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OFFICIAL TRANSCRIPT OF PROCEEDINGS

Agency: U. S. NUCLEAR REGULATORY COMMISISON

Title: INTERVIEW OF GREGORY LEE, JOHN AUFDENKAMPE, WILLIAM F. KITCHENS, WILLIAM BURMEISTER AND DEAN WEST

Docket No.

LOCATION: Waynesboro, Georgia

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ADDENDUM TO INTERVIEW OF William L. Burmeister
(Print Identity of Interviewee)

Page	Line	Correction and Reason for Correction
45	2&3	delete "the greatest period ... ago." since it is not necessary & is more clearly explained by the following sentence.
47	24	add "already" before "received" for clarity.
50	2	change "9-C" to "I&C" (accuracy)
63	16	change "include" to "conclude" (accuracy)
74	8	delete "in" (for clarity)
74	16	change "from" to "for" (accuracy)
75	2	change to "have is to have in excess of the Tech Spec minimum" (clarity)
75	25	change "a cummulator" to "an accumulator" (accuracy)
76	6	Change "Control monitor" to "Control Room monitors" (accuracy)
82	2	change "rent" to "mid"
82	19	change "onto" to "into"
83	15	"these drain" to "these drains" plural
86	5	change "operable" to "inoperable"
97	14	change "pressurize" to "depressurize"
99	7	change "and" to "at"
104	23	Change "the" to "they"
105	2	use colon after "are"

Page 1 Date 4-5-96 Signature WLBurmeister

ADDENDUM TO INTERVIEW OF Dean West
(Print Identity of Interviewee)

Page	Line	Correction and Reason for Correction
		No Comments

Page ___ Date 4-3-90 Signature Dean West

U. S. NUCLEAR REGULATORY COMMISSION

INTERVIEW OF:

GREGORY LEE
JOHN AUFDENKAMPE
WILLIAM F. KITCHENS
WILLIAM BURMEISTER
DEAN WEST

Main Conference Room
Administration Building
Vogtle Electric Generating Plant
Waynesboro, Georgia

Wednesday, March 28, 1990

The interview commenced at 1:43 p.m.

APPEARANCES:

On behalf of the Nuclear Regulatory Commission:

WILLIAM LAZARUS
WARREN LYON
AL CHAFFEE
BILL JONES
RICK KENDALL
GENE TRAGER

On behalf of INPO:

PAUL DIETZ

On behalf of CP&L:

MIKE JONES

PROCEEDINGS

MR. LAZARUS: The date is March 28, 1990, 1:44 p.m. We're at Vogtle Station conducting an interview with -- Whereupon,

DEAN WEST
WILLIAM BURMEISTER
WILLIAM F. KITCHENS
JOHN AUFDENKAMPE
GREGORY LEE

appeared as witnesses herein and were examined and testified as follows:

EXAMINATION

WITNESS WEST: Dean West, Operations Department, Procedures Group.

WITNESS BURMEISTER: Bill Burmeister, Unit Superintendent.

WITNESS KITCHENS: Skip Kitchens, Assistant General Manager.

MR. AUFDENKAMPE: John Aufdenkampe, Manager, Technical Support.

WITNESS LEE: Greg Lee, Engineering Supervisor.

MR. LAZARUS: Okay, thank you.

The purpose of the interview is to develop background on your responses to Information Notice 8817.

MR. LYON: Could each of you in turn perhaps in two or three sentences kind of thing just give us a feedback of your involvement in the 8817 process between the time you

essentially received that letter and say today?

WITNESS WEST: What I essentially -- this is Dean West -- what I essentially did was coordinate with Greg Lee in Engineering and took all the action items and worked them into the operations procedures and also we did some liaison work with Mechanical Maintenance and I&C Department for some of their procedures for instrumentation enhancements. That was my role, making sure they got in the procedures.

MR. LYON: You said I&C and what was the other?

WITNESS WEST: Mechanical Maintenance.

MR. LYON: Okay.

WITNESS BURMEISTER: Bill Burmeister -- I've been involved in a couple of different ways, primarily as an operations person, I've seen all the changes that were made to the procedures since the early generic letter came out on the subject and the updated 8817 letter came out, and how it affected our procedures and I've reviewed the resulting changes. I've also been involved in reviewing changes, physical changes that were made to the plant as far as instrumentation and permanent site glass that we're putting in and have been involved in another way through the owners' group, Westinghouse owners' group. They have developed a guideline on loss of RHR at mid-loop conditions and I've been involved in reviewing and developing that as part of the Westinghouse owners' group.

MR. LYON: Has that guideline been issued?

WITNESS BURMEISTER: No, it's very close. I was told two weeks ago that it would be issued in two weeks and so I would say its issue is imminent.

MR. LYON: Okay.

WITNESS KITCHENS: I've been involved in implementation and the review of the 8817 and the overall issue on mid-loop as a part of the Plant Vogtle management team.

Let me say maybe an overview of the thing here. When we first got the generic letter and the issues that were involved, we did have a task force here and I believe that's what Dean West alluded to as to the inter-departmental group that worked on what should our response be and how can we respond to this item.

Also we have currently in the corporate office in the SONOPCO project -- this is one of the projects that has a project manager assigned to it and we're statused each month as to the status of it. So although the people that are here, with the possible exception of John, will mostly just talk about operational aspects and the procedures, we can also talk to you about training. There is an overall project leader in our company from the point of view of ensuring not only operations and maintenance activities are done right but design changes and analyses that we've done

were all coordinated in a way, so we did have a project and a schedule for all that.

I'd like to say one other thing and I don't mean this to be a paid political announcement, but to start with, I believe that some of the changes that we made to our plant and some of the changes we made to our procedures did help us to come through the event the other day, the site area emergency. So I think that we learned some lessons because of the generic letter and also because of the case study from Diablo Canyon that our people were trained on.

MR. LYON: Okay.

MR. AUFDENKAMPE: I'm John Aufdenkampe. I was involved early when it came out as 8712 from an engineering standpoint. I was in the Engineering Support Department as an engineering supervisor for NSSS systems at the time.

Most of my focus has been on the hardware side of it up until I guess about six months ago when I changed departments. But I was involved in the early development of the hardware side. I worked closely with Jim Mintz who is the project manager that Skip referred to in the corporate office and also was involved in reviewing our submittals to the Commission associated -- the 60-day submittal, the 90-day submittal associated with generic letter 8817.

MR. LYON: That was Jim -- would you spell the last name?

MR. AUFDENKAMPE: M-i-n-t-z. He is available via telephone if we need to talk to him, as is our licensing engineer associated with this project, Jack Stringfellow in Birmingham.

MR. LYON: Okay.

WITNESS LEE: I'm Greg Lee and I was an operations supervisor when I started -- was introduced to generic letter 8712 -- and I say introduced to it, I noted the significance of the whole event. Anyway, I was involved with the response to the generic letter and looking at -- giving input to Engineering what I felt like we needed as far as instrumentation and all to meet the generic letter. We were about to go into a mid-loop situation and I had to get the AOP, abnormal operating procedure 18019 ready for that event, deciding, you know, what we needed to do as far as vent path, what kind of vent path to use and that sort of thing. I've been to some workshops, a workshop that you were at, Warren, on operation. I went to that one and got all the information on that and I took the WCAP and used the generic information and wrote a plant specific AOP from that, and you know, decided based on that which way we needed to go. Like can we close containment in two hours or not, that was one of the things I found to be real significant at your workshop and we wrote that as a cautionary procedure.

But anyway, I was involved with that procedure and later on I became involved with making sure that the rest of the operations procedures like the UOPs, the drain down procedure and all, had the correct kind of correlation between the different procedures and the controls necessary to set up for draining down, making sure instrumentation was installed when it needs to be installed, relying on other departments to make sure to install the instrumentation, that sort of thing, so I was pretty well involved with generic letter 8712 and 8817. I always consider it 8712 because that was the beginning of it all.

MR. LYON: Do you recall the number of that WCAP?

WITNESS LEE: No, I didn't, because I used --

WITNESS BURMEISTER: 11916.

WITNESS LEE: I think that's what it is. I got a copy from Eric Franze from Westinghouse in the beginning and it was the same information. I was just going to use that.

MR. LYON: I understand.

WITNESS LEE: Had all the curves, heat up curves and vent sizes.

MR. LYON: And which workshop did you attend?

WITNESS LEE: Okay, I attended one in D.C. and it was more relative to the inspection teams on EOPs.

MR. LYON: That was the Dulles Airport workshop?

WITNESS LEE: Yes.

MR. LYON: That was held last summer I believe.

WITNESS LEE: That's right.

MR. LYON: Okay.

WITNESS LEE: The one that you held was in Atlanta.

MR. LYON: There was a pa.el discussion in Atlanta. There was one in Denver immediately after the Dulles one.

WITNESS LEE: I went to the Denver.

MR. LYON: You went to the Denver one, not the Dulles?

WITNESS LEE: That's right.

MR. LYON: Okay. Were you also involved in the workshop that Westinghouse sponsored in oh, I think it was September of '88?

WITNESS LEE: No, I was not.

MR. LYON: Okay.

WITNESS LEE: But I was -- I have been a participant in a Westinghouse owners' group and I was involved in early development of that generic --

MR. LYON: Is this the operations subcommittee side?

WITNESS LEE: Operations subcommittee.

MR. LYON: Okay. And you essentially were the channel to provide this information back to Vogtle?

WITNESS LEE: That's right. I've been involved with the shutdown LOCA issues and that sort of thing too and I've recently dropped out of being a participant and Bill

Burmeister has picked up the Georgia Power representative for Vogtle.

MR. LYON: Let me kind of go back and let's follow just a little bit of history of the process. The first communication that came out on this as I recall was an information notice shortly after Diablo Canyon?

WITNESS LEE: Yes.

MR. LYON: Could you tell us your response to that?

WITNESS LEE: I don't remember the response to it. I considered it very similar in events, that the information notice was very similar type of situation to the generic letter.

MR. LYON: Now this was before -- this was immediately following the Diablo Canyon event, one of the first pieces of information that came out as I recall was an information notice. I forget the number. Would that have come to you eventually?

WITNESS LEE: Yes, it would have.

MR. LYON: Do you recall any Plant Vogtle response to that?

WITNESS LEE: Not really. It became a NUREG -- the Diablo Canyon became a NUREG.

MR. LYON: Yes.

WITNESS LEE: I think it was 11 --

WITNESS BURMEISTER: 1269.

WITNESS LEE: I don't remember the number. That's when -- I considered that more detailed and more useful. The other event just seemed like another event, it just kind of was redundant I thought to the generic letter.

MR. AUFDENKAMPE: If it was issued as an information notice, we would have, I'm 99 percent sure, put together a package on it and would have reviewed it and we can pull that up and find out what our initial response -- at least our evaluation of the condition was.

MR. LYON: I'm going to be much more interested in recent history than past history, as you will -- I'm just going to try to lay a path and a foundation and see how we go.

WITNESS LEE: I'm sure there is, you know, response like John said, on every information notice and bulletin.

MR. LYON: I understand. Now the NUREG you referred to came out in June following the Diablo Canyon event that previous April.

WITNESS LEE: Yes.

MR. LYON: And 88 -- I'm sorry, 8712, the generic letter, came out very shortly thereafter. I would guess you got them both at about the same time.

WITNESS LEE: Right, I didn't even remember which one occurred -- they were very similar in nature.

MR. LYON: Could you folks briefly describe the

Vogtle response to those?

WITNESS LEE: Well --

WITNESS KITCHENS: Without going back and looking, we're not going to be able to tell you the Vogtle response to specific I&E notices without looking back into our files.

MR. LYON: Okay. That's a fair feedback.

WITNESS KITCHENS: I want to be sure that when we answer you, that --

MR. LYON: This was two years ago. I'll tell you what, why don't we for the time being -- did you initiate actions at the plant in response to those two documents?

WITNESS LEE: Yes.

MR. AUFDENKAMPE: In response to 8712, definitely. We definitely took action because we were preparing to go into an outage at that time.

WITNESS LEE: Right and I took it very seriously because I knew that we were going into that situation and it had special precautions that had to be taken into consideration.

MR. LYON: Okay, so you did address them then.

WITNESS LEE: I felt like we addressed it in the procedures for generic letter 8712, before we went into the outage.

MR. LYON: And you beat me to it, you took my question away from me.

WITNESS LEE: Good, that's the way we wanted it.

MR. LYON: Okay. And did you have preliminary notification of the content of generic letter 8817 -- yeah, preliminary information.

WITNESS LEE: Yes, I did. I believe your workshop was even preliminary. You know, you said it wasn't issued yet. I got a copy of that before I went to the workshop, a preliminary version of it, realizing that it changed.

WITNESS KITCHENS: 8817, I don't remember the exact details but we did get some preliminary information on it, which we acted on for our first refueling outage.

MR. LYON: Okay, this came by way of Larry Walsh and the owners' group?

WITNESS LEE: Yes.

MR. LYON: And you did then initiate activities in response to that?

WITNESS LEE: Yes, we did.

MR. LYON: Was that information consistent with what you later received as 8817?

WITNESS LEE: It was more detailed.

MR. LYON: In which?

WITNESS LEE: Especially on the containment closure issue.

MR. LYON: 8817 was more detailed?

WITNESS LEE: 8817 seemed to me to be more detailed

in that area.

MR. LYON: Okay. Were there any inconsistencies? I recognize the more detail in the published document, were there any inconsistencies that caused you extra work between what you had gotten by way of the owners' group operations subcommittee and 8817 when it came in?

WITNESS LEE: It was just a different emphasis. We had to look at it a little more differently, especially in the area of containment. After reading 8712, we may not have noticed that we had -- we thought that containment, you know, if you had steam in the area, we didn't know what degree of containment closure, and especially after going to the workshop, made it clear that, you know, we practically have to establish containment integrity, that we couldn't just put a plastic liner up and that would be sufficient. We had to close the hatch with at least so many bolts on the inside.

MR. LYON: What is your impression of the need for closure? What is it that we are trying to protect against?

WITNESS LEE: The fact that you would have a release of steam. You may have fuel damage -- if it got so hot that you had fuel damage, core uncovered, you would have gases that would --

WITNESS KITCHENS: Radioactive release from containment.

WITNESS LEE: Out to the -- straight to the --

MR. LYON: Are we trying to protect against a release or do we anticipate a real pressurization of containment?

WITNESS LEE: Well there wasn't an exact amount of pressurization involved, but you know, most people felt that it was going to be a very minimal amount of pressurization to -- you know, because of the volume in the -- of RCS and decay heat, it would not pressurize containment that much.

MR. LYON: Did you ever -- do you recall having ever received any kind of message or feedback that our real concern was the -- being able to contain a core melt at least for some reasonable period of time and to protect against the pressurization that would result from a hydrogen burn which would be expected following a core melt?

WITNESS LEE: Yes, we heard that and, you know, as far as there being a hydrogen burn, so that would be -- that was another concern of the workshop. There would have to be a certain number of containment coolers running.

MR. LYON: Did that get factored into the degree of closure that you folks had to provide?

WITNESS LEE: Since we had to go to containment closure -- establish containment integrity, then yes, it would have been, you know, sufficient for the pressurization and containment cooling measures were taken too.

MR. LYON: Would you hazard a guess as to order of magnitude pressure you might be protecting against?

WITNESS LEE: That was never determined. There was a lot of speculation about what that pressure might be, you know. After attending the workshop and everything, I gathered some people thought it was not that -- the amount of pressurization would be minimal. I didn't know -- all I know is I established containment integrity because I didn't know what value that we could expect.

MR. LYON: Okay.

WITNESS LEE: This is what we provided in the abnormal procedure, was if you lose RHR, establish containment integrity.

WITNESS KITCHENS: Yeah, but what you're really establishing is refueling containment integrity.

WITNESS LEE: Yes, all the bolts would not be completely established. We did track containment penetrations by information LCO's. We knew -- we had a way of identifying them and --

WITNESS KITCHENS: I just wanted to be sure you didn't -- containment integrity, Modes 1 through 4, refueling integrity, what we have in our procedures is to establish a Mode 6 refueling level, basically, we go out and do the surveillances.

MR. LYON: Do you recall the generic letter 8817

guidance as to the degree of closure needed on the equipment hatch?

WITNESS LEE: There had to be like four bolts, if it was an inside sealing patch.

MR. LYON: It was four bolts.

WITNESS LEE: Four bolts.

MR. LYON: I don't believe you'll find that criterion in 8817.

WITNESS LEE: I'm not sure where --

WITNESS KITCHENS: If you'll hold on just a second I'll look it up and read it, Greg.

MR. LYON: If you can find it, I would be delighted to hear you read it to me because it isn't there.

WITNESS LEE: This was voiced time and time again at the workshop that it was four bolts as long as it was sealed on the inside. It might have been the preliminary 8817, I'm not sure.

MR. DIETZ: Is that the criteria you established then, was four bolts --

WITNESS LEE: Yes.

MR. DIETZ: How many did you get on during this event?

MR. AUFDENKAMPE: I think he's getting four bolts from our Tech Specs. Our Tech Specs say four bolts.

WITNESS KITCHENS: That's what I'm trying to tell

you, for what we do, we maintain -- we get the containment in similar configuration as we would for the refueling mode Tech Spec requirement, which requires four bolts.

MR. LYON: But 8817 did not reference anything of that nature.

WITNESS KITCHENS: Right.

MR. LYON: 8817 requests -- excuse me, recommended that you have a no-gaps criterion, which kind of leads me into my next question. Did you ever check to see if you did have indeed a no-gaps criterion with four bolts, or have you ever tested your equipment hatch such as for example pressurizing between the two seals with the four bolts and seeing if you would hold pressure?

WITNESS LEE: Not to my knowledge.

WITNESS KITCHENS: The no-gaps is the same as refueling Tech Spec requirement. You can't have a direct access between the inside and the outside of containment. Basically if you can see between the inside and outside containment, then you would not have it. But we have not done any pressurization type tests that I'm aware of. We don't do a local leak rate test which is four bolts.

MR. LYON: Do your Tech Specs state that the four bolts is the requirement or that they give you a no-gaps situation? I'm a little confused.

WITNESS KITCHENS: Okay. In Mode 6 while we're

doing refueling core alterations, part of the Technical Specification requirements -- and it's pretty much a generic Tech Spec requirement -- is that you have the containment in a certain condition. You can't have any access, direct access between the inside and outside of containment, and it specifically has some -- I don't have it with me but if you read them it would be easier, but it specifically has you during that time not having any direct access between the inside and outside containment. One of the specific things that's on the list there is equipment hatch closed and retained by a minimum of four bolts.

MR. LYON: I understand.

WITNESS KITCHENS: Also we have other surveillances where we go out and ensure valves are closed. Containment integrity implies a whole different word -- whole different meaning. That implies integrated leak rate testing, local leak rate has been done before refueling containment conditions, it's basically that you can't see between the inside and outside. You want to have it mechanically closed up.

MR. LYON: That's why we coined the word containment closure in that generic letter, we wanted to differentiate between that and the licensing Mode 1, if you will, containment isolation.

WITNESS KITCHENS: One thing that you asked about

may be of use to you. One of the earlier notices or bulletins, and I don't remember the numbers of all these that came in. One of the earlier ones, when we were preparing for the first refueling outage, we actually developed a -- for a containment hatch, equipment hatch so that we wouldn't be required to go and close the hatch -- we actually developed a door for the outside of it that we could close in a rapid fashion. We later decided that was not sufficient to putting the containment hatch on.

I think to answer your question -- I don't remember the exact question, but leading -- you know, we did do some things that we now do differently. We actually developed our own door, if you would, to the outside. I don't recall what it was made of, but it wasn't substantial metal this way, it was like a barn door that you could close with visclene on the outside of it.

MR. LYON: And that would have met your refueling Technical Specification, is that correct?

WITNESS KITCHENS: No, sir, because our refueling Technical Specification specifically says the equipment hatch --

MR. LYON: Okay, I understand.

WITNESS KITCHENS: Had there been another hole in containment -- say there was another penetration or something that we were doing maintenance on --

MR. LYON: Such as your emergency personnel hatch?

WITNESS KITCHENS: I don't recall if there's anything specific on emergency personnel.

MR. LYON: Okay.

WITNESS KITCHENS: If there were any other penetration that's not specifically called out in containment, then you probably would be able to get by with that for refueling.

MR. LYON: I see. The closure time, I understand you folks have come up with a 59 -- or is it 57 minute closure time requirement?

WITNESS KITCHENS: 57.

WITNESS LEE: Yes, that's the new, very conservative value. I say very conservative, that's based on 48 hours after shutdown.

WITNESS KITCHENS: It's based on us being at mid-loop condition 48 hours after shutdown on extended run at full power.

WITNESS LEE: Which is very conservative.

MR. LYON: What is the basis for the conservative statement?

WITNESS LEE: There was an RSA written for Southern Company to evaluate Vogtle's meeting the generic letter and that's one of the things that they were to determine, was you know, what type of containment closure should we have to

preclude core uncovering.

MR. LYON: What does REA mean?

WITNESS LEE: Request for Engineering, it's like a request for engineering support.

MR. AUFDENKAMPE: It's request for engineering assistance, the way we communicate with our off-site engineering agencies.

MR. LYON: I see, do you have an identifying number?

WITNESS KITCHENS: I pulled you a copy. You asked me at my last interview for a copy of this and I brought it today, but I see a note to pass this to Herb Beacher, but you're welcome to have this. This is the calculations and all, it shows the assumptions.

MR. LYON: If you would give that to Herb, so that he can give it to us and process it through, I would appreciate it.

WITNESS KITCHENS: It's REA number was VG-9011.

MR. LYON: Okay.

WITNESS KITCHENS: I believe what he meant by conservative was the assumptions that were used in doing this were conservative assumptions.

MR. LYON: Are you familiar with all of those?

WITNESS KITCHENS: I can read them to you.

MR. LYON: No, no, I don't want them read, I just want to know --

WITNESS KITCHENS: I'm familiar with some of them. They did do assumptions with how much water we had when we were at mid-loop, but actually used mid-loop at 187, we normally don't go that far down. They did the assumption of -- that we were there at the time a loss of RHR, we had been shutdown for only 48 hours, which would be a world's record if we were able to get to mid-loop in 48 hours. That's what he meant by conservative, they erred on the conservative side toward making the time small for those things. The heat sinks of the metal in the vessel were assumed to not exist, those kinds of things. We assumed a larger power that we're authorized by our Tech Specs now. The initial core power would be five percent more than really allowed.

WITNESS BURMEISTER: Also minimum RWST level required by Tech Spec.

MR. LYON: How does the RWST level factor into that number?

WITNESS BURMEISTER: Provides pressure head to provide flow to the RCS.

WITNESS KITCHENS: I believe that one --

MR. LYON: You're calculating this time in which you have to have the equipment hatch closed assuming that you have gravity flow?

WITNESS KITCHENS: No, no. The assumption he just referred to, there's another part of this that does a

calculation to show gravity flow and in that particular calculation they assume minimum. I believe, Bill, the one for time to expose core doesn't assume any mid-loop.

MR. LYON: Okay. Do you know off-hand your heat up rate while at mid-loop 48 hours after shutdown?

WITNESS KITCHENS: 8.3 degrees a minute, I believe.

MR. LYON: Is that in any documentation that's readily available?

WITNESS KITCHENS: Uh-huh, it's also in our procedure that Greg referred to.

MR. LYON: For the record would you state what procedure you're referring to?

WITNESS LEE: 18000?

WITNESS KITCHENS: 18000, 19-C.

MR. LYON: And that is figure --

WITNESS KITCHENS: This heat up rate is Figure 4.

MR. LYON: And that's of the order of eight degrees a minute?

WITNESS KITCHENS: Well it gives the heat up rate versus time after reactor shutdown and if you assume 48 hours, then it turns out to be 8.3

MR. LYON: Does it also give a time to boiling?

WITNESS KITCHENS: Yes.

MR. LYON: And that's what figure?

WITNESS KITCHENS: That's Figure 2.

MR. LYON: And what is the time to boiling?

WITNESS KITCHENS: At 48 hours?

MR. LYON: Yes, sir.

WITNESS KITCHENS: Time to boiling is 48 hours, I'd say approximately 500 seconds.

MR. LYON: 500 seconds, so of the order of ten minutes, say?

WITNESS KITCHENS: Yes.

MR. LYON: From the time of the loss of RHR, you would be boiling at mid-loop.

WITNESS KITCHENS: Yes, 48 hours after shutdown.

MR. LYON: I understand. If we were to have some steam generator manways open under those circumstances, where would the steam go from the boiling?

WITNESS KITCHENS: What other configuration would you have us have? I assume you would not have any nozzle dams or anything.

MR. LYON: No nozzle dams in, the steam generating manways are off.

WITNESS KITCHENS: What about the manway?

MR. LYON: If you want to take the pressurizer manway off, that's okay too. So the steam goes out the manway. Do you have a feel for the volume of steam that would go out through that manway?

MR. DIETZ: That's a trick question.

WITNESS KITCHENS: There was an incident where that actually happened a long time ago, I don't recall.

MR. LYON: It's big.

WITNESS LEE: More than you can make up. That is also addressed in the REA.

MR. LYON: They calculated that steam flow rate? Do you recall off-hand what that is?

MR. AUFDENKAMPE: Not right off-hand, but looking at it, I think there are over 277.93 cubic feet per second.

MR. LYON: Call it say roughly 300 cubic feet per second? So if I multiply that by 60, I've got 18,000, so say of the order of magnitude of 15,000 cubic feet per minute. Would you be able to stay in containment with that kind of steam volume coming out through one of those manways?

(No response.)

MR. LYON: In other words, where I'm headed is, if you were in that situation, could your people remain at the equipment hatch trying to get it off?

MR. AUFDENKAMPE: The answer is yes, and again this is all in this REA and I'm somewhat at a disadvantage, because I read it right before I came here.

MR. LYON: That's all covered in the REA?

MR. AUFDENKAMPE: That's where the 57 minutes comes into.

MR. LYON: Okay.

MR. AUFDENKAMPE: 26 minutes to reach the maximum principal concentration and --

MR. LYON: Excuse me, we're missing each other. I'm not concerned about concentrations.

MR. AUFDENKAMPE: I understand.

MR. LYON: Go ahead, I'm sorry.

MR. AUFDENKAMPE: 26 minutes but to read the maximum radiation, maximum permissible concentration with respect to radiation then we come back in with respirators and finish the job before we reach the maximum temperature that we can withstand. That's where the 57 minutes comes from.

MR. LYON: So you are taking into account the steam and you're condensing that steam?

MR. AUFDENKAMPE: There's no credit for condensing.

MR. LYON: There is no credit. You're right, I'm going to be very interested in reading that because I have never seen one of these analyses.

Okay. In response to 8817, did you look at other penetrations in your containment?

WITNESS LEE: Other than the hatch, equipment hatch?

MR. LYON: Yes.

WITNESS LEE: Well we were keeping track of it, we have an administrative control to identify them and as the note says, to initiate containment closure per this

procedure.

MR. LYON: And since you're keeping track of them, that means the operators have a record of what is open and what is closed?

WITNESS LEE: (Nodding head affirmatively.)

MR. LYON: And the procedure specifically references that record so they could do a cross check to make sure everything was closed up?

WITNESS LEE: That is set up by the procedure itself, that when you go into mid-loop you're to establish this list and identify -- keep track of these penetrations that are open.

MR. LYON: Okay.

WITNESS LEE: Here, it's just general guidance that you need to initiate containment closure. That implies to the operator he's supposed to close them if they're --

WITNESS KITCHENS: Let me answer it a little more direct. In our cool down procedure and shutdown procedure, which is Unit Operating Procedure 12006-C, Greg has put into it as one of the steps, it says when required to initiate RCS draining by performing the following -- there's a whole list of things to do. One of them is determine the closure status of the equipment hatch and ensure the hatch is capable of being closed within 57 minutes, or ensure the hatch is closed prior to reducing RCS level below three feet

below the reactor flange. The one he's talking about is the second requirement. A review of all containment penetrations addressed in procedure number 14210 containment building penetrations, refueling, should be accomplished to determine those which have been opened by manual means and an information LCO generated for those identified.

To answer your question, we have an information LCO manual that the shift supervisor keeps at his work station and he could easily identify for that if there was any penetration that had been opened by manual valve or something.

MR. LYON: Okay. Now in many plants that I have been in I see cabling dragged through the equipment hatch. I see tubing, pipes, walkways, similar kinds of things going through the personnel hatch, stuff such as one would use for steam generator lancing operations. Do you folks do that kind of a process at this plant?

WITNESS KITCHENS: No, sir.

MR. LYON: How do you handle it?

WITNESS KITCHENS: We do during eddy current testing, but during this particular outage, we actually installed in a spare penetration a penetration for that very thing, for sludge lancing and for putting temporary cables through. It's a spare penetration that allows us to run the cables through there, through a sealed penetration.

MR. LYON: You indicated that for eddy current testing you might bring your cables through another path?

WITNESS KITCHENS: This was also for that.

MR. AUFDENKAMPE: For eddy current testing and sludge lancing, we have a dedicated containment penetration that has a special flange adaptor to accept the Westinghouse sludge lance and eddy current hoses and cables. They run through the penetration and they do not communicate with the outside atmosphere.

WITNESS KITCHENS: This also allows us to perform refueling without having the direct access between the inside and the outside, we in essence built a penetration for that.

MR. LYON: So you enhanced your operating capability at the same time that you enhanced safety;.

WITNESS KITCHENS: Yes, sir.

MR. LYON: Are any other kinds of cables, welding hoses, anything of this nature, typically snaked through into containment during an outage?

WITNESS KITCHENS: Through equipment or personnel hatch, is that --

MR. LYON: That kind of a thing, yes.

MR. AUFDENKAMPE: Generally not. As far as power goes, we -- the last outage and this outage, we provided extra temporary power and in this outage we installed

permanent I guess an extra 900 amp service or 600 amp service in containment so we don't have to bring electrical cables in and demin water supply, I think the penetration is sufficiently sized to satisfy all our demin water needs.

MR. LYON: Okay. Let me leave containment and go to a different area. You've mentioned some analyses in this REA. Does that contain essentially all of the important analyses that you have conducted to support your operations for this generic letter response?

WITNESS LEE: Yes.

MR. LYON: There's nothing else that I really should ask for that would provide some additional insight into the preparation for these conditions?

MR. AUFDENKAMPE: Not with respect to analyses. That's not dodging the question --

(Laughter.)

MR. AUFDENKAMPE: This is only analysis, this is only the engineering analysis associated with the response to generic letter 8817.

MR. LYON: Uh-huh.

MR. AUFDENKAMPE: Where you asked us to do the analysis or the Commission has asked us to do that analysis.

WITNESS KITCHENS: We use pretty much generic information from the owners' group and others prior to that but you asked the question are there other things you should

ask for -- you know, one of the things you haven't asked about, I assumed that you would, would have been training. We have a lot of --

MR. LYON: That's on my list.

WITNESS KITCHENS: -- a lot of -- we have performed a lot of training associated with this primarily with our licensed operators.

MR. LYON: Okay.

WITNESS KITCHENS: Both from the point of view of a case study for the specific events in Diablo Canyon and for the 8712 and 8817. You know, we've done a pretty good bit of training for mid-loop ops and that's one thing you had not asked about yet.

MR. LYON: Well since you've identified that issue, let me ask about it. What training do you provide to your maintenance and instrument tech kinds of people as related to 88177

WITNESS KITCHENS: I'm not sure. I will find out for you.

MR. LYON: Does anyone know?

WITNESS KITCHENS: The closest person to know in this group would be me because none of them are responsible for --

MR. LYON: Okay.

WITNESS KITCHENS: I honestly don't know. I'm not

avoiding your question.

MR. LYON: I understand. I find a no to be the easiest response to a question, as opposed to if you know something then you have to go into it a bit.

Would you look into that a little bit?

WITNESS KITCHENS: Yes. You want to know about training that maintenance or I&C types may have had associated with mid-loop ops and particularly the generic letters we've been talking about, those issues?

MR. LYON: Yes. Generic letter 8817 and both the expeditious responses and the program enhancements addressed the avoidance of perturbations through those kinds of operations and we would like to have an understanding of how you have dealt with that issue.

WITNESS KITCHENS: Okay.

WITNESS BURMEISTER: We do have a note in the UOP, you know where Unit shift supervisor controls the activities along those lines as far as allowing maintenance activities. He has a note in the unit operating procedures that says don't allow any type of activity that would cause perturbations during mid-loop operations.

MR. LYON: Uh-huh.

WITNESS BURMEISTER: We do have that kind of note.

MR. LYON: But that's a little different than having your people that are out there in the field having a

sensitivity to those kinds of things.

WITNESS KITCHENS: He specifically was talking about training and briefings to the other people other than operations, I believe, were you not -- not just procedure requirements.

MR. LYON: I'm not going to explore all aspects of your training, but let me explore one aspect. When -- and the one I'd like to look into a little bit you did not reach during this event but I think it's appropriate because if you had not gotten electric power back for an extended time you probably would have -- and that is the behavior of the system once boiling initiates.

You were, as I understand it, in a situation with all manways on, you had closed up all penetrations with the exception of the cono-seal openings. And let's postulate that boiling initiated at that point. My first question is -- let me back up just a little bit -- as we approached boiling, what would your training have told the operators that they should be doing?

WITNESS KITCHENS: For the configuration that --

MR. LYON: Let's make it simple. Forget the cono-seals. The reactor coolant system is closed, you're coming up on boiling. What does the operator expect and would you have been providing training and guidance as to what to expect and what should be done?

WITNESS KITCHENS: I'm trying to remember. Both Bill and I would have received that training. The training I remember was specifically associated with the different things that would happen were you to have a cold leg open with the dams in, manways on or not. We received training as to what pressurization of the reactor vessel head would do under certain conditions, how having manways in in certain conditions would allow you to actually uncover the core quicker that way, just for having the RCS -- no blockages, no manways, no isolation valves, loop isolation valves closed. I don't recall --

MR. LYON: Excuse me -- loop isolation valves? Do you have those beasts?

WITNESS KITCHENS: No.

MR. LYON: Oh, okay.

WITNESS KITCHENS: The only training I recall is to try to recover -- get some flow going, some cooling flow going to the reactor.

WITNESS BURMEISTER: It's kind of hard to say you can take the training that was received and extrapolate from that. Like I was thinking of alternative actions before we got to that point. We were at 120 degrees, maybe 20 or 30 minutes into the event, and before we got RHR cooling back, it had increased to 135 degrees, somewhere around there. And I was already formulating a plan in my mind as to what I

would do and at what point I would do it. And it was based on my training and my knowledge of the events and that may not be the same as someone else was thinking, but I would have at 150 -- somewhere between 150 and 160 degrees, have asked for the pressurizer manway to be removed and to initiate gravity feed. That's personally what I would have done.

But you're not in the situation necessarily where you're relying on one person's judgment. At this time we already had the TSC established and our engineering people were involved in pursuing alternative paths for getting water to the vessel and cooling the core.

MR. DIETZ: Does the term reflux boiling mean anything to you?

WITNESS BURMEISTER: We were on the phone with the NRC and they were suggesting at the time to go ahead and just fill as much as you can and then use the steam generators to remove heat. We recognized the fact that we had not swept the U-tubes and that we would not be able to fill the U-tubes with very much water, just gravity fill the RCS to the point where you got some pressurization. You would have some heat transfer in the steam generators and reflux would be the method of heat transfer.

MR. DIETZ: What's reflux boiling?

WITNESS BURMEISTER: Steam entering into the steam

generators and condensing and running back down in the tubes into the core -- I guess you don't necessarily have to fill up to -- fill up the loops in order to use that type of heat transfer. You have a lot of non-condensables in the RCS which will impede that process but still the steam that does carry with the non-condensables can condense on the tubes and you do have --

MR. DIETZ: So the steam would rise into the tubes.

WITNESS BURMEISTER: Yeah, I guess I was mixing two subjects here, the people at the NRC that were on the phone were talking about fill it up, just fill it up, and we said well we're very close to getting electrical power supply back and we don't believe that's necessary at this time, you know, considering their input. But what you're suggesting, the reflux boiling, I don't know if that particular recommendation came up. But that's after the fact, waiting until the point you've got 212 degrees. What I'm looking at is what are you going to do before you get there. I think -- I was getting ready to take actions before we got to the point of boiling. I didn't want to wait until we got to that point and then figure out what to do with it, but that's just my own personal opinion.

MR. LYON: So you would have attempted to restore a single phase natural circulation by filling it with the manways off?

WITNESS BURMEISTER: Right, with the pressurizer manway off. They had put it on in a very short period of time, I think it was like 15-20 minutes. It didn't take very long at all and the bolts were just snugged down by hand, so they could have been easily removed.

MR. LYON: Okay.

MR. AUFDENKAMPE: A hammer wrench.

WITNESS BURMEISTER: Oh, they were tightened down?

MR. AUFDENKAMPE: They were hammer wrenched, they weren't torqued.

WITNESS BURMEISTER: I heard they were not torqued, so I presumed that we could remove the manway in an expeditious manner.

MR. LYON: Do you know what his question was about reflux boiling, what that process is?

WITNESS BURMEISTER: Yes.

MR. LYON: Could you tell us in maybe one sentence?

WITNESS BURMEISTER: In one sentence? Steam from the core exit travels through the hot legs to the steam generators and is condensed in the steam generator tubes and travels back down as condensate into the top of the core again and is displaced by steam again and that process is in continuous motion.

MR. LYON: All right, and is that an effective technique for core cooling?

I agree, you went into Mode 4. Will it prevent any damage whatsoever to the fuel? Does Diablo Canyon give us any help there?

WITNESS BURMEISTER: I don't know how long Diablo Canyon existed in a state where reflux boiling was used for removing heat.

MR. LYON: Okay.

WITNESS BURMEISTER: Is it something you can use for an indefinite period of time? I can't answer that question.

MR. LYON: Okay.

WITNESS BURMEISTER: It seems like it will buy you time to take other actions.

MR. LYON: Let me go to the technique that you suggested where you said that you would have removed the pressurizer manway, initiated gravity feed and just started filling it up. How full would you take it and what flow path would you have used to do that?

WITNESS BURMEISTER: There's -- in our RHR procedure there is a means of establishing gravity feed.

MR. LYON: That's on the last page, isn't it?

WITNESS BURMEISTER: It's in the procedure, there's another way of doing it too. Actually there's a third option to cooling the core and we basically have --

WITNESS KITCHENS: It's not on the last page.

MR. LYON: Well the figures are on the last page.

WITNESS KITCHENS: I think you're -- he's talking about a whole other procedure.

MR. LYON: You're not in your loss of RHR procedure?

WITNESS KITCHENS: No, system procedure 13011-1, section 4.7 gives you a way to gravity fill. It gives you t he option to either turn RHR pump on and not to fill from the RWST, to fill the reactor --

MR. LYON: But my specific question was what mode of fill would you have used once you've gotten the pressurizer manway off in this event, if you had to do that.

WITNESS BURMEISTER: The mode of fill? Gravity fill.

MR. LYON: Through what flow path?

WITNESS BURMEISTER: The flow path there is from the RWST through the RHR pump flow path through the discharge into the vessel.

MR. LYON: Okay.

WITNESS KITCHENS: You would have had to open some MOV's?

WITNESS BURMEISTER: Right.

WITNESS KITCHENS: Manually. We would have had to take the operators and manually open an MOV and close it.

MR. LYON: Once you started filling, would your level instrumentation give you an accurate indication of what was going on?

WITNESS BURMEISTER: If you experienced pressurization in the RCS, it would not immediately give you a good indication of actual level in the RCS.

MR. LYON: How am I going to pressurize if I took off the manway?

WITNESS BURMEISTER: If pressurization did occur.

MR. LYON: Okay, well I've taken the manway off, that is my situation and I'm flowing in at several thousand GPM, as an order of magnitude, maybe 1000, somewhere in that ball park, through that flow path. What is my indicated level going to be doing in the RCS?

WITNESS BURMEISTER: The RCS is at 100 degrees and you're putting in 70 degree water, it's going to give you an indicated level that's a little bit higher.

MR. LYON: But probably not much more.

WITNESS BURMEISTER: Not very -- yeah, right.

MR. LYON: Did any of the training that was set up cover any potential impact of RCS level on level indication and did anyone look into that in working up the response to 8817?

WITNESS BURMEISTER: The training covered changes in RCS level and if you were to change level rapidly or even at a fairly constant but -- anything other than a slow rate, you could experience an inaccuracy indication due to differences in pressure that occur between the RCS and the

sensing lines. You have a large volume of air that has to travel through the RCS and the sensing lines to balance out in the level glass, you have to wait for that balance to occur. If you're changing level rapidly, that balance will take some time to occur and therefore your level will not be immediately accurate.

MR. LYON: Let's suppose that you fill the RCS up a ways and despite your best efforts the steam generators don't turn out to be an effective heat transfer or heat rejection technique and it starts boiling and the steam is going out through this open manway. Would you expect that would have a big influence on your level indication?

WITNESS BURMEISTER: Yes.

MR. LYON: Why?

WITNESS BURMEISTER: You're saying that the RCS would begin to pressurize, in other words?

MR. LYON: Yes, basically. I mean I've got a head of water up there in the pressurizer, yes.

WITNESS BURMEISTER: Depends on the rate of pressurization but --

MR. LYON: Let's suppose it's at a pseudo-steady state so that I'm pushing steam into the pressurizer and that steam is going out through that open manway and perhaps I'm holding up some water up in the pressurizer as well. Will my level indication be accurate?

WITNESS BURMEISTER: There are other things that can happen. Steam can enter the reference column of the tygon tube --

MR. LYON: Let's assume that doesn't happen.

WITNESS BURMEISTER: At a very slow pressurization rate or --

MR. LYON: Okay, let me leave that topic.

WITNESS LEE: We did use the hot legs, the same hot legs that -- you know, that RHR takes suction off of, to provide a level tap for the temporary and the permanent level instrumentation.

MR. LYON: Is that a drain line up there that you're connected to? Maybe the manifold for your hot leg RTD's? I never did determine what you used for an actual tap there.

WITNESS LEE: It was a -- it was the lower RVLIS tap.

MR. LYON: Okay, someone told me that -- I recall now.

WITNESS LEE: And we felt like it would be -- as far as getting at what you were talking about just now about the DP's across the driving head and all, we felt like that was the level that was chosen because it was more of an indication of the true level at the suction, in case you needed to restore level to the RHR -- we wanted to make sure you could have a level at the RHR suction before you

attempted to start a pump, that you had true level at that suction point.

MR. LYON: Uh-huh.

WITNESS LEE: And as far as having to factor in all the velocity heads and static heads and all because of the flow, I know that would be if RHR were running, you know -- in a running situation, but as far as the situation you're talking about, that's on a different leg in the pressurizer.

WITNESS BURMEISTER: It's like if you had a pressurization in the RCS possibly that's higher than the tygon tube is seeing, then the level is going to indicate higher than the tygon tube, so you'll have an erroneous indication.

MR. LYON: But I have a reference leg that ties back into the RCS to avoid that.

WITNESS BURMEISTER: The reference leg for like the tygon tube is in the top of the pressurizer.

MR. LYON: Yes.

WITNESS BURMEISTER: And --

MR. LYON: And one is on the control board.

WITNESS BURMEISTER: That would have worked fine. The ones on the control board are off the RVLIS.

MR. LYON: And where do their reference sites go?

WITNESS BURMEISTER: They're --

WITNESS LEE: The upper one.

WITNESS BURMEISTER: The upper on the wide range RVLIS?

WITNESS LEE: Yes.

VOICE: I don't think the wide range RVLIS was connected yet.

WITNESS KITCHENS: Y'all are all talking about different things. There's a wide range on the control board that was connected.

MR. LYON: Anybody want a break? Let's take about a -- it's 2:47 according to my watch. Can we start again at 2:57, we'll take ten minutes even.

(A short recess was taken.)

MR. LYON: We've returned from a ten minute break. We're still in the general topic of draining and how that interacted and we just finished covering level.

Could you tell me anything about draining aspects of thermocouple responses covering such things as the ex core thermocouples, the hot and the cold leg narrow range temperature indications, the hot and the cold leg wide range indications and RHR temperature in a situation in which you have lost RHR?

WITNESS BURMEISTER: The most recent tape I just viewed before I came here is the 22 minute tape that we showed to all the operators on shift before the refueling outage started and it discusses the use of two thermocouples

during the period of time when we're at mid-loop operations, the greatest period of time that we can have the two thermocouples hooked up. There's obviously a period of time where the reactor vessel head is in the process of being lifted and set and in that period of time we would not have the two core exit thermocouples available.

The procedures does say if you do not have those available and you are experiencing problems with RHR, the AOP on RHR directs you to fill the hot legs to the point where you would have good communication with the hot leg RTD's and be able to use those, although not as good of a temperature indication from what's going on in the core, they would provide you information -- you know, indication of temperature at the hot leg.

MR. LYON: Does the training or do the procedures discuss the differences that one might see between the ex-cores and those hot leg wide range RTD's?

WITNESS BURMEISTER: Doesn't give you any concrete values, it does indicate that there's going to be a difference.

MR. LYON: Which, the procedures, the training or both?

WITNESS BURMEISTER: The training tape I viewed.

MR. LYON: Covers that. Do the procedures flag that?

WITNESS BURMEISTER: I'd have to look at the AOP. I didn't look at that particular aspect.

MR. LYON: Does anyone know off the top of their head?

WITNESS KITCHENS: What was the question again?

MR. LYON: Whether the procedures flag that there may be a difference between the wide range hot leg RTD's and the ex core thermocouples.

(No response.)

MR. LYON: If you don't know immediately, I can look. We have the procedure.

WITNESS BURMEISTER: It doesn't really say that, it just says to do it.

MR. LYON: I understand.

WITNESS LEE: It's a secondary -- it's an alternative. You use the core exit TC's. If that's unavailable, then you use the core exit TC's. So it was structured as an alternative.

MR. DIETZ: What kind of differences would you expect at mid-loop on the RTD's?

WITNESS LEE: I don't know exactly.

MR. DIETZ: Are they from the top of the pipes, side of the pipe, bottom of the pipe?

WITNESS LEE: Ours are kind of up on the side near the top, so we have a thing here that says operating at mid-

loop, core exit TC's indication is lost, then raise RCS level to top of hot leg.

MR. DIETZ: So if you were at mid-loop you would expect to not be able to read them.

WITNESS LEE: Right.

MR. DIETZ: Except maybe if it starts steaming.

WITNESS LEE: That's true. It's only a backup to the core exit.

MR. LYON: Now that step only occurs in your loss of RHR procedure, is that correct? You would not do that in a normal operation.

WITNESS LEE: That's right.

MR. TRAGER: Is it possible to get a copy of that tape?

WITNESS KITCHENS: What was this tape? I'm writing down things to get them.

MR. TRAGER: I think it's the same tape that Rob Dorman -- is that the same tape that he referred to? Is there a training in mid-loop operations?

WITNESS BURMEISTER: Right, it's a tape that we made available to the shift crews prior to the refueling outage for them to view, it's a 22-minute tape. It discusses the Diablo Canyon event -- kind of a refresher because we had received training on mid-loop operations between this current refueling outage and the last refueling outage and

also prior to the last refueling outage.

WITNESS KITCHENS: We had a tape too where someone had made a model of reactor coolant systems that you could see through and they showed how cavitation works and vortexing -- that's a different tape, I just want to make sure I get the right tape that you want. We've got several tapes on this subject, several lesson plans and every few months we train on this.

MR. LYON: The answer --

WITNESS KITCHENS: What we have on our simulator now simulates mid-loop operations over at the training center.

MR. DIETZ: Have they done any training on the simulator with mid-loop scenarios?

WITNESS KITCHENS: Yes.

MR. DIETZ: With the crews?

WITNESS KITCHENS: Yes.

MR. DIETZ: The crew that was on that morning, had they had that in the simulator?

WITNESS KITCHENS: Which training?

MR. DIETZ: Any scenarios on mid-loop.

WITNESS KITCHENS: I don't know.

MR. DIETZ: I just wondered.

WITNESS BURMEISTER: I believe so. It's covered every week.

WITNESS KITCHENS: Had they already been to the

training -- the answer is yes, at least once. They had at least the one I had last week because they went before me. We've had a lot of training on mid-loop, we've had RHR training and now the new design changes that we put in for the generic letter we were just talking about are modeled over there, having the RHR pump amps on the ERF computer and having the wide range and narrow range indication on the board of loop level, that kind of stuff. They just installed that because we just got it installed on the plant, they installed it on the simulator and we had some training to show everyone that information. So yes, that crew had had that training.

MR. LYON: What determines what thermocouples will be used?

WITNESS KITCHENS: The gentleman that wanted the tape --

MR. DIETZ: It's the 22-minute video on -- refresher video.

WITNESS KITCHENS: Do I just bring it in and give it to Herb? I was going to ask what his name was so I could get it --

MR. M. JONES: Gene Trager is his name.

WITNESS KITCHENS: I'll get him a copy of that tape.

MR. DIETZ: We appreciate it.

MR. LYON: What determines what thermocouples will

be used when you are in a reduced inventory condition?

WITNESS KITCHENS: I think there's a 9-C procedure.

WITNESS LEE: I was looking for a reference in here that discusses that.

MR. LYON: Will you get us a copy of the procedure that specifies which thermocouples?

And what criteria did you use in selecting those thermocouples?

WITNESS WEST: We just trigger I&C to go to enable thermocouples for us and set the alarms on the ERF. So the process they use -- you'll have to ask the I&C for the process.

WITNESS KITCHENS: I'll find out for you. None of us here know the answer to your last question. You just asked how did we pick them? I don't believe anyone knows.

MR. LYON: But you are the people that put together all of this 8817 response.

WITNESS KITCHENS: No, sir, what I tried to tell you at the first, this is only the operations part of it. There's also, as he said, a project manager in Birmingham, Mr. Mintz --

MR. LYON: Okay, now I understand.

WITNESS KITCHENS: There's I&C people that was on the task force Dean was on. All you have assembled here today are operations folks and John Aufdenkampe.

MR. LYON: And you allow him to sit with you?

WITNESS KITCHENS: We love him. He's the only person that's just about as short as me on our management staff and me and him like to stand next to one another.

I'll find that out for you and if we have a procedure or a specific I&C information on that, I'll get that for you too. I think we probably have an I&C procedure for doing that. If not I'll find out how we decided which ones to do.

MR. LYON: I appreciate it.

MR. DIETZ: Would they indicate different?

WITNESS KITCHENS: Sure.

MR. DIETZ: Why?

WITNESS KITCHENS: Well depends on where it is in the core, which RHR train you have in. It also depends whether it's above one in an assembly that you just changed out or not or if it was one that had a lot of decay heat on it. I think it would indicate different because of the actual temperature in that area where the one was, is one reason.

MR. DIETZ: Where would you prefer to have it?

WITNESS KITCHENS: I'd probably prefer to have it near the center of the reactor, personally. I don't know without thinking about it.

Did you understand my last comment?

MR. LYON: Yes, I was asking the wrong people.

WITNESS KITCHENS: But you have operations and one engineering and now licensing rep and the manager of the operation folks. But there are engineering, I&C, other licensing folks, project folks, A&E folks that worked on all this. You just have a small group of the people that worked with the operations procedures and what-not. The reason I'm taking the notes on the training is we should have had our training superintendent here to help talk with you too. There are people that could answer these questions, but I'll get the answers to them on the training

MR. DIETZ: We'll also get ahold of him too.

WITNESS KITCHENS: You've not talked with Rob Dorman?

MR. B. JONES: His interview was conducted at -- there was a scheduling that his interview was conducted at the same time as this one, so it's somewhat fragmented, but that's just the way it turned out.

WITNESS KITCHENS: I'm going to follow up and get this anyway, I'll touch base with him and make sure we get you this.

MR. LYON: You had mentioned RHR pump amps and that was one of the suggestions for monitoring the RHR behavior in 8817. What led you to select pump motor current as opposed to perhaps some other parameters?

MR. AUFDENKAMPE: We did an engineering study and that was the best one available.

MR. LYON: And that engineering study -- could we have a copy of that?

MR. AUFDENKAMPE: Yeah.

MR. LYON: Would you identify that for the record please?

MR. AUFDENKAMPE: BG-0 -- BG-9010.

MR. LYON: Okay. You know you are retaliating because you're going to load me down on the way back and I'm going to dislike you for it.

WITNESS KITCHENS: We'll copy on both sides.

MR. LYON: That's not necessary. Does anyone want to say just very briefly your feel for the behavior of that and why that was selected? Anyone have any feel for why that one was picked?

WITNESS LEE: We were about the only plant that didn't have it, for one thing.

WITNESS KITCHENS: We don't have pump amps in our control room except for reactor coolant pump.

MR. LYON: I think you're the only one I have ever been in that didn't have an analog pump motor current indicated somewhere in the control room.

WITNESS LEE: We had some parameters prior to this, you know, which we used but of course we didn't have amps.

We added it to the indication cavitation.

MR. LYON: How is the pump motor current displayed in the control room?

WITNESS KITCHENS: RHR pump motor?

MR. LYON: Yes.

WITNESS KITCHENS: Now it's input to the ERF computer and it's displayed on the CRT screen as a trend of -- well you could display it many different ways but the way we generally display it is a trend of the value of amps over time.

MR. LYON: How long is --

WITNESS KITCHENS: It's also input to our critical safety function trees for Mode 5 and Mode 6 such that if there's a certain fluctuation in amps, it also provides an alarm on the computer and the critical safety function tree changes color on there. So it alerts the operator by alarm and change of color on the SPDS.

MR. LYON: That is an audible alarm?

WITNESS KITCHENS: Yes.

MR. LYON: It's loud enough that somebody is going to pick it up.

WITNESS KITCHENS: Sir?

MR. LYON: It's loud enough that someone is going to pick it up.

WITNESS KITCHENS: Yes, sir, it's a very irritating

sound. When that alarm goes off, you would definitely hear it in the control room.

MR. LYON: Now that is a computer processed signal. Is that sampled at any particular time interval?

WITNESS BURMEISTER: That's variable, depending upon the selection on the screen.

MR. LYON: Between what and what.

WITNESS KITCHENS: I think you're answering a different --

MR. AUFDENKAMPE: I'd say two seconds but it might be one second. I might have Proteus and ERF confused.

WITNESS KITCHENS: He's talking about how often does the computer give the amps.

MR. LYON: Of the order of two seconds. That would be a minimum, but that is an operator selectable value?

WITNESS KITCHENS No, sir, it is not. What Bill was referring to is that the operator can select the trend, whether he wants to see amps for the last two hours or 20 minutes or five minutes.

MR. LYON: Okay, I understand.

What consideration went into the selection of that two second sample interval and whether it was sufficient to meet the objectives?

WITNESS KITCHENS: The two second sample interval, I believe was the computer itself, it's built into it.

MR. LYON: Okay.

MR. AUFDENKAMPE: Once we got to generic letter 8817 and we decided to display pump amps into the ERF, it was already built into the machine.

MR. LYON: I understand.

MR. AUFDENKAMPE: When they spec'd out the machine, two seconds was something that they evaluated and determined that that would be adequate for our needs.

MR. LYON: Is your judgment that a two second sample time is sufficient to show noise on the pump motor current if you're hitting an intermittent vortex situation?

MR. AUFDENKAMPE: I've never really thought of it.

WITNESS KITCHENS: My answer is yes, based on experience both in the plant and observing --

MR. LYON: Was that considered as to determination of adequacy when you selected this method of showing the motor current?

MR. AUFDENKAMPE: I don't know.

WITNESS KITCHENS: You have the wrong people to get that. That's the design group.

MR. LYON: Okay, that's good feedback, I appreciate that.

WITNESS LEE: It takes a sample, it has to have too many perturbations -- two perturbations in five seconds, something like that, for it to --

MR. AUFDENKAMPE: For the alarm, but to record the data it doesn't.

WITNESS LEE: Oh, all the time.

MR. DIETZ: You mentioned about some experience in the plant. Since you've had it in there, have you gotten down to where you were starting to see a little bit of air being pulled into the RHR pump?

WITNESS KITCHENS: No, not that I'm aware of. The settings that we had put in originally for the -- I told you that this was put in as an alarm function is one of the critical safety function trees, the initial settings were apparently too tight because we did get some spurious alarms. In other words, it sees the fluctuations very well on the ERF computer and when you change flow rates on the pump you can see it very well, the amps changing.

WITNESS BURMEISTER: We had the fortune of being able to do a test on Unit 2 before we actually went critical with RHR in service, and we lowered the level in the RCS and determined exactly under what conditions flow rate versus number of pumps in service, versus reactor vessel level -- at what time -- at what position the onset of air entrainment and air binding had occurred. So we have some good information on that and our procedures pick a margin for operating at mid-loop which is substantially above the level where we get onset of vortexing.

MR. DIETZ: Did you have the amp indication at the time?

WITNESS BURMEISTER: What I was going to ask -- we may have observed motor current and I was just wondering, John, if you knew that.

MR. AUFDENKAMPE: When we did the cavitation time?

WITNESS BURMEISTER: Right. Do you recall -- we may have an individual that is aware of how much cycle or frequency -- what the frequency of cycling was on motor current, who might have information on that, when vortexing actually occurred.

WITNESS KITCHENS: Again if you want to know about that test, you have the wrong people in here, but we can get the right person in here probably -- possibly the one who conducted it. We did do a pre-operational test for this reason of determining when we would get vortexing and the stability of our pumps at mid-loop on Unit 2.

MR. LYON: One thing that I forgot to ask, do you folks have information on the behavior of cold leg temperature indications and say RHR temperature indications when the RHR pumps are not running and is this factored into training?

WITNESS KITCHENS: I need to be excused at least for a few minutes.

WITNESS BURMEISTER: Would you ask that question

again?

MR. LYON: Sure. Do you folks have information on your behavior of your cold leg temperature indications and the RHR temperature indications when you have no RHR flow, how those would be expected to behave and has that been factored into training?

WITNESS BURMEISTER: I'm not probably the best person to answer that, again Rob Dorman may be, but to my knowledge we have not looked at or discussed how cold leg temperature indication would compare to RHR temperature indication while RHR is in service and out of service during training sessions.

MR. LYON: I'm really only interested in the out of service. Do you have a personal judgment on how that would behave if you had loss of RHR, anybody?

WITNESS LEE: It would rise.

MR. LYON: Okay, so the RHR -- am I hearing that the cold leg temperatures and the RHR temperature would track the core exit?

MR. AUFDENKAMPE: They would trail.

MR. LYON: Would what?

MR. AUFDENKAMPE: Trail core exit --

MR. LYON: Trail, but you would expect them to come up slowly, perhaps at a slower rate than the core exits?

MR. AUFDENKAMPE: Yeah, never getting to the core

exits.

MR. LYON: Understand. You're saying they're going to hang behind a ways. Okay, that was the part I had forgotten to cover.

Let me go over to the steam generator for a little bit. Have you addressed steam generator condition in the response to 8817? And if so, how?

WITNESS BURMEISTER: From an inventory standpoint?

MR. LYON: Sure, from anything. Is there anything you do with respect to your steam generators that impacts either positively or negatively on the plant and that's related to the 8817 topics?

WITNESS BURMEISTER: I can tell you what conditions do exist in the plant but I can't tell you how they compare to what our response was in 8817.

MR. LYON: Okay, I'm really not trying to contrast your response in writing, if you will, if that's what you mean. What I'm trying to do is establish a picture of the things that you have in the plant -- yes, tied to 8817 perhaps, but more importantly the actual condition that the plant would be expected to be in to deal with the 8817 topics.

WITNESS BURMEISTER: The steam generators are normally kept in wet lay up at 95 percent level indication on the wide range scale. The only time we drain them down

is to improve the chemistry situation in the generators and to perform sludge lancing and in particular this outage, we drained them down for -- we drained one steam generator down for one other reason and that was to install another steam generator level tap for a modification that we are making to our level control system. So the bulk of the time during the outage, the steam generators are at 95 percent wide range level.

MR. LYON: Is there a control or procedure that deals with those kinds of operations while you're at mid-loop?

WITNESS BURMEISTER: The unit operating procedure has -- as we cool down and enter Mode 5 on the way down, has you place the steam generators in wet lay up which is a condition where you have 95 percent wide range level.

MR. LYON: If you were at mid-loop, would you drain one or more steam generators if you needed to do something with that steam generator such as eddy current testing?

WITNESS BURMEISTER: In light of everything that's happened, it wouldn't be prudent but we --

MR. LYON: But that wasn't my question.

WITNESS BURMEISTER: We don't have procedural controls which would prevent you from draining the steam generator, if that's what you're asking.

MR. DIETZ: During this outage when you went down

the first time, you did some steam generator sludge lancing?

WITNESS BURMEISTER: Right, but that occurred after we had refilled the RCS.

MR. DIETZ: It did not occur at mid-loops?

WITNESS BURMEISTER: The steam generators were only drained during the period of time the cavity was filled with water, to my best recollection.

MR. LYON: Is anything done with respect to steam generator operability so that these are going to serve potentially as a place that will remove heat from the RCS, such as being able to dump steam.

WITNESS BURMEISTER: Not procedurally to my knowledge; however, they were available. I mean all four of the steam generators were available to remove steam, the atmospheric relief valves could have been manually opened without power.

MR. LYON: Is that in procedures anywhere?

WITNESS BURMEISTER: Yes.

MR. LYON: Which procedure?

WITNESS BURMEISTER: 18038, is that the right procedure, Greg?

WITNESS LEE: Yes, that's the procedure on how to manually open the ARV's without any power.

MR. LYON: Is that referred to in the loss of RHR procedure?

WITNESS BURMEISTER: There's also a system operating procedure that covers the same evolution, but I don't believe either of those procedures are referenced by the loss of RHR procedure.

MR. LYON: Is that kind of thing covered by training? Would you believe it was general knowledge that people would respond to?

WITNESS BURMEISTER: In connection with the loss of RHR incident?

MR. LYON: Yes. If the temperature were climbing in the RCS and you were boiling and steam generator pressure were beginning to rise.

WITNESS BURMEISTER: I can't tell you that that's explicitly stated in training. I think you would have to draw together your total -- your integrated knowledge of the plant and overall training to include that.

MR. LYON: Okay.

WITNESS LEE: It has a step in here that says in Mode 4 and the steam generators are available for RCS cooling, then maintain TAUG below 350 by maintaining at least one steam generator field in the narrow range and by dumping steam using the steam dumps or the steam generator atmospheric relief valves. So that's the guidance given in the AOP. It doesn't reference 18038, but that's common knowledge, they know to go to that.

MR. LYON: I understand. One of the areas that 8817 covered was systems that support the RHR system. Could you discuss for us the way in which supporting systems were incorporated into your processes for conducting mid-loop operations and in the training?

WITNESS BURMEISTER: I can give you a perspective from the outage standpoint, outage planning standpoint. We scheduled support systems to be available for RHR, both trains of RHR, during mid loop operations. They include NSCW and CCW cooling. Both systems were available for both trains of RHR and both 1-E busses were energized to support operation of the RHR pumps, unfortunately from the same source, but -- as you well know, but all the support systems were available.

MR. LYON: Is there a procedure or process that reasonably assures that kind of consideration or is this a team judgment, if you will, on the part of the people planning the outage?

WITNESS BURMEISTER: More than anything, I think it is our philosophy or interpretation with respect to complying with Technical Specifications. I'll try to avoid using acronyms.

MR. LYON: Do you believe that compliance with Technical Specifications is going to mean that you also comply with the recommendations of 8817?

WITNESS BURMEISTER: I think it's our intent to comply with both, the recommendations in 8817 and Technical Specifications.

MR. LYON: Understand.

WITNESS BURMEISTER: I'm not sure I understand.

MR. LYON: All right, let me try it again. I have a set of Technical Specifications, I have a set of recommendations in generic letter 8817. Do you believe that complying with your Technical Specifications would also satisfy the 8817 recommendations?

MR. CHAFFEE: Or would they ensure that --

WITNESS BURMEISTER: No, there are many more recommendations and requirements addressed in the generic letter that go above and beyond what is called for in the Technical Specifications.

MR. AUFDENKAMPE: The way we take care of that, Warren, is all our commitments associated with generic letters or any other NRC correspondence goes through our commitment tracking program. We generate action items which go to Greg, who puts them into the procedures and then we follow our procedures. So all of those commitments are incorporated into procedures.

MR. LYON: Can you describe how the commitment -- I'll put it in quote -- well first of all, what is your commitment to supply supporting systems for the RHR in mid-

loop operation and can you describe how that is processed through the procedure you just described? What assures that it is going to happen?

WITNESS BURMEISTER: That's a big question.

WITNESS LEE: You have to have two loops of RHR and, you know, our RCS loops, that's a Tech Spec, and to have support systems -- for RHR to be operable, that means you have a support system. Sometimes though -- there was some guidance to have a backup for things like SIP's which is in conflict with the Tech Specs.

MR. LYON: Yes. And that's a piece of it.

WITNESS LEE: I know that's not exactly the support systems that you're referring to, you're talking about support systems to ensure --

MR. LYON: Okay, but that's a support system, if you will, for RCS cooling and that's fair game, if you will, in the scope of my question.

WITNESS BURMEISTER: As well as containment air coolers?

MR. LYON: Yes, we did not mention containment air coolers in 8817 but that's fine too.

WITNESS BURMEISTER: We put that in our procedures too and they're tracked by commitments as John mentioned earlier.

MR. LYON: And the SI pump?

WITNESS LEE: Having it available even though it's, you know, racked out, but available for use. That's in the procedures, which is really like a -- we're complying with Tech Specs but you know, we have it available should we need it as a last resort, since we don't have hot leg injection any other way but by the SIP.

MR. CHAFFEE: So you make sure they're available when you're in mid-loop operations, is that what you're saying, or just when you're shut down or at all times?

WITNESS LEE: For mid-loop operations.

MR. CHAFFEE: That's required by one of your procedures?

WITNESS LEE: Yes.

MR. CHAFFEE: But was that an enhancement as a result of generic letter 8817 or an offshoot from that?

WITNESS LEE: Yes. In the way that the Westinghouse owners' group was going with their procedure and recommendations when I was --

MR. CHAFFEE: Did the Westinghouse owners' group publish their guidance for their procedures?

WITNESS BURMEISTER: It has not been distributed yet, should be within a week or two.

MR. CHAFFEE: Do you know what's going to be in it?

WITNESS BURMEISTER: Yes.

MR. CHAFFEE: Have you implemented what's in it?

WITNESS BURMEISTER: A lot of what's in it, we have currently covered in our abnormal operating procedure.

MR. AUFDENKAMPE: You know, we haven't implemented all the corrective actions associated with generic letter 8817. Those are the hardware things committed to be done by the end of this outage -- we're close but the hardware stuff is committed to be done by the end of this outage with the analysis and procedure changes by May 3, that's on Unit 1, and Unit 2 is the end of the upcoming Unit 2 outage.

MR. CHAFFEE: You've probably gone over this before, but let me ask a question, can you summarize for me the things that you've done as a result of 8817 in hardware changes, procedure changes?

WITNESS LEE: There have been a lot of procedure changes. I can go through the procedures --

MR. CHAFFEE: I don't mean -- like what have you done to assure that you have redundant sources of water available to make up the RCS?

WITNESS LEE: We have a statement about maintaining RWST level.

MR. AUFDENKAMPE: We have RWST level, we have a charging pump available that we have to have available at all times. We have a safety injection pump that although Tech Specs require us to have it inoperable, all we do is take out the pump breaker and the hand switch, the entire

system beside that is ready to come to service.

MR. CHAFFEE: Oh, the Tech Specs require the safety injection pump to be inoperable?

MR. AUFDENKAMPE: Yes. What we've done is if we would have to use that, then we would use 1054-X for an emergency condition.

MR. CHAFFEE: I see. So in this case, the Tech Specs are set up so they work against being able to deal with the problem of loss of RHR.

WITNESS LEE: But we're proceeding to request --

WITNESS BURMEISTER: I can briefly go through about a dozen changes to our procedures if you want me to.

MR. CHAFFEE: Okay.

WITNESS BURMEISTER: These are all additions that we didn't have say two years ago. We've made changes over the last two years and we've made changes as recently as 3/8/90. We're continuing to add more information as we get it.

MR. CHAFFEE: And the thing that triggered you to start making changes two years ago was what?

WITNESS BURMEISTER: Probably --

WITNESS LEE: Probably 8712, the Diablo Canyon event.

WITNESS BURMEISTER: Containment closure status to ensure it is capable of being closed within 57 minutes is our current time based on the latest analysis or ensure the

hatch --

MR. CHAFFEE: I have a question on that. On this particular event on Tuesday, I think it took an hour and 20 minutes to close the hatch. Is there a reason why it took longer or do you have any idea?

MR. AUFDENKAMPE: I think the answer to that is once the order was given to close the hatch, it took like 42 minutes.

MR. CHAFFEE: Oh, is that right?

MR. AUFDENKAMPE: But there was a delay in giving the direction to go close the hatch, in evaluating the condition that we were in and taking the appropriate corrective actions.

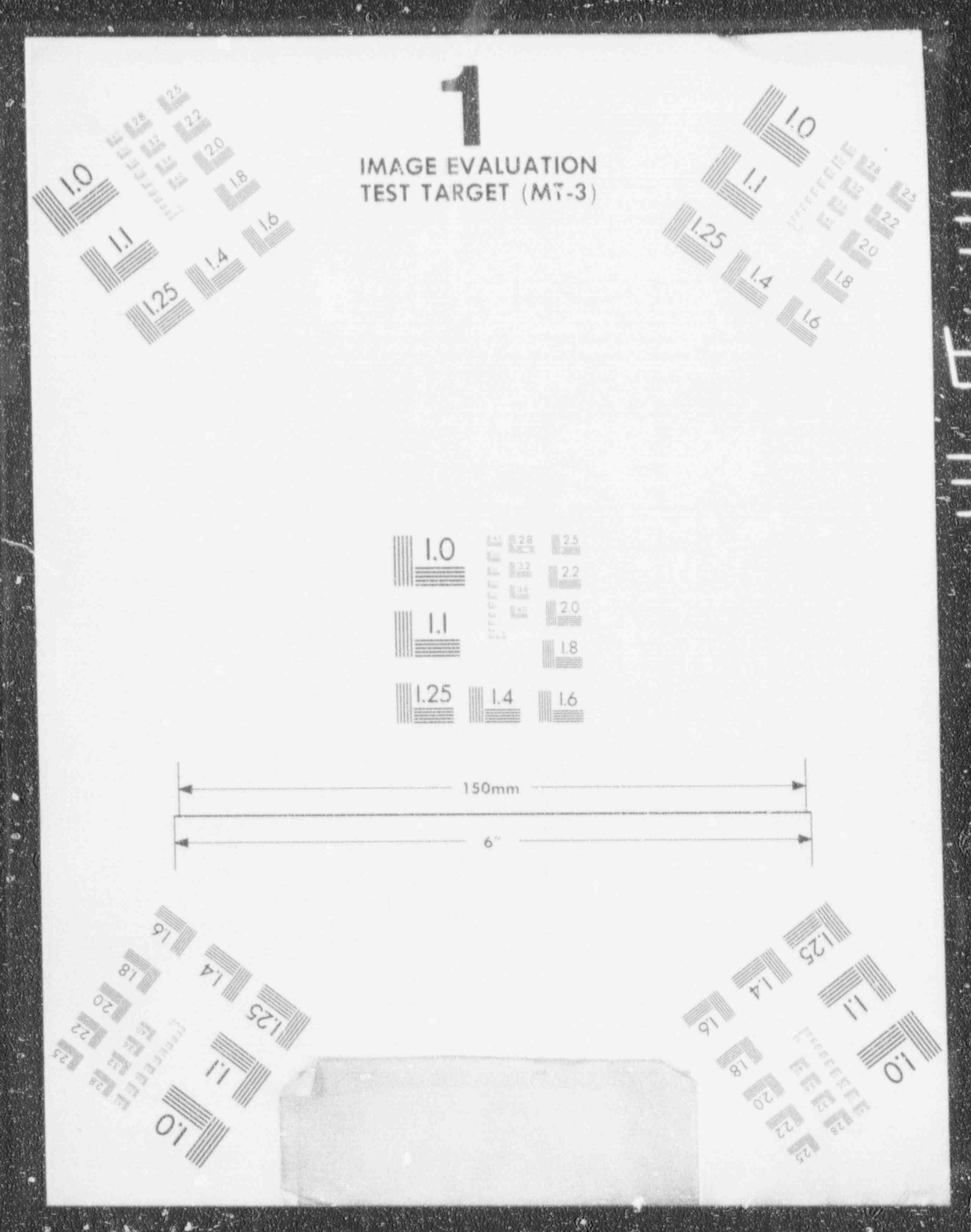
WITNESS BURMEISTER: Right. We initiated action to close it and we got it into condition to where it could readily be closed and then we told them to wait because I think at that time we had established RHR cooling.

MR. CHAFFEE: Does the 57 minutes include the time it takes to recognize you need to do it or is it from a certain point in the event or do you know?

WITNESS BURMEISTER: That information should be in that --

MR. AUFDENKAMPE: That 57 minutes is from time zero when you do shutdown cooling.

MR. CHAFFEE: So in this case --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TEST TARGET (MT-3)
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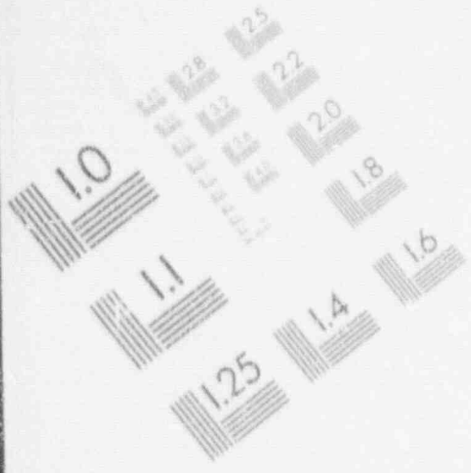

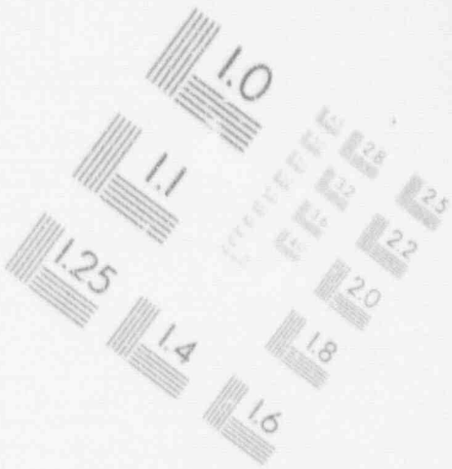

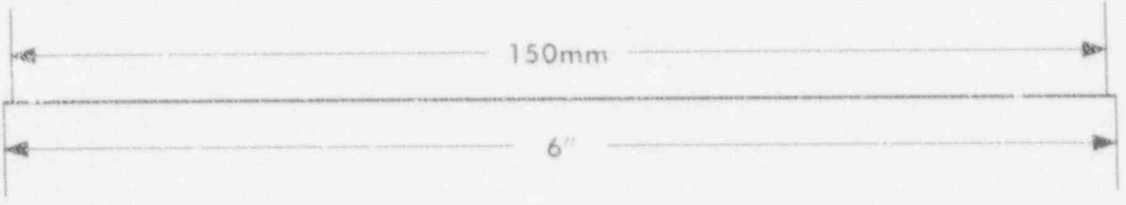

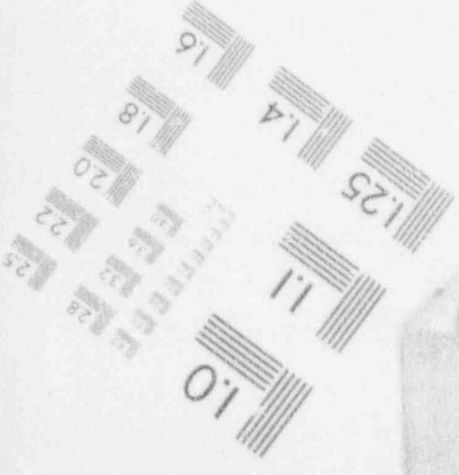

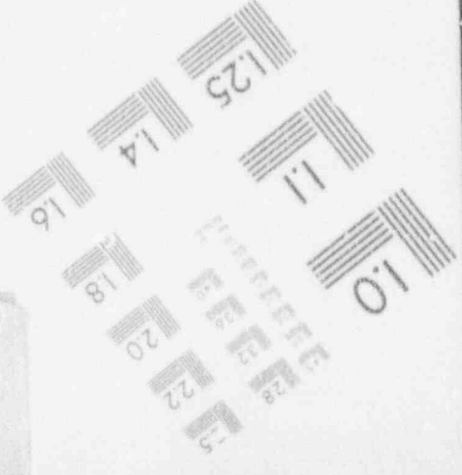

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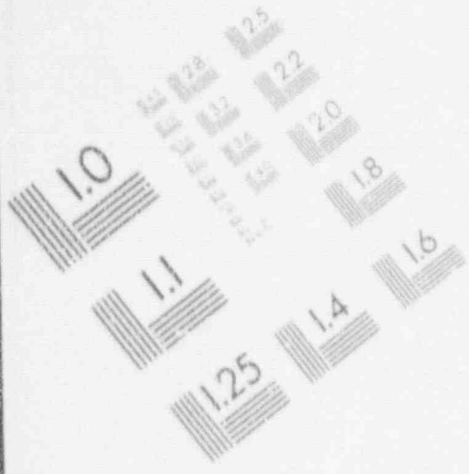
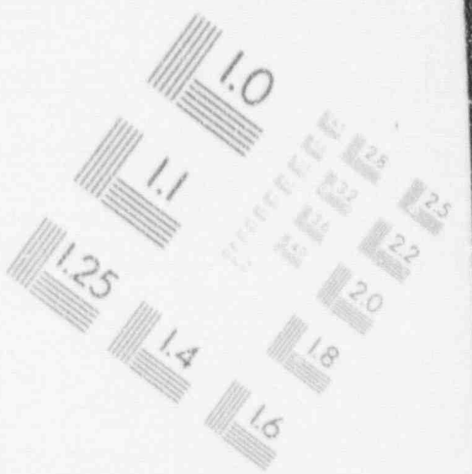
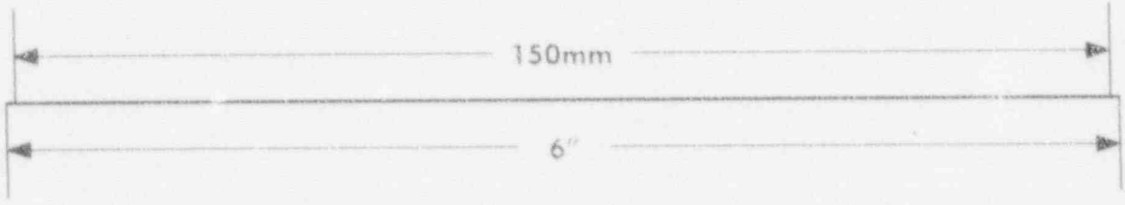
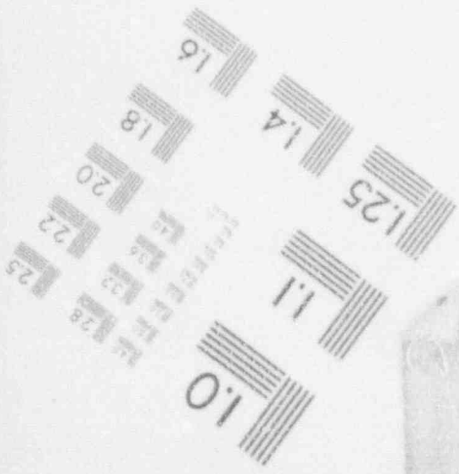
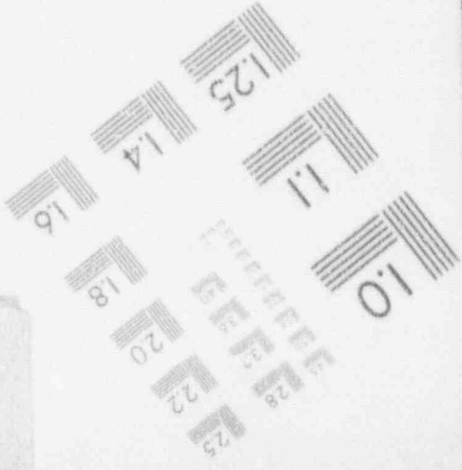
IMAGE EVALUATION TEST TARGET (MT-3)











MR. AUFDENKAMPE: But the 57 minutes is also with respect to the worst case condition, which is 48 hours after shutdown.

MR. CHAFFEE: So the follow on question would be, in this case it took an hour and 20 minutes to do it -- granted it wasn't the worst case. Is there some reason to believe that if it was a worst case you would have been able to do it in 57 minutes instead of an hour and 20 minutes? Is there something about what happened here that -- just the fact that it was not as much of an anxiety -- can you think of any reason why you could do it faster in the worst case scenario than in this case? It must have taken some time to recognize you needed to do it?

MR. AUFDENKAMPE: I wasn't in the control room but my perspective from the TSC, although power was back by the time I got to the TSC, is that they had started preparations for it but they were concentrating on restoring power and had restored power and in fact the order was actually given after power was restored, to go ahead and shut it.

WITNESS BURMEISTER: While I was in the TSC, that happened. I went to the TSC after electrical power had been restored and I requested that maintenance not continue attempting to put the equipment hatch in place because we had RHR cooling in place and RCS had been cooled down to 90 some degrees and conditions were stable and they were in the

process -- they had already energized one RAT -- reserve auxiliary transformers -- to one of the emergency busses and were in the process of energizing the other bus from the reserve auxiliary transformer. And I at that time told them not to continue trying to close the hatch and to just stay on standby and keep people there ready to close it if we need them, but not to continue. And that's why I think there was a pretty substantial delay in closing the equipment hatch. It's not that we were not capable of closing it sooner, we had pulled them back from doing it.

MR. LYON: What was the position of the hatch and the condition of the polar crane with respect to the hatch when you told them to hold?

WITNESS BURMEISTER: I was told that the hatch was lowered, they had begun lowering the hatch over the opening.

MR. LYON: That's close enough.

WITNESS BURMEISTER: I don't have a very good description other than that.

MR. LYON: That's close enough.

WITNESS BURMEISTER: To me it sounded like it was imminent, you know. If I asked them to do it, they could get it done in 15 minutes. That's the impression I got talking to the maintenance manager in the TSC.

MR. AUFDENKAMPE: From the point he slowed down, not from the beginning.

WITNESS BURMEISTER: Right.

MR. CHAFFEE: The 57 minutes to shut the hatch, is that something that -- that's what you have to meet in worst case conditions?

WITNESS BURMEISTER: Yes.

MR. CHAFFEE: And what in fact can you do, best case, is it a lot -- can you do it in 30 minutes or --

WITNESS BURMEISTER: I don't think we have conducted a time test, that would be something interesting to try.

MR. CHAFFEE: Yeah, I agree, that's a good idea.

MR. DIETZ: How long did they delay from the time you asked them to stop until you then requested them to restart -- what time delay are we talking about?

WITNESS BURMEISTER: I don't know because I left the TSC sometime after that and apparently Skip or somebody else there, Jimmy Paul Cash possibly, asked them -- requested them to continue placing equipment hatch, for whatever the reason was.

MR. CHAFFEE: You were taking us through --

WITNESS BURMEISTER: Okay, I'm sorry. The next item we have, a review of all containment penetrations addressed in a procedure or surveillance procedure, we have should be accomplished to determine those which have been opened by manual means and an info LCO generated for those identified. Basically review all the penetrations and make sure they are

secured.

MR. CHAFFEE: So you do that before you go out to mid-loop, is that the idea?

WITNESS BURMEISTER: Right. And they're either secured or we initiate a piece of paper that says this penetration is not in a condition that constitutes containment integrity for Mode 6 or Mode 5 and therefore, we could look at these pieces of paper. They're in what we call information LCO's -- and determine which penetrations we need to go out and manually secure. I think that was talked about a little bit earlier today.

The next item is with respect to installing cold leg dams and what we need for vent paths. Basically the vent paths that we can use are the pressurizer manway or steam generator manway on the hot leg side that is not dammed, or removing three pressurizer code safeties from vent paths.

If it is intended to operate at one foot above mid nozzle level, the preferred RHR configuration is one train in operation with a flow of 3000 gallons per minute.

MR. CHAFFEE: Is that a change from previous?

WITNESS WEST: It was to reinforce the fact not to have excessive flow. The pump is capable of much more than 3000 gallons a minute.

MR. CHAFFEE: So previously you had no guidance for mid-loop and this became the guidance?

WITNESS WEST: The standing order that the troops have is to have an excessive Tech Spec minimum and the Tech Spec minimum we decreed is 3000 gallons a minute and that's the only guidance that they had.

MR. CHAFFEE: So the tendency would be to have 3500 or 4000 to make sure you don't drop below the Tech Spec limit, but in this case --

WITNESS WEST: In this case here we want them to keep it as low as possible.

WITNESS BURMEISTER: If it is intended to operate below 191 foot elevation -- this is four feet above mid-loop or three feet below the flange -- a minimum of two in-core thermocouples shall be available during periods where the reactor head is installed and to request I&C to set an in-core thermocouple alarm set point to 10 degrees above the desired temperature per a procedure they follow.

MR. CHAFFEE: Where are the thermocouples read out when they're installed?

WITNESS BURMEISTER: On the ERF computer.

MR. CHAFFEE: Is that the only place?

WITNESS BURMEISTER: Or also the Proteus.

I&C should be notified to install temporary remote level monitoring in the control room, this is the RVLIS tap, the instrumentation that comes off the RVLIS taps and it's available on a cumulator level indicator on the main

control board.

Tygon tube watch is required any time the RCS level is being changed while the RCS level is below 17 percent. Periodic comparison checks should be made every four hours between the control room and temporary level monitors in the tygon tube. Control monitor should agree within seven percent of scale with the tygon tube.

MR. CHAFFEE: Is there any standard in there in terms of how close the reading should be between the thermocouples? Between the thermocouple reading out on the ERF as opposed to the Proteus?

WITNESS BURMEISTER: No, we don't have any procedural guidance.

MR. CHAFFEE: Have you had any problem with the two disagreeing?

WITNESS BURMEISTER: It's the same information, they should read out the same, but I can't tell you without checking myself, I haven't verified that.

Two out of three level monitors must agree before draining the RCS below the top of the hot leg. If neither control room RCS monitor is available, a continuous tygon tube watch should be established while the RCS level is below 17 percent in the pressurizer.

While operating with steam generator nozzle dams installed --

MR. CHAFFEE: The word you used was "should" or was it --

WITNESS BURMEISTER: Our "shoulds" are like "shalls".

MR. CHAFFEE: Okay.

WITNESS BURMEISTER: According to our guidance in the procedures. That's different than most places, but -- I think the definitions are like if we have a "shall" in a procedure, that's like a regulatory commitment or an ANSI document or some other type of commitment. If it's a "should" we follow it anyway, but it's not necessarily required by some other document. Is that right, Greg?

WITNESS LEE: Yeah, that's right. "May" is the only thing is optional and even at that you have to have management okay to perform a "may" -- not to perform a "may".

WITNESS BURMEISTER: If neither control -- excuse me, the next one -- while operating with the steam generator nozzle dams installed ensure one safety injection pump is capable of being racked in and operated in the hot leg injection mode if needed. This is what we talked about earlier.

While level is in the region of the RCS hot leg, trend RHR pump parameters on the ERF for early detection of possible RHR pump degradation due to vortexing. This would

include the current indication of RCS RHR flow --

WITNESS WEST: RCS pressure also.

WITNESS BURMEISTER: RCS pressure, temperature -- also have an interesting parameter that I used to monitor when I was on shift and that's RHR pump discharge pressure and I used to monitor that on the shutdown train because it's an indication of water level.

MR. CHAFFEE: Oh, is that right?

WITNESS BURMEISTER: A very good one in fact. We can set limits on our trended parameters to alarm if they're exceeded and in one particular instance, we had a suction valve on one of the RHR trains go closed and got -- we were trending the RHR pump discharge pressure on the shutdown pump and the trend parameter went off scale and changed just from that perturbation and the operators caught it and within 30 second they were able to shut down the RHR pump, so that's a good indication of water level that we don't take credit for.

MR. CHAFFEE: This is a side question. If we wanted to find out what the data collection capabilities are of your ERDS --

WITNESS BURMEISTER: ERF computer?

MR. CHAFFEE: Proteus. Who do we ask to get a half hour tutorial on its ability to collect data?

MR. AUFDENKAMPE: Those are two different people.

The ERF computer is John Ealick and the Proteus computer is Larry Smith.

MR. CHAFFEE: Do you happen to know from those two systems if they collected all the data up from this particular event?

WITNESS BURMEISTER: That should be part of the event critique package. I don't know if you've had the opportunity to look at that yet.

MR. CHAFFEE: It's actually included as part of the package?

MR. AUFDENKAMPE: Everything that printed would be in that package.

MR. CHAFFEE: Is it typically a fairly voluminous amount of material or --

MR. AUFDENKAMPE: Proteus generally is, although in this kind of condition you may not get much. It's really when you get a trip from power that it starts going berserk.

MR. LYON: But that system only puts out what is printed?

MR. AUFDENKAMPE: Both of them just generally put out -- well for the conditions that we're looking at, generally just print out the alarm status changes.

MR. LYON: And in this instance was any of that material being printed out or provided or was it disabled because of the power situation, do you know?

MR. AUFDENKAMPE: No, the computer worked, we had a -- let's talk about the ERF computer because that's going to give you better data associated with this event.

MR. LYON: Okay.

MR. AUFDENKAMPE: The ERF computer has a hard disk. It always keeps two hours of plant history and when you have a -- what I'll call a mode change, computer mode change, when it goes to mode zero, it saves that two hours of data on hard disk and then it starts accumulating data, it starts out at two second frequencies and then as time goes on it goes to five seconds and keeps getting longer and longer and I think at about 14 hours it runs out of storage space. And in this event, we -- about an hour and a half into it, we took it from whatever mode it was in, probably mode 6, to mode zero and saved all that data so we can replay the entire event on the simulator.

MR. CHAFFEE: Oh, is that right? You've got that all saved!

MR. AUFDENKAMPE: Yes.

MR. CHAFFEE: In the simulator, you could reproduce the entire thing?

MR. AUFDENKAMPE: (Nodding head affirmatively.)

MR. CHAFFEE: Well how about that.

WITNESS BURMEISTER: Can it actually run the simulator?

MR. AUFDENKAMPE: Yes.

MR. CHAFFEE: And that would include -- would that by chance include the data on the thermocouples?

MR. AUFDENKAMPE: It includes the thermocouple data, unfortunately at some time into the event, the thermocouple data on the ERF computer went screwball.

MR. CHAFFEE: Figures. I thought that was too good to be true. Okay. Maybe we ought to -- who do we talk to to have it run on the simulator?

MR. AUFDENKAMPE: Probably Ken Holmes. There may be some bugs in it, it's designed to do that, I don't know if we've ever done it before.

MR. CHAFFEE: Okay, that's great.

WITNESS BURMEISTER: There's a couple more statements in the procedures.

A minimum of four containment cooling units will be operable and capable of being started if required while the RCS level is below 191 feet.

MR. CHAFFEE: Say that one more time.

WITNESS BURMEISTER: A minimum of four containment cooling units will be operable and capable of being started if required while the RCS level is below 191 feet, which is three feet below the flange. We also give some explicit guidance on controlling level. Minimum RCS level is one foot above mid-nozzle except for steam generator burping

during the initial drain down, and there you can reduce level to six inches above vent loop to facilitate burping the steam generators.

MR. LYON: While you're doing that draining operation, are there pauses to allow the system to stabilize?

WITNESS BURMEISTER: Actually this particular requirement existed quite a bit earlier, two or three years ago and maybe even longer than that. We currently drain the steam generator U-tubes in a different fashion. We introduce nitrogen to the channel heads and actually force the water -- or displace the water in the U-tubes with nitrogen, and this can be done at a higher level than mid-loop.

MR. LYON: And when you say you introduce it, how is it brought in?

WITNESS BURMEISTER: The nitrogen?

MR. LYON: Yes.

WITNESS BURMEISTER: Through a regulator onto channel head drains off the steam generators, there's a one inch flow path that's just right at the bottom of the steam generator, the nitrogen comes in and flows up into the U-tubes displacing the water and allows them to drain.

MR. LYON: You're very unique in that, few people can do that.

WITNESS BURMEISTER: There are a few other plants that use it.

MR. LYON: It was one of the suggestions, few people have figured out a way to do that well. There are a few that have installed pipes. I didn't know that you were one.

WITNESS BURMEISTER: We just did that just prior to the last refueling outage.

MR. CHAFFEE: What's this pipe again?

WITNESS BURMEISTER: It's a channel head drain that's part of the Westinghouse design on the steam generators. We didn't ask for anything to be added, that's just -- if you were to drain the channel head, for example, to do eddy current inspection, you have to put your equipment inside the steam generator channel heads. Before you do that, you can open these drain -- the one inch drain valves and drain that area so that it's a lot easier than having to go in there and suction it out or mop it out or otherwise take it out.

MR. CHAFFEE: I'm missing the significance of having it there.

MR. LYON: The significance is that most people drain down and they have to allow nitrogen to pass from either the vessel head or the pressurizer by way of the surge line, or both, up into the steam generators so that the water can drain out of the tubes and it usually comes

sloshing down and it's a very erratic kind of an operation, difficult to control and it introduces a lot of uncertainty. By introducing the nitrogen directly below the -- shoot, what's the word I want -- the tube sheet, directly below the tube sheet, it allows the tubes to drain smoothly and you don't get into a lot of this difficulty and you can progress with your draining more rapidly without all that erratic nonsense. It's a good technique.

MR. CHAFFEE: What they do is they actually have a pipe that --

MR. LYON: It injects nitrogen, if you will, right down below the ends of the tubes and it goes right up into the tubes and allows them to drain.

MR. CHAFFEE: And that was standard design in the steam generators, is that --

WITNESS BURMEISTER: Yes.

MR. AUFDENKAMPE: It's not designed --

WITNESS KITCHENS: No, but I mean we didn't ask for it for this reason in our steam generators. There are some plants that don't have that and originally we were going to inject the nitrogen by disassembling one of the RCS flow scoops, which is what I believe Plant Farley does. Some other plants do that. But because we have the channel head drains, it's easier, we just hook up a nitrogen supply, a nitrogen bottle, to the channel head drain and blow the

water out of the tubes that way.

MR. AUFDENKAMPE: Here's a diagram of it, this is the tube sheet here and you have a baffle between the hot leg and the cold leg and then we've got a little drain valve in here and we send nitrogen up in there, it bubbles up into here and then it helps the water come down and provides a gas to displace the water. And then it also drains out this section. There's a little hole between the baffle pipes so it communicates with both sides.

MR. LYON: Now what is the reason you come down with this six inches at mid-loop to do that?

WITNESS BURMEISTER: No, we don't.

MR. LYON: I misunderstood, would you say again at what level --

WITNESS BURMEISTER: If we were not to use the nitrogen bottles, we would drain down to six inches above mid-loop to facilitate natural draining of the U-tubes. But because we introduce the nitrogen into the channel heads, we can do that at some level above the top of the hot legs.

MR. LYON: Okay, I misunderstood then.

WITNESS KITCHENS: He read you the procedure, it tells you to only go to 188 foot unless you're going to burp the steam generators. We haven't used that.

MR. LYON: And you cannot do that?

WITNESS BURMEISTER: The provision exists in the

procedure, but we don't use that right now.

MR. LYON: Okay, so one real benefit is they don't have to go to mid-loop to drain their steam generators and a plant without this capability has to do that and it's a very erratic kind of a mid-loop to boot.

MR. CHAFFEE: You don't have to go to mid-loop to drain the steam generators.

MR. LYON: As defined in the generic letter.

MR. CHAFFEE: Oh, I see, but other plants have to go to mid-loops just to get the water out of the U-tubes?

MR. LYON: Yes. To put the dams in, yes, you still have to go to mid-loop, but that's a more stable condition then.

You indicated -- I'm sorry, are you finished?

WITNESS BURMEISTER: Yes.

MR. LYON: Okay --

WITNESS BURMEISTER: There's one other important change that I think you might already be familiar with, but the interlocks on the suction valves for RHR are disabled when we drain to mid-loop.

MR. CHAFFEE: Required by procedures?

WITNESS BURMEISTER: Right.

MR. LYON: When you put an SI pump onto what you've termed an available basis, what assures that that SI pump is lined up and that the various valves that are needed are

indeed either lined up or can be operated so that you can pump water into the RCS -- what procedure covers that?

WITNESS LEE: This procedure here does.

MR. LYON: Which procedure is that?

WITNESS BURMEISTER: The procedure requires that condition to exist and you're asking how do we go about implementing that?

MR. LYON: No, what I'm asking is if I need that pump, how do I know that I can get it into an operating status quickly? How do I know that somebody didn't go out and start working on a valve associated with that pump that I am going to depend upon?

WITNESS BURMEISTER: We have a work control process where myself or another individual reviews all the work that's authorized prior to the shift supervisor seeing it and --

MR. CHAFFEE: But doesn't that process depend upon -- doesn't it anchor itself to Tech Specs in terms of what you do and don't tag out?

WITNESS BURMEISTER: No, actually the Tech Specs require us to have it tagged out. We tag it out to ensure that it's still available with the nozzle dams in should we need it. We keep it semi-operable. We keep it such -- the way it's worded in the procedure is ensure one safety injection pump is capable of being racked in and operated in

the hot leg injection mode, if needed. That's a step in this procedure. What we do is -- in the clearance that we have for complying with Tech Specs -- see, there's a conflict here, the Tech Spec says this has to be rendered operable. The generic letter and the real good practice is to have one available should you need it for cooling, is something different.

You're asking how do we maintain the control, we have work controls -- we have people that know that they have to do this, it's in this procedure. Also in our outage schedule, we know what equipment we have to have or not have, so we don't schedule to do maintenance on equipment that we have to have in certain modes. So we treat it sort of like a Tech Spec item in that we don't -- we ensure at least one safety injection pump is available should we need it.

MR. LYON: So it is tracked by the same tracking system that you use for tracking your Tech Specs, is that what I'm hearing?

MR. DIETZ: Do you also have a chart in the control room that you keep up to date with the flow paths and that?

WITNESS BURMEISTER: The safety injection pump system window was placed on the outage schedule and no work was scheduled to occur at the same time we wanted to keep a safety injection pump available.

MR. LYON: Okay, now that would make this work, but what would assure that that was indeed the condition during your planning?

WITNESS BURMEISTER: I personally reviewed all outstanding clearances and work associated with the system and we had just run the system for a surveillance test, check valve flow test, just prior to draining down.

MR. LYON: Let me try something a little different.

MR. CHAFFEE: Oh, I see, you don't have to have the safety injection pump operable the full time you're at mid-loop in this outage?

MR. AUFDENKAMPE: Available.

MR. LYON: Available, big difference. Let me suppose that you've gone through this whole process of planning and everything and you have specified an SI pump and it is available and everything is all lined up and one of the maintenance people is walking along and he sees that a valve in this particular system is leaking and needs to be repaired. Now of course that's all dutifully reported back up and someone schedules rip that valve apart and fix it. What in your process would keep that from happening until you made a different line up or set up your other SI pump to meet this situation?

WITNESS BURMEISTER: Well in order to do that work, it would require a clearance.

MR. LYON: Yes.

WITNESS BURMEISTER: And I personally review every single clearance before it's issued to the field.

MR. LYON: If you got run over by a truck and --

WITNESS BURMEISTER: My counterpart is Bob Brinkley.

MR. LYON: But is there a procedure or a check in the written process of things that would make that happen?

WITNESS KITCHENS: There's no check other than the normal work controls we have for ensuring configuration control for compliance with our procedures and our --

MR. CHAFFEE: What would be the problem of having a mid-loop procedure that addressed it?

WITNESS KITCHENS: That's what this is. The whole section here that he was reading out is all about mid-loop and requirements thereof.

MR. CHAFFEE: So that procedure addresses only mid-loop operations?

WITNESS KITCHENS: No, this procedure addresses unit cool down to cold shutdown. One section of it that we're talking about right here is for mid-loop operations and gives the configuration requirements.

MR. CHAFFEE: Is there a problem with having a procedure that's sole purpose is mid-loop operations that would have precautions, limitations, that you would have to meet before you go into that configuration?

WITNESS LEE: This one does.

WITNESS KITCHENS: It's a preference item of do you have many small procedures or fewer larger procedures, but this section here could be taken out. When you get to this point you could say refer to mid-loop operations procedure number whatever and all this could be put in there if you so wanted to do that.

WITNESS LEE: But reducing RCS level needs to be addressed in your plant administrative type of procedure which is our unit operating procedure. If you don't address it in there, you wouldn't know to go to the other procedure. So you either have to put it in here or have it refer in this procedure, one way or another.

WITNESS BURMEISTER: To give you a little background on it, what we call unit operating procedures direct the use of all the other system operating procedures and appropriate surveillances and alarm response procedures, et cetera. We are always in a unit operating procedure upon receipt of a license.

MR. CHAFFEE: And you're required to meet the limits, precautions that apply for that procedure at the time.

WITNESS BURMEISTER: Right.

MR. CHAFFEE: Okay. Do operators, when they get clearances or stuff, do they check whether or not -- what

the work that's involved -- violates the current procedure that they're in?

WITNESS BURMEISTER: That's kind of a hard question to ask -- to answer, I'm sorry. I mean, I would say yes, they should be familiar with the procedures that they're required to follow in the current plant condition, the status of the plant and the impact of the work that they authorized should be considered when they authorize the work to be performed.

MR. CHAFFEE: Who authorizes the work in the control room, the PRO, the SRO?

WITNESS BURMEISTER: Work is authorized by the shift supervisor.

MR. CHAFFEE: Once he signs off then it goes ahead and gets implemented?

WITNESS BURMEISTER: Yes, and in some cases a clearance is required and would have to be --

MR. CHAFFEE: But he doesn't see these clearances until they come through some -- I forgot the -- like the equipment control group that screens the stuff first or does the --

WITNESS BURMEISTER: Our work planning group prepares the clearance initially. I have individuals that work for me that review the clearances and also prepare a sheet of clearances to be installed by the shift for each

night. I review that list also and I go to a daily meeting that reviews clearance activities and specific work orders that are to be performed during the next 24 hours. And so this list is brought down to what we call the SSS, support shift supervisor, and has a list of all the clearances that are to be hung during the next 24 hours and we put the time that we expect it to be hung by and so if somehow he gets a clearance that's not on this list, he generally will not hang it unless it's an urgent thing that came up that was needed to support continuing operations.

MR. CHAFFEE: Then you screen them so that no clearance goes out that's going to be in conflict with the mode.

WITNESS BURMEISTER: That's right. I think most of them understand fairly well that if they authorize a clearance that's not on that list, they're sticking their neck out a little bit further. In other words, you know, they should do a closer review before they authorize it.

MR. CHAFFEE: Okay, I understand.

WITNESS KITCHENS: For the SI system during this outage, we did not come up with a board for the flow path, we did for boric acid flow path and a special standing order because during the outage schedule the work that was scheduled on the CVCS system was such that we wanted to absolutely maintain control of that during -- because there

was a lot more work going on and there's I don't know how many, four or five possible flow paths. For the SI pump here, there's really just the two.

MR. DIETZ: That was for the gravity drain capability?

WITNESS KITCHENS: No, sir, that was for our boric acid flow path, to maintain at least one boric acid flow path. We did come up with some special things for the outage because of the nature of the schedule. We didn't do that for SI probably because the schedule was such that you do A-train and you do B-train and it's a lot easier to maintain control.

MR. LYON: A couple of quick areas because I promised that I would allow ten minutes for Paul.

Why do you use hot leg injection for your SI pump?

WITNESS LEE: That's the only system that can give us hot leg injection.

MR. LYON: Yes, but why do you want hot leg injection?

WITNESS LEE: I know we don't need to because we're not in the situation where you have the hot leg dams installed. I know you can get in a configuration where that's the only way to put water into the top of the core, is through the hot leg.

MR. LYON: Is that need for hot leg injection

limited to only when you have the nozzle dam line up that you're referring to? Suppose I didn't have any nozzle dams in place, would I still have a potential place where I would need hot leg injection?

WITNESS LEE: If you had a cold leg opening -- you know, it's always better -- if you had a cold leg opening, it would be better to use hot leg injection. You know, there is -- if you had a bubble in the head for some reason, which usually occurs because you have a dam, then you would need hot leg injection.

MR. LYON: Okay.

WITNESS LEE: But that is just a contingency, you could probably do away with that step.

MR. LYON: Do your procedures include an accumulator dump as one way of injecting water into the system?

WITNESS BURMEISTER: Yes, that's in the Mode 4, Mode 5 procedure.

MR. LYON: Where does that appear in the line up versus gravity feed? I think it's toward the very end of the loss of RHR procedure.

WITNESS KITCHENS: Is your question where does it come in the sequence of performing this procedure?

MR. LYON: Yes, is it before or after the guidance to the operator for using gravity as a means of adding water to the system?

WITNESS LEE: It's at step A-12 as far as the SI accumulators.

MR. LYON: And where is the --

WITNESS LEE: And 27.

MR. LYON: So dumping the accumulators is significantly before you would try gravity feed?

WITNESS LEE: Depends on RCS temperature. You know, if you're at a point where RCS temperature is greater than 200 degrees, you don't want to rely on gravity feed because you're approaching boiling and you might have a pressure build up in RCS and gravity drain may not be available, depending on the RCS pressure.

MR. LYON: Okay.

WITNESS LEE: It was put as a contingency early, depending on RCS temperature being greater --

MR. LYON: I understand. Did anyone assess -- let me ask a different question. Do you assure that the accumulators will be available, do you maintain pressure in the accumulators for this purpose and a water volume?

WITNESS KITCHENS: No -- the answer is no. In the same was as we maintain an SI pump?

MR. LYON: Yes.

WITNESS KITCHENS: No, we don't administratively require the accumulators to be full and pressurized with nitrogen while we're at mid-loop.

MR. CHAFFEE: Do you have any water in them at all?

WITNESS KITCHENS: I don't know of any procedural requirement that we have aux feed water in them at all. If you were to have them, you could use this procedure --

MR. LYON: I understand, but it is a specific step in the procedure that is designed to cover a particular situation and yet what I'm hearing is they very well may not be available at all.

WITNESS KITCHENS: May not.

MR. LYON: Would they be likely to be available?

WITNESS BURMEISTER: Yes, in Mode 4 and 5 because that procedural requirement to use accumulators if they're available appears in the Mode 4 and 5 procedure and typically we do not pressurize the accumulators and drain them until well after Mode 5 activities have started.

MR. CHAFFEE: Don't you have them drained at the time you go to mid-loop?

WITNESS BURMEISTER: Pardon?

MR. CHAFFEE: Don't you drain them at the time you go in mid-loop?

WITNESS BURMEISTER: If not drained, at least depressurized before you go to mid-loop, yes.

MR. CHAFFEE: You wouldn't keep them pressurized with the steam generator manways removed with people in the proximity doing work, would you?

WITNESS BURMEISTER: But while the RCS -- typically while the RCS is pressurized, in other words, you're above 200 degrees, in the early parts of the cool down into Mode 5, accumulators are still pressurized.

MR. CHAFFEE: Right, but I think all this discussion is focusing on mid-loop, right?

WITNESS KITCHENS: You're either talking about in Mode 5 during mid-loop, we probably would never use that response not obtained part. If you did, it would be to drain the accumulators and not to inject them with nitrogen.

MR. LYON: One of the steps in the loss of RHR procedure is a use of the accumulators.

WITNESS BURMEISTER: I understand, step A-12.

MR. LYON: Yeah.

WITNESS BURMEISTER: And you may not be at mid-loop when you're in this procedure.

MR. LYON: That is correct.

WITNESS KITCHENS: You could be at 349 degrees in this procedure.

MR. LYON: Yes.

WITNESS KITCHENS: And pressurized.

MR. LYON: Right. Now let's suppose I am a little cooler than that and perhaps I'm at 50 psi and I initiate this injection step. Will I inject nitrogen into the RCS? Has anyone evaluated that, and if so, has anyone looked at

the implications of that nitrogen injection, perhaps with respect to efforts to restart RHR?

WITNESS KITCHENS: Probably not.

MR. LYON: Okay.

WITNESS BURMEISTER: That particular thing, to my knowledge, has only been addressed for an accident situation and hot condition.

MR. LYON: With a large break.

WITNESS BURMEISTER: A large break LOCA --

MR. LYON: Yes, I understand, in which case we know it's not a problem.

WITNESS BURMEISTER: Not a problem, but not while we're in mid-loop conditions.

MR. LYON: Okay, I've only got one more thing that I want to touch base on here. Do you have a procedure for RHR venting?

WITNESS BURMEISTER: Yes.

MR. LYON: And what does that involve?

WITNESS KITCHENS: First off, I think we're having trouble with some of the questions and we're answering you probably in a different sense than what you're asking. We have a system operating procedure for RCS filling and venting.

MR. LYON: I'm sorry, let me --

WITNESS KITCHENS: Are you referring to the AOP?

MR. LYON: Let me set the perspective then. You're in mid-loop, something happened and for whatever reason, you know you have sucked a lot of air into an RHR pump and you have lost that pump.

WITNESS KITCHENS: But it was previously running?

MR. LYON: It was the pump that was running. And now you wish to try to get that pump back. What would you do, is there a procedure that covers that? I'm hearing the answer is yes.

WITNESS LEE: Yes. We stop the pump and we open the vent valves.

MR. LYON: Which ones?

WITNESS LEE: Okay, they're the solenoids --

MR. LYON: Okay, those are the ones that are up in the top --

WITNESS LEE: In the very high point.

MR. LYON: Yeah, the high point immediately outside of containment.

WITNESS LEE: Yes.

MR. LYON: And that is what size pipe?

WITNESS LEE: About a one inch.

MR. LYON: And does the operator know whether that vent is being effective, that indeed it is venting air?

WITNESS LEE: We don't have --

MR. AUFDENKAMPE: We do know when it's completed

venting air and it's blowing water.

MR. LYON: How would you know that?

MR. AUFDENKAMPE: Because you have a sump in it to give you a high level --

MR. LYON: But you wouldn't have an indication that it was blowing air, although once the sump started filling, you'd know you had reached that point.

MR. CHAFFEE: That valve in question, you'd have to operate it locally or is it a remote manual?

MR. AUFDENKAMPE: Remote.

MR. LYON: Do you have any other vents that you would operate?

WITNESS LEE: No. I talked to the RHR engineer and supposedly our system has very -- as far as the arrangement of the RHR piping, it has a good gradual slope to the hot leg and --

MR. LYON: Okay, I will agree that that vent will vent most of the RHR hot leg between the containment wall and the lowest point in the RHR system. From that lowest point, the RHR pipe turns and goes up several feet into your RHR pump. Is there a vent --

MR. AUFDENKAMPE: Not several feet.

WITNESS LEE: It'd be a foot or two, it's just right at the bottom.

MR. LYON: Yes, agreed. I would have guessed that

it was about at my waist level, so maybe it's a food and a half, two feet -- okay. Now I don't see how the vent you have just operated would take care of venting the pump casing if it had become either steam or air bound. Do you have any experience that this is effective so that you could do that?

WITNESS LEE: We have quite a head of water there. If you stop the pump, it should collect a bubble.

MR. LYON: Is there another vent and is it called out in the procedure?

WITNESS LEE: Just this one vent, there's only one.

WITNESS KITCHENS: In the abnormal operating procedures, we spell it out.

MR. LYON: Okay, it's all yours, Paul.

MR. LIETZ: I guess I'd like to shift a little bit away from the direct things dealing with RHR and talk to you a little bit about what procedures you have available to cover various emergencies in a shutdown condition. Being not only loss of RHR, cavitation of RHR at mid-loop, but LCA at mid-loop -- LOCA, period. This would be a loss of inventory. A criticality or a loss of AC power, loss of instrument air. Do you have -- loss of maybe instrumentation power. Do you have procedures that govern those that deal with mid-loop -- or with shutdown?

WITNESS BURMEISTER: Yes.

WITNESS LEE: We have a procedure for a loss of 125 volt AC to 1-E. It'll address, you know, any mode you might be in. It could be Mode 1 or several modes. Usually the procedures are divided up into sections by mode.

WITNESS KITCHENS: To be more specific to answer your question, I think some of the ones you just mentioned actually cover all the modes of operation or the major ones. some of them probably are written where they only cover power operations. Greg is telling you about the one procedure there, it probably would cover all modes of operation, instrument air abnormal operating procedures is divided into whether or not you're on RHR, whether you're in Mode 4 or 5, power, whatever. We actually cover that and that would be covered in loss of instrument air.

We do have a loss of coolant -- also reactor coolant abnormal operating procedures for when we're shutdown. We do have a shutdown in Modes 3, 4, 5 and 6 I guess.

WITNESS LEE: Yes, divided up into various modes.

MR. DIETZ: Does it help you diagnose that you've actually for -- for instance if the RHR suction relief opens and sticks open, would it help you get that isolated?

WITNESS LEE: Well that would just be an RCS leak type of situation there and that would be -- could be in the RCS leak procedure, 18004.

MR. DIETZ: How big a hole is that?

WITNESS LEE: A big one. It addresses it to that extent. For instance cavitation --

WITNESS KITCHENS: To answer your specific question, that is addressed in this procedures, it's one of the symptoms to go look for if you lost it, is RHR lifting of relief valves, (reading) as indicated by rising PRT level pressure or temperature. That's one of the symptoms they go to to try to determine where the leak is while you're on RHR.

MR. DIETZ: How about criticality as well, shutdown, loss of something that causes a dilution, inadvertent dilution?

WITNESS KITCHENS: We don't have specific abnormal or emergency procedures I don't think for inadvertent criticality or dilution accident. We do have a high flux at shutdown alarm and we have an alarm response procedure that addresses if you were to get to a point where you would get the high flux at shutdown alarm. There are specific steps that are similar to one of these, but it's only in the case where you would get that alarm.

MR. DIETZ: Is the owners' group working on any kind of a shutdown emergency type procedures?

WITNESS BURMEISTER: They're working on what the call Mode 4 LOCA guidance. They did an analysis and there are four potential options for plants to take to ensure that

they will not have a problem in the event the Mode 4 LOCA occurs and they are to use, for example, a single train cool down on RHR. To give you the background and the scenario, say you had two trains of RHR in service at 350 degrees on recirc with the RCS and you had a LOCA. The risk of the potential exposure is that you could have steam binding and take out both RHR pumps. So one of the recommendations is that you only use single train cool down and leave the other one lined up for injection. Until you get down to 275 degrees -- that's a plant specific number dependent upon elevation head in RWST.

Another option is to have the ability to purge the RHR pump suction piping with cold water to -- you know, in the event that you have steam binding from a small break LOCA and it takes out one of your RHR pumps, you need to be able to restore it and this is one means of doing it. Some plants don't have that capability.

Another option to deal with the problem is to demonstrate somehow that you have -- you can maintain RHR pump operability. That would require further analysis and more testing, I'm sure.

A fourth option was to make high head pumps available, which are currently not available by Tech Specs.

Another plant suggested just don't put RHR in service until you get down to a certain temperature, use

your atmospherics or your steam dumps to cool down to 275 degrees. The drawback with that option is that it would be a much slower cool down.

MR. DIETZ: Those are setting yourself up with the right condition so that if you have the events --

WITNESS BURMEISTER: You'll be able to deal with them. But that's all this particular analysis took a look at.

MR. DIETZ: I'm looking for procedures for dealing with -- detecting the event and mitigating it.

WITNESS BURMEISTER: To my knowledge, the owners' group is not working on anything in that area.

MR. DIETZ: You also have safety function status trees that you use while at power.

WITNESS KITCHENS: We also have safety function status trees that we use in every mode. We have actually gone through and programmed ours such that they are functional in Modes 4 and 5 and I believe 6.

MR. DIETZ: The trees, do you have copies of those, are those hard copy available also?

WITNESS KITCHENS: We can get those, I can print them off the computer if nothing else.

What we did there, there's no owners' group that I know of -- there's no Westinghouse owners' group requirements for those or recommendations for those, but we

at Vogtle did make us some and they're based in large part on Tech Spec parameters and on other -- just other good parameters that we thought we would need to know while we were shut down.

MR. DIETZ: Each one of the status trees for coming down or an accident at power has a bubble at the end that has a procedure associated with it. Do you have a procedure associated with the shutdown one too?

WITNESS KITCHENS: On some of them.

MR. DIETZ: Is it possible to get a copy of the emergency type procedures that would deal with the shutdown type events we've been talking about, the ones that you do have?

WITNESS KITCHENS: Yes.

WITNESS BURMEISTER: We brought them here, but I guess we're not supposed to give them to you directly.

MR. DIETZ: You know who to give them to.

WITNESS KITCHENS: We'll give them to Herb.

WITNESS KITCHENS: Do you want any of the abnormal or emergency procedures -- actually we call them abnormal procedures that deal with the plant in a shutdown mode?

MR. DIETZ: Right.

WITNESS KITCHENS: Also you'd like to see what we've got set up for our critical safety function trees for other than the Modes 1, 2 and 3 that the owners' group had.

MR. DIETZ: Right.

WITNESS KITCHENS: Okay, I'll get you those.

MR. DIETZ: That'll help a lot.

MR. CHAFFEE: I guess -- I'm sorry I came in here late, but John --

MR. AUFDENKAMPE: Aufdenkampe.

MR. CHAFFEE: Okay. Can you tell me how you fit in the organization, what's your position title?

MR. AUFDENKAMPE: Presently my position is Manager of Technical Support. The sections that report to me are quality control, reactor engineering, NSAC which is the group Herb works for, plant procedures group and the plant performance group. The reason I was requested to come to the interview is associated with generic letter 8817.

MR. CHAFFEE: I understand.

MR. AUFDENKAMPE: At the time of 8817, I was in engineering and was the supervisor of the NSSS group, which is -- so I was involved in the engineering aspects of generic letter 8817.

MR. CHAFFEE: Great.

MR. AUFDENKAMPE: Also was the engineering supervisor in the TSC at the time of the event.

MR. CHAFFEE: Okay. Now I've got a lot of questions.

MR. AUFDENKAMPE: I get off at four.

MR. CHAFFEE: You had the engineers on your staff that were in the TSC, that were monitoring RCS temperature and did some sort of a plot?

MR. AUFDENKAMPE: Yes.

MR. CHAFFEE: How come that plot I understand showed maximum temperature of 118 degrees whereas I understand the operators kept saying it was 136 degrees?

MR. AUFDENKAMPE: Because that plot is based on historical data maintained by the ERF computer and at some point into the event, the computer decided it didn't want to keep that historical data any more.

MR. CHAFFEE: Oh, so you recognized that 118 degrees as --

MR. AUFDENKAMPE: I did not recognize that at the time.

MR. CHAFFEE: No, but I mean now.

MR. AUFDENKAMPE: That is my understanding now.

MR. CHAFFEE: But you haven't actually --

MR. AUFDENKAMPE: I talked to John Ealick who is our guru of the ERF computer and that is what he told me.

WITNESS KITCHENS: What I believe the real case is, is that 136 degrees is probably closer to the maximum temperature. We do have a plot for RHR suction now that show it going to 130 degrees. The 136 degrees was reading from the thermocouples that an SRO was taking during that

time in the control room. One thing to remember on the time frame, by the time these engineers you're talking about got to the TSC, we were already back on RHR so they didn't see the real time information. They did go and get historical data for the plot.

MR. CHAFFEE: The reason I asked is I'm trying to figure out what was the maximum temperature.

MR. AUFDENKAMPE: Let me add with respect to the plot, the plot was done approximately two hours into the event and was done to provide our corporate people something to make the press release that was scheduled I think for 2:00 that afternoon. The information that we were working on or using in our assumptions and actions in the TSC was assuming 136 degrees because that's what we had gotten from -- I don't remember --

WITNESS KITCHENS: From the control room.

MR. AUFDENKAMPE: We were assume about a four to six degree rise in 36 minutes, is what we were operating on.

MR. CHAFFEE: So the initial temperature was what?

MR. AUFDENKAMPE: Ninety approximately.

MR. CHAFFEE: Okay, one more question. In your role as it relates to 8837, did the engineering department do any kind of calculations or have any calculations done that looked at worst case scenarios or is this a question that Warren has already asked?

MR. AUFDENKAMPE: We just completed that, design engineering completed that. We talked to Warren about it, we're going to make that available to him. It was completed on February 16 of this year in response to the generic letter. Our commitment was to have every -- just about everything done by the end of this outage. So it was in preparation for that.

WITNESS KITCHENS: We have incorporated that into our --

MR. AUFDENKAMPE: We've incorporated the majority of what's in there into our procedures.

MR. CHAFFEE: What is that calculation?

MR. AUFDENKAMPE: That's where the 57 minutes comes from, maximum steaming rate in the core, all sorts of different things. As Warren has --

WITNESS KITCHENS: We also gave a calculation for gravity fill of the RCS through several flow paths, including RHR and CVCS, SI.

MR. CHAFFEE: Can we get that today?

MR. AUFDENKAMPE: Yes.

WITNESS KITCHENS: I brought you a copy because you had asked me for it the other day and I gave it through Herb Beacher and I think you may have it by now.

MR. CHAFFEE: Great.

WITNESS KITCHENS: I also have two other copies.

I'd give them right to you except you might not want them. But we have that here and I brought you one because it's the same thing you had asked me for the other day.

MR. CHAFFEE: Thanks.

MR. LYON: Would you folks put together a list of what you consider all the procedures that are applicable to the generic letter 8817 response and provide that to us and that should identify the administrative kinds of controls as well as your normal and abnormal whatever you want to call them, emergency -- in other words, everything --

WITNESS KITCHENS: May I make a suggestion on that?

MR. LYON: Sure.

WITNESS KITCHENS: I think the best thing to do, maybe I'll ask Greg to do this, is to make that list but also for us to mark you up a copy because as we pointed out the unit operating procedure, one section of it, covers mid-loop. Why don't we mark it for you so you won't have to read through all -- it'll be like this --

MR. LYON: That would be great.

WITNESS KITCHENS: We'll give you a list but we'll also -- if we can get the right procedures and get them to you in the proper way, to mark those sections that we think are applicable to the generic letter.

MR. LYON: That's be great. I'll take all the help I can get.

WITNESS KITCHENS: We'll highlight them or mark them so it'll make it easier for you to see all these procedures we've been telling you about.

MR. LYON: Okay. Anything further anybody?

MR. KENDALL: John, I've got some questions --

MR. LYON: May I interrupt for a second? Do we need to hold anyone else?

MR. LAZARUS: I have some questions.

MR. LYON: Okay, go ahead.

WITNESS KITCHENS: May I ask if we could ask Bill questions first, he's supposed to be at simulator class.

MR. LAZARUS: Mine I think will be very short.

WITNESS KITCHENS: If you could ask him the questions first, then he --

MR. LAZARUS: I'm Bill Lazarus, the question I have shifts back to the classification of the event, so it's a totally different hat here.

Basically I was looking through the emergency classification procedure and we discussed a little bit, the procedure says for site area emergency, loss of all off-site and all on-site AC power for more than 15 minutes or loss of all vital DC power for more than 15 minutes. In this case you lost the two vital busses and I got some indication that your training has been that the loss of the vital busses is what you use as a definition for this site area emergency

loss of all on-site power and off-site power.

WITNESS BURMEISTER: When we look at the word "off-site power" we have a surveillance procedure that we perform to determine whether or not we have off-site sources available, and it's typically as it pertains to energizing the RATs and because we didn't have two RATs available, we didn't have any means of off-site power, is the way I looked at it. And therefore, that combined with not having the on-site power led us conservatively, but in any event we stayed -- I believe it to be a site area emergency because we did have non-1-E power available through station backfeed, but that was not immediately available to power any RHR pumps or anything to cool the core and it would have taken some modifications and some either movement of piping or hoses or pumps or whatever to get flow going to the core.

MR. LAZARUS: Was that specifically part of your training or previous understanding that loss of just the vital busses, loss of essentially safeguards, load capability, would qualify for this site area emergency?

WITNESS BURMEISTER: I should say yes, but I can't really say that. I don't recall at the time.

MR. LAZARUS: Basically what I'm saying, I think that NUREG 0654, which is almost identical to the words you use, is ambiguous and your decision is probably the right one, but I was just trying to find out if that was something

that had been pre-determined or you determined at the time to be applicable.

WITNESS LORMEISTER: Skip may be able to provide more input on it, but to my knowledge it was not pre-determined.

WITNESS KITCHENS: The thing that I told you the other day, we have a loss of all AC power emergency procedure and the symptoms for entry into that are loss of both emergency AC busses -- both emergency AC busses are de-energized. It doesn't say all power, both AC busses being de-energized, emergency AC busses, gets you directly into this loss of AC -- all AC. Now this really assumes you're at power or probably Mode 3, but we made a conscious effort and changed that recently. It used to say loss of all AC power. We changed it -- you can see a rev bar here -- May of '89, we changed it to say both safety related busses. Loss of all AC power is the name of the procedure.

MR. LAZARUS: Is that something in the package of things that have already been submitted or will be submitted to us?

WITNESS KITCHENS: I'll be glad to submit it. I do not know the answer to your question. I can put it in with the procedures that you asked for on the shutdown. Even though this one isn't really specifically for shutdown condition.

MR. LAZARUS: I appreciate that. The other question, just a quick one on accountability. I've had a couple of I think conflicting views from people on their understanding of assembly areas. Some have indicated that they believe there are still two assembly areas which will be announced by the shift supervisor or whoever is making the announcement in the control room at the time of a site area emergency being declared, depending on wind direction. Others have indicated there's only one assembly area and that's the admin building parking lot. What is your view on what the current situation is with assembly areas?

WITNESS BURMEISTER: Non-essential personnel not involved in the emergency?

MR. LAZARUS: Yes.

WITNESS BURMEISTER: The assembly area is the admin parking lot. The evacuation centers are the visitors' center -- not the visitors' center but the rec area and Plant Wilson.

MR. LAZARUS: So there are really three different assembly areas; one -- is this by procedure, this admin building parking lot?

WITNESS KITCHENS: The admin building parking lot is an accountability place, it's an assembly area we call it. And I know we're using words, but the relocation center is what I believe by procedure we call -- when we evacuate

the site, we have site evacuation, we have to say, depending on which way the wind is blowing, whether we go to the recreation center or Plant Wilson. One is that way and one is that way. But I do not believe we ever called them accountability centers.

For an alert, procedurally and I think by training and generally for an alert, we would send people to the admin building for accountability.

For a site area and general emergency, there's no pre-determined accountability area.

MR. LAZARUS: Is there a pre-determined message for an alert that would say go to the admin building or admin building parking lot?

WITNESS BURMEISTER: It says go to your assembly area.

WITNESS KITCHENS: I'd have to look in the procedure and see what it says.

MR. LAZARUS: It says report to your assembly area?

WITNESS BURMEISTER: Yes. I think the confusion is that for a site area and a general emergency the procedure says that you assembly -- for non-essential personnel, you assemble at either the Plant Wilson or the rec area at the direction of the Emergency Director. The Emergency Director in this particular case, knowing the circumstances involved, elected not to follow that procedural requirement. This has

already been discussed.

MR. LAZARUS: Yeah, I understand that.

WITNESS BURMEISTER: You have all that information.

MR. LAZARUS: Yes.

WITNESS BURMEISTER: And that's where I think some of the confusion came in because security people were -- or other personnel were used to going to those two areas for site area emergency or a general and when the Emergency Director elected to send the people to the normal assembly area for an alert, it created a little bit of confusion.

WITNESS KITCHENS: Even during this conversation I can see the confusion in that there are relocation centers for evacuation and there's an accountability area, which the only one I know of, as accountability area, is the admin building.

MR. LAZARUS: You used two terms and neither one of them was assembly area, which is the one that I've heard.

WITNESS KITCHENS: Assembly area may also be a term they use for here, for the admin building parking lot. That as not intended for a case where you evacuate and I believe Bill is right, the procedure pretty much says to -- that you evacuate and the decision is with the Emergency Director as to which of the two relocation centers you go to. Do you see what I'm getting at? There's all these terms.

I heard a page announcement after I arrived at the

TSC that said all personnel report to your accountability area and most people looked around and we said what's an accountability area. So we contacted the control room again and said gee, you'd better tell them where to go, we don't know what accountability area means. They made another announcement that said all non-essential personnel go to the administration building parking lot. But even we in the TSC were confused when that announcement was made, to go to your accountability area, we did not know what that meant.

MR. CHAFFEE: Did that announcement come from the control room?

WITNESS KITCHENS: Yes, all the page announcements come from the control room.

MR. LAZARUS: Almost.

WITNESS KITCHENS: Well anybody can pick up the page -- we don't normally make pages from anywhere except the control room that I know of. We have a procedure on that. That's where we make them from.

MR. LAZARUS: That's all I have. I understand why I'm confused now.

WITNESS BURMEISTER: Sorry.

MR. CHAFFEE: Any other questions? Okay, let's go off the record.

(Brief pause.)

MR. CHAFFEE: Go ahead.

MR. LYON: We were discussing the RHR system a little while ago and discussing the vents and you had discussed that you have a vent that I understand is operable from the control board that you could use. If that were to be ineffective, what other vents do you have on the RHR system that might permit you to get the pump back into operation?

WITNESS KITCHENS: For the pump itself we have a pump casing vent.

MR. LYON: Would you describe the size of that, where it is located and what would be necessary to operate it?

WITNESS KITCHENS: I don't know the size of it without looking at a P&ID but it's probably a one inch or half inch valve. To vent it, what you would do is you'd go and probably direct a hose to the floor drain so it wouldn't come out on you. It's right at the pump casing and you would open the valve and vent it until air quit issuing from it and water issued from it.

MR. LYON: Do you know if that is a single valve, a double valve or whether it has a cap or anything like that on it?

WITNESS KITCHENS: Not off-hand, I don't know, sir.

MR. AUFDENKAMPE: The standard design for that

pressure system would be a single valve with either a cap or a flange.

WITNESS KITCHENS: That particular one would probably have a cap on it, it probably would be a single valve.

MR. LYON: Would whoever went to vent it know that and take whatever wrench was needed?

MR. AUFDENKAMPE: They would check the P&IDs and that would tell them what it had on it and they would take the appropriate equipment.

MR. LYON: But that's not something you would flag in the procedures normally?

WITNESS KITCHENS: It's in the procedures.

MR. LYON: Is it, that you need that wrench? We can find that out. Why don't we drop that because we can look in the procedure. Unless anyone has anything else to to add, I think we have everything we need. Thank you very much.

(Whereupon, the interview was concluded at 4:50 p.m.)

C E R T I F I C A T E

This is to certify that the attached proceedings before the U. S. Nuclear Regulatory Commission in the matter of:

Name: Interview of DEAN WEST, SKIP KITCHENS, JOHN AUFDENKAMPE AND GREGORY LEE

Docket Number:

Place: Vogtle Nuclear Generating Plant, Waynesboro, GA

Date: March 28, 19990

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken stenographically by me and, thereafter reduced to typewriting by me or under my direction, and that the transcript is a true and accurate record of the foregoing proceedings.

William L. Warren

WILLIAM L. WARREN
Official Reporter

Ann Riley & Associates

05-48-90

3/30/90

DIESEL GENERATOR FAILURE ANALYSIS

JACKET WATER PRESSURE LO (1/1 NORMAL TRIP)
JACKET WATER TEMP HI (2/3 EMERGENCY TRIP)

OK 3/23 CALIB. SENSOR
186°/200° ± 4°
-READJUSTED
-OTHER 2 TESTED NOW

TURBO CHARGER LO PRESSURE (½ TAKEN TWICE)

TROUBLE SHOOTING REQ'D
CALIB.
BUBBLER TESTING

LUBE OIL HI TEMP (190° ALARM OFF THERMOCOUPLE)

140° ALARM (KYLE)
SPURIOUS? (JOHN'S)
(IN CR)

LUBE OIL LO PRESSURE SENIOR MALFUNCTION
(EMER. TRIP) (OBSERVED IN CR FOR > 1 MIN.)

(ACTION PACKS)
AFTER HI TEMP
-BOTH CLEARED
AFTER RESET

TESTING SHOWED "A"
SENSOR WOULD

LUBE OIL LO LEVEL
(ALARM NOTED AFTER 3rd START ADDED OIL)

NOT RESET 3/23

HI LUBE OIL TEMP TRIP (1/1 NORMAL)

3/30 SLUGGISH REPLACING SENIOR

SENSOR LINE LEAKAGE

2/23 ~1/2 AIR LINE LEAKS
3/29 E23H VIBRATION (2 LOCATIONS)
E92 TURBO CHARGER LO PRESSURE
E18 HIGH TEMP LUBE OIL (2 LOC.)

E16B HI TEMP JACKET WATER LINES
E14 LO JACKET WATER PRESSURE
E68 HI CRANKCASE PRESSURE

(P3 TRIPS AT 45# AND RESETS AT 49#; checked GRI PRESSURE AT 61#)