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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the matter of:

TEXAS UTILITIES ELECTRIC COMPANY, et al

Docket No. 50-445-2
50-446-2

(Comanche Peak Steam Electric Station, Units 1 & 2)

Deposition of: James Calvin Keller

Location: Glen Rose, Texas

Pages: 78,000-78,026

Date: Friday, August 3, 1984

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY & LICENSING BOARD

In the Matter of:	:	
TEXAS UTILITIES ELECTRIC COMPANY, et al.	:	Docket Nos. 50-445 50-446
(Comanche Peak Steam Electric Station, Units 1 and 2)	:	

Glen Rose Motor Inn
Highway 67 & FM Road 201
Glen Rose, Texas

August 3 , 1984

Deposition of: JAMES CALVIN KELLER

called for examination by counsel for the Applicants taken before Margaret K. Schneider, Court Reporter, beginning at 11:03 a.m., pursuant to agreement.

APPEARANCES:

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I N D E X

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E X H I B I T S

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P R O C E E D I N G S

11:03 a.m.

MR. HORIN: Good morning. My name is William Horin. I'm with the law firm of Bishop, Liberman, Cook, Purcell & Reynolds. With me is Mr. Leonard Belter, also with the law firm of Bishop, Liberman, Cook, Purcell & Reynolds. And we represent Texas Utilities Electric Company in the licensing of Comanche Peak Steam Electric Station.

We are here today to present the testimony of Mr. James Keller regarding pre-service inspection and in-service inspection of ASME components and systems.

Can we go on around the table and introduce ourselves?

MR. BACHMANN: My name is Richard Bachmann. I'm counsel for the NRC Staff.

MS. GARDE: My name is Billie Garde. I'm a law clerk with Trial Lawyers for Public Justice that represents Intervenor CASE in this matter.

THE WITNESS: My name is James Keller, and I'm a Mechanical Engineer with Westinghouse Corporation out of Pittsburgh.

MR. HORIN: I'd note for the record that Mr. Keller was sworn before we commenced our questioning.

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Whereupon,

JAMES CALVIN KELLER

the Deponent herein, having first been duly sworn, was examined and testified on his oath as follows:

DIRECT EXAMINATION

BY MR. HORIN:

Q. Mr. Keller, do you have in front of you a copy of a document titled "Testimony of James Keller Regarding Pre-Service Inspection and In-Service Inspection of ASME Components and Systems"?

A. Yes.

Q. And do you also have in front of you a copy of the Resume of James C. Keller?

A. Yes.

MR. HORIN: I'd like to mark these documents as Keller Exhibit 1, and the Resume as Attachment 1 to Keller Exhibit 1.

(The documents above referred were marked Keller Deposition Exhibit No. 1 and Attachment No. 1 to Keller Exhibit No 1 for identification, a copy of which is attached hereto.)

Q. Mr. Keller, was this testimony prepared by you and under your direction?

A. Yes, it was.

Q. Are there any corrections or additions you would like to make to this testimony?

A. No, not at all.

Q. Is it true and correct to the best of your knowledge and belief?

A. Yes, it is.

Q. And do you adopt it as your testimony in this proceeding?

A. Yes.

MR. HORIN: I move that Keller Exhibit 1 and Attachment 1 be moved in evidence.

MR. BACHMANN: And bound into the record as if read.

MS. GARDE: No objection.

MR. HORIN: No objections.

MR. BACHMANN: No objection.

MR. HORIN: I pass the witness.

CROSS-EXAMINATION

BY MS. GARDE:

Q. Mr. Keller, are you familiar with whether or not Westinghouse has pre-service inspection programs at plants other than Comanche Peak?

A. Yes, they do.

Q. To the best of your knowledge, is it

something that Westinghouse does at all their plants?

A. They are not normally -- sometimes, they are not successful. It's a competitive business. It's done by a number of people in this business.

Q. Uh-huh. And how long has the pre-service inspection/in-service program been in place at Comanche Peak?

A. We started it about 1979.

Q. When you began the program, was there any kind of requirement for a backward look at the materials -- excuse me -- at hardware?

MR. HORIN: Objection. I don't understand the question to begin with.

MS. GARDE: Okay. Well --

MR. HORIN: What do you mean by a "backward look"?

MS. GARDE: Okay. Well, I'll rephrase the question, Mr. Horin. The witness understood the question. I think he could have gone ahead and answered the question but I'll restate it.

BY MS. GARDE:

Q. At the time in 1979 when you began this particular program, pre-service inspections/in-service inspections program, was a hardware -- and I'm going to use the term "walkdown" only because I've heard that a lot

in these depositions.

That is, did anyone from Westinghouse actually go out and look at hardware prior to the institution of this program for the purpose of this program?

A. Yes, they have to in order to put together a program.

Q. Okay. Were you a part of that effort?

A. I was not here at that time.

Q. Was a report prepared, to the best of your knowledge, on that pre-inspection, walkdown inspection?

A. I think it's evidenced by the program itself that indicates what they walked down, what they found, to review the stuff as built --

Q. Uh-huh.

A. -- so they knew what to expect. That is the program.

Q. Okay. Let me ask you, so that I am not using incorrect terminology, did that particular program prior to the institution of these in-service and pre-service inspections have a name? Did that particular walkdown have a name?

A. Oh, yes.

Q. And what was that called?

A. Oh, it's called the pre-service program walkdown.

Q. Okay. That's what it's re --

A. Well, I -- you know, that's what I would call it. I don't know --

Q. That's what you would refer to it as.

A. That's right.

Q. You don't know of any particular name on that report.

A. No.

Q. And you weren't involved with that program.

A. Yes, but that -- do you mind?

Q. It's -- yes. If I'm --

A. It was -- it was a small portion of the total program.

Q. Uh-huh.

A. The major part of the program I've been involved with, which is about 95 percent --

Q. Yes.

A. -- the first five percent was only those particular systems, the main coolant system --

Q. Uh-huh.

A. -- which they examined early on.

Q. Uh-huh.

A. But we, when I got involved in a program, we re-examine them, starting about 1980-81.

Q. Okay. What -- just my notes, I didn't get

what you said was looked at early on in the first five percent. Did you name a building?

A. The main coolant system.

Q. Okay. Now, when the main coolant system was looked at prior to getting into these ongoing programs, what percentage of the system itself was looked at, if you know?

A. I would only be guessing.

Q. I don't want you to guess.

A. Okay.

Q. Okay. You don't know.

A. I don't really know.

Q. Have you ever read that report?

A. Yes, I've looked at the results.

Q. And to the best of your knowledge, when was that part of this program completed? When I say "that part," I'm referring to the first five percent.

A. Okay. The combination of the whole thing was completed about 1982, late '82.

Q. Now when you say "the whole thing," do you mean from start to finish of this part of the inspection program, the main coolant system?

A. Yes.

Q. So there was a walkdown, so to speak, or a hardware look.

A. You know, it's very difficult because the pieces of this thing are -- the reactor vessel is part of it. The steam generator is a part of it. And that has been an ongoing program.

Q. Uh-huh.

A. And we finished that all up --

Q. Uh-huh.

A. -- about the latter part of 1982.

Q. So, the first part of the pre-service inspection program is a look at a particular system. And is it -- would it be fair to characterize that -- strike that.

If I used the term "vertical slice," do you understand what I mean?

A. No.

Q. Okay. Would you please describe briefly that part of the first portion of your inspection program, the main coolant system inspection -- strike that.

If you'll give me just a minute to think of my question.

A. Sure.

Q. I think it'll move quicker.

MR. HORIN: What information are you trying to obtain?

MS. GARDE: Let me think for a minute. Okay.

Let me try to phrase this.

(Pause.)

MR. BACHMANN: Off the record just for a second.

(Discussion off the record.)

MS. GARDE: All right. Back on the record.

BY MS. GARDE:

Q. It's my understanding of your testimony, Mr. Keller, and your explanation that the main coolant system inspection was one of a series of parts to the whole program, is that accurate?

A. That's accurate.

Q. Okay. And that is my summarizing it.

A. Okay.

Q. And that part began in 1979, but was not completed until 1982.

A. Yes.

Q. Okay. I understand, I think, what you're trying to say but go ahead and explain it.

MR. HORIN: I'd also like to have it clarified as to exactly what the inspection is that Mr. Keller is referring to during the '79 to '82 period. I think there's a misunderstanding as to the initial look-see at the main coolant system and the subsequent reinspection, which he testified to.

I think if he could clarify exactly what activity he is referring to in that '79 to '82 time frame --

BY MS. GARDE:

Q. Okay. Why don't you just briefly explain that part of the program.

A. Okay. What normally happens on a nuclear power plant is we usually tie in reactor vessels, steam generators and the pumps to this system. Those particular weldaments were inspected early on, had Westinghouse come in.

Q. Right.

A. And then that was the only part of the piping for the PSI program that had -- at that time was intitiated for inspection. They walked away from it, and when I got involved we come back and started the program entirely --

Q. Uh-huh.

A. -- from -- because the plant was 95 or 90 percent complete.

Q. Uh-huh.

A. All the Class I systems, Class II systems were in place.

Q. Uh-huh.

A. So we were able to come in or Westinghouse was able to come in and inspect or start their program.

Q. Uh-huh.

A. At that time, there was some of the main

there was some of the main coolant that probably had not been examined during the first phase.

Q. Uh-huh.

A. And we come back and we started that particular phase over again --

Q. Uh-huh.

A. -- because by contract, they only have so many trips in. So they backed off in the beginning and come back to start off where we had a bigger shot at completing the program.

Q. Uh-huh, uh-huh.

A. And that's kind of the way it went.

Q. Okay, okay. And that main coolant system part of the program was completed in 1982.

A. Yes.

Q. Okay. Now the other parts of the program that are not yet completed -- excuse me.

A. Everything is completed on Unit 1.

Q. Okay. Including the pre-service inspections and the in-service inspections.

A. Well, you've got to understand what ". - service" is. That is not now.

Q. Okay.

A. "Pre-service" is prior to in-service. In-service does not begin until three years from now or

the first shut-down.

Q. Okay. All right. That's what I understood in-service was.

A. Yes, okay.

Q. So, for the purposes of the rest of your deposition, we don't have to talk about in-service inspections.

A. I would think not.

Q. Because the plant is not operating yet.

A. That's right.

Q. Okay. And that's -- so that's another piece of this program that Westinghouse has.

A. That's right.

Q. Okay. All right. So one piece, the first five percent, is now finished -- the main coolant system.

A. The main coolant is not five percent of the total program.

Q. All right. I thought your testimony was that there was -- that the first five percent of the program was the main coolant system.

A. Well, you know, how do you -- how do you tell percentage whenever you're looking at, say, sixteen welds versus 2,000? And when you're looking at sixteen welds that are 31 inches in diameter by three inches thick versus the other 2,000 that are like ten inch averaged w th the

one-inch wall or three-quarter inch wall.

Q. Okay. Then I misunderstood your testimony. Would it be more correct to say that the first five percent of work that was done, was done on the main coolant system?

A. No, I don't think that's right either.

MR. HORIN: I think it would be helpful just to back away from the five percent concept and just deal with what particular activities were done at what time.

BY MS. GARDE:

Q. All right. Mr. Keller, let me just let you explain the different parts of this particular program. Okay. And if you'll explain them, please, as separate items that I can follow while you're saying that.

A. Well, right now we're talking about Class I systems. The main --

Q. Okay. Tell me about the whole program. Okay. You're over the whole program, right?

A. That's right.

Q. And you answer to Westinghouse in Pittsburgh.

A. No, I do not.

Q. Okay.

A. That's a misconception.

Q. Okay.

A. I am employed by Texas Utility as an advisor and consultant and only -- the only people that I --

Westinghouse is my employer but I am farmed out to this corporation and have nothing to do with the Westinghouse program, per se, other than coordinated for this particular customer as a Texas Utility employee.

Q. Okay. All right. Would you please describe for me the different parts to this particular program? Okay. Don't tell me what you're doing now. Just tell me what the different parts are.

If you were putting a chart on the wall and explaining to me, "These are the different pieces of this program."

A. Yes, all right.

Q. Okay.

A. The program is laid out in three segments, Class I, Class I and III. And they're all tabbed. Every operation by system is tabbed in accordance with Section 11 of ASME.

Q. Okay.

A. They specifically tell what all has to be done and everything is laid out by those particular tab numbers.

Q. Uh-huh.

A. And behind each one of those tab numbers is the definition of the system.

Q. Uh-huh.

A. And the definition of the system runs into being shown by an isometric, by weld numbers --

Q. Uh-huh.

A. -- that tell you exactly what's being done to each weld number --

Q. Uh-huh, uh-huh.

A. -- by system. And that goes through the main coolant system. That goes through the CVS system. That goes through the surge lines --

Q. Uh-huh.

A. -- the pressurizer --

Q. Uh-huh.

A. -- everything that's Class I and Class II --

Q. Yes, sir.

A. -- by the rules of the game. In that program, you have to look at the program --

Q. Yes.

A. -- to appreciate all the different things that are covered by the program.

Q. Yes. And your prefiled testimony, which is only five pages long, is only the briefest summary of what that program is.

A. It is general, yes.

Q. Yes. Now, is the pre-service inspection program intended to take the place of the quality control

program?

A. No.

Q. What would you describe the relationship between the quality control program and the pre-service inspection program?

A. Well, the pre-service inspection program, the intent of it is to get base line through volumetric examination, which in this case is ultrasonic examination, to get available base line for balancing the ISI program against it in later years.

The examination program that goes on under Section 3 does the same thing, other than only the way they do their volumetric examination is by RT.

And the reason that the code, I believe, goes to the UT is because that's the best way to get a base line of volumetric examination for refe.ing to it at later dates.

Q. Now when you use the term "get a base line," would you explain that to me, please?

A. Yes. It s to validate the weld material and put into the joint to be sure that it has no flaws or discrepancies.

Q. And you had -- okay. Excuse me just a minute. When you say it's to validate the weld material to insure that there were no flaws or discrepancies, I don't understand what you mean by that, sir.

A. Well, when the weld is x-rayed --

Q. Yes.

A. -- it's one method of doing the job, which --

Q. Yes.

A. -- all the welds on this job have been x-rayed --

Q. Yes.

A. -- and are well within the range of what's allowed by Section 3.

Q. Yes, sir. I understand that.

A. Now when we go to Section 11, they are trying to get a recordable method for a base line that they can look at some years hence and --

Q. Well, what are they going to do when they look some years hence?

A. They are going to look at what these -- the base line of this examination brings up. If it -- if there's -- and we haven't found any, but if there is something wrong or if you come out with a clearer picture which I -- and we've done --

Q. Uh-huh.

A. -- then when you go back in after, say, three years from now, you go with the same type of technique, the same type of --

Q. Uh-huh.

A. -- transducers from the same area, make the same reading. And then if you see some problems, you know that something has turned up in the time, the period of time between your base line and the present time you're inspecting it.

Q. Okay. During your conducting these pre-service inspections, do you identify flaws?

A. Yes, we can pick up discrepancies. We have not picked up anything in the base material. We have picked up one that had a -- see, along with the UT we go with a surface examination.

Q. Yes.

A. The surface examination under Section 3 is not cut. It has the criteria.

Q. Uh-huh.

A. But the PSI people have a little bit stronger criteria because we're trying to get a surface that we don't even have to bounce anything against later on.

Q. Uh-huh.

A. Now if there is a discrepancy, why we take care of it, smooth it out and do the various things that make it become a good joint or a good surface condition.

Q. Uh-huh, uh-huh.

A. So we do pick up those type of things and we do take care of them --

Q. Uh-huh.

A. -- and put them out of the picture so that we do not, when we to go our final inspection, have any kind of things to deal with.

Q. Okay. All right. When you do find problems, such as you've just described -- a flaw, some type of problem with the weld -- and it's corrected, is it written up on any forms?

A. Oh, yes. Oh, yes.

Q. And do you use the Brown & Root construction procedure forms, quality assurance forms?

A. Yes. We have an RPS program that repairs the surface. Now we're talking surfaces.

Q. Uh-huh.

A. And, yes, there is documentation and letters saying that this has been taken care of, yes.

Q. And is that documentation on a separate track from the regular Brown & Root program?

A. Yes, it'll be part of the -- it'll be Tab F in the PSI program.

Q. Okay. I have only one more question. Bear with me just a minute.

On page three of your prefiled testimony in answer to question six, you state that, "PSI is performed on a sample of the welded joints," which is kind of what we

have been talking about now.

A. Uh-huh.

Q. The statement is, "The sample is carefully chosen..." Now, how is the sample chosen?

A. Well, the code tells you how to choose it.

Q. Is it a random selection?

A. No.

Q. It's not a statistically --

A. No, it's a --

Q. -- random selection.

MR. BACHMANN: If you read the rest of his answer --

MS. GARDE: I read the rest of his answer.

A. It's the high stress areas and the discontinuities -- are the triggering point of the first parts of the examination.

Q. So that divides all welds into a number of categories.

A. Yes, it does.

Q. Okay.

A. Some are not as vulnerable as others, and that's why they picked those.

Q. Okay. Who does the picking?

A. The program -- the people who put the program together, and that is reviewed by the NRC and accepted and

before it's even done.

Q. Okay. So when you use the terms throughout your testimony when you talk about samples and selection, you're not necessarily referring to statistical sampling.

A. Oh, no. It's --

Q. It's a selective --

A. -- code requirement.

Q. It's required but different than statistical.

A. Yes.

MS. GARDE: I have no further questions.

MR. BACHMANN: The Staff has no questions.

MR. HORIN: If we could just take a couple of seconds, we'll decide if we have any questions.

(Whereupon, a short break was taken.)

MR. HORIN: Let's go back on the record.

Mr. Keller, I just have a few questions for you.

REDIRECT EXAMINATION

BY MR. HORIN:

Q. You mentioned earlier in the deposition that all welds are x-rayed. Could you clarify exactly the scope or the type of welds that you were referring to when you said that all welds are x-rayed at Comanche Peak?

A. Okay. The Class 1 and 2 welds, four-inch piping and above are x-rayed a hundred percent.

Q. So you weren't referring to, for example, structural welds on the pipe supports.

A. Yeah, that's -- that's another. It's not -- we're talking about pressure boundary type welds, which is butt welds not fillet welds.

Q. Mr. Keller, you also mentioned that there was one deficiency in your examination which required any repair. Where was that deficiency located?

A. That was on a piece, a component furnished by an outside --

Q. Was it on a piece of structural --

A. Yes, it was a structural member on a component.

Q. Okay. Approximately how many feet or whatever measurement you wish to use of weld have you inspected in your PSI program?

A. Oh, in the actual pressure boundary welds, you're probably looking at about 5,000 feet.

Q. And if you included welds in addition to the pressure boundary welds, that puts you a similar number --

A. It's not -- it's not anywhere near that kind of a number. You're probably maybe looking at maybe a couple hundred feet.

Q. Okay.

A. That'd be my guess.

Q. How long was the particular deficiency which you mentioned earlier?

A. About 30 to 40 inches.

Q. You mentioned in your testimony "discontinuities" as one of the criteria for selecting the sample of welds to be inspected under Class 2 systems. Could you define what "discontinuities" are?

A. Yes. Discontinuities usually appear at the nozzle connections, the first pipe weld at the nozzle connection and the first weld at a fitting, a pipe fitting, where the structure that it's adjacent to is normally a heavier section than what the piping is, itself. And that's why we use the discontinuity level.

Q. So that's not referring to any deficiency in a weld.

A. Not at all, no. It has nothing to do with it at all. All it does is say that it's probably at a high stress points. Most high stress points begin at equipment and near where discontinuities are.

MR. HORIN: No further questions.

MS. GARDE: No further questions.

MR. BACHMANN: No further questions. Thank you, Mr Keller.

THE WITNESS: Thank you.

MS. GARDE: Thank you, Mr. Keller.

MR. HORIN: Thank you very much.

(Whereupon, at 11:38 a.m. the deposition was concluded.)

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James C. Keller, Deponent

CERTIFICATE OF PROCEEDINGS

This is to certify that the attached proceedings before the NRC COMMISSION

In the matter of: TEXAS UTILITIES ELECTRIC COMPANY, et al
(Deponent: James C. Keller)
Date of Proceeding: August 3, 1984
Place of Proceeding: Glen Rose, Texas

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

Margaret K. Schneider
Official Reporter - Typed

Margaret K. Schneider
Official Reporter - Signature

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	Docket Nos. 50-445
TEXAS UTILITIES ELECTRIC	)	50-446
COMPANY, et al.	)	
	)	
(Comanche Peak Steam Electric	)	(Application for
Station, Units 1 and 2)	)	Operating Licenses)

TESTIMONY OF JAMES KELLER
REGARDING PRE-SERVICE INSPECTION
AND IN-SERVICE INSPECTION OF ASME
COMPONENTS AND SYSTEMS

Q1. Please state your full name, residence, job title, and educational and professional qualifications.

A1. My name is James Keller. I reside in Granbury, Texas. I am employed by Westinghouse Electric Company at Comanche Peak Steam Electric Station in Comanche Peak Project Engineering as the Field Engineering Supervisor. My educational and professional qualifications are attached to this testimony as Attachment 1.

Q2. Please describe your technical duties.

A2. I am currently responsible for overseeing and coordinating the development and implementation of the pre-service inspection program (PSI) which is carried out for ASME piping, welds, hangers, and equipment. I also have responsibility for coordinating development of the in-

service inspection program (ISI) which is the responsibility of TUGCO Operations and will cover ASME equipment once the plant begins operating.

Q3. What is the purpose of your testimony?

A3. The purpose of my testimony is to describe those aspects of the PSI and ISI programs which provide independent inspection and verification of the quality of ASME components.

Q4. What is the PSI program?

A4. The pre-service inspection program for Comanche Peak Station fulfills the requirements of the ASME Boiler and Pressure Vessel Code, Section XI, 1980 Edition. The program includes:

- Non-Destructive Examination of Welds
- Hydrostatic Testing of Piping
- Pump Examination
- Valve Examination
- Component Support and Attachment Examination

The PSI program is performed during the construction and start-up phases of the station.

Q5. Which of the activities listed above in the PSI program are cumulative to other inspections or tests?

A5. The non-destructive examination of welds conducted as part of the PSI program is cumulative to construction inspection and testing of welds.

Q6. Please describe the non-destructive examination of welds which is carried out in the PSI program.

A6. The PSI program includes ASME Class 1 and Class 2 systems and components. The particular testing differs for each class of equipment.

All welds on ASME Class 1 equipment (piping, supports and attachments or appurtenances) are subject to non-destructive examination. The examinations include ultrasonic, or volumetric, tests (UT) and surface tests, as required by ASME Code Section XI. The surface test may be either a penetrant test (PT) or a magnetic particle test (MT).

For ASME Class 2 equipment, PSI is performed on a sample of the welded joints. The sample is carefully chosen to include those joints with the largest measured discontinuity and the joints which analysis has shown to be the high stress points. The overall weld selection process is intended to include all worst cases and the sample will be no less than 50% of the welds on the main steam system and 25% of the welds on the balance of the Class 2 systems. The NRC reviews and approves the selection of welds for inclusion in the PSI program. The actual PSI tests performed for Class 2 welds are a volumetric examination (UT) and/or a surface test (PT or MT) as required by the ASME Code.

Q7. How is the PSI program described above cumulative to other construction inspection and testing of welds?

A7. ASME Code Section III requires inspection and testing of welds during construction for all ASME Class 1 and Class 2 components. At Comanche Peak Station, this activity is performed by Brown & Root. The ASME Section III testing includes x-ray (RT) and dye tests (PT) of the welds. The PSI tests described above are conducted over and above these construction tests and provide further assurance of the quality of the welds. Any problems uncovered by PSI are referred to site Engineering for investigation and corrective actions.

Q8. Is there any overview of PSI program results?

A8. Yes. All tests are observed by an Authorized Nuclear In-service Inspector (ANII) and by TUGCO QA/QC observers. All test results are documented and will become part of the permanent plant records.

Q9. What is the ISI program?

A9. The in-service inspection program has been developed in accordance with the provisions of ASME Code Section XI. The program is a long-term program which, as its name indicates, will be carried out during operation of the plant. The program will be reviewed and approved by the NRC prior to licensing.

Q10. How does the ISI relate to PSI?

A10. During the first ten years of operation, ISI will include inspection of all welds inspected in PSI. Inspection will be the responsibility of TUGCO Operations. The PSI results provide the baseline data for comparison with ISI results. Any degradation in a weld can, therefore, be detected and corrective action can be taken. This provides another separate verification of the adequacy of ASME welds and provides assurance that inadequate welds will be identified even after many operational cycles.

Q11. Does this conclude your testimony?

A11. Yes.

RESUME

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Age: 62 Married 4 Grown Children Height: 5'7" Wt. 160

EDUCATION: University of Pittsburgh, Mechanical Engineering

EXPERIENCE:

March 1, 1979 to Present — SENIOR PROJECT ADVISOR: Westinghouse Electric Corporation, Pittsburgh, PA. Consulting on all overseas projects regarding all mechanical activities on jobs in Yugoslavia, the Philippines, Korea and Brazil.

These activities have included setting up construction management, engineering procedures and code definitions for piping, piping supports, welding and equipment integration for total systems.

Managed a team of piping and hanger analysts to review safety related piping systems to verify that seismic analyses were applicable to as-built conditions. This was an on-site operation in Yugoslavia to satisfy the NRC IE Bulletins.

June 1977 to March 1979 — SENIOR PROJECT ENGINEER: For Offshore Power Systems, Division of Westinghouse, Jacksonville, Florida. Reviewing and approving engineering and manufacturing drawings for producibility, operability and constructibility of piping systems including mechanical equipment for use in construction of Floating Nuclear Power Generating Plants.

August 1971 June 1977 — MANAGER OF PIPING DIVISION: Eichlealy Corporation, Pittsburgh, Pa. (General Contractor). Estimating Engineering Detailing, Purchasing, Construction and the operation of pipe fabrication ship were under my direction.

March 1967 August 1971 — SENIOR CONSULTING ENGINEER: Westinghouse Nuclear Energy Systems (WNES) Pittsurgh, Pa. Both the Turnkey Projects as well as Nuclear Steam Supply Systems (NSSS).

The disciplines involved were Piping Cost Control, Subletting of Pipe Fabrication, Construction Scheduling and Control.

The Turnkey Projects involved for which I acted as advisor for WNES projects and the various Architect Engineers were as follows:

Rochester Gas & Light	Robert Ginna	490 Mwe
Consolidated Edison	Indian Point No. 2 & 3	873 Mwe
Carolina Power & Light	H. B. Robinson	700 Mwe
Wisconsin Electric Power & Light	Point Beach No. 1 & 2	497 Mwe

The following types of job experience go hand-in-hand with my piping background.

- All Welding Techniques
- All Codes including Nuclear and Quality Control Standards
- Ice Condenser Concept (Part of original study)
- Offshore Power Systems Concept (Part of original study)

March 1967
June 1941

PROJECT MANAGER: Pittsburgh Piping and Equipment Company, Pittsburgh, Pa. Reported directly to the Chief Engineer (Vice President - In Charge of Engineering). Responsible for Administration of Specifically assigned projects including contract interpretaton and adherence to specification; drafting and detailing of piping systems, purchasing of raw pipe materials and manufactured products such as valves, instrumentation, and equipment; co-ordinate shop production with field requirements; schedule manufactured products according to field needs, analyze job progress comparing actual versus estimate preparations, submittal and customer contact. As a Project Manager, job visitation on a regular basis was required to properly evaluate progress of the job.

Spent time in school studying C.P.M.
Set up field forces and job site to handle construction contract to erect main station piping for multi-million dollar contracts.

Managed construction for Pittsburgh Piping & Equipment Company until sale of said company to National Valve Company on February 10, 1967.

Was employed by National Valve Company as Assistant to Vice-President of Construction.

ORGANIZATIONS

American Nuclear Society (ANS).

American Society of Mechanical Engineers (ASME)

MILITARY

U. S. Coast Guard - 1st Class Petty Officer aboard U.S.S. Brunswick
Honorable Discharge in 1945.