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MEETING ON THE TEXAS UTILITIES MOTION
FOR SUMMARY DISPOSITION ON THE UPPER
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NATIONWIDE COVERAGE

MEETING ON THE TEXAS UTILITIES MOTION
FOR SUMMARY DISPOSITION
ON THE UPPER LATERAL RESTRAINT

Held at Gibbs & Hill, Inc.
393 Seventh Avenue
New York, New York
Wednesday, December 5, 1984

P R E S E N T:

SPOTTSWOOD BURWELL

TERRY LANGOWSKI

SUSHIL SHARMA

FRANK RINALDI

RALPH MC GRANE

P. T. KUO

CHARLES MILLER

CARL COSTANTINO

MORRIS REICH

JOHN EICHLER

C. M. JAN

ANIL KENKRE

SEBASTIAN MARANO (part-time)

REPORTED BY:
MARGARET J. TEILHABER, C.S.R.

E X H I B I T S

MR. BURWELL: Good morning. My name is Spottswood Burwell. I'm with the NRC and we are here this morning to review a portion of the applicant's motion for summary disposition on the upper lateral restraint. I believe we have met on this particular item a number of times before and I will not attempt to summarize those meetings.

The purpose of this meeting this morning is to provide an opportunity for our consultants at Brook Haven National Laboratory to examine the structural design of the walls supporting the upper lateral restraint. Do I need to say more, Morris?

MR. REICH: No, I think that's okay unless P.T. wanted to say something else.

MR. KUO: No. Whatever statement you would like to make.

MR. REICH: Pertaining I think to the last meeting or should we start a new meeting?

MR. KUO: I believe this meeting has nothing to do with the previous meeting. Like Spot just mentioned, the purpose of this meeting is to review part of the design calculations on the reactor cavity wall which supports the upper lateral restraint. I think that's the only purpose for us to be here. If anybody else has anything to add,

but that's the way I understand it.

MR. REICH: Fine. In that case, let us go and talk about the design calculations of the beams, of the lateral support beams. First let's talk about the upper lateral support. As you remember, we talked to you last time about the worst case scenario, and if I recall correctly, the worst case scenario was a main steam line break with a temperature rise of approximately 355 degrees calculated with the RELAP codes if I'm not mistaken and we will take that temperature as the correct temperature instead of the design temperature of, let's say, 370.

Under that condition, could you people go over with us exactly the pedestal design, the wall design, and all the things you considered, how the walls move and the safety of the beam and the walls. We would like to review that with you because first of all, we didn't have the exact drawings, we couldn't make heads or tails of exactly what pedestal sizes are, how the anchors are and so forth. I see you have some of these here. We would like you to discuss these. We had some that he sent that but not everything, not all the details. We would like to go over it with you.

MR. KUO: In addition we would also like to have you tell us the missing rebar issue identified by the TRT, where the locations are and the numbers of those missing rebars. We would like to make an assessment of the impact of those missing rebar on the conclusions that our consultant makes about the upper lateral restraint.

MR. REICH: There's one more item I would like to sort of verify today and have it down on the record and see if I'm correct. When I asked last week about calculations regarding the lower lateral support, I was told that none are available. These were done by Westinghouse and it's something I just want to verify or make sure it's on the record, if that's the case. Maybe I didn't understand it right.

MR. KENKRE: The lower level restraint beam has been designed by Westinghouse. It has not been designed by Gibbs & Hill and it is true that we do not have those calculations for the beam.

MR. MILLER: Have you put those loads into the concrete walls?

MR. KENKRE: Yes. The embedments of the lower lateral beam is in Gibbs & Hill scope and we do have calculations for those embedment design.

MR. EICHLER: May I make a suggestion. I

think that Anil, who has the background on this, is best to get into a description. I would suggest that since we are all here at one time, we have these drawings laid out so that there's no question at all about the physical configuration of this structure, to have Anil take you through it from bottom to top or top to bottom, show where the lateral restraints are, show the area of the missing rebar and then we can get into the discussion of design bases, both original and more importantly in regard to the upper and lower lateral supports, these analyses and designs we have been going through for the last nine months.

MR. REICH: We would also like you at the same time to discuss with us the loadings and all the inputs for these designs if you could.

MR. EICHLER: Yes.

MR. KENKRE: What I would do is take them through the physical description.

MR. BURWELL: Anil, could I ask you to be careful to identify things like compartment numbers and the wall, the purpose of the wall and so on so we can get some, so that the record will be meaningful to someone reading it with the drawings at some future date.

MR. KENKRE: Yes.

MR. BURWELL: I'll give you a hand with that every now and then. It's hard to do.

MR. REICH: For the record, I would like to say that I spoke to Anil a few times last week and I received from him eight drawings thus far.

MR. KENKRE: Not nine?

MR. REICH: I think it's eight but I'll check the number. Several drawings came in the day before and I left the office and I haven't been back so it could be nine. I was told there were two, maybe three. However, a lot of them are included here but I'm sure not all of them because I called you and I know we didn't have all the details. Some of them were missing.

MR. BURWELL: Okay, sir.

MR. KENKRE: What I've got here on the wall are some of the drawings which will help explain the geometry. They are not all of the drawings. We may have to go and bring the other drawings from our area down there. This drawing number is 0553.

MR. KUO: That's the drawing number.

MR. KENKRE: This shows a cross-section to the entire containment building including the

internal structure.

MR. BURWELL: This is an elevation drawing.

MR. KENKRE: This is the containment structure and what is inside is the so-called internal structure. These two structures are separated from each other. This is the reactor. These are the steam generators. This and this are what we call the steam generator compartments. This is what we call the reactor cavity. These are the reactor cavity walls. These are the steam generator walls. I guess from here we can go to some of the plans.

MR. COSTANTINO: On the outside you have floors between the steam generator cavity and the reactor walls. Are those continuous on the outside on both sides?

MR. KENKRE: These?

MR. COSTANTINO: Yes. Are those continuous walls?

MR. KENKRE: Continuous all around. They don't touch the containment. These are continuous all around. In some places, there may be openings and things like that.

MR. COSTANTINO: But they are free on the outside?

MR. KENKRE: They have columns on the outside. These floors are supported steam generator walls on one side and columns on the other side. Can we go to the next plan drawings.

MR. KUO: Can you identify for the record where is the upper lateral restraint in terms of elevation?

MR. KENKRE: This is the upper level restraint. The elevation is 888'8". That's the upper lateral restraint.

MR. REICH: You may as well show the lower one, too, right there. I think it shows it.

MR. KENKRE: The lower one is right here and the elevation is 834'10".

MR. COSTANTINO: Is that on both sides?

MR. KENKRE: Yes.

MR. COSTANTINO: 834?

MR. KENKRE: Ten. Now we are on drawing 0519. This drawing shows the plan at the lowest elevation, which is 808 and 812. 808 is the floor elevation outside the compartment walls and 812 is the elevation inside the compartment walls. This is compartment number one.

MR. EICHLER: You are at this elevation, depicting with the ruler.

MR. REICH: He is at the elevation that he is pointing to.

MR. BURWELL: Is that the 832 I believe you said? Correct?

MR. KENKRE: 812.

MR. BURWELL: 812. Excuse me.

MR. KENKRE: This is compartment number one, two, three, four. These are the compartment walls. We also have a wall here and here. This is the reactor cavity wall.

MR. BURWELL: Could I ask for a clarification, please? You said that there was a wall between steam generator compartments two and three and between steam generator compartments four and one. Is that correct?

MR. KENKRE: Yes.

MR. BURWELL: Is this all the way up and down?

MR. KENKRE: This wall, what you see here is an opening, a local opening, but this wall goes all the way up and we will show that as we come to the next plan.

MR. BURWELL: Fine. Then the opening is down below?

MR. KENKRE: Right. The opening is down

below.

MR. BURWELL: Below the 812 elevation.

MR. KENKRE: Excuse me. Not below the 812. The opening is starting from 812 to a certain height above 812.

MR. BURWELL: Oh, right. Thank you.

MR. KENKRE: In here and here we have the refueling cavity and these are the walls of the refueling cavity which are connected with the reactor cavity wall. These are the columns on the periphery which support several floors of the internal structure. Any questions on this plan? We will now go to 0522 which is this plan.

MR. BURWELL: Excuse me. Could I enter into the record that this is a plan of elevation 832'.6".

MR. KENKRE: That's correct. This floor has got slabs all around right up to here and in here there's a local opening in the floor. This floor supports other equipment like an accumulator, et cetera.

MR. COSTANTINO: Is that a concrete floor?

MR. KENKRE: These are concrete floors.

MR. COSTANTINO: What about the members underneath? Those are beam supports?

MR. KENKRE: The ones shown dotted are the beam supports.

MR. COSTANTINO: How thick is the floor?

MR. KENKRE: There are several thicknesses of the floor, 18 inches, 2 feet, 3 feet.

MR. COSTANTINO: The floor, 3 feet thick?

MR. KENKRE: There may be 18 inches, 2 feet thick, 2 feet, 2 feet, 2 feet. There's no 3 feet.

MR. REICH: Let me ask you. So the wall varies at different lower lateral supports. In other words, there are four lower lateral supports that are pushing against the wall at this juncture -- this is for my own information -- and you have different wall sizes at each one. Am I correct? Wall thicknesses I just said. I mean floor thicknesses intersecting that wall.

MR. KENKRE: Yes. Floor thicknesses are different, that's right.

MR. REICH: The wall thickness is the same but the floor thickness intersecting the wall at that level varies.

MR. KENKRE: That's correct.

MR. REICH: It's not the same thickness.

MR. KENKRE: This floor system comprises

of concrete beams roughly about four feet deep supported on one end on the steam generator compartment walls and at the other end concrete columns.

MR. REICH: Anil, can you tell us anything about the perpendicular or the side walls, the compartment walls that are coming perpendicular to the structure, those, that are coming all around like that?

MR. KENKRE: These?

MR. KENKRE: No. The ones outside of the walls. These, yes. Those that are coming all around.

MR. KENKRE: These are not walls. Those are concrete beams. These are the ones --

MR. REICH: That's what I wanted to know. Fine.

MR. KENKRE: This is the refueling cavity now, which is on the top of the reactor cavity wall pedestal here, which is at this elevation here on the drawing.

MR. BURWELL: Could you read that number, please, sir?

MR. KENKRE: 834 feet oh and a half inches. Any questions on this plan? We will now go to the

next elevation at 860. The drawing is 0525.

MR. COSTANTINO: What's the elevation of the next floor before you get to 860?

MR. EICHLER: You are talking about this one?

MR. COSTANTINO: Yes.

MR. EICHLER: 851'6". This is 860. That 851'6" is a very local area. It just happens to go through that cross-section.

MR. REICH: It only effects one steam generator compartment or it doesn't even effect one?

MR. KENKRE: It effects two of them.

MR. REICH: On two sides only, number one and four?

MR. KENKRE: One and four, right. Now we are on 0525. This is the elevation at 860. These are upper lateral beams, one in each compartment.

MR. COSTANTINO: Anil, two of the upper lateral beams are above the floor and two of them are at the floor, according to that drawing?

MR. RINALDI: The floor elevation is different.

MR. COSTANTINO: Coming in on cavities one and four, the upper lateral beams are above the floor. See, right over there, is that a temporary

floor or --

MR. RINALDI: What direction is section 2-2?

MR. KENKRE: This is the direction, east-west.

MR. BURWELL: Vertically.

MR. KENKRE: East-west.

MR. BURWELL: Vertically on the drawing, excuse me, is a better definition, right.

MR. COSTANTINO: The answer is?

MR. KENKRE: The answer is yes, on this side it is at 860 and on this side is 861'6".

MR. COSTANTINO: So the answer is compartments one to four, the upper lateral restraint becomes above the floor.

MR. KENKRE: Below.

MR. COSTANTINO: The floor at compartments one and four is at elevation 851. Right, Anil?

MR. EICHLER: Could you show the outline of the lower floor at 851'6" on that plan? That drawing isn't here.

MR. MILLER: Could you make some sketches of the cross-section through the lateral support beams showing the intersection of lateral support beam with the vertical wall and locate the floors on

that section?

MR. KENKRE: I need the other drawing to be correct. I know roughly where it is but I need the other drawing.

MR. REICH: But you can sketch it sort of on the board.

MR. KENKRE: (Sketching.) Roughly this is the upper lateral beam. There is a floor at 851'6" and then there's one at 861'6".

MR. KUO: This is for all four compartments?

MR. KENKRE: Just one and four.

MR. COSTANTINO: Anil, the picture on the other side.

MR. KENKRE: It's something like this. This is at 860 and this is 858.

MR. COSTANTINO: So that would be compartments two and three?

MR. KENKRE: Two and three.

MR. RINALDI: Excuse me. Looking at the first sketch that you made and looking at the figure 0553, that floor that you indicate, 861'6" really shows a half floor, and elevation eight, I believe 73 or 75, shows a full floor. Is that correct?

MR. KENKRE: Yes, that's correct. This

861'4" if I show on the plan will show where the opening is, why it is short. This is the slab that you see here and this is open.

MR. RINALDI: Thank you. This 860 floor also has a floor system which consists of slabs, beams and the beams are supported again on the steam generator compartment walls on one side and the columns on the other side. This floor has got slabs of thickness 3 feet, 3 feet, 3 feet. Some of them are 12 inches, 18 inches.

MR. COSTANTINO: Where the upper lateral beam is, it is three feet.

MR. KENKRE: It's three feet.

MR. COSTANTINO: On both sides.

MR. KENKRE: Three feet, three feet.

MR. REICH: But then they are differently located, am I correct, by looking at it right now, some of them are located directly under the support, some of them are sort of at some angle to the support. Not all the same.

MR. KENKRE: You mean the slabs?

MR. KENKRE: Yes.

MR. KENKRE: This is all 860 elevation. This is the only one which is 861'6" that we see here but below that there is another floor at 851.

MR. REICH: But the beams are not exactly always in the same location.

MR. KENKRE: The beams are always at the same elevation.

MR. KUO: Same elevation. By that you mean horizontal?

MR. KENKRE: Right.

MR. KUO: For compartments two and three, the beams are at elevation what?

MR. KENKRE: 858'6".

MR. REICH: So they are almost directly, they are not directly opposite the support.

MR. KENKRE: No.

MR. REICH: Okay. A little bit below it. But they come at different angles towards it, radially speaking. You have some coming almost, I don't know, the angles from here look different.

MR. KENKRE: They come at, well, the same according to the center line of the containment.

MR. MILLER: Are the beams all radial?

MR. KENKRE: Some of them don't look exactly.

MR. KENKRE: No, they are not radial because the internal structure is not, the center of the internal structure is not the same as the center

of the containment. There is a three-foot offset.

MR. RINALDI: Excuse me. For clarification, this elevation of 858'6" that you referred to before, that was the elevation of the upper lateral restraint beam?

MR. KENKRE: That's correct.

MR. MILLER: What's the wall thickness in those compartments?

MR. KENKRE: These?

MR. MILLER: Right.

MR. KENKRE: From 860 upwards, it's 2'9" here. Here it is 3'6". 3'6" here, 4 feet here. 2'9".

MR. COSTANTINO: It's 2'9" where the beams come in?

MR. KENKRE: 2'9" where the beams come in for two and three.

MR. COSTANTINO: And one and four?

MR. KENKRE: Right, one and four.

MR. COSTANTINO: So it's 2'9"?

MR. KENKRE: Right. These wall thicknesses, 2'9", are above this elevation 860. However, if you go back and try to find out what is just below this, there is four thickness, 4 feet and 4'9", four feet for compartment one, two, three, and

4'9" for compartment four.

MR. REICH: That's that's for the lower support.

MR. KENKRE: This is just below the 860 elevation. The lower support is at 834'10".

MR. REICH: The thickness is four feet. Over there the thickness is four feet.

MR. KENKRE: Any more questions on this floor?

MR. REICH: So there's sort of a section change right near the support.

MR. KENKRE: Close to the support, yes. Just above it.

MR. REICH: From 4 feet to 2.9 feet.

MR. KENKRE: 2'9". The change in the thickness of the wall is depicted on this cross-section and this is where they come in. This is the upper and the change occurs above the upper.

MR. REICH: This is on the inside. I thought he was asking you the outside thickness.

MR. KENKRE: That's also the same thing here because the upper lateral beam top is 858'6" and the floor elevation where the wall changes its thickness is 860.

MR. REICH: And it goes --

MR. KENKRE: It goes from 4 feet to 2'9".

MR. REICH: Inches.

MR. KUO: On this section drawing here, it seems that the upper lateral restraint beam there on both sides shown are at the same elevation. I understood before that in compartment one and four they are at elevation 851'6" and on the opposite side it's 858'6".

MR. KENKRE: No. That is not true. The upper lateral restraint beams, all compartments are the same elevations, 858'6".

MR. KUO: Good. Okay. I thought that's what --

MR. REICH: What he was saying is there are two walls here. There's local floors over there.

MR. KUO: Thanks.

MR. REICH: Am I correct?

MR. BURWELL: Just one minor detail. You said that the lower walls in compartment four were 4 feet on one and 4'9" or what? What were they?

MR. KENKRE: 4 feet on one, 4 feet on two, 4 feet on three, and 4'9" inches on four. Any questions related to this plan? I don't have the 9059 plan here. Would you like me to bring that in? It is very high above. I don't believe it is

relevant.

MR. REICH: I don't think so. This basically describes the geometry of the internal structure.

MR. MILLER: Something I would like to see and maybe you have to get some more drawings for it are details of the support between the lateral beam and the vertical walls. In particular I'm interested in the details that will be required to make some estimate of punching shear response.

MR. KENKRE: This is one of the drawings which is 0550 and this area here gives the detail of the upper lateral beam. Section 14-14 gives the cross-section of the steam beam. Section 13-13 shows the end base plate which is connected to the concrete wall by bolts.

MR. BURWELL: Could you give me a height and width of that beam approximately? Is it on the drawing?

MR. KENKRE: Yes. The height is 3'6" inches and the width is 3 feet. It is a box beam.

MR. COSTANTINO: Could I ask you again a geometry question. The upper lateral restraint beam has a cross-sectional area of about 357 square inches and the lower lateral restraint beam has a

cross-sectional area of 8 square inches. Is that true?

MR. KENKRE: Yes, that's true.

MR. COSTANTINO: Why the big difference in the size of the members?

MR. KENKRE: We have not seen Westinghouse's calculations on their beam. This beam, upper lateral beam is designed by Gibbs & Hill with loads provided to us by Westinghouse.

MR. REICH: What loads? All loads?

MR. COSTANTINO: Does Westinghouse take the main steam line break temperature in their analysis also?

MR. KENKRE: We don't know.

MR. REICH: They just --

MR. COSTANTINO: If you make an approximate number, the upper lateral restraint beam was just barely qualified for the high temperature and you get, and the lower lateral restraint beam is also longer.

MR. REICH: You have to qualify what you just said. You made a very conservative approximate number.

MR. COSTANTINO: Yes. I was just wondering if you had looked into it at all.

MR. KENKRE: No.

MR. MILLER: I would like to go back to your sketch up there, so if I wanted to look at the punching shear requirements on the wall, that's saying that the axial load in the beam comes out into a 2'9" wall? There's nothing behind that that increases the --

MR. KENKRE: If you look at the cross-section, we will find that the diaphragm, that the slabs are very close to that and the punching cone would probably intercept the floor.

MR. MILLER: That's the kind of detail I'm really looking for which doesn't show up, I don't think, on any of the drawings we have here. Maybe you could, maybe it could be put together. At some point, I will like to see a sketch like over there like you have on the board, an elevation through that joint showing what that cone might intersect.

MR. KENKRE: I think in this case we will have to make a specific sketch for this purpose the way we know it because we have the floor elevations, we know where they are and the upper lateral restraint locations.

MR. MILLER: I guess this may be jumping ahead into the stress evaluation but was such an

evaluation done?

MR. KENKRE: Yes.

MR. MC GRANE: One correction, though. It is not a 2'9" wall abutting into it. It's a 4 foot wall at that level.

MR. MILLER: There's a transition --

MR. MC GRANE: The transition will be above the beam.

MR. MILLER: Out of the cone.

MR. MC GRANE: I don't know whether it's out of the cone or not. I haven't plotted the cone but it is above the beam.

MR. KENKRE: I will make a note to make some sketches.

MR. REICH: In this sketch, you should also include the pedestal that this thing sits on the way it sticks into the cavity. There's a pedestal there.

MR. KENKRE: Where?

MR. EICHLER: There's no pedestal there.

MR. REICH: I see a pedestal.

MR. EICHLER: What pedestal are you speaking of?

MR. KENKRE: Okay. You are talking about this. Yes, I was coming to that. Let me make a

note.

MR. EICHLER: I'm think of pedestal. This is a pedestal.

MR. KENKRE: The base plate, which is shown on section 13-13 on 0550 bears on a pedestal, concrete pedestal. Details of that pedestal are shown on 0544. Detail F on 0544 gives the connection detail between the upper beam and the concrete wall. Detail A on the same drawing provides the connection between the lower beam and the concrete wall.

MR. BURWELL: Can we go off the record for just a minute?

(Discussion off the record.)

MR. KENKRE: Any questions so far?

MR. KUO: I would like to go back to the loads provided by Westinghouse. At the beginning of the design you got the loads from Westinghouse. Is there any, did you check with Westinghouse in the design process later on whether the loads you got at the beginning of the design was indeed the finalized loads or it was their original estimate?

MR. KENKRE: I will have to verify if there's a record of that.

MR. KUO: Please do.

MR. RINALDI: On the other hand, they might have used original estimate and then confirmed the final one was much more different than the estimate loads.

MR. KUO: Yes, that's all right. That's what I'm trying to find out.

MR. EICHLER: This is not a unique situation. All loads from vendors go through a process of an original submittal, updates and final.

MR. KENKRE: Usually they are envelope loads that they give in the beginning which are supposed to be much larger than the final one for that.

MR. KUO: Just check it. That would be helpful for us making the evaluation.

MR. KENKRE: Yes.

MR. MILLER: What type of reinforcement do you have in the outer wall compartment, outer walls of the compartments?

MR. KENKRE: In general there are two layers of reinforcement going horizontal and vertical. These drawings that I've got here do not show the actual reinforcement size. There are separate drawings of the individual walls. I don't have them here. I'll have to get them and give the

exact reinforcement.

MR. SHARMA: Are there shear reinforcements perpendicular to the walls?

MR. KENKRE: Yes. All walls do have shear reinforcement. Any other questions on these?

MR. KUO: Any other questions?

MR. REICH: How deep are those anchor bolts that you have there? They go all the way in? I couldn't tell from that drawing.

MR. KENKRE: They go all the way in up to the end of the, up to the other side of the wall.

MR. REICH: They go all the way across?

MR. KENKRE: Yes.

MR. REICH: Through the whole thickness?

MR. KENKRE: Right. This is the other side of the wall. Let me explain about this bolt. You said anchor bolt just now. What we have is the upper lateral beam has got a base plate and to match that base plate, there is an embedded plate into the concrete and the embedded plate in the concrete has got cad welds welded through the embedded plate. The welds are embedded to the embedded plate and then there are reinforcing bars into the welds. That is the anchoring system. Any questions? Now I'll try to come to the area about cavity rebars,

missing cavity rebars. This is approximately the area where the rebars are missing.

MR. KUO: That is between elevation --

MR. KENKRE: 812 and 809 and this happens to be that area.

MR. KUO: All around or at one location?

MR. KENKRE: In this cavity.

MR. RINALDI: There was a concrete pour made and bars were deleted and perhaps you could tell us the deptn of that pour and the number of bars that were deleted and I believe some bars are added to the following concrete pour.

MR. KENKRE: Yes. The deleted bars were from 812 to 819, and from 819 to around 834 additional rebars were provided.

MR. BURWELL: This is the reactor vessel cavity that you are talking about?

MR. KENKRE: That's correct.

MR. BURWELL: Or the inner wall of the steam generator compartment.

MR. KENKRE: I want to show the relation of this area where some of the reinforcement was missing with respect --

MR. COSTANTINO: Before you get into that, were the bars horizontal, vertical?

MR. KENKRE: Horizontal.

MR. EICHLER: If I may interject at this point. Is there any question about what the configuration of the missing rebar or what happened? Maybe we should run through that so that this discussion isn't out of perspective and out of context.

MR. COSTANTINO: We would like to know the story.

MR. EICHLER: You are not privy to the story?

MR. RINALDI: No, we are not.

MR. EICHLER: Anil, do we have a cross-section showing the reinforcing down at the slotted area the intended reinforcing? Two and three of a drawing whose number I don't recall at this moment will show the intent of the additional rebar and will then identify, will be able to use that drawing as a means of identifying what took place, what was left out and what was put in to compensate for it and the reasons why all of this happened.

MR. KENKRE: Yes. Those drawings are available. I'll have to go and pick them up.

MR. EICHLER: Maybe at this point it pays

to bring them in.

MR. BURWELL: Why don't we take a ten-minute break or so.

(Short break.)

(Exhibit 1 marked.)

MR. KENKRE: The way that we will try to explain this missing --

MR. EICHLER: Can we go off the record for a moment?

(Discussion off the record.)

MR. KENKRE: We have got two plan drawings and three cross-sectional drawings which we will need to explain what is happening in this area in the cavity wall. We have revision two of this drawing 0572. This drawing shows these slots in the wall for the neutron detector tubes. Revision three was made to this drawing, and if you see the difference between the two, it is these reinforcing bars that were added. A pour was made up to elevation 819 but these bars were not installed.

MR. RINALDI: Can you describe the bars?

MR. KENKRE: The two layers of number nine bars.

MR. BURWELL: They are laid essentially circumferentially around the periphery of the

reactor vessel cavity.

MR. KENKRE: 13 inches roughly.

MR. COSTANTINO: Two at 13 inches.

MR. KENKRE: The pour was made without these bars. Going to the cross-sectional drawings, 0574, we have revision two, which did not ask for these bars which would be somewhere here. We have revision three of the same drawing which shows these bars placed in here. This is the slot location which is marked up on 0574. It extends to about 11 feet height from 8'10" to 822'3" and this is the area where those original horizontal bars were shown on revision three of these drawings.

MR. BURWELL: These slots are in the inside face of the reactor biological shield.

MR. KENKRE: Right.

MR. LANGOWSKI: Excuse me, but I think you are referring to the wrong reinforcing bars. Do you mind if I get up and -- rather than the ones on the left here, it's the ones on the right in here.

MR. KENKRE: Yes. That's the one I referred to.

MR. LANGOWSKI: I couldn't see from over there.

MR. KUO: Between elevation 812 and 818,

supposedly this is where the bars are "missing." My question is are really these bars missing by design or was it really overlooked?

MR. KENKRE: Revision two of these drawings did not ask for these reinforcement.

MR. KUO: So it's by design?

MR. MC GRANE: No.

MR. KENKRE: By revision two.

MR. MC GRANE: Excuse me. I think what you are asking is were they accidentally left out. The answer is yes. There was a foul-up in communications where the field was advised verbally that this change was coming but before they actually had this drawing in the field, they didn't hold up the pour. They went ahead and placed the concrete.

MR. KUO: Thank you.

MR. COSTANTINO: Anil, were all the circular bars missing or just on one side or alternate bars?

MR. KENKRE: All these bars.

MR. COSTANTINO: The whole ring?

MR. KENKRE: Right. These bars were in. The bars somewhere in the middle, they were all missing, inside face.

MR. BURWELL: Then in essence revision two

shows the way it was poured and revision three of that drawing is the delayed revision that did not get to the construction crowd sufficiently early, crowd or crew.

MR. COSTANTINO: What was the purpose of the bar? What is the impact of leaving those out?

MR. MC GRANE: You want me to answer that?

MR. KENKRE: Yes.

MR. MC GRANE: The bars were put in there at my direction. When I looked at this drawing, I noted that we had a slot cut in here and since this cavity of this ring is designed to withstand the internal pressure of a pipe rupture and the pressurization of the cavity, I questioned whether or not there was a need for them. The answer was no, that the calculations showed that there was no need for the rebars. However, I had thought that as a result of the internal pressure, we could, even though the strength was there, we could get some cracking, was a potential for cracking and I directed that to avoid that possibility -- there were that calculations performed -- but just to avoid that possibility, that we add additional rebar to compensate for the break that occurred here. These were merely an eyeball judgment on my part

that this would be prudent to put them in. There was no demonstrated need for them.

MR. COSTANTINO: Would the fact that they are left out violate any provisions of ACI code?

MR. MC GRANE: No.

MR. COSTANTINO: The face seal requirements for concrete members, there's no requirement for that.

MR. REICH: You made a calculation with the STARDYNE code, for specifically a pressure case. Right?

MR. KENKRE: Yes.

MR. REICH: And yet you had in there this case without the bars, right? You have the results?

MR. KENKRE: The pressure in the cavity itself, you do not have a STARDYNE code for the pressure for this particular loading. The STARDYNE code has loadings, other loadings like Seismic, other loadings.

MR. REICH: No pressure case?

MR. KENKRE: No pressure case. The pressure was done locally by hand calculation.

MR. COSTANTINO: In the STARDYNE run, the properties you assume for the concrete were cracked section properties?

MR. KENKRE: No.

MR. REICH: This is elastic run.

MR. COSTANTINO: But the modulus would assume no cracking?

MR. KENKRE: Right.

MR. MILLER: What size are those cracks?

MR. KENKRE: The slots?

MR. MILLER: Yes.

MR. KENKRE: They are about nine inches wide, roughly 18 inches deep.

MR. EICHLER: What's the minimum thickness in the shield of the areas where we are talking about?

MR. KENKRE: This is over eight feet thick.

MR. MC GRANE: I think we might want to point out, too, just to get the picture correct in your mind as to this thing being a pressure, concrete pressure vessel, is that in the calculations that were performed to verify it or to determine the reinforcing requirements in there, the assumption was made that this was just a thick cylinder, eight foot thick wall, and no consideration was given to the very substantial stiffening elements that occur all around that wall. In other words, we took a simplified and very

conservative approach.

MR. KUO: Ignoring everything else, just an eight foot thick cylinder.

MR. MC GRANE: Yes.

MR. MILLER: What kind of pressure is inside there?

MR. KENKRE: This varies but the maximum is around 40 PSI.

MR. REICH: For the accident case.

MR. KENKRE: This revision four of this drawing 0574 shows in cross-section the fact that these bars were not provided here, and above the 819 elevation, they are bunched up.

MR. COSTANTINO: What was the point of that? Just to make up the total number of bars?

MR. MC GRANE: This was a suggestion that they make up the total number or half the total number at the level above the slots so they could proceed with construction and at that point there was not much else to do but say well, go ahead and do it since we knew that there was no design requirements for these in the first place.

MR. KENKRE: I think this more or less covers this discussion on this rebar.

MR. COSTANTINO: I'm confused by one thing.

The analysis of the cylinder was a hand calculation for a thick cylinder. Is that right?

MR. KENKRE: For the pressure, right.

MR. COSTANTINO: What is the relation with STARDYNE?

MR. REICH: Nothing.

MR. KENKRE: The STARDYNE module for the total internal structure.

MR. COSTANTINO: And that included internal pressure, seismic?

MR. KENKRE: No, not term pressure. Seismic.

MR. COSTANTINO: STARDYNE was only seismic run.

MR. KENKRE: Seismic and it included live loads, dead loads of the entire internal structure.

MR. COSTANTINO: In that run, what were the assumed properties of the shell elements you used in the STARDYNE run?

MR. KENKRE: We had modeled vertical and horizontal beam column elements.

MR. COSTANTINO: Not shell elements?

MR. KENKRE: Not shell elements.

MR. COSTANTINO: So the steel had no impact on the STARDYNE run?

MR. KENKRE: Right.

MR. COSTANTINO: The beam stiffnesses that were used in the STARDYNE run were based on uncracked gross concrete section properties?

MR. KENKRE: Correct. Would you like to see the relationship of this area with respect to the upper and lower restraints?

MR. EICHLER: I think you should.

MR. KENKRE: This shaded area is the area that we were just talking about and the lower lateral restraint is somewhere here and the upper lateral restraint is even higher above that.

MR. BURWELL: What approximately is the top elevation where you left the reinforcing rod out?

MR. KENKRE: 819.

MR. BURWELL: 819.

MR. REICH: Right.

MR. KENKRE: The lower restraint beam is at 834'10" and the upper beam is at 858'6".

MR. RINALDI: I wanted to ask you, giving us all this information on the design for this missing rebar and explanation for omitting these bars, was all this provided to the TRT team that investigated the allegation, this type of information about, that you are giving us now on

this missing rebar, they have already been provided?

MR. KENKRE: I do not know. We had provided this information to the site and we do not know whether this information was --

MR. RINALDI: The site means Texas Utilities?

MR. KENKRE: Yes.

MR. EICHLER: Let me add something there. The TRT team has identified that they understand the problem. The correspondence that took place at the time in essence, paraphrased, they asked us then to provide, despite all of that, our approach to providing numbers that it's no problem and we are in the process of doing so. That will be forwarded through the normal course, normal channels.

MR. REICH: Essentially what you are doing is putting in the analysis that you just spoke about. In other words, you made a thick cylinder approach.

MR. EICHLER: The load in that area, instead of being assumed to travel or will be assumed to travel vertical to the reinforced portions of the cylinder; that is, that portion above where half the missing rebar was placed in the next pour.

MR. COSTANTINO: I'm confused.

MR. MILLER: You are not confused. You don't understand.

MR. COSTANTINO: Right. The thick cylinder analysis, internal pressure, you look to see if the cylinder blows up. Right? What does that have to do with transferring loads up and down? Either it works for that analysis or it doesn't work. Your implication was it worked for that analysis.

MR. MC GRANE: I'm going to make the assumption that it doesn't work in that they are going to see if they can carry the load or they are going to show, if it didn't work, it's a what if, even if it didn't work, you can carry the load from here vertically up to the ring above there.

MR. COSTANTINO: Before you get to the what if, does it work for carrying the internal pressure? No internal rebar.

MR. MC GRANE: No rebar across the crack or slot.

MR. MILLER: If you only have 40 PSI internal pressure, it sounds like you can't have stresses bigger than 40 PSI, PR over T. R is about equal to T. Maybe you have 80 PSI tensile stress. That would cause the concrete to crack.

MR. COSTANTINO: T is eight feet?

MR. KENKRE: Yes, about eight feet, eight feet six or something.

MR. REICH: Take it as seven because of the crack.

MR. BURWELL: Just roughly, the wall is eight feet thick, correct, roughly? What is the diameter of the internal diameter of the cavity? What is the diameter of the cavity?

MR. KENKRE: 17 feet diameter.

MR. BURWELL: Thank you.

(Discussion off the record.)

MR. EICHLER: While off the record, a discussion ensued as to how the analysis would be performed in order to establish that the effect of the missing rebar, establish what the effects of the missing rebar would be. Gibbs & Hill indicated that as a result of the TRT findings, that they understood what took place and why it took place and the context in which it took place but they expected Gibbs & Hill to provide calculations showing or identifying what the effects, if any, of the missing rebar were on the stresses in the structure. Again to recapitulate, the discussion off the record discussed the possible case that Gibbs & Hill would employ in order to address this. Does anybody care

to add anything else to that?

MR. BURWELL: Shall we continue, then? Does that wipe out our need for further discussion on the missing rebar or are there further questions concerning that matter?

MR. REICH: No, we have no questions on it right now.

MR. BURWELL: All right. Where does that leave us in our agenda now we are through the physical description of the cavity in considerable detail and of the location and placement of the upper and lower lateral restraint.

MR. COSTANTINO: Can we go off the record again?

MR. BURWELL: Off the record.

(Discussion off the record.)

MR. BURWELL: We have a request to go back on the record to say what we would like to see after lunch.

MR. KUO: After lunch we would like to see the calculations pertinent to the portion of the concrete wall supporting the upper lateral beam and that's it and any related information that could help us to make a better assessment.

MR. BURWELL: I might add that you might

also include the analysis that was done for the earlier sessions of the hearing in which this allegation was first discussed. Off the record. Let's break for lunch.

(Luncheon recess.)

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

MR. BURWELL: I believe what we were going to do this afternoon is start taking a look at the analysis. With that gentlemen, I guess it's your show.

MR. REICH: Anil was going to start off.

MR. KENKRE: Do we want to see the hand calculation that were done as a result of the NASTRAN analysis?

MR. REICH: Not only the NASTRAN calculations but any hand calculations that you've done.

MR. KENKRE: Okay.

MR. BURWELL: Would it be a good way to start off with the evolution of the design? How do you have it arranged? Any way you would like.

MR. KENKRE: I would suggest we start with this first and this is the hand calculation that

were done as a result of the recent NASTRAN analysis.

MR. RINALDI: Were there any calculations before that, before the NASTRAN program was run, to evaluate 58 thermal loads?

MR. KENKRE: Yes. These were hand calculations that were done at the time of the previous testimony. I don't remember the date exactly and those were the calculations which they felt were not complete enough and that's why we are here.

MR. KUO: Can I suggest one thing. Can you go through this calculation back here, spend about five or ten minutes, and tell all of us what you have in there and where we can find certain things. Then we can break and then let us take a look at the calculations ourselves.

MR. KENKRE: Okay.

MR. RINALDI: The other item I think --

MR. REICH: This was a good point.

MR. RINALDI: -- that we were trying to clear this morning was the verification of the loads. I think they would help us making the conclusion on any points that we get from either this calculation or the other one that you were referring to before.

MR. KENKRE: Yes. Okay. Fine.

MR. RINALDI: It's a possibility that the loads may be, considering the analysis, may be much larger than the actual load that you may have.

MR. KENKRE: I will need a little time to go and see what the situation is because somebody is looking for that documentation.

MR. EICHLER: As a clarification for that, Frank, the loads that we would clarify or verify would be the status of the Westinghouse loads and those are not thermal loads.

MR. KUO: I understand. Whatever the loads you got from Westinghouse.

MR. EICHLER: Whatever loads, okay.

MR. REICH: Let me ask you this. You mentioned before that there was a time that you did do some calculations for the thermal loads which you showed I guess at some hearing and you said it was rejected or something like that or you were told to redo it. I think Anil just mentioned that. Am I right?

MR. KENKRE: Right.

MR. REICH: Could you show us those, too?

MR. EICHLER: Yes. They are a matter of the record actually. They were simplified calculations done during the court hearings, the

licensing hearings, in which we made an assessment of the stiffness of the walls and the thermal thrust on a purely manual basis.

MR. REICH: We would like to see that, too. That sounds like -- in fact, we would like to see those first.

MR. EICHLER: That was the thing which in effect ended up with being inadequate and going on to better, even better things and a real realistic analysis, resulted in a request by the licensing judge that a more definitive analysis considering the actual stiffness and physical configuration of the term structures be taken into account in serving the interaction between the lateral supports and the structure. Yes, we can. Would you rather see those?

MR. REICH: We will see both.

MR. EICHLER: All right.

MR. REICH: We can start with these while somebody is looking for the other ones.

MR. EICHLER: Fine. Go ahead. I'll get them.

MR. KENKRE: These calculations are calculation book number SRB-167C, set 3, sheets 1 through 52.

MR. REICH: Could you go over that? You

went pretty fast.

MR. KENKRE: SRB-167C, set 3, sheets 1 through 52. These calculations were included in the recent submittal to NRC. These are the calculations that we went through the last time we were here in I think the August meeting or whatever. What these calculations are, as a result of the NASTRAN analysis, we have taken out from those outputs the thrust from the lateral beams and computed by hand the punching stresses, punching shear stress in the walls, and also the diagonal tension in the plates.

MR. RINALDI: Excuse me. Based on your discussions with Brook Haven, any changes have been made to these calculations or any changes have been contemplated on these calculations?

MR. KENKRE: Based on the discussion in, was it August or --

MR. BURWELL: That was the meeting.

MR. KENKRE: Was it August or October? August, I think. We had made some additional calculation and submitted them.

MR. BURWELL: You submitted those to Brookhaven and to the NRC?

MR. KENKRE: Right.

MR. COSTANTINO: Those were the back of

the envelope numbers we were talking about before?

MR. KENKRE: Yes. But they were done on the same sort of calculation sheets.

MR. REICH: Anil, the set we have, though, is called SRB-4C3. That's one set. Let's see what the other set is. Now, we have the 167 but we are starting off on, I think, page 50, yes, 53.

MR. KENKRE: 53 is those additional calculation that resulted from our discussions.

MR. REICH: But I don't have the other page. Okay. I may have them someplace but I don't know for sure.

MR. BURWELL: Perhaps when you look at it, you'll be able to recognize them now.

MR. REICH: These I went over in detail.

MR. KENKRE: Right. These calculations also include some calculation on the embedment of the upper lateral, as far as these hand calculations are concerned, just to say what they contain. Now is the right time to go to the old calculations which were done for the licensing?

MR REICH: Before you go ahead even to the old ones, can you sort of summarize for us, when you did these calculations and you looked at the upper lateral -- let's first go to the upper lateral

support -- and you made the calculations for the, let's say, punching shear and things like that, what did you use? What kind of numbers did you use? Do you have that summarized?

MR. KENKRE: Yes. The thrust that we got, the maximum thrust that we got from the NASTRAN analysis, the maximum thrust in the beams, we took those thrusts and evaluated the punching shear on the walls.

MR. REICH: What was the case? What was the maximum case?

MR. KENKRE: The maximum case was the main steam break. Let me just verify that. With 450 pounds per square inch, tensile strength in concrete.

MR. REICH: Is that calculation on sheet 60? Is that the one?

MR. KENKRE: No. The one that I'm looking at here are the calculations prior to calculations that were generated as a result of the meeting.

MR. REICH: Fine. Go ahead.

MR. KENKRE: We took the thrust from the NASTRAN analysis and we put them on the concrete walls and evaluated the stresses. There were only two areas where we did not have diaphragm immediately behind these beams and those were the

ones which were considered as the most critical ones and we looked at those.

MR. REICH: Okay.

MR. COSTANTINO: How did you decide on most critical?

MR. KENKRE: First by looking at the geometry, first of all, the thrust on both walls were identical. One of the wall had diaphragm immediately beyond, behind the bed so that was not a critical because it could never punch through that area. The other side wall did not have the diaphragm. That's how we concluded that should be the critical one as far as the area is concerned and we had picked the maximum thrust which was as a result of main steam break.

MR. COSTANTINO: Is punching shear the only item you looked at?

MR. KENKRE: No. We looked at diagonal tension shear also and those we looked at a distance D from the supports and load point and there we took the value from the NASTRAN code.

MR. MILLER: Did you do that element by element?

MR. KENKRE: Yes.

MR. MILLER: So you satisfied the

allowable shear within each element?

MR. KENKRE: Right.

MR. REICH: But the case was the 450 PSI?

MR. KENKRE: Right. That is as far as these calculations.

MR. KUO: What else in your calculation book there?

MR. KENKRE: That's all. I'm referring to these calculations.

MR. REICH: Let's take a look at that first.

MR. COSTANTINO: How about looking at stresses and rebar.

MR. KENKRE: The stresses in the rebar were looked at directly from the output of the NASTRAN because the stress in the rebars is one of the --

MR. COSTANTINO: One of the outputs from the NASTRAN?

MR. KENKRE: Right.

MR. REICH: But you have to remember that the rebar stress from, according to what we know about the NASTRAN, cannot do any inelasticity in the rebar. Right?

MR. KENKRE: We don't know because we have

not written --

MR. COSTANTINO: In any situation did the rebar yield?

MR. KENKRE: No.

MR. REICH: It couldn't because it just doesn't work that way.

MR. COSTANTINO: The stress output was less than yield?

MR. KENKRE: Yes.

MR. SHARMA: Those rebar stresses were based on this 450 PSI concrete strength?

MR. KENKRE: Let me take a look at the table which gives -- the question was whether these maximum stresses were from a certain loading combination?

MR. SHARMA: No. Whether those rebar stresses were based on 450 PSI tensile strength concrete or zero strength tensile strength concrete.

MR. KENKRE: The answer to the question is we will take a look at the table that was put forth. I don't remember off the top of my head.

MR. JAN: Very likely it's the case because it will give you very less flexibility in the wall because you assume higher tensile strength in the concrete. Therefore, you have less degree of

cracking.

MR. EICHLER: Already on the record there is a table in Iotti's testimony and which we discussed last time, I think we provided some clarifying tables in addition to that which tabulated the stresses from the NASTRAN output for both zero and 450 PSI but not necessarily in every case, every load case. Both were looked at. Both were considered.

MR. KENKRE: Any questions on this as to what this calculation is?

MR. REICH: Maybe we should get off the record, look at this first, and then come back to the next package after this.

MR. BURWELL: Fine. Could we go off the record.

(Discussion off the record.)

(Short break.)

MR. BURWELL: Let's go back on the record and I believe you gentlemen had one or two quick questions on what some of the things in the analysis were.

MR. MILLER: On page 36 of that calculation, SRB-167C, what I would like to have someone do is to sort of walk through the drawings

relative to the dimensions, the dimensions of the shear punch out section. It seems to me it's the northeast wall and if you could sort of relate dimensions on here to things on the drawing, I think that would be of help. I think in doing that, it would be nice if you could sort of sketch a section through that wall.

MR. RINALDI: Compartment three I believe he is indicating, compartment three.

MR. MILLER: It looks like that's the one that is really of most interest.

MR. RINALDI: I think if we indicate by compartment, I think that would be clearer.

MR. KENKRE: This one?

MR. MILLER: The one above that.

MR. KENKRE: This 66 inches, which is here, that is this distance and we have taken the 45 degrees dispersion and the section that is checked is D by two and this is what the section looks like over there.

MR. MILLER: Where in there do you get the 77 inches thick section?

MR. KENKRE: This is not a 77 thick section. This distance is 77. This is the periphery at the D by two.

MR. MC GRANE: Go up a little higher.

MR. KENKRE: This 77 is from here and that is 38. This is 38.

MR. MC GRANE: Okay.

MR. MILLER: So you are saying that above the support that wall is 2'9" or 33 inches thick.

MR. KENKRE: Yes.

MR. MILLER: On that wall below is four feet thick.

MR. KENKRE: Right.

MR. MILLER: And the slab that comes in --

MR. KENKRE: This one is 18 inches thick.

MR. MILLER: 18? If that properly describes the geometry, then I can make my own --

MR. KENKRE: We are making sketches for you, the 16 sketches. You have 4 upper, 4 lower, 8, has got 2 ends, so 16, we will have 16 sketches showing the geometry.

MR. MILLER: Then this is sort of redundant. Sorry about that.

MR. KENKRE: We are making cross-sections exactly at the junction of the beams and the walls.

MR. BURWELL: Through the center line of the support as it is attached to the wall.

MR. MC GRANE: That's a three-foot slab.

MR. MILLER: As long as he is preparing the sketches, then this is sort of not too necessary.

MR. REICH: You are also preparing something on the lower one like that?

MR. KENKRE: 4 lower beams, 4 upper beams, we have 8 times 2, 16 sketches.

MR. BURWELL: What is that 19-inch dimension?

MR. KENKRE: That is the dimension from the pad to where the critical section intersects.

MR. BURWELL: Fine.

MR. RINALDI: Maybe I guess we are at the point where you could explain all the calculations, the one before the NASTRAN, to see if we have any problem with that or questions.

MR. KENKRE: This hand calculation was making a lot of assumption as far as stiffnesses of the walls were concerned and the basis was, the basis is really depicted on this graphical solution here where what we are saying is if the supports were not moving at all, then we will have a certain load, depending on the differential temperature, and if they are fully flexible, is allowed to grow without any restriction at all, then the growth would be so much. We draw a line and then we have

these lines going from the origin which showed the assumed stiffnesses of each of the two end walls. Then we draw an imaginary line here which would be the balancing load. The load will be somewhere between zero and this maximum of 14,402 and we find this graphically of how much that balance and load would be and then we use that load and verify what the stresses in the walls would be only due to that thrust. Those stresses were then added -- I'm sorry. Due to that stress, we found out how much reinforcement would be required and then to that we added the reinforcement that was required for originals which was done for all other loadings except the thrust.

MR. COSTANTINO: Can you repeat that? This does the thermal load component only?

MR. KENKRE: Yes. We found out what is the reinforcement required for that component. To that we added the reinforcement that was required in the original STARDYNE calculations.

MR. COSTANTINO: For seismic?

MR. KENKRE: For seismic and other loads, dead load, live load and so forth, seismic and so forth.

MR. RINALDI: What controls this

computation is the differential temperature that you take in design?

MR. KENKRE: Yes.

MR. RINALDI: It's very important to pick the correct differential temperature.

MR. KENKRE: Yes.

MR. RINALDI: Because if you underestimate or overestimate, you might get considerable change in results, less reinforcing or much more than you required.

MR. KENKRE: That's correct.

MR. RINALDI: Is this temperature in agreement with all the calculated temperature values?

MR. KENKRE: The answer is this temperature is based on LOCA break. For example, we have seen several values. At the last meeting, I think we referred to the calculated value of 355. This calculation, are they consistent with that value?

MR. KENKRE: These calculations were done prior to the HEATING 5 code used. This had approximately 220 and this was for LOCA.

MR. KUO: 220 instead of 355?

MR. KENKRE: 220 instead of 210 that we have now got for LOCA. The main steam was not

considered here.

MR. KUO: How did you determine the position of that horizontal line there, balancing the loads you mentioned before?

MR. KENKRE: This can be done graphically by trial and error or you can make two equations and find that out also. What shows here is the graphical approach.

MR. KUO: So you draw the line by trial and error?

MR. KENKRE: Right.

MR. COSTANTINO: The two displacements have to equal the thermal growth potential.

MR. RINALDI: So basically you are saying that the value, the differential temperature that you used in this calculation is more conservative than the one derived from the HEATING 5 code?

MR. KENKRE: No. I think we had used 220 as the differential temperature. The one that we got after the HEATING 5 code was done is I think 282 or something like that.

MR. RINALDI: For the upper lateral restraint beam and LOCA condition.

MR. KUO: There were several values mentioned. Let's clarify that once. You mentioned

a number 210 and there's a 220, there's a 285 and there's 355. Can you clarify each of these values, what they are?

MR. KENKRE: I would need all the documents that go along with it, which is the tables and the testimony.

MR. KUO: Just give us a description. What is 210? What is that number?

MR. KENKRE: That's why I will need that document which will show that figure 210.

MR. EICHLER: You are talking of differential temperatures, aren't you?

MR. KENKRE: Right.

MR. EICHLER: We are mixing apples and oranges.

MR. KUO: That's what I'm trying to clarify for the record.

MR. COSTANTINO: 285 and 355 are both main steam break. 285 is differential temperature and add to that 70, the ambient, gives you the 355, which is the main steam break temperature, is that right, and the LOCA temperature is 220 plus 70 which is 290 which is the absolute temperature. You are saying there's maybe a 210 instead of a 220?

MR. KENKRE: Maybe 210 is not the right

number. I don't recollect. There are so many numbers.

MR. COSTANTINO: A LOCA which is 220 differential and a main steam is 285 differential.

MR. REICH: In the letter that we have here, it says the upper beam temperature will be 282 F, the lower one 289. That's for LOCA. At 216 seconds, it is 282 degrees Fahrenheit at the upper beam and 289 degrees Fahrenheit at the lower beam and finally at the main steam peak temperatures at 324 seconds, you have 370 degrees Fahrenheit but there Iotti told us at the last meeting that they had calculated this with the codes mentioned previously and they found out that, they concluded that there were 355 degrees Fahrenheit, not 370 Fahrenheit.

MR. EICHLER: For the purposes of discussing this calculation, let me speak of main steam and LOCA. The two should not be used in the same context with respect to this. In hearings at that time, the allegations were with respect to LOCA, LOCA effects, LOCA temperatures, and LOCA and nothing but LOCA, and until the time that the court order December 28, '83, came out, no one had discussed main steam. Main steam was not an issue.

LOCA was and consequently everything that has been done with respect to these calculations will refer only to LOCA. The differential temperatures of 210 or 220, the best point that could be made there, chances are that we used the more conservative rather than diminished to be less conservative differential temperature, the actual beam growth, so if anything, we overstated the effects.

Main steam came about only subsequent and during the NASTRAN analysis where, because you have certain physical realities, upper beam, lower beam. Lower beams have not been mentioned during the court hearings. LOCA with its lower temperature, higher pressure, but coincident seismic effect was one case, but it's obvious, and if we didn't raise it, somebody else might, therefore we raised it. The main steam had to be looked at. Higher temperature, nill pressure, differentials and, of course, no seismic. That's how main steam got in there. So I just wanted to put it in context since Frank brought the question up.

MR. COSTANTINO: Are we going to get a copy of the two sets of calculations or will a copy be sent?

MR. REICH: A third set.

MR. COSTANTINO: Apparently there is no third set.

MR. EICHLER: You mean the hand calculations?

MR. COSTANTINO: Yes, to look at those, page 1 to 52.

MR. REICH: Those are the ones, then, at the hearing which were rejected. Am I correct?

MR. EICHLER: Can we go off the record, please.

(Discussion off the record.)

MR. MILLER: After reviewing the steel that was left out in the lower portion of the containment and considering its distance from the upper lateral restraint beam and the supports of the upper lateral restraint beam, we conclude that that missing beam can have no impact on the stresses in the vicinity of the upper lateral restraint beam or in the capability of the upper lateral restraint beam to perform its function.

MR. MC GRANE: Would you like to contain that containment to the reactor cavity?

MR. MILLER: The reactor cavity wall, right.

MR. KUO: Can we also describe what our

information that we requested and that will be provided by Gibbs & Hill and are we bringing back with us today.

MR. REICH: Can we have those? First of all, we are taking a calculation number SRB-167C, set three, and we are taking that from sheet number 2 up to 52, those calculations. We have no cover sheet.

MR. KENKRE: Make it 1 to 52.

MR. REICH: Now it's 1 to 52. We have been given the cover sheet. Amend it. The next one, the next bundle of things that we are getting is calculation number SRB-111C, set 4, and it starts with sheet 30 and it goes up to number 51 and again, I'll give you the subject is the upper lateral restraint, accident temperature investigation. On the latter, by the way, the first one, the title is Analysis for Accident Temperature (Cracked Model).

Now, in addition to this, we understand that we are going to get drawings pertaining to the cross-sections of the upper and lower support, where the beams contact the wall and the wall measurements in the area there, descriptions of the wall and the rebar area, rebars in the wall.

MR. KENKRE: Could we make it sketches

instead of drawings?

MR. REICH: Sketches. Not drawings. These are sketches. We are getting 16 sketches.

MR. BURWELL: In fact, if you could do those sketches on an 8 1/2 by 11 sheet of paper, it's much easier for us to handle and it would be entirely adequate.

MR. REICH: In addition, we are going to get a set of drawings which are up on the wall here, just to make sure that we have the same set of drawings. That's about it.

MR. BURWELL: I believe you are.

MR. REICH: And the reinforcing detail. That's the only item which isn't up on the wall.

MR. BURWELL: I said I believe you will have to mail us the drawings. Is that not correct?

MR. KENKRE: That's correct. We will have to mail. Would you also need Westinghouse drawings on the upper and the lower? Do you need them?

MR. BURWELL: Would they be proprietary to Westinghouse?

MR. KENKRE: We have used them to do our calculations.

MR. REICH: Okay.

MR. COSTANTINO: The answer is yes.

MR. REICH: Yes.

MR. KENKRE: There was a question about the Westinghouse's load that were given. I have got some information on that. WPT 1203 of July, 1976.

MR. MC GRANE: For the court reporter's information, that's a letter number.

MR. KENKRE: Of July, '76, the loads given to us by Westinghouse by this letter was used in our original STARDYNE analysis and here we had assumed the peak loads in all the cases without trying to see whether they were occurring simultaneously or not. Later on WPT 6668 of October '83 and 6987 of February, '84 provided the loads which were different from the earlier loads and which were smaller than the earlier loads and these loads were used in our latest NASTRAN analyses with due regard to whether they occur simultaneously or not.

MR. KUO: Can you repeat the last part?

MR. KENKRE: The WPT 6668 and 6987 provided loads which were less than the loads provided earlier by WPT 1203 and these loads were used in our latest NASTRAN analysis with due regard to time relationship between them.

MR. REICH: Thank you. That's it.

MR. KUO: When can our consultants get

your drawings? You are going to send out tomorrow?

MR. EICHLER: Friday it will go in the mail.

MR. REICH: It usually comes within a day.

MR. MC GRANE: Our reproduction efforts aren't as prompt as they used to be.

MR. REICH: Monday we should have it problem. By the way, when you send it, last time you wrote deliver 129 and it came there, which is good because otherwise it goes to some building and we have trouble finding it.

MR. KENKRE: We used the same address that you gave me.

MR. KUO: That's all we have, Spot.

MR. BURWELL: If I may summarize, which we did a little bit earlier perhaps, I believe you made the statement that with respect to the analysis of the upper lateral restraint, that the missing rebar question would not impact your analysis for that portion and conversely, that your analysis or the forces and design of the upper lateral support were sufficiently removed so that they would not impact any analysis on the question of, on the behavior of the wall in the area of the missing rebar.

With that, I believe we are finished and

all I can say is thank you very much, gentlemen. I note we got the information we wanted, which was a good physical description of the design, and we will get the description of the rebar arrangement and so on in forthcoming drawings. Thank you.

MR. MC GRANE: Our pleasure.

MR. BURWELL: Would you make that Exhibit 2.

(Exhibit 2 marked.)

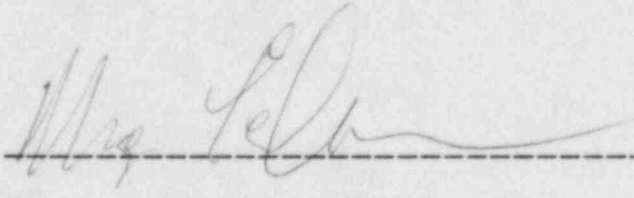
(Proceedings concluded.)

C E R T I F I C A T E

I, MARGARET J. TEILHABER, a Certified Shorthand Reporter and Notary Public of the State of New Jersey, do hereby certify that prior to the commencement of the examination the witness and/or witnesses were sworn by me to testify the truth, the whole truth and nothing but the truth.

I do further certify that the foregoing is a true and accurate transcript of the testimony as taken stenographically by and before me at the time, place and on the date hereinbefore set forth.

I do further certify that I am neither of counsel nor attorney for any party in this action and that I am not interested in the event nor outcome of this litigation.



Notary Public of the State of New Jersey

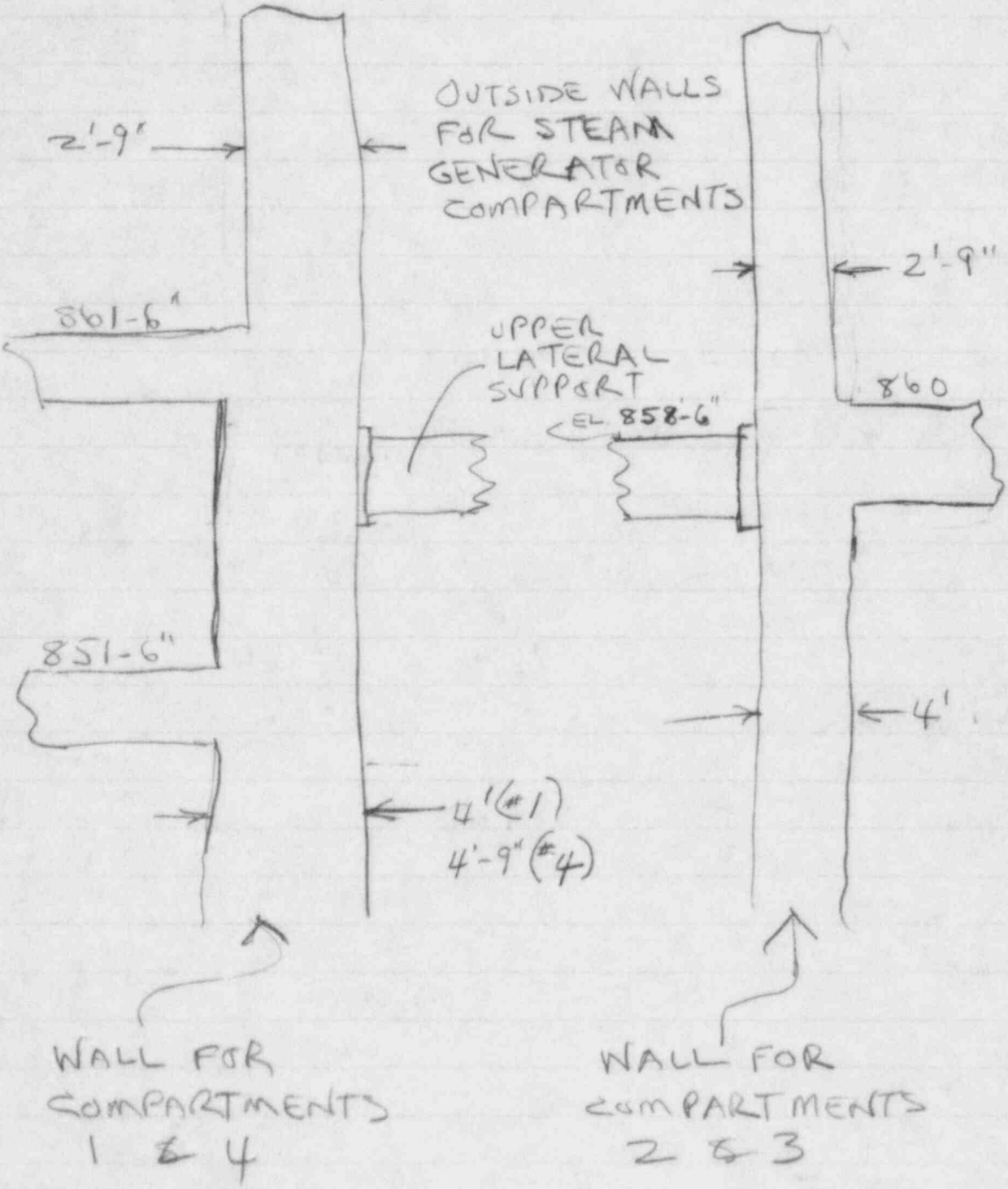
Certificate Number 856

My commission expires July, 1986.

Dated: _____

EXHIBIT
1
4-5-84 mjt

DESCRIPTION OF OUTER WALLS OF THE STEAM GENERATOR COMPARTMENTS (A. Kenkre)



CROSS-SECTION OF OUTER WALL OF COMPARTMENT #3 (A. Kenkre)