ORIGINAL

OFFICIAL TRANSCRIPT
PROCEEDINGS BEFORE

NUCLEAR REGULATORY COMMISSION

THE ATOMIC SAFETY AND LICENSING BOARD

DKT/CASE NO. 50-454 OL & 50-455 OL

TITLE COMMONWEALTH EDISON COMPANY
(Byron Nuclear Power Station, Units 1 & 2)

PLACE Rockford, Illinois

DATE March 4, 1983

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:	Docket Nos.:
COMMONWEALTH EDISON COMPANY (Byron Nuclear Power Station Unit 1)	50-454 OL
COMMONWEALTH EDISON COMPANY (Byron Nuclear Power Station Unit 2)	50-455 OL

United States District Courthouse
211 South Court Street
Rockford, Illinois

March 4, 1983

The hearing in the above-entitled matter convened, pursuant to notice, at 8:30 A. M.

BEFORE:

IVAN W. SMITH,
Administrative Judge

DIXON A. CALLIHAN,
Administrative Judge

RICHARD F. COLE,
Administrative Judge

APPEARANCES:

On behalf of Licensee, Commonwealth Edison Company:

Alan Bielawski, Esq.

Victor Copeland, Esq.
Joseph Gallo, Esq.

Isham, Lincoln & Beale
Three First National Plaza
Chicago, Illinois 60602

On behalf of Nuclear Regulatory Commission Staff:

Steven Goldberg, Esq.
Richard Rawson Esq.

On behalf of the Intervenors:

Bryan Savage, Esq.
Diane Chavez
Paul Holmbeck
Betty Johnson

C O N T E N T S

JUDGE SMITH: Is there any preliminary business?

MR. GALLO: Judge Smith.

JUDGE SMITH: Mr. Gallo.

MR. GALLO: It would be helpful, if it's possible and convenient for the board, if we could find out the schedule for Monday in order to schedule in witnesses.

JUDGE SMITH: 2:30 to 6:00, no afternoon break.

MR. GALLO: That's fine. Thank you.

JUDGE SMITH: Are you ready to testify, sir?

MR. SERKIZ: Yes, sir.

JUDGE SMITH: May I administer the oath?

(Witness sworn.)

JUDGE SMITH: Where are you going to sit?

MR. SERKIZ: If the board wants me to sit there, I will sit there.

JUDGE SMITH: Yes, I think that would be a good place.

MR. GOLDBERG: Could the witness sit --

JUDGE SMITH: I am sorry. I could see him better there.

JUDGE COLE: I can't see him from there. then.

MR. GOLDBERG: You are better here then. Okay. Go ahead.

We will be breaking today at 11:30 today.

ALECK SERKIZ

called as a witness by counsel for NRC Staff, having been first duly sworn by the Chairman, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. GOLDBERG

Q Mr. Serkiz, do you have before you a document entitled testimony of Aleck Serkiz on DAARE/SAFE Contention 9A?

A I do.

Q Did you write that document?

A Yes, I did.

Q Do you have any changes you wish to make?

A No, sir.

Q Are the contents true and correct?

A The contents are true and correct to the best of my knowledge.

Q Do you adopt this as a statement of your testimony in this proceeding?

A I do.

Q Do you also have attached thereto a written statement of professional qualifications?

A I do.

Q Did you write that document?

A Yes, sir.

Q Do you have any changes to make?

A No, sir.
Q Are its contents true and correct?
A The contents are true and correct.
Q Do you adopt it as a statement of your professional qualifications in this proceeding?
A I do.

MR. GOLDBERG: Judge, at this time I would like to move that the written testimony of Aleck Serkiz and accompanying statement of professional qualification be received in evidence and bound into the record as if read.

JUDGE SMITH: Are there any objections?

MR. COPELAND: Applicant has no objections, your Honor.

MS. CHAVEZ: DAARE/SAFE has no objections.

JUDGE SMITH: The testify is received.

(The document referred to, the prepared testimony of Aleck Serkiz, received in evidence, follows:)

MR. GOLDBERG: At this time, Judge, the witness is available for Cross Examination.

JUDGE SMITH: Ms. Chavez.

CROSS-EXAMINATION ON BEHALF OF DAARE/SAFE

BY MS. CHAVEZ

Q Mr. Serkiz, can you hear me?

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	)	50-455
(Byron Station, Units 1 and 2)	)	

TESTIMONY OF ALECK SERKIZ ON DAARE/SAFE CONTENTION 9A

Serkiz Summary

This testimony addresses the issue raised in DAARE/SAFE Contention 9(a) regarding the implications of the 1981 KRSKO water hammer event on Byron. It makes the following principal points:

1. As best as can be determined, the KRSKO water hammer occurred external to the steam generator, namely, a bulge or blister in the bypass piping of the secondary shield wall. The cause is attributed to backleakage through auxiliary feedwater (AFW) check valves which were apparently known to leak. It was reported that the incident occurred during intermittent testing of the AFW pumps.

2. Whereas the KRSKO event indicated that a water hammer (due to a steam void collapse) can occur in a plant which employs a preheat steam generator, there are key design features, controls and operating procedures for Byron which differ from those that contributed to the KRSKO event. A generic evaluation performed by Staff consultants concluded that water hammer potential is very low if these features, controls and procedures are present.

3. In the Staff opinion, the KRSKO event is unique to that plant and not generic in nature.

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TESTIMONY OF ALECK W. SERKIZ
REGARDING DAARE/SAFE CONTENTION 9(a)

Q.1. Please state your name and affiliation.

A.1. My name is Aleck W. Serkiz. I am a Senior Task Manager in the Generic Issues Branch, in the Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission. A copy of my professional qualifications is attached.

Q.2. What is the purpose of your testimony?

A.2. The purpose of this testimony is to address the staff position with regard to DAARE/SAFE Contention 9(a) dealing with serious water hammer problems.

Q.3. Do you adopt the SER section on water hammer as part of your direct testimony?

A.3. Yes. As task manager for Unresolved Safety Issue (USI) A-1, "Water Hammer", I have reviewed Section C.5 (A-1) of the February 1982 Byron Safety Evaluation Report (NUREG-0876) and adopt it as a part of my direct testimony on contention 9(a).

Q.4. Are you aware of a 1981 water hammer event at the KRSKO nuclear plant in Yugoslavia which utilizes a Type D-4 steam generator?

A.4. Yes. In affidavits accompanying the Applicant's June 7, 1982 motion for summary disposition of Contention 9(a) reference is made to a water hammer event believed to have occurred at the KRSKO Nuclear Power Plant in Yugoslavia during hot functional testing in July 1981 and cite examinations revealing small permanent displacement of some feedwater bypass piping and some bulging in the area of the secondary shield wall. Discovery of damage is given as August 1981.

Q.5 What is the extent of your knowledge about this event?

A.5 The Staff does not have precise details of events leading to the water hammer occurrence at the KRSKO. Some information regarding this KRSKO event was obtained in a meeting with Westinghouse and Commonwealth Edison staff on July 27, 1982, 1/ and followup information was transmitted by Commonwealth Edison on September 9, 1982. 2/ The Staff's knowledge of the KRSKO water hammer event is based on Applicant answers to Staff questions provided in a September 9, 1982 memorandum. 2/ This memorandum also relates the KRSKO event and system design features to the Byron plants. As reported, the KRSKO water hammer occurred external to the steam generator (e.g., a bulge or blister in the bypass piping downstream of the secondary shield wall was reported). The cause was attributed to backleakage through auxiliary feedwater (AFW) check valves "which were known to leak" and were later refurbished. 2/ In addition, it was reported that the incident occurred during intermittent testing

(e.g., "start and stop") of the AFW pumps. Thus, it appears that both design deficiencies (i.e., leaky check valves and random AFW system operation) led to the KRSKO event.

Q.6. What corrective measures did Westinghouse recommend to KRSKO?

A.6. The corrective actions recommended to KRSKO were: (a) maintain steam generator water level above the auxiliary feedwater discharge pipe inside the steam generator, (b) at low load or hot standby conditions, the operator is instructed to supply feedwater continuously rather than intermittently, and (c) instrument the piping upstream of the steam generator auxiliary feedwater nozzle to monitor temperature for detecting the onset of steam back leakage. In retrospect, had these corrective measures been in effect in the first place (particularly the continuous feedwater flow in the AFW line), the KRSKO water hammer event would likely not have occurred.

Q.7. What is your assessment of the significance of the KRSKO event to Byron?

A.7. Whereas the KRSKO event reveals that a water hammer (due to steam void collapse) can occur in a plant which employs preheat steam generators, there are important design features, controls and operating procedures for Byron which are designed to prevent establishment of those conditions which contributed to the KRSKO water hammer. These can be summarized as follows:

(1) In contrast to KRSKO startup, Byron startup uses the main feedwater system. Leakage through the feedwater regulatory

valves is eliminated by closure of the upstream isolation valve and steam generator level control during hot standby is to be controlled by blowdown not intermittent feed.

(2) Although automatic switchover to the lower steam generator nozzle occurs at 20% power, tempering flow will be maintained through the upper steam generator auxilliary feed nozzle during all phases of power operation. With continuous flow in this line back leakage of steam is essentially eliminated. Also, the Byron steam generators are to be under automatic level control at all times thus further lowering the potential for uncovery of the AFW nozzle within the steam generator and avoiding exposure of the AFW line to steam. A more detailed discussion of the Byron design and operational procedures are contained in the September 9, 1982 Applicant answers to Staff questions.[2]

(3) Although the applicant has indicated[3] that warming flow to the auxilliary nozzle will not be maintained during the heat-up phase, and that the check valve near the auxilliary nozzle of the steam generator will be removed (or rade inoperable), the installation of temperature sensors on the bypass piping near the auxilliary nozzle will provide a means for detecting back leakage of steam or hot water -- thereby avoiding the type of situation which occurred at the KRSKO plant.

In addition, the question of water hammer potential in preheat steam generators has been studied from a generic viewpoint.[4] This generic evaluation concluded that water hammer potential is very low if the types of design features and operational controls such as planned for the Byron plants are implemented. Thus, it is the Staff position that the KRSKO event is plant-specific and not generic in nature.

Q.8. Does the Staff believe that any additional water hammer protection features are necessary as a result of this event?

A.8. No. As noted above, the Byron plant design features and operational procedures appear adequate and capable of avoiding a water hammer condition similar to that which occurred at KRSKO. Furthermore, the actual susceptability of the Byron steam generators to water hammer will be determined during preoperational testing as noted in Section 10.4.7 of the Byron SER.

References

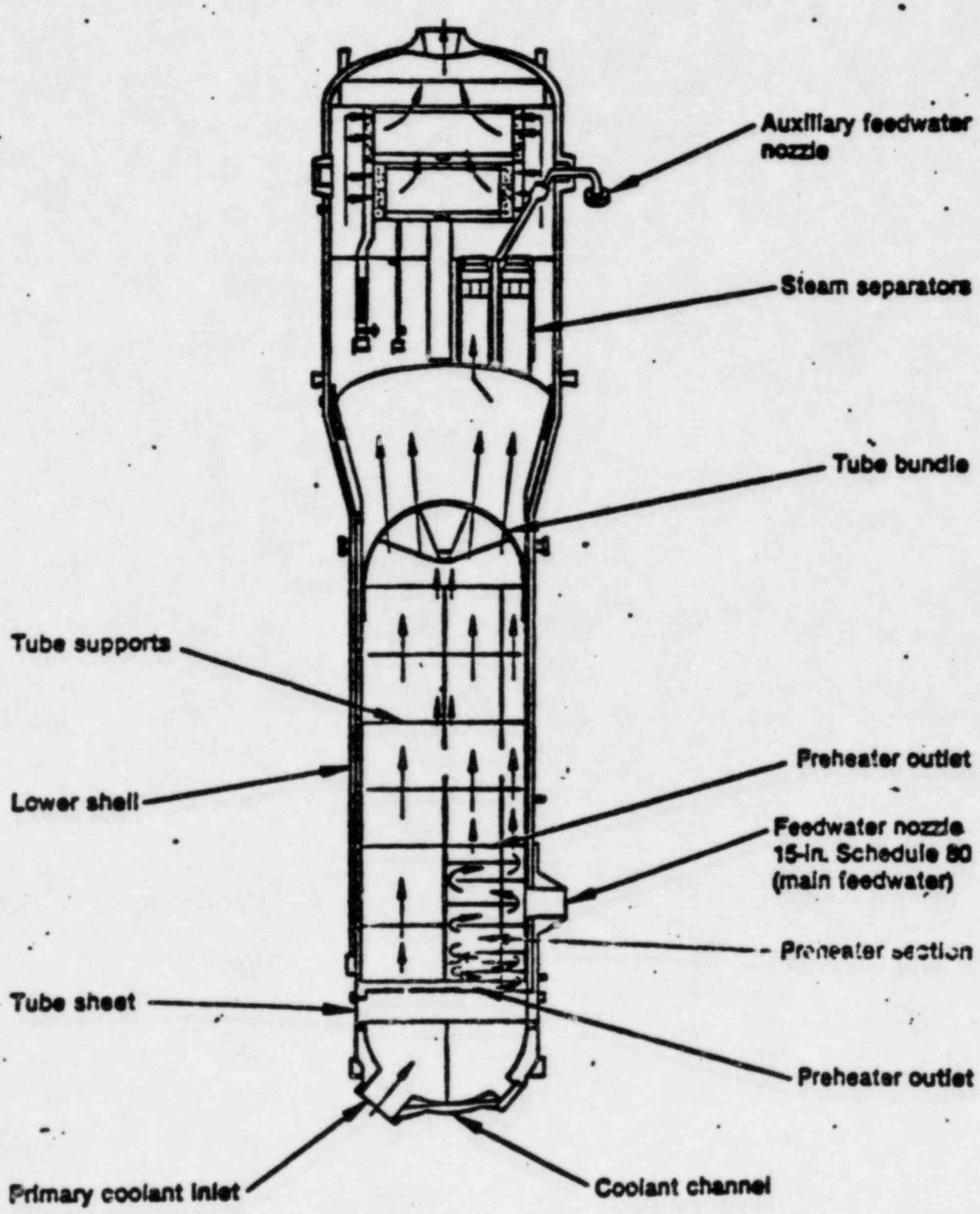
1. 8/5/82, Memo from S. H. Chestnut to B. J. Youngblood summarizing 7/27/82 meeting with Westinghouse.

2. 9/9/82 Memo from T. R. Tramm (Commonwealth Edison) to H. R. Denton (NRC), "Byron Station Units 1 and 2, Braidwood Station Units 1 and 2 Water Hammer Prevention, NRC Docket Nos. 50-545, 50-455, 50-456, 50-457."

3. Affidavit of Kenneth A. Ainger (Commonwealth Edison Co.) submitted before the Atomic Safety and Licensing Board on February 10, 1983.

4. NUREG/CR-3090, "Evaluation of Water Hammer Potential in Preheat Steam Generators," December 1982.

Figure 1 Preheat Steam Generator at McGuire 1



PROFESSIONAL QUALIFICATIONS

Aleck W. Serkiz

My name is Aleck W. Serkiz and I am employed as a Senior Task Manager in the Generic Issues Branch, Division of Safety Technology, U. S. Nuclear Regulatory Commission, Washington, D. C. I have held this position since April 1981 and am responsible for managing efforts related to the resolution of the Unresolved Safety Issue A-1, Water Hammer.

I received my Bachelor of Science Degree in Mechanical Engineering from Clarkson College of Technology in 1956 and attended the University of Cincinnati graduate school in 1958-1960. I am also a registered Professional Engineer in Ohio and Pennsylvania.

Prior to joining the Generic Issues Branch, I was employed in Division of Reactor Safety Research, Office of Nuclear Reactor Research, NRC for 7½ years in the position of Senior Nuclear Engineer, Section Leader and Branch Chief (Acting). During those years I planned and supervised experimental research programs directed at resolving thermal hydraulic questions associated with the loss-of-coolant accident phenomena. I joined the Atomic Energy Commission in 1973, being employed by the Division of Reactor Licensing. Prior to government employment I was employed by Battelle Memorial Institute - Columbus Laboratories and by the General Electric Company. I have accumulated 26 years of experience in engineering, project management and supervision; 17 of those years have been in the private sector. Most of my experience has been related to power systems (both nuclear and non-nuclear), nuclear safety related research and reactor licensing.

A Yes, I can.
Q If at any point in the proceeding, you don't understand what I am saying, please indicate so.

Can you identify for me a short description of what the water hammer phemonenon is?
A Would you repeat that question again, please?
Q Yes. Can you give me a short description of the water hammer phenomena?
A Water hammer phenomena as related to the contention in question has to do with steam water hammer.

That phenomena has to do with steam condensation that is brought about by cold water coming in contact with steam, causing a condensation locally and then setting up a potential for a water slug to impact structures.
Q Okay. Mr. Serkiz, is there any differentiation between water hammer in bubble collapse phenomena in preheat steam generators as opposed to other types of steam generators?
A Repeat the question, please.
Q Is there any difference between bubble collapse water hammer in preheat steam generators as opposed to other types of steam generators?
A The phenomena referred to as bubble collapse is the same as I indicated earlier, steam pocket collapse.

A bubble or a pocket can be considered the same terminology.

Q Okay. Does it occur in the same location in both types -- in all types of steam generators?

A Steam water hammer can occur in a system where steam and water come in contact. There is no one preferred place that steam water hammer has to occur.

Q Can you give me an idea of the locations at which bubble collapse water hammer has occurred in steam generators?

MR. COPELAND: Your Honor. I would like to object to the relevance of this question.

We have a specified contention here where the water hammer occurred. We only have three hours here this morning.

I don't think it's necessary to go into a general exposition of water hammer in other steam generators.

JUDGE SMITH: I might say, Ms. Chavez, that. perhaps. the relevancy of the question is really arguable and debatable; and that will be a judgment call.

MS. CHAVEZ: Okay.

JUDGE SMITH: No matter what, you will have to complete your Cross Examination this morning.

So suit yourself as to the detail in which you go into these questions.

MS. CHAVEZ: Okay.

JUDGE SMITH: In the meantime. the objection is overruled.

Excuse me. Let me clarify that point: I am not even saying that you have the entire morning to do it, either; but you have no more than the morning.

MS. CHAVEZ: I see. Okay.

MR. COPELAND: Your Honor, at this point I would like to add, also, that Applicant has a few questions for the witness, also.

JUDGE SMITH: Of course.

BY MS. CHAVEZ:

Q Mr. Serkiz, in your testimony you referred to the document which I have one copy of -- Staff may have more copies -- entitled, "Evaluation of water hammer potential in feedwater in generators."

Do you have a copy of that document?

A Is the document NUREG/CR-3090?

Q That's right.

A I have a copy.

JUDGE SMITH: Before you proceed, I overruled the objection to your last question; but it was not answered.

THE WITNESS: I beg your pardon?

JUDGE SMITH: Do you want the question answered?

MS. CHAVEZ: No, I don't.

JUDGE SMITH: You withdraw the question?

MS. CHAVEZ: I withdraw the last question that I

addressed to you.

JUDGE SMITH: Okay. Proceed.

BY MS. CHAVEZ:

Q On Page 3-9 of the Staff report, the last paragraph in Section 3.2.3 identifies the water hammer prevention logic at Byron which will automatically close the main feedwater isolation valve and open the bypass valve to the auxiliary feedwater line if flow -- if temperature and flow -- conditions reach a state conducive to steam bubble collapse in the preheat section of the steam generator.

Mr. Serkiz, are you familiar with that logic?

A With respect to the paragraph that you are referring to in this report let me clarify for the record, this is not a Staff report. It is a contractor report I am familiar with.

With respect to your question as to the water hammer prevention logic that is mentioned in that paragraph, that is the terminology which is used to describe the control on automatic valves in that plant or other plants, which are tied into other functional sensors, which would then perform the function there, which is to open or close the valve to admit water to the auxiliary feedwater line.

Q Are you familiar with it in general or are you specifically familiar with the system at Byron?

A I am familiar with it in general.

Q Okay. In general then, based upon your general familiarity, do you know what sort of instrumentation is usually placed in these systems?

A Generally speaking, when you have a valve, you will sense flow by appropriate instrumentation.

Q So you cannot specify any particular type of instrumentation?

A I will repeat what I said.

For the type of valve that you are questioning and the logic in question, in general, or the design practices that are used, will sense flow through a sensor.

The sensors vary plant to plant, application to application.

Q Uh-huh. Do you know what type of sensors would be placed in --

A I have not seen the specifications on the sensors in this plant.

Q Okay. So --

JUDGE SMITH: So the answer is no?

THE WITNESS: The answer is no, sir.

BY MS. CHAVEZ:

Q Do you know why there happens to exist that particular logic for that location?

MR. COPELAND: Your Honor, again I would like to object.

The section she is referring to talks about or concerns water hammer in the preheater section, which was -- this issue was disposed of in motion for summary disposition.

We are concerned with the KRSKO water hammer events which occurred in the auxiliary feedwater system and the feedwater bypass system. She is asking questions concerning bubble collapse in the preheater section.

JUDGE SMITH: Do you agree?

MS. CHAVEZ: Your Honor, I would like to say that as far as I understand the ruling on the motions for summary disposition, the particular type of water hammer excluded from consideration in this case was the type associated with the Zion plant, which is a prefeed ring steam generator, which means water hammer occurring in the upper half of the steam generator.

JUDGE SMITH: So do you understand your contention then as it's revised --

MS. CHAVEZ: I understand my contention not to say anything in particular about the preheater section.

JUDGE SMITH: But you understand your contention as it survived to include every other type of water hammer event, other than the one that was disposed of by summary disposition?

MS. CHAVEZ: Your Honor, my interpretation of

that contention may include that; but it specifically intended and was directed toward that type of water hammer which could occur at the KRSKO plant; and, to my knowledge, no one has addressed the possibility of preheater or any other type of water hammer occurring at the KRSKO plant.

JUDGE COLE: I don't think it was the Board's intention to expand it that far.

MS. CHAVEZ: Oh, okay.

MR. GOLDBERG: Judge, I think we could only look to the language of the stipulated contention that the parties filed on February 15th to ascertain the language and scope of the contention; and it, basically, is what precautions have been taken at Byron to preclude the type of bubble collapse water hammer that occurred at KRSKO feedwater bypass line.

I haven't been objecting to the questions because -- I mean, I have let them go for a while; but it is arguably irrelevant to the issue.

JUDGE SMITH: Objection sustained.

MS. CHAVEZ: Okay.

BY MS. CHAVEZ:

Q In response to Question 3 on the bottom of your first page of your testimony, you identify yourself as a Task Manager for Unresolved Safety Issue A-1, Water hammer.

Can you define for me the scope of the NRC task force and its responsibilities and your participation in that task force?

A Let me address your first question.

As Task Manager on this Unresolved Safety Issue, I have studied and evaluated water hammer occurrences in nuclear power plants.

I have looked at the underlying causes, the attendant damage, the corrective measures taken and the safety significance of those occurrences relative to this Unresolved Safety Issue, which goes beyond the scope of this contention, as is my understanding.

In the capacity as the Task Manager on this Unresolved Safety Issue I act, in effect, as a Project Manager.

This means that I prepare the work scope, lay out the work, draw in specialists from both within the NRC Staff and external, utilize those resources placed at my disposal, to come up with an understanding of water hammer as we see it today based on fact and to develop a position of resolution on this generic issue. That is my role as Task Manager.

Q Can you define for me the number and scope of their responsibilities of the respective members on the task force?

A There is not a task force studying water hammer.
Q Okay. Can you define me what nature of staffing there is in the NRC investigating this phenomena?
A The staffing in the NRC that is utilized is Staff from the respective review branches that address different aspects of the nuclear systems or subsystems.
Q Can you tell me what review branches are involved in this process?
A In the case of water hammer, the Auxiliary Systems Branch and Reactor Systems Branch were the primary branches involved.
Q Was that latter Reactor Systems Branch?
A That was the Reactor Systems Branch.
Q Can you tell me if either of these two branches have had direct input into the investigation of the KRSKO water-hammer event?
A The NRC has not had an investigation of the KRSKO water-hammer event.
Q Okay. You identify in your testimony that fact that the information upon which the NRC Staff has relied has been based in large or in all part upon information received from Westinghouse and Commonwealth Edison regarding the KRSKO plant event; is this correct?
A In my testimony I reference a document for information which is noted as Reference 2, which was transmitted by

Commonwealth Edison on September 9, 1982, which responded to a series of questions from the NRC Staff that had to do with the KRSKO water-hammer occurrence and the Byron plant.

Q Has this been your only source of information on the KRSKO event?

A Also as noted in my testimony, there was a meeting held on July 27, 1982, at which time Westinghouse personnel and Commonwealth Edison personnel provided a presentation.

Q Can you tell me the scope of the presentation in terms of transmitting information about the event?

A The reference noted here in my testimony is a memo from Steve Chestnut to Joe Youngblood, dated August 5, 1982, which summarized the July 27, 1982, meeting with Westinghouse and Commonwealth Staff.

Q Did you participate in that meeting with Westinghouse and Commonwealth Staff?

A I attended that meeting, yes.

Q Can you tell me details about the scope and nature of the information transmitted to you about the event from Westinghouse and --

A The scope and nature of material transmitted in that meeting is also contained -- if your question is directed to the KRSKO event -- is also contained in a transmittal to the NRC, which is my Reference 2 and included in that

reference.

Q Mr. Serkiz, without referring me to a specific reference that you cite in your testimony, can you tell me the general scope and details of the information that was transmitted to you at this meeting and to other NRC Staff members by Westinghouse and Commonwealth Edison?

A There was a presentation made by Westinghouse Staff that described what they knew about the KRSKO event.

Q Can you give me more detail?

A What detail would you like?

Q I would like detail concerning the nature of the event.

JUDGE SMITH: Nature of the what?

MS. CHAVEZ: Water hammer event at KRSKO plant.

A As I indicated in my Answer 5 to Question 5, that meeting reported on the KRSKO water-hammer event and it reported that the KRSKO water-hammer event had occurred external to the steam generator.

Evidence of such an event was described in the form of a bulge or a blister occurring external to the steam generator in the bypass piping.

The cause attributed to that water hammer by the Westinghouse staff was back leakage through the auxiliary feedwater check valves.

It was noted in the September 9th submittal that the valves were known to leak and were later refurbished.

In addition, at the same meeting and also in the other transmittal, the second transmittal, it was reported that the incident had occurred during preoperational testing in which there was intermittent testing, namely start and stop of auxiliary feedwater pumps.

In my opinion, it appears that both the deficiencies, namely leaky check valves and random, arbitrary feedwater pump operation, set up the conditions which led to the KRSKO water-hammer event.

Q Is the information that is transmitted about the nature of the KRSKO event, which you summarize in your testimony, complete and accurate in terms of the scope of information that the NRC has about the event?

A To the best of my knowledge, it is.

Q In other words, the NRC has no further information about the event, other than what is specified in your testimony?

A I don't know. To the best of my knowledge, this is the information available.

Q Does the NRC have access to or has it had access to information concerning the investigation and the details of that investigation about the KRSKO water-hammer event?

A Please repeat the question.

Q Yes. Does NRC Staff have or in the past had access to information from the investigation at the KRSKO plant into the water-hammer occurrence?

A I am not familiar with any investigation at the KRSKO plant.

Q Correct me if I am mistaken, but are you saying that, to your knowledge, you have no familiarity with any investigation of the water-hammer event that has taken place at the KRSKO plant?

A My familiarity of any investigation is summarized in the transmittal that was sent to us, dated September 9th.

Q Do you have any familiarity with any of the informational data which may have been obtained as a result of any investigation after the event?

A I have none.

Q Do you know if any other Staff individuals known to you or dealing with the water-hammer phemonenon would have had access to that information?

A I don't know.

JUDGE SMITH: Would you have been in a position to know?

THE WITNESS: I would have been in a position to know but I don't, frankly, know.

The information that was provided to us was in direct response to a series of Staff questions to help clarify this sort of questioning and so we would have in one place what we felt was a concise and reasonably accurate record of what had happened.

The best reference that I can take anyone to on the KRSKO event is the transmittal by the Utility on September 9th that put on the written record what people knew about the KRSKO event.

Since there were attendant questions to whether the events could replicate -- excuse me, not replicate but also occur in the Byron plant, we asked a series of comparative questions with the Byron plant.

If there were other knowledge or considerations, I am not aware of them.

MS. CHAVEZ: Your Honor, can I go off the record for a minute to ask Staff if he has a copy of that document that is referenced in his testimony?

JUDGE SMITH: Stay on the record and do it.

MS. CHAVEZ: Not that one but that communication from -- it's Reference 2.

MR. GOLDBERG: Yes, I do.

MS. CHAVEZ: Okay. Do you have a spare copy that I can use?

MR. GOLDBERG: You can use it for purposes of questioning. It's my only copy.

MS. CHAVEZ: Okay.

MR. GOLDBERG: Does the witness have a copy?

THE WITNESS: I have a copy.

BY MS. CHAVEZ:

Q Are you familiar with the document that you referenced as No. 2 in your testimony?
A I am.
Q Do you have a copy of it before you?
A I have a copy.
Q Okay. Figure 4 as an exhibit identifies the layout of the KRSKO upper half of the steam generator.

For general informational purposes, is this layout in detail the same or fairly similar to the Byron layout?
A Yes.
Q Okay.

JUDGE SMITH: Excuse me. You are looking at a very sizeable document.

MS. CHAVEZ: Yes. It's Figure 4.

I don't see a page citation on it.

JUDGE SMITH: Well. as I read your testimony. Reference 2 is a memo.

MS. CHAVEZ: Right. right.

JUDGE SMITH: And that is it?

THE WITNESS: For the Board's clarification. Reference 2 is a memo with an attachment.

The figure that Ms. Chavez is referring to is a cross-sectional view of the upper portion of a D4 steam generator.

(Indicating.)

JUDGE CALLIHAN: Can that document be identified for the record?

JUDGE SMITH: Do you want it in evidence?

JUDGE CALLIHAN: No.

THE WITNESS: It's identified as my Reference 2, sir; and I apologize that I don't have an extra copy for you, for the purpose of this hearing.

MR. GOLDBERG: I only have one copy, your Honor.

MR. COPELAND: Excuse me, your Honor. We have quite a few copies here.

Would you like a copy?

JUDGE COLE: Yes. You said you have quite a few. How many do you have?

MR. COPELAND: Well, I am not sure. This was the document as sent to Staff, the letter from from Commonwealth Edison and the attached document.

JUDGE CALLIHAN: Should we have this? Is this somewhere in our files, Mr. Goldberg?

MR. GOLDBERG: No, it isn't, Judge Callihan.

MR. COPELAND: I thought I would clarify, your Honor.

On October 14th of 1982 Mr. Gallo sent a letter to the Board and attached to that letter was an affidavit of Leslie A. Bowen and further attached was a copy of this document, the letter from Tom Tramm of Commonwealth Edison

to Harold Denton, Director of the Office of Nuclear Reactor Regulation, and attached to Mr. Tramm's letter was this document which we are now concerned with

JUDGE CALLIHAN: Is it true that Ms. Bowen's affidavit will not be a part of this record?

MR. COPELAND: We are not submitting it as part of the record.

JUDGE CALLIHAN: Thank you.

MR. COPELAND: We are concerned with -- I am just indicating when it was served on the Board.

JUDGE CALLIHAN: Yes. I have a copy and I just wondered of its disposition.

This is the attachment to her affidavit?

MR. COPELAND: It was a second attachment to the letter from Mr. Gallo. It was not actually an attachment to Ms. Bowen's affidavit.

JUDGE CALLIHAN: Thank you.

BY MS. CHAVEZ:

Q Mr. Serkiz, can you tell me if the information contained within this document is the full extent of the information that's been transmitted to Staff about the KRSKO plant?

A To the best of my knowledge, this is the record that we have based our evaluations on for this contention.

Q Mr. Serkiz, what part or what weight is given to the evaluation of the KRSKO water-hammer event to the

evaluation of your generic task?

A The KRSKO water-hammer event is another event which demonstrates that when steam and water come in contact, you can generate a water hammer.

With respect to the generic issue, this event is the only example we have at this point in time that for a nuclear power plant system employing preheat steam generators, that a steam water hammer occurred.

We, therefore, look at it as an example to evaluate generic implications.

We also, as indicated in a contractor's report that you referred to earlier, the NUREG/CR 3090, looked at it generically to see if there were implications to similar nuclear power plant designs in the United States.

The contractor's evaluations are presented in that report. As noted in that report, there are certain conditions that are necessary to establish a steam water hammer, these being, when you boil it all down, that you have to have steam in contact with cold water.

That there are design features and operational procedures which can be used --

MS. CHAVEZ: Your Honor, can I interrupt the witness?

He is getting into areas which I will address in going over specific detail concerning that document.

JUDGE SMITH: It's your option.

Do you feel that you have answered the question?

It does seem like you have gone beyond the simple answer that she requested.

THE WITNESS: I will stop.

BY MS. CHAVEZ:

Q Can you tell me on a scale of 1 to 10 -- can you give me -- can you assign a value to the relative weight you will give in evaluating the KRSKO event and evaluating the generic water-hammer potentialities?

A No.

MR. COPELAND: Objection, your Honor. It calls for speculation of the witness.

THE WITNESS: My answer is no.

MR. GALLO: Ask for an instruction that the witness not answer in the face of an objection.

MR. COPELAND: Your Honor, if I may ask that the witness not answer a question while there is an objection on the floor.

THE WITNESS: Excuse me.

MS. CHAVEZ: Your Honor, I wish to respond to that objection by saying that I know of no one with better qualifications to respond to it.

JUDGE SMITH: It's moot, it's moot.

MS. CHAVEZ: It's moot?

JUDGE SMITH: Yes.

MS. CHAVEZ: Okay.

JUDGE COLE: He already answered it.

MS. CHAVEZ: Okay. Thank you.

BY MS. CHAVEZ:

Q Mr. Serkiz, on Page 3 of your affidavit -- I mean your testimony -- you respond to the question about what corrective measures did Westinghouse recommend to KRSKO and list them.

Can you tell me whether or not the -- can you tell me upon what basis you have evaluated those specific recommendations in terms of their effectiveness at KRSKO?

A I am not sure I understood the question, but let me answer it this way --

JUDGE SMITH: Two of us, at least, did not understand it, either.

MS. CHAVEZ: All right.

BY MS. CHAVEZ:

Q You have identified the document you call Reference 2 as being one source of information your office has had in making its evaluation of the KRSKO water-hammer event.

I am wondering if you were solely dependent upon that document in reaching your evaluation of the modifications that Westinghouse recommended to KRSKO to remedy the water-hammer event.

A The recommendation you are referring to was not made -- excuse me.

The recommendation that is referenced in my Answer 6 was, indeed, made by Westinghouse and are abstracted from my Reference 2.

My evaluation or our evaluations were not based totally on that.

Q Can you identify any other documents or information which was or which served as a basis for your evaluation?

MR. GOLDBERG: What evaluation are we talking about now?

MS. CHAVEZ: His evaluation of the KRSKO water-hammer event.

MR. GOLDBERG: Of what occurred or --

MS. CHAVEZ: Of what occurred.

MR. GOLDBERG: Just what occurred, all right.

JUDGE SMITH: You see, the difficulty is Question and Answer 6 related solely to --

MS. CHAVEZ: Yes. Okay. Let me --

MR. GOLDBERG: -- Westinghouse recommendations.

JUDGE SMITH: Yes.

MS. CHAVEZ: You are right.

JUDGE SMITH: If you have changed the direction of your questioning, you should indicate, I believe.

MS. CHAVEZ: No, your Honor. I am still

referring to the recommendations.

MR. GOLDBERG: Can you repeat the question then in that context?

MS. CHAVEZ: Okay.

BY MS. CHAVEZ:

Q Can you identify to me any other information or documents that you or NRC referenced and used in its evaluation of the recommendations that Westinghouse made to the KRSKO plant concerning the KRSKO water-hammer event?

A The recommendations made by Westinghouse can be put into category of good engineering design practices and prudent operating procedures.

We did not need additional documents to make that evaluation.

The point I make in the conclusion of my Answer 6 is, in retrospect, if those corrective measures recommended after the fact had been in place, particularly the continuous feedwater flow in the aux feedwater line, the KRSKO water-hammer event would likely not have occurred.

I think for the record it should be clearly stated that if you do not have a condition where cold water can come in contact with steam, you will not have the type of event that occurred at KRSKO.

Q Mr. Serkiz, I don't think that was a direct response to my

question. I will ask it again.

A I have not used nor has the Staff used any additional documents, other than those referenced, to review the Westinghouse recommendations regarding the KRSKO event.

Is that an answer, Ma'am?

Q Yes, that is.

Let me ask one follow-up question to that answer.

That includes, I am presuming -- and please correct me if I am wrong -- the information contained in that document?

MR. GOLDBERG: Let the record reflect that document is Reference 4 to Mr. Serkiz' written testimony.

JUDGE SMITH: If that document is not offered by one of the parties, it's going to be brought in as a Board Exhibit, so we might as well start referring to it by proper identification.

Does anybody plan to offer it?

(No response.)

JUDGE SMITH: All right. Then it will be Board Exhibit 2.

MS. CHAVEZ: Exhibit 2?

JUDGE SMITH: Yes.

(The document was thereupon marked as Board Exhibit No. 2 as of March 4, 1983.)

MR. GOLDBERG: Would you like me to read the

reference into the record?

JUDGE SMITH: Yes. Would you read the entire identification?

MR. GOLDBERG: Yes, Judge. Board Exhibit 2 is entitled, Evaluation of Water Hammer Potential in Preheat Steam Generators.

It was prepared by the Quadrex Corporation. E. G. and G., Idaho, Incorporated, for the Nuclear Regulatory Commission and bears the title number NUREG/CR-3090.

JUDGE SMITH: Are there any objections to receiving it in evidence?

MR. GOLDBERG: No objection.

JUDGE SMITH: It's received.

BY MS. CHAVEZ:

Q Mr. Serkiz, you indicated to me that further information other than what is contained in your testimony in that document which was referenced as Reference 2 to your testimony was not necessary -- and correct me if I am wrong and you did not use the words, "not necessary" -- to your evaluation or NRC Staff's evaluation of the recommendations that Westinghouse made to the KRSKO plant; is that correct?

A Ms. Chavez, what I said in response to your question, which had to deal with my Answer 6, is to what additional documents the Staff used to evaluate the Westinghouse

recommendations for the KRSKO plant.

We did not use any additional documents to evaluate Westinghouse's recommendations to the KRSKO plant.

Q Did you feel it necessary then to use any other document?

A With respect to the base question addressed, Westinghouse's recommendations to the KRSKO plant, no, because the KRSKO plant is not a United States nuclear power plant.

We looked at the recommendations in the context that I responded previously.

There were recommendations that embodied good design practices and prudent operating procedures, which trained engineers or designers in the field will not need additional references to to make an evaluation thereof.

Q Are those your words, good operational practices and prudent -- I forget the exact phraseology that you just used; but are those your words?

A No. I used the phrase using good design practice and prudent operational considerations.

Q Are those your own? Is that your own terminology to describe --

A That is my own terminology in response to your question.

Q Okay. Can you tell me what is the basis for your using those terms in your evaluation of the recommendations based upon your use of your document referenced as 2 in

your testimony?

MR. GOLDBERG: Did the witness understand the question?

THE WITNESS: I was going to ask for the question to be clarified or repeated.

MR. GOLDBERG: I think you are combining a lot of concepts in there.

BY MS. CHAVEZ:

Q Can you tell me --

MR. GOLDBERG: If you want to just know the basis for his opinion, maybe you can just ask the basis for his opinion.

BY MS. CHAVEZ:

Q Can you give me the basis for your opinion, then?

A Opinion with respect to what?

Q With respect to using that terminology by which you characterize the recommendations.

A Yes. With respect to my reply to your question addressing my Answer 6, professionals that are trained to design these types of plants or components would incorporate some of the features that were recommended by Westinghouse.

The issue at hand, which is steam water hammer -- okay? -- is, basically, founded on whether or not you have steam and water come in contact.

Prudent operating procedures, as I responded to your

question. deals with simply: Operate the plant so you do not set up a condition leading to contact of cold water with steam, which could lead to a water hammer.

Q So is it an assumption on your part that those good and prudent actions will be followed?

MR. GOLDBERG: May I have a clarification?

The question is the Westinghouse recommendations to KRSKO, corrective action recommendations of Westinghouse to KRSKO; and those were the questions to which the witness was responding.

MS. CHAVEZ: Okay.

MR. GOLDBERG: Now, if you want to apply those recommendations to KRSKO in some other context, I think we are getting into a different area.

MS. CHAVEZ: Let me clarify my application of that.

MR. GOLDBERG: Okay.

BY MS. CHAVEZ:

Q Mr. Serkiz, you are characterizing those practices which form the basis for the recommendations and implementation of those recommendations at the KRSKO plant.

Is that an assumption on your part that those characterizations will be carried out?

A It's not an assumption. It's a recommendation that Westinghouse went on the record and provided documentation

accordingly. I don't need to make an assumption.

Q But isn't an assumption of yours based more upon your scientific experience that they will use good designing and prudent operation?

A I cannot speak to what KRSKO is going to do.

JUDGE SMITH: All right. Let's get straight to the point here.

You say, in retrospect, had these corrective measures been in effect in the first place, particularly the continuous feedwater flow in the AFW line, the KRSKO water-hammer event would likely not have occurred.

Well, inherent in that retrospective view is that procedures would be followed and that good engineering practices would be followed and that is an assumption of regularity.

THE WITNESS: The recommendations are technically sound, sir, yes; and if they are followed and implemented in that vein, we should not have an occurrence of a water hammer such as occurred at KRSKO; and, furthermore, as I continue in my testimony, by looking at that event -- and if the question that was being directed, are these being implemented at the Byron plant -- and immaterial not trying to lead the intervenor, sir; okay?

JUDGE SMITH: I think what they are seeking is: Have you assumed that ordinarily competent engineering

judgment will be applied?

THE WITNESS: Yes, sir.

JUDGE SMITH: Or would have been applied?

THE WITNESS: Yes, sir. I don't have a basis not to.

BY MS. CHAVEZ:

Q Does that mean that you have never known in your operational or scientific experience for those -- for that not to occur?

A For what to occur, Ma'am?

Q For faulty design or faulty operation to occur.

A No.

JUDGE SMITH: My observation is -- and I haven't consulted with the Board -- that when he stated what his assumptions are, examination into the details of the assumptions go beyond the scope of the direct examination.

MR. GOLDBERG: Judge, I am not ensure that we are talking about assumptions here.

We are talking about Westinghouse recommendations to a foreign nuclear utility, namely, KRSKO; and he has described what those recommendations were. He has given his opinions that if they had been implemented at KRSKO, the bubble collapse water-hammer event that occurred would not have likely occurred and then goes on to testify what precautions are going to be taken at the Byron plant to

similarly preclude a recurrence but I am not sure --

JUDGE SMITH: For example, Item B, at low load or hot standby condition the operator is instructed to supply feedwater continuously, then intermittently. Well, simply instructing the operator doesn't do anything. The assumption is that the operator will do it, too. This is all inherent and I think that is the direction --

MR. GOLDBERG: Okay.

JUDGE SMITH: -- where Ms. Chavez is going.

MS. CHAVEZ: Okay. I am going to move on.

BY MS. CHAVEZ:

Q Is the KRSKO event then -- tell me if I am wrong, but is the KRSKO event the extent of your experience with bubble collapse water hammer in preheat steam generators?

A The KRSKO event is the only reported event I am aware of that has experienced a steam bubble or a steam water hammer in a nuclear power plant.

Q Is it also the only event that the NRC Staff is aware of?

A Yes.

Q Okay. A clarification. Did you say in response to my first question that that is the only event that you are aware of by having read about it?

A I stated in response to your question which was addressed, is this the only one the NRC, this is the only reported event that we are aware of.

Q Okay. In terms of -- okay. Is there any other -- is there any other possibility that an unreported event could have occurred that neither you nor Staff could have been aware of?

A Yes.

MR. GOLDBERG: Judge, I am not sure you can know about an unreported event. Would you know about --

JUDGE SMITH: Wouldn't it be more productive to establish that there are systems in place at the Nuclear Regulatory Commission where such events would probably be reported or not probably be reported, whichever the case is, and when they are, you would know about them? I mean there are requirements that they be reported.

THE WITNESS: Yes. The Nuclear Regulatory Commission has what they call licensee event reports; and in the case of events such as water hammer, these are reported.

As I indicated in my testimony in reviewing this Unresolved Safety Issue, that over 100 water-hammer events have occurred in nuclear power plants. This has to do with my Answer 3 and it's in the Byron Safety Evaluation Report.

Our evaluation of water hammer is a generic issue. It was based on reported events, as I indicated earlier, the underlying causes, corrective measures and so on.

With respect to Ms. Chavez' question, the only event that I am aware of in a nuclear power plant system that does apply preheat steam generators wherein a water hammer has occurred is the KRSKO plant.

JUDGE COLE: Mr. Serkiz, were you aware or are you aware of any other steam bubble water-hammer event in any other kind of plant?

THE WITNESS: Yes, sir. The steam bubble water hammer was the principal underlying cause for another type of steam generator, which is called the top feed ring. The phenomena or the physics associated with this phenomena are the same, where you have an opportunity to produce steam and bring cold water in contact.

So the answer to that is yes. with respect to a system or a plant using preheat steam generators. we looked at the three plants which the Board has termed Exhibit 2, where we have some operating experience in the United States, namely McGuire and Summer -- I correct that -- two plants that are operating. We also looked at the Byron plant and its features; and based on what we know about the physics of the problem and events that have led to a steam water-hammer occurrence, the design features in a plant like Byron and operating procedures which call for tempering flow support a situation where you will minimize or avoid back leakage of steam. If you do not have back

leakage of steam -- and there are several layers, if you will, of precautions that are proposed for the Byron plant -- I think the situation is such that the probability is low for a water hammer of this type to occur.

JUDGE COLE: That was more than my question asked for. I didn't want to stop you.

THE WITNESS: I am sorry. I get carried away.

BY MS. CHAVEZ:

Q Mr. Serkiz, part of what you address there -- I don't know. Is the Board finished?

JUDGE COLE: Yes. Thank you.

BY MS. CHAVEZ:

Q Part of what you address brings me to my next topic, which is Page 3-12 of Exhibit 2 --

MR. COPELAND: Is that Board Exhibit 2?

MS. CHAVEZ: Board Exhibit 2.

BY MS. CHAVEZ:

Q -- wherein the report identifies the four conditions which you have identified must be present in one form or another in order for bubble collapse water hammer to occur.

Mr. Serkiz, was there any Staff participation in the draw-up of this report?

A What do you mean by Staff participation?

Q Direct participation.

A No.

Q Okay. Either by yourself or by any other individual?
A No.
Q Okay. Can you tell me if there was indirect participation. and, if so. to what extent and what the nature of that participation was?
A Yes. There was indirect participation on my part in that I provided to this contractor information related to the KRSKO event and plant design specifics for the McGuire, Summer and Byron.

As indicated in the Board Exhibit 2, there are a series of references in the latter part of the report, which constitute reports or information dealing with what I have just mentioned. These were provided to the contractor for his independent evaluation. to look at this particular issue.

Q In terms of those references in Board Exhibit 2, can you tell me if the information pertaining to the Byron plant that you transmitted to the contractors who drew up this report was contained in Reference 7, which I will identify as the affidavits of Robert W. Carlson and Leslie A. Brown or Bowen?
A That's correct, that's one of them.
Q Were there any others?
A Yes. If you will look at Reference 4 on Page 5-1. This is a letter from Mr. Tramm to Mr. Denton, which I

referred to as my Reference No. 2.

Q Okay. In response --

A If you look at Reference 9, this is information on the Virgil Summer plant.

Q Okay. I am speaking specifically concerning the Byron plant and not about the Summer plant or the KRSKO facility.

A What is your question then?

Q My question is whether or not Reference 7 contained a -- contained all of the information pertaining to the Byron plant which was transmitted to the contractors of this report to draw --

A I just answered the question no. because Reference 4 and Reference 7 both contain information pertinent to the Byron plant.

JUDGE COLE: How about 14?

THE WITNESS: 14 also, but I didn't get that far.

JUDGE COLE: Thank you.

BY MS. CHAVEZ:

Q Can you tell me whether or not for Reference 14 you transmitted the entire SER for Byron and Braidwood or whether you transmitted portions and if so, which transmissions?

A I transmitted what is referenced there, Section 10.2.

JUDGE COLE: You mean the FSAR. I believe you said SER.

MS. CHAVEZ: I meant FSAR.

THE WITNESS: FSAR, yes, sir.

BY MS. CHAVEZ:

Q Can you identify for me the origination of the information which was contained in Reference 7 that you transmitted?

MR. COPELAND: Your Honor, I will object to this. We have been over this before. As I explained earlier, this letter was sent to -- this was attached to a litter from Mr. Gallo sent to the Staff.

MR. GOLDBERG: Judge, I believe Reference 7 refers to affidavits that accompanied --

MR. COPELAND: I am sorry.

MR. GOLDBERG: Applicant summary disposition motions in this case.

MR. COPELAND: I stand corrected.

THE WITNESS: That is the information that was transmitted to Quadrex.

BY MS. CHAVEZ:

Q On Page 3-12 of Board Exhibit 2, you identify four conditions, one of which must be present in order for bubble collapse water hammer to occur.

MR. GOLDBERG: Ms. Chavez, can you repeat that?

MS. CHAVEZ: Yes.

BY MS. CHAVEZ:

Q On Page 3-2 of Board Exhibit 2 --

MR. COPELAND: 3-12?.

BY MS. CHAVEZ:

Q I mean 3-12, yes.

-- you identify -- I mean the report identifies four conditions. one of which --

JUDGE SMITH: That's where I think Mr. Goldberg's trouble comes.

MR. GOLDBERG: My question was: She said you identified and I just want to reflect that this is a contractor report.

MS. CHAVEZ: Right.

JUDGE SMITH: Finish your question. I am sorry.

BY MS. CHAVEZ:

Q Let's see.

-- as having to be present in order for bubble collapse water hammer to occur?

JUDGE SMITH: Now, do you agree with the premise of the question?

A No, because the report states, "for water hammer similar to that of the KRSKO plant to occur in U. S. plants which use preheat steam generators. the following conditions must exist concurrently in the feedwater bypass and auxiliary feedwater lines. not singularly."

Q All right. I stand corrected there.

The first condition involves a drop in the steam generator water level, which would drop low enough to uncover the internal discharge pipe from the auxiliary nozzle for an extended time period.

Based upon Figure 4 in Reference 2 of your testimony, which is essentially that schematic depiction of the internal portion of the KRSKO water hammer -- I mean water steam generator, can you tell me if -- can you tell me how long that -- what that time period would have to be?

A I don't -- I don't know which figure you are referring to. Would you take me to the figure?

Q Figure 4.

A Of which document?

Q Of Reference 2 of your testimony.

A Figure 4 you referred to before?

Q Yes.

A Would you ask your question again now that I have the correct figure?

Q Yes. Looking at that steam generator design and the location of that pipe and the angle and diameter of that pipe as indicated in the -- as indicated in Figure 4 --

JUDGE COLE: I am sorry. Which pipe are you talking about on Figure 4?

MS. CHAVEZ: Figure 4 is the internal discharge pipe connected to the auxiliary feedwater nozzle.

THE WITNESS: I am having difficulty relating to that pipe; but let me look at this.

MS. CHAVEZ: Okay.

THE WITNESS: To place myself in prospective on this figure is that the pipe that would be at or near the vertical elevation. we are on the right-hand side, the words are, "top of auxiliary nozzle discharge."

MS. CHAVEZ: Yes.

THE WITNESS: Your question again, please?

MS. CHAVEZ: Okay.

BY MS. CHAVEZ:

Q Can you tell me for what extended time period that discharge pipe would have to be uncovered in order to lead to conditions which would initiate a water hammer?

A That would be dependent on two factors. One, the operational mode of the plant; and, secondly, the system design in a feedwater or auxiliary feedwater system external to the pipe that you are referring to in this figure, which is introduced through the auxiliary nozzle, auxiliary feedwater nozzle, even though not termed such on this drawing.

Q Right. Can you tell me if there are a number of factors, not only those two that you specified but others which

would determine the length of time that that nozzle would have to be uncovered in order for a water hammer to initiate?

A Those two factors encompass the answer to that question. It depends on the operational mode of the plant and also the design of the feedwater and auxiliary feedwater system upstream of that nozzle.

Now, if you can be specific, I can try to address your question.

Q All right. The implication of your answer is that depending on the mode of operation and a number of variables associated with the design of this, of the feedwater system, water hammer could or could not occur at a specific facility?

A That's correct. The Board Exhibit 2 that's been referred to, I think, on Page 3-12 at the top, indicates four conditions which must exist concurrently, which could set up conditions. These are dependent on the plant operational mode and the plant design.

In my response or in my testimony, going with my Answer 7, I tried to address the latter question that you posed here, that there are design features and operating modes which would prevent setting up conditions leading to it.

Now, I can try to further address your question and

not talk in the abstract; but if your question is fundamentally aimed at in the Byron plant: Do I expect the type of water hammer in the KRSKO? My answer is no.

Q Okay. That's not the direction my question is leading.

A Again, I will try to be responsive.

Q Okay. What I am trying to determine by my line of questioning is to whether or not there exists a significant number of variables which could be differentiated for each of those conditions identified on Page 3-12 of that report according to specific facilities?

A The only way I can answer that question, I don't feel there are a significant number of variables; but I don't know how to deal with your terminology of variables.

Q What variables other than those specifically identified on Page 3-12 would you consider to be pertinent to each of those conditions?

A None.

Q Would you consider it important to know details at a more specific level for each of those conditions in order to determine whether or not any one of those conditions could exist?

A No.

Q So, in other words, in your opinion, those conditions as set out on Page 3-12 form an adequate basis, without consideration of any specific detail related to any one of

those for --

A No, no. Those conditions set forth are the conditions as stated there. If they existed concurrently, you could have water hammer.

My answer to you just previously was based on the design as we see it submitted by the Applicant on Byron, both from the design features and the operational considerations; and the operational considerations are further detailed in the testimony of Mr. Pleniewicz, which will come before the Board.

I feel that there is adequate design and operational consideration and precaution taken to avoid a water hammer such as occurred at KRSKO. However, it should be clearly stated the water hammer will continue to occur. The fact that you have a water hammer occur does not automatically make it a safety issue.

Q When you state that water hammer will automatically continue to occur, can you give me a number of instances that you would predict for that to occur over the lifetime of a steam generator?

A Water hammer is unpredictable.

Q Are you familiar with Westinghouse recommendations that in any particular facility no more than ten water-hammer events of significant severity occur per steam generator?

A I am familiar with that and that is not applicable to the

contention being discussed here. That is a different issue. It is not steam water hammer.

JUDGE SMITH: Mr. Serkiz, that may very well be.

THE WITNESS: Excuse me. I am familiar with it, yes.

MR. GOLDBERG: I will make any objections, Mr. Serkiz.

(Laughter.)

THE WITNESS: Pardon me. I apologize.

JUDGE SMITH: Well, it's not necessarily an objection. It can also be a factual explanation.

THE WITNESS: That's why I was trying to make the point, that it is a different type of water hammer.

MR. GOLDBERG: All right. I am sorry, your Honor.

BY MS. CHAVEZ:

Q Does that statement imply that different types of water hammer cause different types of fatigue rates on the metal associated with the piping in the feedwater systems and preheat steam generators?

MR. GOLDBERG: Now I will object on the relevance to the Contention 9A.

MS. CHAVEZ: The relevance of the question addresses the basis for Westinghouse recommendation that no more than ten water-hammer events occur during the

lifetime of the facility because of the concern that -- concern of the result that this may have upon the fatigue factor of the piping systems in those facilities.

MR. GOLDBERG: But as Mr. Serkiz has testified, there is water hammer and there is water hammer. There is water hammer of the type that occurred at KRSKO and there is water hammer of a different character.

MS. CHAVEZ: Right, and he has differentiated between the two; and I am trying to find the basis for his differentiation.

THE WITNESS: I will answer your question correctly of anyone who wants me to.

MR. GOLDBERG: Well, if you can --

JUDGE SMITH: Wait a minute. Nobody talk now.

(Board conferring.)

JUDGE SMITH: Is there an objection?

MR. GOLDBERG: Yes, there is. I think it's irrelevant to the specific contention, which is KRSKO incident and precautions at Byron to reduce the -- demonstrate that a similar event will not occur at Byron.

MS. CHAVEZ: Can I add something?

JUDGE SMITH: Just a minute.

Go ahead. You can comment.

MS. CHAVEZ: Okay. I think the question is relevant because it concerns the fatigue rate of water

hammer upon the piping systems of facilities, and I am trying to determine whether there is a differential in that fatigue rate between bubble collapse water hammer and the more -- more familiar type of water hammer.

JUDGE COLE: Classical water hammer.

MS. CHAVEZ: Classical, yes.

JUDGE SMITH: Some of the ten would be KRSKO types, bubble collapse types?

THE WITNESS: No, sir. What Ms. Chavez has brought up is a Westinghouse recommendation, which, as I read the background material on this, has to do with, under certain conditions, in a preheater section, and the valving that goes with it, to avoid setting up situations wherein you might induce the classical water hammer; and if you had a situation that tended or -- that tended to continued recurrence even though at a fairly low frequency or a low magnitude, could be categorized as inducing fatigue-type loadings.

That type of water hammer, Ms. Chavez, that would be attached to your question is not the type of water hammer that occurred at KRSKO or that we were discussing previously.

JUDGE SMITH: But is the same type of fatigue produced?

JUDGE COLE: Could the same type of fatigue be

produced?

THE WITNESS: I will answer it this way. No, because fatigue, generally, is driven by a higher frequency of occurrence. I don't pretend to be a metallurgist, but it's a repeated, imposed loading.

In another sense, any time you load a structure, you could construe it as adding to fatigue.

JUDGE COLE: Well, I --

THE WITNESS: I don't know how to answer your question there any better than that.

BOARD EXAMINATION

BY JUDGE COLE:

Q Westinghouse made a recommendation that they not exceed ten water-hammer events in a certain section; is that correct, sir?

A That's correct.

Q Now, the end result of a bubble collapse water hammer and the end result of the classical water hammer, wouldn't that have about the same effect on the piping system?

A It could. It also should be noted that the type of water hammer and the magnitudes associated with it are related to the conditions that set it up; and I can't answer, you know, quantitatively; and that's why I said earlier in my response to this that because of the frequency as observed now, one event of the KRSKO type, versus another type.

which is where the Westinghouse recommendation comes from. which is principally established on a concern that you could have valve closures, sudden valve closures, if you will, that lead to the classical water hammer, there if one does a dynamic system piping evaluation. Westinghouse came to the conclusion and transmitted to Commonwealth. to avoid the occurrence of ten of these type of water hammers. I don't know what other way to answer it. I have not gone into it in more detail to be aware of that recommendation and some background on it.

Q My question is: How does the pipe that is impacted know what the cause of it is?

A It doesn't, it doesn't.

JUDGE COLE: All right. Thank you.

JUDGE SMITH: Objection overruled as modified, as explained later on, the question was relevant.

BY MS. CHAVEZ:

Q Mr. Serkiz, can you tell me whether or not the fact that Westinghouse has not made a recommendation on the restriction and number of bubble collapse water-hammer events to be practical or to be minimized at a facility, relates to the fact that Westinghouse has not yet had significant -- sufficient information regarding the bubble collapse water hammer phemonenon to make such a recommendation to utilities?

A You will have to ask that question of Westinghouse or the Applicant. I don't know.
Q Okay. Can you tell me whether or not in the case of bubble collapse water hammer it might be true that as in the case of classical water hammer, there exists magnitude pulses of such small size and duration as to be virtually unnoticeable?
A It's a possibility.
Q Do you know whether or not that is the case?
A I just answered it's a possibility.
Q Is it likely?
A It's a possibility.
Q How possible?
A I don't know. It's a possibility. You are asking me to quantify something and I don't know.
Q Okay. Is your lack of knowledge associated with your lack of knowledge about the bubble collapse water hammer phemonenon?
A I do not have a lack of knowledge about bubble collapse water hammer. I answered your question honestly.

Since you couched the question in abstract terms, I could only answer it that way.

Q Okay. Do you know whether or not then these minimal pulses with regard to classical water hammer have been included in consideration of the number of recommended

water hammer occurrences that Westinghouse has stated not to exceed for classical?

A I don't know. You will have to ask Westinghouse.

Q Okay. With respect to Page 3-12 again, are you familiar with the -- with direct evaluation of the length of time by which the internal discharge pipes in differing systems must be uncovered in order for water hammer to occur?

A Can you take me to specifically on 3-12 so I can relate to your question. please?

Q Okay. Specifically on 3-12 I am talking about paragraph -- well, the second paragraph in the page beneath Condition 4.

Do you feel you have the basis to --

A Just a moment. I am trying to relate to the page.

You are talking Item 2 on Page 3-12?

Q No. I am speaking about the middle of the page beneath Item 4.

JUDGE SMITH: For Condition 1 to be an initiating mechanism?

MS. CHAVEZ: Yes.

THE WITNESS: Your question, please.

BY MS. CHAVEZ:

Q Can you tell me whether or not you feel that you have the basis to evaluate the time length period by which the internal discharge must remain uncovered long enough for

steam to leak back through the lower horizontal line?
A That's dependent on plant condition.
Q Do you feel that you have the basis, if you were making an evaluation of a specific water-hammer event at a specific facility, to evaluate whether or not check valve back leakage had occurred?
A That's a different question.

Do you want to come back to your first one or your second one?

Q The second one.
A Repeat the second question.
Q Do you feel whether or not -- do you feel whether or not you have the basis to evaluate a specific facility after a specific water-hammer event. whether or not steam back leakage had occurred?
A I will answer the question this way, but I recognize it may not be responsive.

If the information is provided in sufficient detail. yes.

Q What would you define sufficient detail to be?
A Well. let me define the information first. The plant operating conditions. the level of damage, if there was damage; and one could then do an after the-fact diagnosis to make --
Q Isn't it --

A May I finish my response?
Q Sure.
A One could do an after-the-fact or after-the-event diagnosis to address the questions or the items that you put on the table.
Q Isn't the extent of damage one of the variables that you would be trying to determine in your investigation of that event?
A Certainly.
Q Do you feel qualified to go onsite and make a direct examinati. after an event of that nature and be able to determine those -- that information your for yourselves?
A Which examination are you referring to?
Q Of a water-hammer event at a specific facility.
A That's a different question than you posed previously.
Q Such as occurred at the KRSKO plant.
A You asked me what I would be qualified to go make an examination?
Q Yes.
A Or you are asking me if I am qualified to go to a plant?
Q I am asking you if you are qualified to go to a plant and make a specific examination of a specific water type event such as occurred at Byron -- I mean KRSKO.
A I am qualified to go to a plant and make an examination. I cannot be responsive to a question on inspection without

understanding what you are referring to.

Q Well, let me put it this way.

Are you qualified, if it were part of your job responsibility, to make routine investigations of water hammer bubble collapse events at specific facilities that had occurred?

A If I were qualified to do all of what you just encountered, very specifically, in quotes, I could do that, yes.

Q I am asking: Are you qualified?

A Yes.

Q Then can you tell me what the extent of your knowledge is in relation to check valves at the KRSKO plant?

A None. I didn't go to KRSKO.

Q Can you tell me then how it is that you reached an evaluation on the character and nature of the KRSKO water-hammer event without that information?

MR. GOLDBERG: Judge, I think we have had a whole -- you know, we are sort of back full circle about the basis for Mr. Serkiz' knowledge of the KRSKO occurrence.

Also, this is not an NRC publication. It's a contractor publication.

I think, you know, we have asked and answered the same if not similar questions.

JUDGE SMITH: You see, you don't always have to agree with the purposes of the question. She got you to say, okay, you are qualified to go to a plant and to investigate a water-hammer event.

THE WITNESS: I am qualified, sir, to go to a plant and do an investigation.

JUDGE SMITH: Then the next question was, assume the premise, if that being the case, then you should be able to tell us all about the check valve at KRSKO and you should have said "Well, it doesn't follow or does it follow?" You didn't have to accept that second premise. If you don't know, if you can't, say it.

THE WITNESS: I don't know. I didn't go to KRSKO.

JUDGE SMITH: After all, it's your testimony and not hers.

THE WITNESS: I understand, sir. I am just trying to be responsive.

JUDGE SMITH: I know you are.

BY MS. CHAVEZ:

Q Have you ever made a direct examination of a facility of either a classical water-hammer occurrence or a bubble collapse water-hammer occurrence?

A No.

Q Is that part of your job responsibility?

A No.
Q Is that part of a responsibility that -- well, identify for me the office or branch in the NRC whose direct responsibility that would be?
A Plant inspections fall under the cognizance and purview of the regional offices. When an event occurs at a plant, the principal responsibility lays or, rather, rests with the particular regional office and they send representatives to a plant to investigate or in many cases there are resident inspectors.

The onsite inspectors are the people most qualified to take immediate action to determine what has occurred, level of damage, et cetera.

Q Can you tell me whether you have ever based your evaluation of a water-hammer event of a bubble collapse nature upon the information from one of those regional offices?
A Yes.
Q Can you tell me what facility in particular it concerned?

MR. COPELAND: I object to the relevance of this question.

JUDGE SMITH: Well, in a theoretical sense it's relevant, all right.

My concern is more how productive.

MR. COPELAND: Your Honor, I would like to point

out that we are now halfway through the time allotted for Cross Examination of Mr. Serkiz this morning.

JUDGE SMITH: That's true, that's true.

MR. COPELAND: And this is, in my opinion, it is rather unproductive here, and if she could direct her questions and get to her point.

JUDGE SMITH: I did want to make an observation about your Cross Examination, Ms. Chavez.

A relatively small amount of it has been directed to the physical phemonenon in dispute. Much of it has been directed to the papers surrounding it and this man's qualifications and things which have remote relevance to the actual issue that we have to decide.

MS. CHAVEZ: Uh-huh.

JUDGE SMITH: I want to point out to you that you are using your time in what I view not as productive a fashion as you might be.

One of our responsibilities is to be assured that Cross Examination is productive and, also, we would like for you to know that you are not making the best use of your time.

MR. COPELAND: Do I have a ruling on the objection, your Honor?

JUDGE SMITH: Overruled. As I understand it, you conceded that it was an objection of productivity and

not one of relevance.

MR. COPELAND: I would also object on the materiality of this line of questioning.

JUDGE SMITH: Well, I think that the relief has been granted in the form of the admonition.

MR. COPELAND: Thank you.

JUDGE SMITH: Where does that leave the question. that's your point, isn't it?

MR. COPELAND: I am sorry?

JUDGE SMITH: The point is: Where does it leave the question. and I don't recall the question.

MR. COPELAND: I don't, either.

JUDGE SMITH: Is there a question pending, Ms. Chavez, do you know?

MS. CHAVEZ: No, your Honor.

JUDGE SMITH: If there had been a question, it's now withdrawn. You will have to repeat it.

MS. CHAVEZ: Okay.

BY MS. CHAVEZ:

Q Based upon my questions to you, I have pretty much corrected the conclusion -- and correct me if I am wrong -- that you have lacked the specific detail what happened or familiarity with the operations of the system that were responsible for the KRSKO water-hammer event to reach the conclusion that you reach in your testimony?

A No, I disagree with that.
Q All right. I understand that.
What I am trying to determine is what specific information you had that was specific enough for you that you felt you could reach that evaluation.
MR. GOLDBERG: Judge, I object. This question has been asked and answered. The references for his opinion testimony are identified in his prefiled written testimony. He has been examined at considerable length on --
JUDGE SMITH: We have made the same observation.
Objection sustained.
MR. GOLDBERG: Thank you.
BY MS. CHAVEZ:
Q Do you know what the steam generator secondary side pressure was at the time of the KRSKO feedwater event?
A I don't recall it. I think it was mentioned in Reference 2.
If you want me to look it up, I will take the time now to look it up.
Q No, I don't need you to look it up.
Do you know what the flow rate at the plant was?
A I think that also was mentioned in that reference, and I could look that up, also.
Q Okay. Could you tell me what the mode of operation of the plant was?

A It was in preoperational testing or some time termed high functional testing.

Q Okay. Can you tell me specifically what was occurring at the plant at that time in that mode?

A As best I can read it back from Reference 2, Ma'am.

Would you like me to do that?

MS. CHAVEZ: No.

JUDGE SMITH: This line of questioning is designed to see what he knows about it without reference to Reference 2?

Otherwise, it seems to be rather pointless. You ask the question, he offers to get the answer and you say never mind.

MS. CHAVEZ: He can refer to Reference 2.

JUDGE SMITH: He may or may not?

MS. CHAVEZ: He may.

JUDGE SMITH: Do you want him to?

MS. CHAVEZ: Yes.

JUDGE SMITH: Okay.

BY MS. CHAVEZ:

Q Mr. Serkiz, is your evaluation of the FSAR of modifications that were proposed at the KRSKO plant to the Byron plant based upon any familiarity with the bypass -- feedwater bypass -- system at the Byron facility?

A As provided in Reference 2, which the Applicant provided,

comparative information and specific information on both plants and comparative information between the two plants and also the information Applicant provided in this FSAR and subsequent submittals to the NRC on that docket or dockets.

Q Can you tell me whether or not the alteration that Applicant has indicated will take place in the placing of the check valves at the Byron plant will have any significant impact, in your opinion, upon the proposed modifications?

A For clarification, which check valve or check valves are you referring to?

Q I am referring to the check valve which was placed closest to the auxiliary feedwater nozzle in the Byron feedwater system and which Applicant has indicated will be removed.

A The Applicant has also indicated it will be placed back further in the system.

Q That is correct.

A So in effect there is no basic change. You have three check valves in series, and check valves are designed to prevent back leakage.

So you have three check valves in series, as previously admitted, although as previously stated or admitted, one was closer to the steam generator.

Q In your opinion, was there any particular reason for

originally placing that check valve in its original location as opposed to any other location?

A You will have to ask the Applicant that.

I am not aware of a specific reason.

Q Based upon your qualifications scientifically, do you feel there was a particular reason?

A Not particularly.

Q Based upon your information about the Byron feedwater system and bypass line, again, do you have any particular concern that steam back leakage could occur and not be detected for a significant length of time?

A The Applicant has indicated a commitment to put in temperature sensors, so, if you will, the indication of any back leakage would be accomplished through that system.

Q Okay. Do you know where those temperature sensors will be located?

JUDGE SMITH: Before you ask your next question, give me a chance to discuss a matter with you, please.

MS. CHAVEZ: Okay.

JUDGE SMITH: Go ahead. Answer it.

A The Applicant has stated, or Mr. Pleniewicz in his testimony has stated, that Commonwealth Edison plans to install temperature sensors on the feedwater bypass feeding a J tube to the auxiliary feedwater nozzle on each

of the generators.

The essence of that is he is placing temperature sensors up near the auxiliary steam water nozzle, which is at a very close proximity to the steam generator.

JUDGE SMITH: All right. Based upon Mr. Serkiz' written testimony, which is rather short and rather narrow, we have allocated, I believe, more than enough time for all parties to address the testimony. There has to be time left for other parties and the Board to ask some questions.

Therefore, I want to discuss with you how much time you think you need, I want to have us agree upon it, if we can, and then caution you that you better start being aware of it.

MS. CHAVEZ: Is it possible for me to have 15 more minutes?

JUDGE SMITH: Yes.

MS. CHAVEZ: Okay.

JUDGE SMITH: Be realistic about that. Is that 15 minutes going to do it?

MS. CHAVEZ: Yes.

JUDGE SMITH: All right.

BY MS. CHAVEZ:

Q Are you familiar with the fact: Do you know whether or not those temperature sensors have been used in other

facilities in a similar location?

A I have not seen the specification on these particular temperature sensors; but temperature sensors have been used on a similar facility, trying to get back to the issue at hand here, temperature sensors of a similar nature design probably were used at the McGuire plant to monitor conditions attendant to the preoperational test to demonstrate whether or not water hammer would have occurred at McGuire and the information given back to the NRC showed no evidence of back leakage of steam or evidence of water hammer.

I don't know if that answers your question; but they probably were of a similar nature, but if your question is have I seen specifically the specification of these sensors, the answer is no.

Q So you are aware that temperature sensors of a similar or exact type may have been used at McGuire?

A I stated of a similar nature probably were used at the McGuire plant, yes.

Q Are you -- what is your experience with temperature sensors and the effectiveness of their function?

A It depends upon the type of temperature sensors. If this is a resistance RTD device, a device that is commonly used in the industry, both nuclear and non-nuclear.

Q What is your familiarity with check valve maintenance or

temperature sensor maintenance?

A Which question do you want me to --

Q Both.

A I do not have an intimate knowledge of check valve maintenance.

Many years ago I personally put on temperature sensors called thermocouples or RTD's.

So I have felt them. I have welded them on, I have pasted them on, both methods apply. I have drilled holes and put them into devices.

I have that familiarity. I have a hands-on familiarity at the present time that is about 15 years back of me.

JUDGE SMITH: The question is maintenance.

A (Continuing.) On maintenance, I had maintenance on those devices 15 years ago.

BY MS. CHAVEZ:

Q Do you know what the review or inspection time will be at Byron for those devices?

A I have not seen information submitted to answer that question, so the answer is no.

Q Do you know what the inspection time for the KRSKO plant facility was?

A I am not familiar with either maintenance or inspection procedures or matters of that nature with respect to the

KRSKO plant.

Q Do you feel this information might be valuable in predicting the probability of a water hammer bubble collapse occurrence at a facility?

A Possibly.

Q Aside from the the features identified in your testimony, can you tell me what familiarity you have with the preoperational testing that will be done at the Byron facility?

MR. GOLDBERG: I am sorry. Ms. Chavez, what features identify the testimony are you talking about?

MS. CHAVEZ: Aside from the features of the modifications and so forth.

MR. GOLDBERG: Are you talking about the features summarized in Answer 7 on Page 3, beginning -- the summary beginning on Page 3, Answer 7?

MS. CHAVEZ: Yes, the numbers indicated 1, 2, 3 -- 1, 2 and 3. They begin on Page 3 and they continue on Page 4.

THE WITNESS: Your question again, please?

BY MS. CHAVEZ:

Q Are you familiar with the preoperational -- first, are you familiar with the preoperational testing which will occur at the Byron facility?

A No. It hasn't been written right now.

Q Do you feel that this would have any importance in determining -- in making your determination that you reach in response to Question A8 on Page 5?
A The question is now a new question?
Q Yes.
A And your question is directed to Page 5 of my testimony?
Q Yes, Response 8.
A A8?
Q Yes.
A I think the response stands on its own. I have reviewed the design features and operational procedures that have been submitted or committed to and these are further substantiated by Mr. Pleniewicz' testimony, and they do appear adequate and capable of avoiding a water hammer condition similar to that that occurred at KRSKO.
Q Is it an assumption --
A May I finish my response?
Q Yes, sure.
A But I think the key part of my answer there, if I can bring it to your attention, is the actual susceptibility of the Byron steam generators or feedwater systems in the Byron station will be determined during preoperational testing, as noted in Section 10.4.7 of the Byron SER and I will offer for clarification further that preoperational testing is related to an NRC requirement, which is called

a Branch Technical Position 10-2, which applies to steam generators in nuclear power plants, wherein the concept is to set up preoperational tests to demonstrate the absence of water hammer in such systems.

So the final measure of checking out whether it is design, procedures or whatever is culminated in those preoperational tests, which are designed specifically to demonstrate whether you have water hammer or lack thereof.

Q My question is related to the phrasing of your response to Question 8, and I am asking you if lacking specific familiarity with the preoperational testing to take place at Byron, whether or not your response is an assumption that the susceptibility of the Byron steam generators will be determined?

A It's not an assumption, it's a conclusion.

JUDGE SMITH: You accept the premise of that question, that you lack the relevant familiarity. You just described to me a great degree of familiarity of functional testing with respect to water hammer. So you accept the premise of the question that you don't have relevant familiarity?

THE WITNESS: No. I apologize.

JUDGE SMITH: You don't have to accept that.

THE WITNESS: I apologize. The question as I was interpreting it was: Do I have present and operating

procedures at the Byron plant. I do not have because they have not been yet written.

JUDGE SMITH: Then her question comes back lacking familiarity, which you have just described in pretty detailed familiarity of what was going to happen with respect to this issue.

THE WITNESS: That's correct. And that's why I answered it's not an assumption on my part, it's a conclusion.

JUDGE SMITH: Now, is your question he should know more about the preoperational testing?

MS. CHAVEZ: Well, your Honor, my question is -- maybe I should ask it to him.

Whether or not there exists significant differences between specific facilities with regard to preoperational testing programs.

MR. GOLDBERG: That is a different question.

MS. CHAVEZ: That's right. it's a different question.

JUDGE SMITH: It's too broad to be of any value. Ms. Chavez. You can follow it but you don't have much time.

MS. CHAVEZ: I would like to follow it up.

JUDGE SMITH: It's up to you.

THE WITNESS: Repeat the question. please.

MS. CHAVEZ: Yes.

BY MS. CHAVEZ:

Q Are there significant differences between facilities in preoperational testing programs?

A There are two parts to that question. Am I interpreting the question correctly?

Q How are you interpreting my question?

A I am trying to.

Q Are there significant --

JUDGE SMITH: Even though you are willing to waste your time, we are not. There are many different types of facilities, different types of theory, there are BWR's, PWR's, different manufacturers. Obviously, there are going to be different preoperational procedures. Go on to your next question. Either make it more specific or go on to your next question.

MS. CHAVEZ: I believe that finishes my questions.

JUDGE SMITH: Is that correct?

THE WITNESS: That's correct. That's what I am trying to understand and respond.

MS. CHAVEZ: I think that finishes my questions.

JUDGE SMITH: We will take a five-minute break.

(Recess.)

JUDGE SMITH: Mr. Copeland.

MR. COPELAND: Thank you, your Honor.

BY MR. COPELAND:

Q Mr. Serkiz, on Page 5 of your testimony, the third full sentence from the top of the page reads. "Thus, it is the Staff's position that the KRSKO event is plant specific and not generic in nature."

Do you see that, what I am referring to?

A Yes, I do.

Q Could you explain the basis for that statement?

A Yes. The basis for that statement is every water hammer that occurs is plant specific.

The reason for inserting this statement in my testimony for this contention is it is the Staff's position that the KRSKO event is plant specific and should not be applied unconditionally or generically in nature to all U. S. plants.

Q If --

A May I continue? I am not finished.

Q Yes, please do.

A It is also indicated in my answer in a sentence, well, beginning at the top of Page 5, "We have studied the question of water hammer potential in preheat steam generators from a generic viewpoint, particularly as applied to U. S. plants." This, in my consideration, is a generic-type evaluation in which we also did look at what

knowledge or indication. as I phrased earlier, we had on the KRSKO event.

Our conclusion was, based on what information was given to us from the KRSKO plant, that that was plant specific and set up by the conditions that that plant was operating at the time that water hammer event occurred; and I described some of those earlier in my testimony.

That's the underlying basis on why the Staff position was the KRSKO event was plant specific and not generic in nature.

It was a plant situation during preoperational testing in which conditions were set up at KRSKO which triggered this water hammer.

Q Does that conclude your response?

A Yes, it does.

Q Do I understand correctly that water hammer is treated as a generic issue by the NRC?

A Yes.

Q Yet, every instance of water hammer is considered to be plant specific; is that what you stated?

A That's correct.

Q Do you consider that the KRSKO water hammer event is within the purview of Unresolved Safety Issue A-1, water hammer?

A Yes.

Q Mr. Serkiz. are you familiar with the general design criteria for nuclear power plants that are found in Appendix A of Part 50 of Title 10 of the Code of Federal Pegulations?

MR. GOLDBERG: The criteria in their entirety or any individual criteria?

I am sorry. I am testifying.

A I have familiarity that I have gone to that particular reference and looked up the various general design criterias listed.

MR. GOLDBERG: Let me ask: Are you going to ask him about the criteria?

I would like to give him a copy of the Code of Federal Regulations.

Let the record reflect that I am handing the witness a copy of the bound Title 10 to the Code of Federal Regulations.

BY MR. COPELAND:

Q Could you tell us. please. if you know. which criteria would be applicable in the design of the bypass feedwater system -- in the design of the feedwater system for prevention of a water hammer?

A I believe it's General Design Criteria 2 that deals with -- it's either 2 or 4. Let me just check that for a moment.

MR. GALLO: Page 406.

THE WITNESS: Thanks.

MR. COPELAND: Take your time.

A The general design criteria wherein water hammer is, if you will, carried under or referenced back to, is General Design Criteria 4; and the portion of that criteria that is used with which to evaluate water hammer has to do with protecting against dynamic effects.

Do you see where I am in GDC 4?

Q Yes.

A "The actual review and/or evaluation for the design for or avoidance of water hammer is normally reviewed through different portions of the safety review plan."

MR. COPELAND: We have no further questions.

JUDGE COLE: Just a couple of questions, Mr. Serkiz.

BOARD EXAMINATION

BY JUDGE COLE:

Q What is the status of the technical resolution of unresolved Safety Issue 1, water hammer?

A The status is as follows: One, the Staff has prepared the technical findings report; and, two, has recommended changes to different portions of the standard review plan. which would reflect the experience and knowledge gained from reviewing water hammer in nuclear power plants to assure that design concepts and/or operational procedures

which have appeared to demonstrate a capability to avoid or minimize the water hammer occurrence have been prepared.

The state of those two items is that they have been prepared and they have been forwarded to the Committee for the Review of Generic Requirements. the CRGR; and there is a meeting scheduled with the CRGR next Wednesday, which I think is the 9th of March, the 9th of March.

At this time the Staff will address any questions that the CRGR has relative to the findings or the recommended changes in the standard review plan; and then the process calls for following such dialogue and approval to proceed, we will put these documents out for public comment, receive public comment, which we would probably give people 60 days for public comment, and to then return once again to the documents and received public comments, accommodate those comments pertinent and valid and then to go forward to implement changes in the standard review plan.

Q Do you have any feeling or estimate of how far down the road that this issue, if it is to be taken off of -- out of the category of unresolved safety issue, when and if that might occur?

A Well, from the viewpoint of the technical findings, the issue is technically resolved at the present time.

The actual resolution or the taking off of this safety issue, we go through the cycle -- or the schedule that I see embarked on would be early winter, somewhere around November or December of 1983.

Q All right, sir. Thank you.

In response to a question, sir, you stated that the Nuclear Regulatory Commission had not made an investigation of the KRSKO event.

Do you recall saying that, sir?

A Yes, sir.

Q But the Staff has reviewed information of the investigations of the KRSKO plant; is that correct, sir?

A That is correct.

Q What is the status of the Staff review of the investigations of the KRSKO plant?

Are you now satisfied that the Staff knows enough about the KRSKO event to draw conclusions and apply that to U. S. plants?

A That's several questions. Let me back up a minute.

Q Well, go ahead.

Do you understand the question?

A The answer to your final question, the answer is yes. I feel we know enough through the documentation that was provided in my Reference 2, consultation among various Staff that have been involved in both the water hammer

issue and who are aware that the KRSKO event did take place -- based on what we have been able to learn, the conclusion we reach is that we know enough about that and the design of U. S. plants of a comparable design basis, using preheat steam generators, that the conclusion is that the Byron plant -- or the Applicant for the Byron plant has shown knowledge of what is happening there, has incorporated design features in the intent to instruct operating procedures to take the steps that are outlined in Mr. Pleniewicz' testimony here that should preclude what happened at KRSKO.

Q All right, sir.

The contractor report, Evaluation of Water Hammer Potential in Preheat Steam Generators, Board Exhibit No. 2, which was prepared, I guess, at the request of the Staff by a consultant to the Staff?

A That's correct.

Q What is the status of the Staff review of that document?

A We have completed the review and a report has been issued out.

The Staff finds the findings presented in this report as correctly representing the situation as we know it both from the viewpoint of U. S. plants and the KRSKO.

Q You said a report is out.

What report are you then referring to?

A I am referring to your Exhibit 2, sir. This is the contractor's report.

We don't edit or censure contractor reports; and the reason for going to an independent contractor here principally was to get an external, independent evaluation of what we knew about the KRSKO event and the type of plants that are in the U. S., and this is the report he has issued for our benefit.

Q All right, sir. Maybe you misunderstood my question.

A I am sorry.

Q I asked about the Staff review of this contractor's document.

A It has been completed and there is no follow-up report.

Q So the Staff has completed its review, but that is not documented in any additional report --

A That's correct.

Q -- or summary?

A That's correct. No additional Staff documentation on this report.

Q Do you have a copy of that report. sir --

A Yes, sir.

Q -- NUREG/CR 3090?

A Yes, sir.

Q Could you turn to Page 2-8 of that document. Figure 2-5, which is identified as the main and auxiliary feedwater

systems for KRSKO?

A Yes.

Q Now, at the KRSKO -- in your testimony you refer to an occurrence as the KRSKO event, that plant, which resulted in a bulge or a blister in certain of the piping.

Could you identify exactly where that occurred on this figure, sir?

A Yes, sir. The bulging I refer to is recorded on Figure 2-6 on Page 2-9 in the right-hand margin at the locations numbered -- or between the locations No. 114 and 116.

Information was submitted to us that there was a bulge in the feedwater pipe in the KRSKO plant.

With respect to the blistering --

Q Well, could you locate that on Figure 2-5?

A Okay. It's more difficult to locate it on 2-5 because it's a schematic; and it would have occurred between what is shown on Figure 2-5 as the containment wall, which is a vertical series of lines drawn at the left-hand side, and the steam generator.

I may not be making myself clear.

It would be in a region between where the steam generators are depicted and the containment wall.

That drawing is not to scale.

(Indicating.)

Q All right, sir.

A In other words, in this vicinity here.
(Indicating.)
Q You are pointing to Steam Generator No. 2, and there are two lines extending to the right from Steam Generator 2, and it occurred in the uppermost of those two lines?
A It would have occurred in what is represented by the line going to the auxiliary feedwater nozzle near the top.
(Indicating.)
Q And you are now pointing to the line coming from the top of Steam Generator 2 extending toward the containment wall?
A Extending toward the containment wall, yes.
Q And it was in that pipe section?
A In that pipe section, which is better described in the figure on 2-9, because that contains the dimensions and isometrically shows you how the piping bends.
Q All right, sir.
MR. GOLDBERG: Excuse me. You meant Figure 2-6 on Page 2-9.
A I meant Figure 2-6 on Page 2-9. The isometric locates the bulging in the pipe; but with respect to the question in Figure 2-5, it is in a region between the containment wall and the steam generator.
JUDGE COLE: All right, sir. Thank you.
BY JUDGE COLE:

Q Now, on Figure 3-5, Page 3-11, identified as the Byron main feed and auxiliary feedwater connections to the steam generator. there is shown a check valve that has been installed in the feed line near the auxiliary nozzle.

Could you identify that on Figure 3-5? Is that in the same location as the break that you -- or the bulge that you identified in Figure 2-5 and in 2-6 --

A No. With --

Q -- in that same pipe section?

A It would be in the same pipe section, but it would be downstream of where the check valve is shown in Figure 3-5 -- I am sorry -- upstream.

Q But the check valve that is referred to that's shown in Figure 3-5 is the same check valve that is referred to on Page 3-9 in Section 3.2.3 in the first paragraph?

A That's correct, sir.

Q Okay. Now, just one more question, sir.

Based upon what you have learned about the KRSKO event and your knowledge of water hammer events and specifically about the KRSKO event, if a KRSKO-type event were to occur at the Byron plant -- assuming just for argument sake that it were to occur, what would be the consequences at Byron, sir? Do you have any estimate of that?

A There wouldn't be any consequences, because if the

identical event occurred with, essentially, the same level of damage, the pressure boundary was never breached, so there was no release of any fluid; but even if the pressure boundary had been breached or would be breached in the secondary system, you are not breaching a boundary of the primary coolant.

Furthermore, the design basis accidents that are analyzed for different plants as part of that analysis do a limiting type calculation for a feedwater line break, which is a total feedwater line break, to determine the consequences of losing the capability of secondary cooling from that generator or any other attendant accident conditions.

This has been done for the Byron plant and reported in the FSAR, and the consequences were found acceptable; in other words, no release.

Q All right, sir.

A total loss of main feedwater is a design basis event?

A That is one of the design basis accidents that are analyzed, sir.

JUDGE COLE: I have no further questions.

Thank you, sir.

JUDGE CALLIHAN: I have a couple of small items, if I may, please.

BOARD EXAMINATION

BY JUDGE CALLIHAN:

Q We are back to leaky valves.

Are there generic or routine methods that are applicable for detecting leaky check valves, anything that is required of designers and steam suppliers and so forth. anything that is practical?

A Yes. In the case for the contention at hand, because there is a concern about check valves leaking, setting up the condition, the Applicant has indicated in his testimony that he is going to implement sampling or checking for leaky check valves; and I am not familiar with the actual sampling technique that the Applicant will implement.

One technique which could be used is a pressure differential or a temperature differential to indicate a movement of fluid across the check valve.

Depending on -- the leakage that would be anticipated would determine the type of monitor that would be installed; and, perhaps, the Applicant could be more specific, you know, to follow up on that type of question that you have raised, because he has indicated that he is going to do this sort of thing in the Byron plant.

It's an in-service type of inspection. In some cases, I guess you could call it that. It's implemented

in systems where there is a concern for back leakage.

Q Has the NRC taken any position on requirements and methods, that sort of thing, that follow from your knowledge?

A Yes. In the case of certain valves that are dependent upon -- I am sorry.

In the case of those valves which are relied upon to seal up containment, the concept is generally two valves in series, and those valves are pericdically checked for leakage.

And so in that sense, yes; and it becomes then a function of the system and the reliance on those valves maintaining containment isolation, I guess, is the way I would phrase it. Those would be the principal ones.

In the case here where there is a concern, it's prudent to do something like that.

Q Thank you.

My remarks are a bit spotty, because I am just filling in gaps on my list, most having been covered before.

Back to the matter of the Yugoslavian event and its report and analysis and so forth, I think you made the statement that the Staff per se didn't make an investigation, the NRC per se didn't make an investigation.

However, what participation did the NRC have in the IAEA investigation?

Was there not an NRC member of that investigating group?

A I don't really know. I received inconsistent -- my knowledge, at the time I attempted to pin down that specific thing, which was about the same time frame that we were preparing testimony on this contention, was that, A, the Staff was aware that the KRSKO event had occurred.

I was not able to determine whether there was a specific Staff assignment to it.

In trying to follow this up, to the best of my knowledge, there was not a special Staff task force set up. However, Staff were aware of it; and since the degree of reliability on what had happened at KRSKO was spotty at the time I was preparing testimony, we felt it proper to request the Applicant to submit to us answers to a series of questions addressing both what had happened at KRSKO, the similarities or dissimilarities between the two plants and any other pertinent information that should be related to the Byron plant.

This was then responded to in what I call my Reference 2 in my testimony.

So we had at one place, to the best of everybody's knowledge, what happened and the applicability.

I don't know if the NRC formally, you know, engaged in that investigation; but Staff were aware that it was going on.

JUDGE SMITH: What is the group that Dr. Callihan referred to?

THE WITNESS: What is it, IAEA?

JUDGE CALLIHAN: International Atomic Energy Agency.

THE WITNESS: The International Atomic Engery Agency. It's an international agency that has various functions, and I guess, with respect to the KRSKO event, had solicited Staff's views or opinions on what had happened; but I am not familiar with the administrative interface, if you will, that was set up; and I was never able to opinion that down.

JUDGE CALLIHAN: Well, it's not my purpose to testify; but the IAEA report does list a member of the NRC as a member of the mission.

THE WITNESS: Yes. Bill Kane was my principal contact on that; and I never got a clear answer out of Bill whether he was formally designated or he was doing this as -- you know, the agency was cooperating, you know, in this investigation.

JUDGE CALLIHAN: Well, I just wish the record to show that NRC was in on the act and as a member of the

mission which reviewed the event on June 7-12, '82, as listed by Tedesco.

THE WITNESS: I guess Tedesco would have been then the designated one.

Bill Kane happened to be the technical Staff wherein the Staff. the direct Staff, involvement would have been.

BY JUDGE CALLIHAN:

Q So NRC was in on it, really?

A Certainly aware of it.

MR. GOLDBERG: Judge Callahan, could I just ask you to identify the IAEA document to which you refer? Maybe I missed something.

JUDGE CALLIHAN: Yes. Thank you.

This is entitled "Nuclear Power Safety Report to the Government of Yugoslavia," and the number is -- it's issued by the International Atomic Energy Agency. It's dated 2 July 82, and the designated number is WP/5/1937. and the meaning of that I don't really know, because it's further identified as TA Report 1937, and was transmitted to the Board by you on October 29, 1982.

MR. GOLDBERG: Yes. I recall that and --

JUDGE CALLIHAN: There was no criticism.

I wanted to get the detail in the record, since the interest was spoken about.

MR. GOLDBERG: I am not testifying under oath

and I am not sure how important this is to the Board.

The document was classified by the Yugoslavian authorities prior to my ability to dispatch it to the Board and parties and, as I understood it, the --

JUDGE COLE: You mean subsequent to or prior to?

MR. GOLDBERG: It was classified prior to my ability to publicly distribute it.

I believe it was first referenced in a correspondence Ms. Chavez had with the Board and then I undertook to distribute it.

My understanding is the solicitation by the Yugoslavian authorities for NRC technical contribution, if you will, was --

JUDGE CALLIHAN: We are uncomfortably close --

MR. GOLDBERG: Yes, rather uncertain.

JUDGE CALLIHAN: We are rather uncomfortably close to bars in the marshal's office down the hall. I hope we are not incriminating --

MR. GOLDBERG: No, I don't mean that. I just wanted to show you the association.

JUDGE SMITH: The Board does not intend to use the report in deciding the issue.

JUDGE CALLIHAN: I merely brought it up to show that, at least to some extent, the Nuclear Regulatory Commission was rather closely associated with the initial

investigation. I am not sure about the final report.

BY JUDGE CALLIHAN:

Q I would like to return to Applicant's question on the statement that you make on Page 5 of your testimony, the Staff position about the Yugoslavia event being not generic, rather plant specific.

Certainly, it doesn't apply to all plants? Certainly it's limited to pressurized water reactors, just to narrow the field; but --

A Let me comment a bit further.

Q Will you please?

A The reason for the wording on that is, as we worked with the information we had on the Yugoslavian plant or the KRSKO event, it appeared to the Staff that it was very unique in the way KRSKO was doing preoperational tests.

There were several factors involved there. One, we were not able to get explicit details of the type of preoperational tests that were being run other than in the sense that they were doing testing on auxiliary feedwater trips, pumps, a trip and start, stop and start.

We tried to determine, you know, if there was anything unique in a particular preoperational test or plant state; and we were not able to get specific information whether procedures were being followed, whether there was some type of specialty tests.

The water hammer damage was discovered after the event had occurred.

The date of discovery listed is, I believe, August, and the event occurred several months before; and we did want to be sure that if there was a series of preoperational tests that were unique to this type of secondary system design and installation, if we could determine if there was something generic in nature.

We kept coming back to obtaining the same information provided to us, that they felt the cause was related to back leakage through check valves, which was acknowledged, as the check valves, after the fact, were noted to have some damage, and were refurbished; and lacking the specifics on what was going on, we categorized this as a KRSKO specific event and not generic in nature.

That's, really, the underlying reason. Perhaps those words don't convey that message.

Q That's not to say that this occurrence could not be in this country?

A No, that was not the intent of the statement, and it's my phraseology, if it's conveying the wrong information.

What I have just gone through with you is our attempt to come to grips with exactly what was going on, how the plant was being run, whether there had been a loss of feedwater level in the steam generator that had been

allowed to exist and so on.

We only got general feedback, and so we said, "Well, there are generic implications in the sense that you did have a feedwater event occur, but this is not surprising from the generic viewpoint; that if you set up a condition that you let a lot of steam in lines and bring in cold water. you are going to have it."

So we said, "We can't use the KRSKO event to lay out a generic implication for that same type of plant design." and --

Q That is quite helpful.

A (Continuing.) -- that was the intent of that statement.

JUDGE CALLIHAN: It's quite help, I believe, for the record.

Thank you very much. That's all I have, Mr. Chairman.

JUDGE SMITH: How much additional cross-examining do you have, Mr. Goldberg?

MR. GOLDBERG: I just have one or two questions on redirect examination.

MR. COPELAND: I have no cross.

JUDGE SMITH: Ms. Chavez, do you have cross based upon the Board's questions?

MS. CHAVEZ: No, I don't, your Honor.

JUDGE SMITH: Do you have anything?

JUDGE COLE: No.

JUDGE SMITH: Mr. Goldberg.

MR. GOLDBERG: Thank you, judge.

REDIRECT EXAMINATION

BY MR. GOLDBERG:

Q Mr. Serkiz, Judge Cole asked you about your professional qualifications as task manager for resolution of the Water Hammer USI.

I wonder if you could also tell me what relevant educational experience you have pertinent to the issue.

A Well, as indicated in my professional qualifications, I have a Bachelor of Science Degree in mechanical engineering; graduate work done at University of Cincinatti.

In order to clarify what my principal areas of study were, they were heat transfer, fluid dynamics and power systems.

From the basis of qualifications from that viewpoint, engineers are trained to study and understand the laws of physics and then to apply them to design hardware practical applications.

The physics associated with the steam water hammer, which is the gist of this contention, deals with the heat transfer and fluid interaction of steam and water in a power system.

As task manager on A-1, the Unresolved Safety Issue Water Hammer, I have studied and evaluated water hammer occurrences in nuclear power plants -- and there have been roughly 150 such occurrences -- their underlying causes, the attendant damage, corrective measures taken and the safety significance.

With respect to the underlying causes, steam water hammer happens to be one of them, and if you bring steam and water in contact, you can generate the type of situation that's been of discussion this morning.

With respect to the safety significance in the study of water hammer, both by Staff and myself and the contractors we have employed, we feel that the safety significance of this issue, if one stands back and takes a look at the fact that we have had like 150 water hammers, the damage has been principally limited to pipe hangers and snubbers, and the damage has been relatively minor. in the cases like Indian Point 2, where you had a feedwater line break in 1972; and I might state that the Indian Point 2 event was a very principal or dominant reason why the Staff at that time or shortly thereafter decided to designate water hammer as an unresolved safety issue, because there were implications.

There were a lot of reactors going on line in the early '70's. New plants were coming on line.

Despite the fact that we have had this number, we find that the level of damage is low. We have not released any radioactivity. The damage that has been done to plants has been confined and corrected.

About half of the events that have occurred -- and I am speaking to all light water reactors, not only pressurized water reactors -- about half of it has occurred because of design deficiencies, which have been corrected along the way. The introduction of J tubes into top feed ring steam generators is one example, because it's illustrative of the subject at hand here.

The other half have been related to operating considerations or operational considerations wherein some portion of the plant's system has been set up that's conducive to it.

When one steps back and looks at this -- and the Staff has, again, done this, done it collectively and through the use of external contractors; and based on what has been reported and the corrective action, our conclusion is that it is not the safety issue it was felt to be back in the early '70's.

It does warrant a change in standard review plans. If both the reviewer and the designer are aware of certain systems that have worked, certain considerations should be folded in and maintained in future plants.

And so I guess my bottom line here is: I am familiar with what has occurred. My training, my background, does give me the knowledge of the physics involved.

I don't feel the issue at the present time is a significant safety issue.

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

Q You may have given me more in your answer than I asked for in the question. I may have some questions on your answer.

How complicated is this phenomenon, given your educational and professional expertise, to understand both the phemonenon and measures to mitigate?

A If one goes back to the underlying causes, the methods to analyze those type of physical occurrences and to design for them is covered in the training that a graduate engineer obtains, and for the persons -- or, I should say, the parties that normally design plant systems, these fall under the category of fluid dynamics, fluid systems, power systems, variously termed. They have the training and the understanding to be able to design for an avoidance.

With respect to operational procedures, these become plant specific, and, therefore, you become dependent on a particular design, and the owner of that design developing suitable operating procedures to avoid it.

We have a good data base. We understand what has

happened. This has been documented in a variety of places.

It would behoove the plant owner to fold that into his operating considerations.

Q Finally -- you may have given me the answer and we don't have that much time -- you indicated in answer to Judge Cole that the water hammer unresolved safety issue was technically resolved, and you may have given the reasons it is technically resolved.

Can you just tell me what the technical resolution is?

A The technical resolution is manifested in terms of the additional inserts into the standard review plan in different sections that reflect the plant design features that have been found to be successful in avoiding and mitigating water hammer. and also emphasizing the fact that operating procedures should be structured with this type of information being considered to avoid setting up plant conditions that could lead to a recurrence.

So the resolution reflects itself in terms of the changes of the standard review plan.

MR. GOLDBERG: I have no further questions.

JUDGE SMITH: Is there any additional questioning?

MS. CHAVEZ: Your Honor. I have one.

RECROSS EXAMINATION

BY MS. CHAVEZ:

Q With regard to the last question and answer, what was the status of your resolution of the generic task at the time of the occurrence of the KRSKO water hammer event?

A It was in the final stages.

MS. CHAVEZ: That is my last question.

JUDGE SMITH: Thank you. You are excused.

THE WITNESS: Thank you.

(Witness excused.)

JUDGE SMITH: The discussion of the generic safety issue has reminded me of a question that I would like to hear -- an answer I would like to hear from Mr. Goldberg.

What is the Staff's plans to address the general issue of relevant generic safety issues? Is that done in your --

MR. GOLDBERG: In the safety evaluation report; and those relevant to Byron are enumerated and their treatment disclosed.

JUDGE SMITH: Okay. Now, the Board isn't going to have anything further to do with providing cross examination plans among the parties after the testimony. That's up to the parties to work out. It's up to the author of the cross examination plan to provide it, and

failing that, it's up to the other parties to demand it. So don't look to us for compliance with that unless you have to.

We are going to meet on one other thing.

Mr. Miller, on Wednesday evening, I guess it was, asked us what our pleasure was with regard to receiving into evidence some documents, and we put him off. We weren't following it.

I don't know what time problem you might have with respect to that; but I didn't mean to put him off too long, but whenever you want to raise it, we will listen to you.

Do you recall the discussion?

MR. GALLO: Yes, I do, Judge Smith.

It had to do with the Staff FES and the Staff SER and also the Applicant's FSAR.

I think, because of the hour, it's really too late to launch into that today.

JUDGE SMITH: All right.

MR. GALLO: I haven't given up that we might be able to stipulate that in yet.

JUDGE SMITH: Okay. Is there anything further before we adjourn?

MR. SAVAGE: Yes, your Honor.

MR. GOLDBERG: Yes. Go ahead.

MR. SAVAGE: One housekeeping matter.

It has come to my attention that there are probably some errors in the record with respect to the argument on DAARE/SAFE's motion to amend and consolidate the evacuation issues.

If you don't mind, if we could have three or four minutes to talk among ourselves and then two or three minutes to correct the record --

JUDGE SMITH: To correct the transcript?

MR. SAVAGE: Yes, yes, sir.

JUDGE SMITH: The transcript is already issued, of course. That's how you noticed it.

MR. SAVAGE: Yes, sir, we noticed it from the transcript, when Mr. Bielawski had a chance to read it, and also in discussions among ourselves afterwards.

JUDGE SMITH: Okay. We will --

MR. BIELAWSKI: Judge, they are not typographical errors or anything else. They are substantive errors in terms of the chronology of certain things which, because of my absence from the courtroom when the argument was being made, I wasn't able to make that disclaimer.

JUDGE SMITH: With respect to transcript corrections generally, when the hearing concludes, typically what will happen is that one party or another

will make a motion for transcript corrections. Other parties will have a chance to respond to it. Absent an objection, we will adopt the transcript corrections.

Now, if you need to make corrections so that we have the argument in context when we make our decision, it's not going to be possible to actually correct the transcript; but why don't you just -- when we schedule the matter for argument again, why don't you give us your proposed transcript corrections on it so we will know what they should be; but we are not prepared to order transcript corrections piecemeal.

MR. BIELAWSKI: No. Well, to try to clarify what it is that we are saying:

For example, dates were given with respect to when parties received certain information. Those dates, after discussing amongst ourselves, were the wrong dates.

JUDGE SMITH: Okay.

MR. BIELAWSKI: Now, as the motion is pending, and those dates may or may not be significant to your decision, we feel that it is important that you are informed with the correct dates.

JUDGE SMITH: Why don't you stipulate to correct dates?

MR. BIELAWSKI: Fine. We can do that.

MR. SAVAGE: Certainly.

JUDGE SMITH: We will take the stipulation and bind it in the transcript.

Is there anything further?

MR. GOLDBERG: One final housekeeping matter.

Betty Johnson earlier in the week raised the matter of the availability of her steam generator witness.

I would just like to say the parties have conferred and as yet have been unable to achieve an agreeable schedule; and I think we will advise the Board at the opening session on Monday about any scheduling agreements we have been able to reach relative to that so the Board and parties can plan the schedule accordingly.

JUDGE SMITH: Okay. It looks like we would probably arrive at that issue next week, in any event.

MR. GOLDBERG: Yes. It was scheduled to be heard the week following that.

MS. JOHNSON: The 14th.

JUDGE SMITH: Yes. We will try to schedule further discussion of the emergency planning problems and a report from the parties early next week.

Anything further?

MR. GALLO: Judge Smith.

JUDGE SMITH: Yes.

MR. GALLO: I am prepared to give a report now, if you would like to hear it.

The Applicant has been meeting with Mr. Savage and has briefed Mr. Goldberg of the NRC Staff.

During our meetings we have attempted to reach an accommodation of this issue. We are still far apart. However, we haven't given up.

The discussions with Mr. Savage and his clients are going to continue next week.

We have scheduled at approximately 9:00 A. M. in Chicago on Monday a meeting with Mr. Erie Jones and other state officials having responsibility for emergency planning.

At that meeting Mr. Savage and his clients will be present, we will be present, and we will attempt, with the state people, to reach some sort of accommodation.

In addition, we are going to conduct discussions with respect to the wording of the contention. However, we are still far apart on other issues, which I don't want to get into, but that's the status as of right now.

JUDGE SMITH: Anything further?

(No response.)

JUDGE SMITH: All right. We will adjourn until 2:30 Monday.

We will meet back in the main courtroom.

One thing further on the record.

Before you leave, I would like to establish the

practice, as we leave one issue and enter another issue. that we agree -- would you please be quiet?

JUDGE CALLIHAN: You have a gavel there.

JUDGE SMITH: I would like to establish the practice that you report to the Board and the parties exactly the identity of the written testimony that comes up on the next issue, because it depends now upon just a bulk list; and so for occupational radiation exposure. could you quickly give us who your witnesses are on it, so we will be sure that we have them all ready?

If you are not -- we already know about water hammer. We will make sure we have them.

MR. GALLO: I can give you Applicant's.

MR. GOLDBERG: Do you want this on the record or off the record?

JUDGE SMITH: No. We will adjourn now and you can give us that information.

(Whereupon, at 11:20 A. M., the hearing in the above-entitled matter was recessed, to reconvene at 2:30 P. M. on Monday, March 7, 1983.)

NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the

ATOMIC SAFETY AND LICENSING BOARD

in the matter of: COMMONWEALTH EDISON COMPANY (Byron Nuclear Power Station, Units 1 & 2)

Date of Proceeding: March , 1983

Docket Number: 50-454-OL and 50-455-OL

Place of Proceeding: ROCKFORD, ILLINOIS

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

G. Allen Sonntag

Official Reporter (Typed)

Official Reporter (Signature)