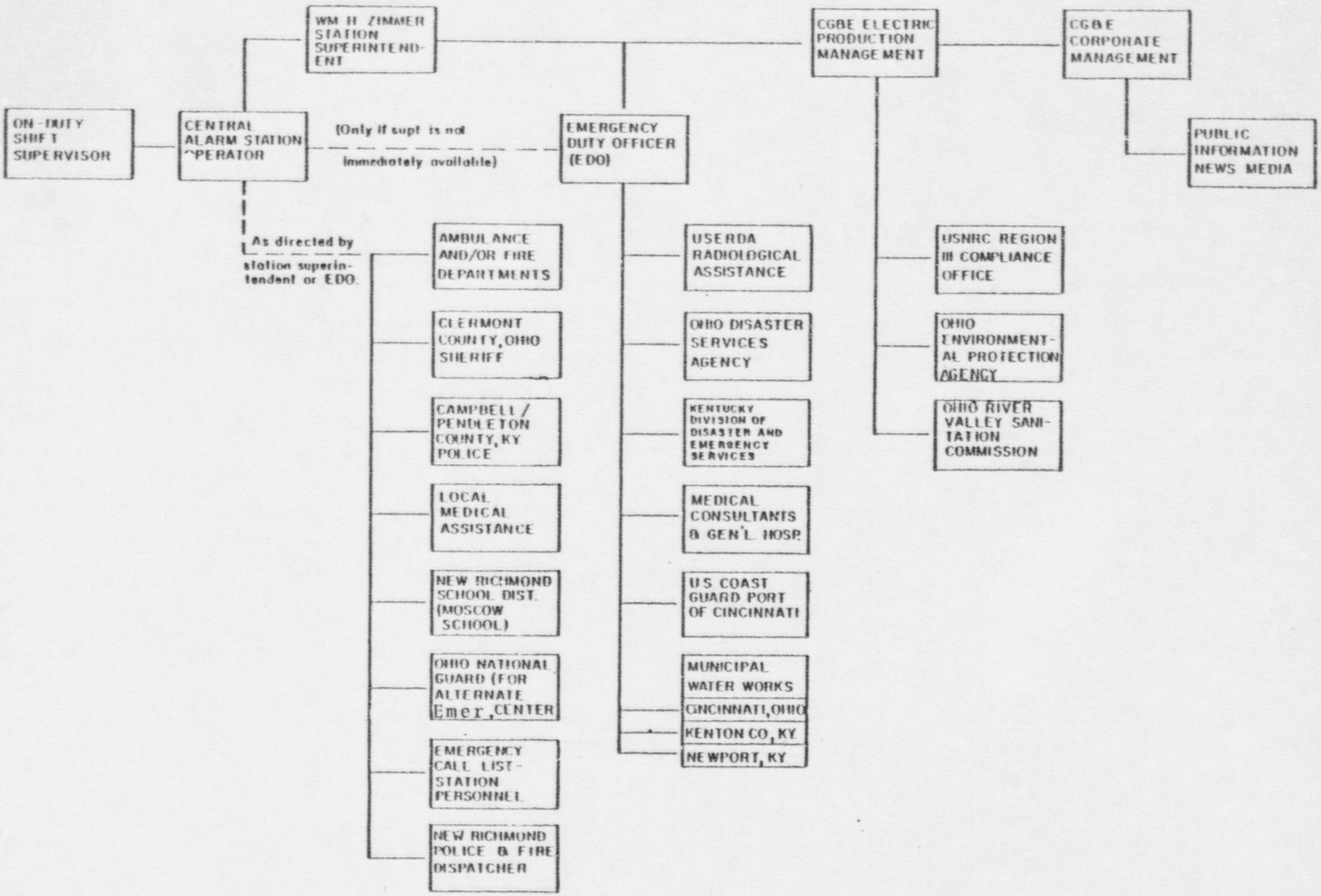
IV. -CR SCRAM TIMING

V. -REFUELING

C. APPARATUS OPERATION

D. PLANT CHANGES (DESIGN, PROCEDURES, T.S., ETC.)

E. PROCEDURE REVIEW
(ABNORMAL & EMERGENCY)


ON-DUTY SHIFT SUPERVISOR
CENTRAL ALARM STATION ^PERATOR
WM H ZIMMER STATION SUPERINTEND-ENT
(Only if supt is not immediately available)
EMERGENCY DUTY OFFICER (EDO)
CG&E ELECTRIC PRODUCTION MANAGEMENT
CG&E CORPORATE MANAGEMENT
PUBLIC INFORMATION NEWS MEDIA
As directed by station superintendent or EDO.
AMBULANCE AND/OR FIRE DEPARTMENTS
CLERMONT COUNTY, OHIO SHERIFF
CAMPBELL / PENDLETON COUNTY, KY POLICE
LOCAL MEDICAL ASSISTANCE
NEW RICHMOND SCHOOL DIST. (MOSCOW SCHOOL)
OHIO NATIONAL GUARD (FOR ALTERNATE Emer, CENTER
EMERGENCY CALL LIST-STATION PERSONNEL
NEW RICHMOND POLICE & FIRE DISPATCHER
USERDA RADIOLOGICAL ASSISTANCE
OHIO DISASTER SERVICES AGENCY
KENTUCKY DIVISION OF DISASTER AND EMERGENCY SERVICES
MEDICAL CONSULTANTS & GEN'L. HOSP.
U.S COAST GUARD PORT OF CINCINNATI
MUNICIPAL WATER WORKS
CINCINNATI, OHIO
KENTON CO, KY
NEWPORT, KY
USNRC REGION III COMPLIANCE OFFICE
OHIO ENVIRONMENTAL PROTECTION AGENCY
OHIO RIVER VALLEY SANITATION COMMISSION

Brumbeman

(3)

ZIMMER UNIT 1

GENERAL INFORMATION

1. LOCATION:
   - A. 24 MILES SOUTHEAST OF CINCINNATI, OHIO
   - B. 0.5 MILES NORTH OF MOSCOW, OHIO
   - C. WASHINGTON TOWNSHIP, CLERMONT COUNTY
   - D. 631.7 ACRE SITE

2. UNDIVIDED JOINT OWNERSHIP
   - A. THE CINCINNATI GAS & ELECTRIC COMPANY
   - B. THE DAYTON POWER AND LIGHT COMPANY
   - C. COLUMBUS AND SOUTHERN OHIO ELECTRIC COMPANY

3. PLANT CAPACITY/MAJOR EQUIPMENT
   - A. 2436 MW_T/839 MW_E GROSS
   - B. GE BWR5 BOILING WATER REACTOR
   - C. WESTINGHOUSE 4 FLOW CONDENSING TURBINE
   - D. R.C. NATURAL DRAFT COOLING TOWER

4. SCHEDULE

A. PSAR SUBMITTED	APRIL, 1970
B. E.R. SUBMITTED	JANUARY, 1971
C. AEC ENVIRON.STATEMENT	SEPTEMBER, 1972
D. CONST. PERMIT ISSUED	OCTOBER, 1972
E. FSAR SUBMITTED	MAY, 1975
F. FUEL LOADING	JUNE, 1979
G. COMMERCIAL OPERATION	JANUARY, 1980

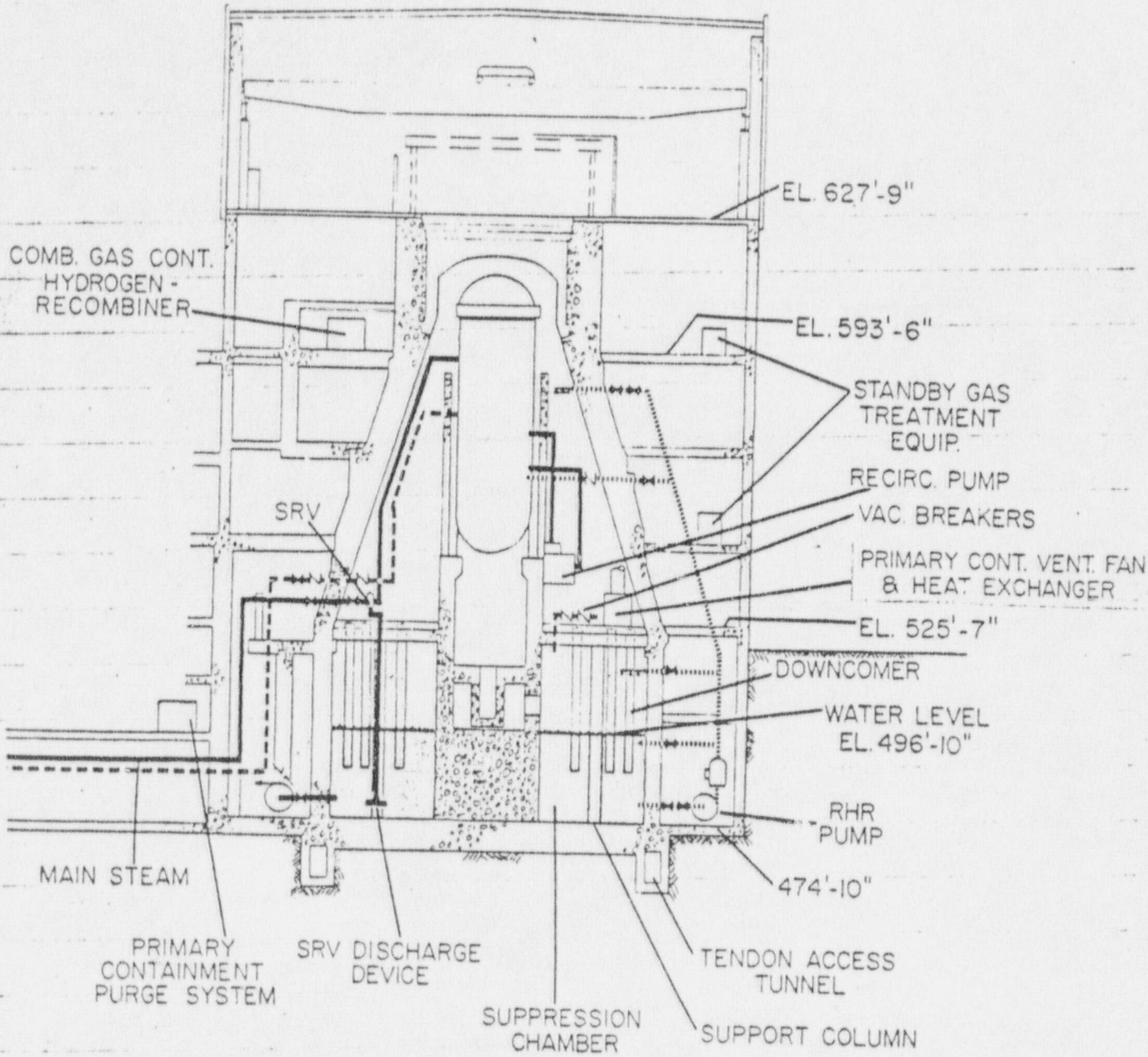
ZIMMER UNIT 1

CONTAINMENT FEATURES

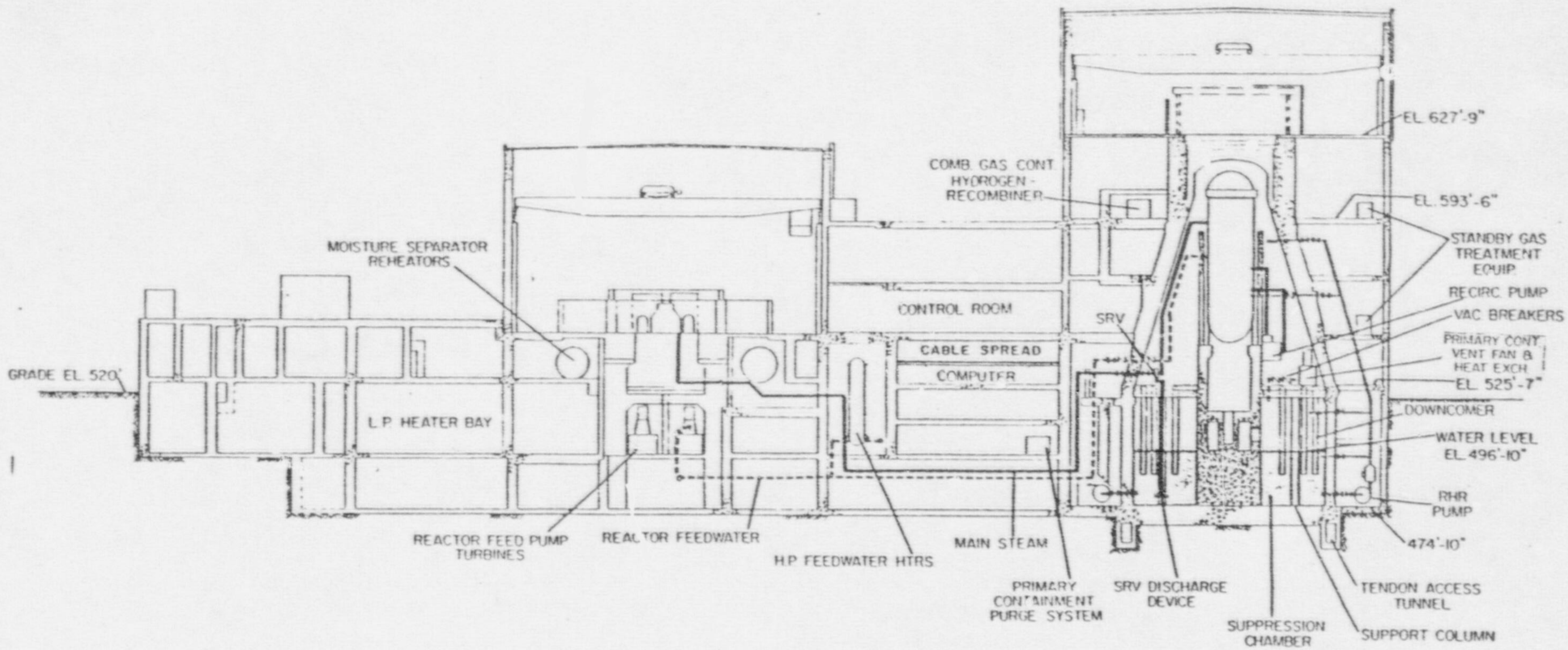
1. PRIMARY CONTAINMENT
   - A. MKII ARRANGEMENT
     - A. OVER & UNDER ARRANGEMENT
     - B. WATER POOL FOR STEAM SUPPRESSION
     - C. STEEL LINED PRE-STRESSED CONCRETE
   - B. DESIGN PRESSURES & TEMPERATURES
     - A. INTERNAL PRESSURE 45 PSIG
     - B. EXTERNAL PRESSURE 2 PSIG
     - C. FLOOR PRESS. DIFF. 25 PSI DOWNWARD
9 PSI UPWARD
     - D. TEMPERATURE 275 F WETWELL
340 F DRYWELL

Brinkman

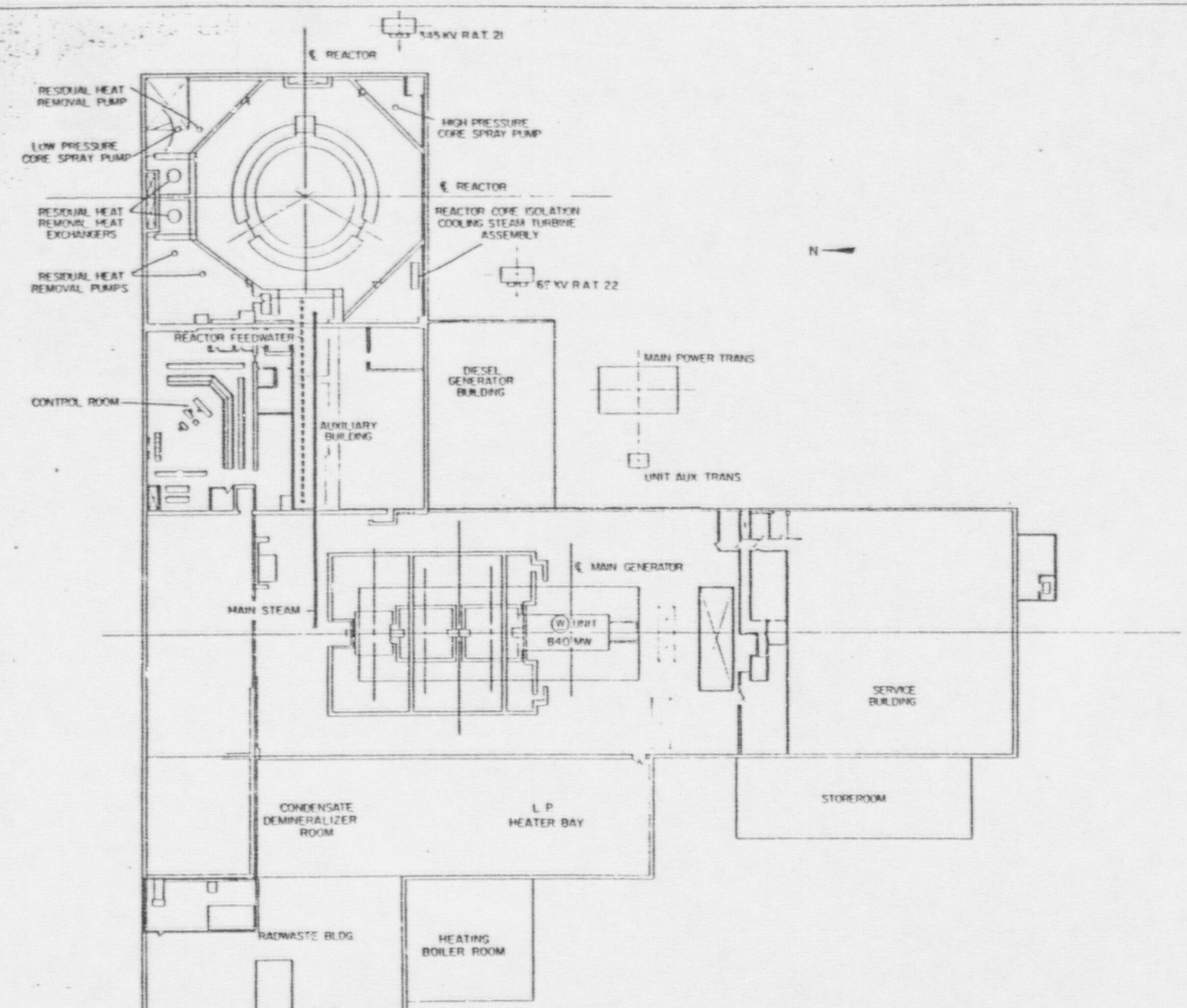
(B)



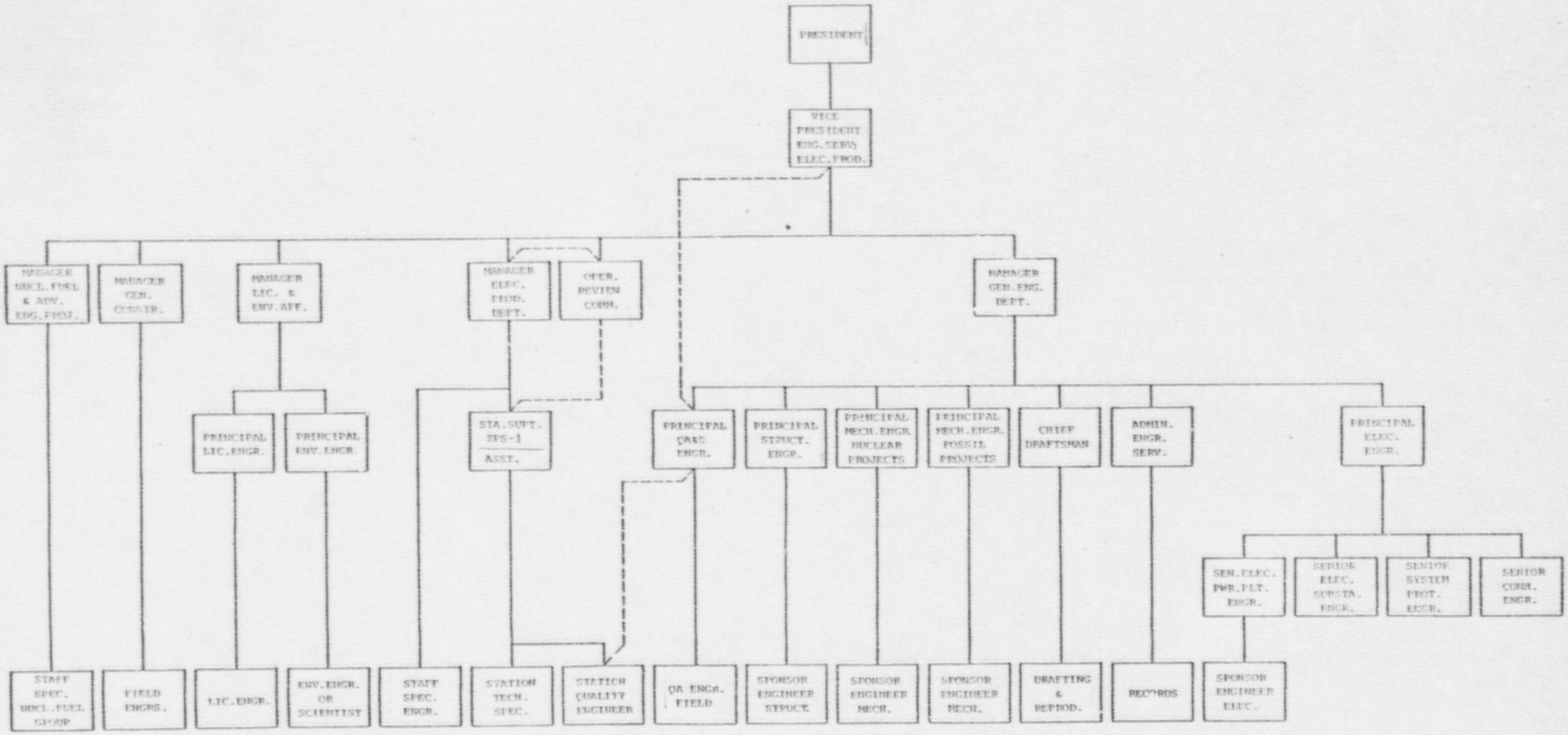
CONTAINMENT CROSS SECTION
WM. H. ZIMMER STATION



CROSS SECTION
WM. H. ZIMMER STATION



PLAN
WM. H. ZIMMER STATION



LEGEND

- - - - - - - COMMUNICATION

——————— RESPONSIBILITY

NOTE: CONSULTANT AND OUTSIDE TECHNICAL SERVICES MAY BE RETAINED BY THE ABOVE SECTIONS AS REQUIRED.

WM. H. ZIMMER NUCLEAR POWER STATION UNIT 1
FINAL SAFETY ANALYSIS REPORT

FIGURE 13.1-1
CG&E ORGANIZATIONAL CHART

WM. H. ZIMMER NUCLEAR POWER STATION

SCHEDULE ANALYSIS

NOVEMBER 7, 1978

A.V.C.

70

CHANGES SINCE LAST REVIEW

1. REACTOR INTERNALS - Installation of the reactor internals started last week, when it was decided to defer the shroud head seismic pin work to a later date.

2. PREOPERATIONAL TESTING SCHEDULE - A review was conducted last week by E.P.D. and G.E.D., during which several major logic and duration changes were made. These changes have been incorporated into the Project Schedule.

3. SUPPRESSION POOL - K.E.I. has prepared a detail schedule covering remaining work in the suppression pool, including replacement of the safety relief valve (SRV) piping and installation of quenchers. This schedule allows for a "window" during the month of December, when the suppression pool is to be made available for functional testing of the ECC Systems.

4. DRYWELL STRUCTURAL STEEL - K.E.I. has recently issued a schedule covering rework of the drywell structural steel and must analyze physical interference problems to determine if preoperational testing will be affected. Estimated manhours for the rework has grown from 14,000, in September, to the current 30,000 manhours. Craft manpower requirements to perform this work will peak this month, at approximately 50 men and completion is not expected until March, 1979.

5. ELECTRICAL CABLE TESTING - Electrical cable testing was 39% complete, as of 10-27-78. Testing has averaged 1.15% weekly, over the last approx. 16 weeks. This is below the necessary sustained rate of 2.76% (weekly), that must be maintained in order to complete by April 1, 1979. An additional Multi-Amp engineer will be on site this week, to handle determination requests, and it is expected that this will be an aid in expediting cable testing.

6. PRIMARY CONTAINMENT TESTING - Currently waiting for receipt of "graph-oil" packing to begin testing of the first ten (10) Primary Containment (PC) isolation valves. All testing is required to be complete to support the integrated leak rate test (I.L.R.T.)

WM. H. ZIMMER NUCLEAR POWER STATION

UNIT 1

SCHEDULE ANALYSIS

MILESTONE	PROJECT SCHEDULE DATE	REVISED PROJECT SCHEDULE DATE	CURRENT STATUS
NSSS FLUSH COMPLETE	COMPLETED	N/A	N/A
R.P.V. HYDRO	COMPLETED	N/A	N/A
SECONDARY CONTAINMENT TEST (COMPLETE)	3-09-79	3-05-79	15 DAYS LATE
INTEGRATED LEAK RATE TEST (I.L.R.T.)	3-22-79	3-05-79	45 DAYS LATE
REACTOR INTERNALS COMPLETE	5-14-79	5-09-79	45 DAYS LATE
FEEDWATER (FW-1) PREOP COMPLETE	6-14-79	6-14-79	30 DAYS LATE
LIQUID RADWASTE SYS. (LR-1) PREOP COMPLETE	6-14-79	6-14-79	40 DAYS LATE
VITAL BUSES (AP-5) PREOP COMPLETE	5-16-79	5-18-79	6 DAYS LATE
FUEL LOAD	6-15-79	6-15-79	49 DAYS LATE
COMMERCIAL OPERATION	N/A	N/A	N/A

11-07-78
AVC

22

1979 — 11/7/78 A.V.C.

DESCRIPTION	APR	MAY	JUN

LOW PRESSURE CORE S

HIGH PRESSURE CORE S

RESID. HEAT REMOVAL

Rx. CORE ISOLATION CO

SUPPRESSION POOL

REACTOR INTERNAL

CONTROL ROD DRIVE (I

REACTOR RECIRCUL

CONTMT. PENET. TEST

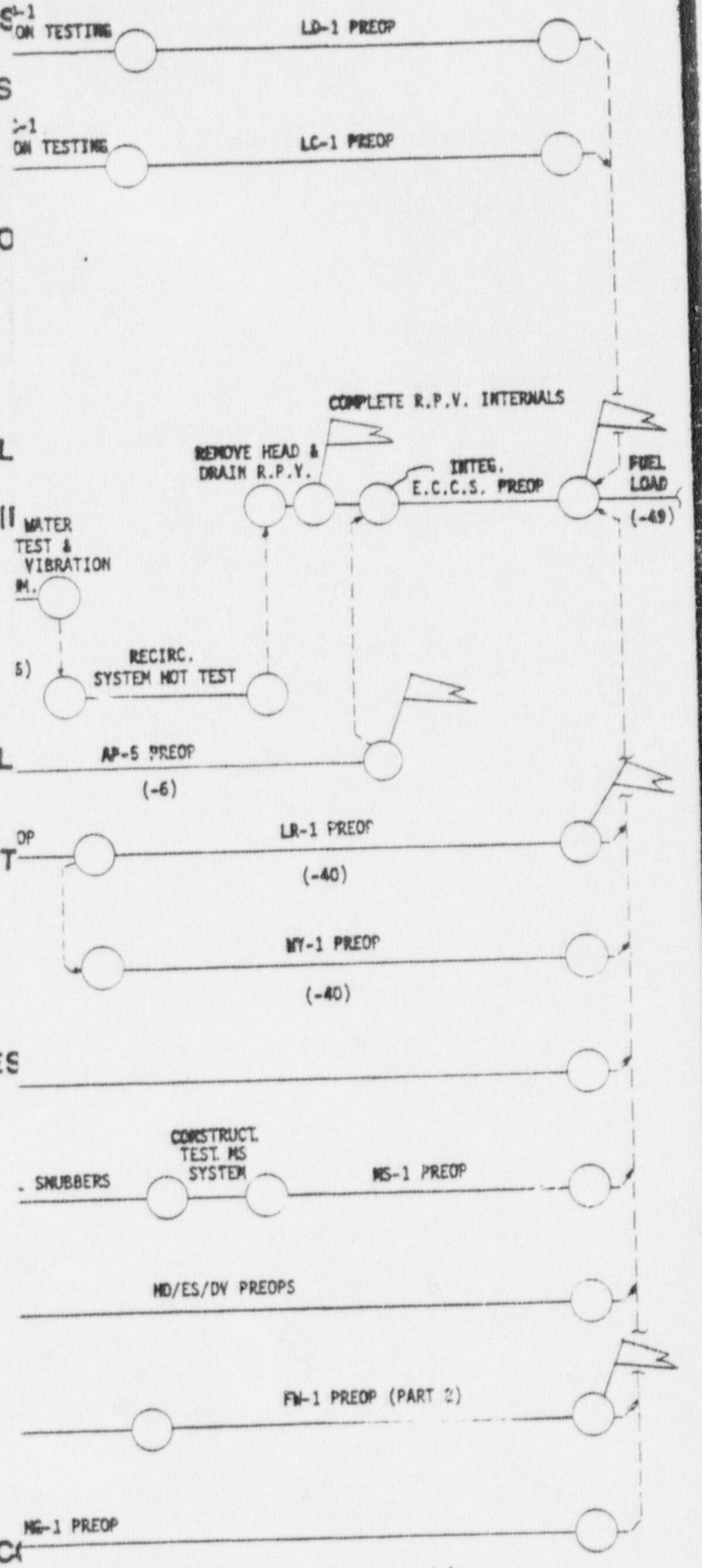
CONTROL ROD DRIVES
(RD-1 & RD-3)

MAIN STEAM

HD/ES/DV SYSTEMS

FEEDWATER

CONTMT. COMB. GAS C



SHIFT WORK OPERATIONS
HR. WORK WEEK
OTED

FLOAT: Negative (-)
Positive (+)

MILESTONE

11-7-78
CHERISE T FIRTH

23