OFFICIAL TRANSCRIPT OF PROCEEDINGS

Agency: U.S. Nuclear Regulatory Commission
Atomic Safety and Licensing Board

Title: Alabama Power Company
(Joseph M. Farley Nuclear
Plant, Units 1 and 2)

Docket No. 50-348-Civp;
50-364-Civp;
ALSBP No. 91-626-02-Civp

LOCATION: Bethesda, Maryland

DATE: May 20, 1992 PAGES: 1771 - 1995

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ATOMIC SAFETY AND LICENSING BOARD

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In the Matter of: : Docket Nos. 50-348-CivP;

Alabama Power Company : 50-364-CivP

(Joseph M. Farley Nuclear Plant, : ASLBP No. 91-626-02-CivP

Units 1 and 2) :

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Nuclear Regulatory Commission

Fifth Floor Hearing Room

4350 East-West Highway

Bethesda, Maryland

Wednesday, May 20, 1992

The above-entitled matter came on for further hearing, pursuant to notice, at 9:00 o'clock a.m., before:

The Honorable G. Paul Bollwerk, Chairman

The Honorable James H. Carpenter, Member

The Honorable Peter A. Morris, Member

Atomic Safety and Licensing Board, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555

APPEARANCES:

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I N D E X

E X H I B I T S

APCo 129 Page 1 being the fact sheet from Raychem to Mr. DiBenedetto; Pages 2 and 3 being the results from the Raychem telephone log reporting on the conversation between Mr. Wilson and Mr. Baker. 1949 1950

PROCEEDINGS

[9:00 a.m.]

JUDGE BOLLWERK: We're here this morning to hear the rebuttal and surrebuttal panels regarding the Chico A/Raychem seals. Is there anything preliminary that either counsel wishes to take up with the Board?

MR. MILLER: Nothing for us, sir.

MR. HOLLER: Nothing for NRC.

JUDGE BOLLWERK: Why don't we go ahead and start with the Staff panel's testimony and then we'll move to the Applicant -- the licensees, rather.

MR. HOLLER: Thank you. Mr. Wilson is seated, and I will remind Mr. Wilson that he has been sworn in, and is under oath.

Whereupon,

RICHARD C. WILSON,

a witness, having been previously called for examination, and, having been previously duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. HOLLER:

Q Mr. Wilson, for the record, will you please state your name and current position?

A [Witness Wilson] Wilson, Senior Reactor Engineer, Inspection Branch.

Q And I'll ask you, Mr. Wilson, do you have before you, a document titled Rebuttal Testimony of Richard C. Wilson, on Behalf of the NRC Staff Concerning Chico A/Raychem Seals?

A [Witness Wilson] Yes, I do.

JUDGE BOLLWERK: Let me stop you just one second. Mr. Wilson, one of those other two mikes that's on the end of the table, you also need. That one is all right, leaving it there, but you need to pull one of those toward you. That's the room mike. There we go. Let's make sure we can hear you.

WITNESS WILSON: Okay, will that do it?

JUDGE BOLLWERK: I think that's all right.

MR. HOLLER: Thank you, sir.

BY MR. HOLLER:

Q And did you prepare the document that's before you, sir?

A [Witness Wilson] Yes, I did.

Q Is it -- I would ask you at this time if you have any corrections to the document?

A [Witness Wilson] I have two corrections. The first one is on page 4, in the first line of page 4. Delete the word, "referenced," and substitute the phrase, "included in a qualification rationale."

The second correction is on page 20. It is on the

13th line from the top of the page, just about in the middle. Delete the line that begins, "And the failure to ...," and also delete the first two words of the following line, which are, "insertion constitute ..."

Now, in place of that deletion, insert the two words, "is an," and the second word following the deletion, "examples," delete the "s." That is all of the changes that I have.

MR. HOLLER: I'll note for the record that these changes have been effected in the copies that have been put in the Court Reporter.

BY MR. HOLLER:

Q Mr. Wilson, I will now ask you if the document rebuttal testimony of Richard C. Wilson on behalf of the NRC Staff concerning Chico A/Raychem Seals is true and correct, to the best of your knowledge and belief?

A [Witness Wilson] Yes, it is.

MR. HOLLER: At this point, I'll move that the testimony of Mr. Wilson be bound into the record as if read.

MR. MILLER: No objection.

JUDGE BOLLWERK: Then the Rebuttal Testimony of Richard C. Wilson on behalf of the NRC Staff Concerning Chico A/Raychem Seals will be received and bound into the record.

[Rebuttal Testimony of Richard C. Wilson follows:]

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	Docket Nos. 50-348-CivP
ALABAMA POWER COMPANY	)	50-364-CivP
	)	
(Joseph M. Farley Nuclear Plant, Units 1 and 2)	)	
	)	(ASLBP NO. 91-626-02-CivP)

REBUTTAL TESTIMONY OF RICHARD C. WILSON
ON BEHALF OF THE NRC STAFF CONCERNING CHICO A/RAYCHEM SEALS

Q1. State your full name and current position with the NRC.

A. Richard C. Wilson, Senior Reactor Engineer, Vendor Inspection Branch, Division of Reactor Inspection and Safeguards, Office of Nuclear Reactor Regulation.

Q2. Have you prepared a copy of your Professional Qualifications?

A. A copy of my Professional Qualifications has been admitted previously into evidence as Staff Exh. 1.

Q3. What is the purpose of your testimony?

A. The purpose of my testimony is to rebut portions of the Alabama Power Company Testimony regarding violations of the environmental qualification (EQ) requirements for the Chico A/Raychem Seals at the Farley nuclear plant which led to the civil penalty that is the subject of this hearing. The APCo testimony which

is the subject of this rebuttal testimony is contained in Direct Testimony of Jesse E. Love, James E. Sundergill and David H. Jones on Behalf of Alabama Power Company (ff. Tr. 978) (hereafter L/S/J), and Direct Testimony of Philip A. DiBenedetto on Behalf of Alabama Power Company (ff. Tr. 1227) (hereafter DiBenedetto).

Q4. Could you please summarize APCo's position regarding the Chico A/Raychem Seals as you understand it? (L/S/J Q&A 130, p. 146).

A. The licensee has advanced various arguments since the beginning of the November 1987 inspection. The NRC inspection report, pertinent portions of which are included in my Direct Testimony on pages 10 through 15, addresses information provided during the inspection. My Direct Testimony, particularly the response to Q16 on pages 26 to 31, addresses information submitted after the inspection.

Where the licensee presents only a vague rationale for qualification, and the NRC Staff is unable to envision any plausible rationale based on known tests and analyses, the NRC Staff has a very difficult time specifying what is wrong with the licensee's qualification arguments. The NRC Staff had this difficulty with qualification of the Farley Chico A/Raychem seals until APCo submitted direct testimony in January 1992.

The licensee's direct testimony finally presented a qualification rationale in the response to Q130 (L/S/J p. 146). This response states that (a) Raychem Report EDR 5033 demonstrated qualification of the boot materials; (b) the 1981 Farley submergence test demonstrated the seal's ability to exclude moisture; and (c) the 1981 Bechtel test demonstrated that the Chico backing resolved the moisture problem. I will address this argument in this rebuttal testimony as I am unaware of any other rationale that could demonstrate qualification, based on known test reports or analyses.

Q5. Were you aware of the argument qualification presented by APCo through Mr. Love's testimony in his answer to Q130 (L/S/J p. 146) at the time of the NRC inspection in November 1987?

A. No. Two of the three test reports on which APCo now bases qualification of the seals were not introduced into this issue until APCo filed its direct testimony in January 1992. My written direct testimony, filed in December 1991, criticized the reports submitted by the licensee prior to 1992, including the 1981 Bechtel test (Staff Exhibit 33). The 1981 submergence test report (APCo Exh. 61) was unknown to me until the licensee submitted and referenced it in its January 1992 direct written testimony, except for a reference to it on pages 224-25 of Mr. Love's 1991 deposition which related only to outside-containment applications. Raychem Report EDR 5033 (also known as Wyle Report 58442-2) (APCo

Exh. 60) was also not referenced by the licensee until its 1992 testimony. I will address all of these reports in my rebuttal testimony.

Q6. Lets take things one step at a time. To begin with, what are the requirements applicable to the environmental qualification of Chico A/Raychem seals at Farley?

A. 10 C.F.R. § 50. 49 is the requirement for qualification and is what must be followed. The regulation specifies extensive criteria for qualification, essentially similar to Category I of NUREG-0588. Section (k) of that regulation does not require requalification for equipment that was previously required to be qualified to NUREG-0588 or to the DOR Guidelines. NUREG-0588 Category I is a higher level of criteria referencing IEEE Standard 323-1974, while Category II and the DOR Guidelines reference IEEE Standard 323-1971. Farley Unit 1 is subject to NRC IEB 79-01B, which requires meeting the DOR Guidelines. Farley Unit 2 is required to meet Category II of NUREG-0588. The DOR Guidelines are the less stringent of the two standards.

Q7. Please explain the requirements of the DOR Guidelines (APCo Exh. 8) as they relate to qualification of the Chico A/Raychem Seals.

A. The DOR Guidelines are the lowest level of qualification criteria. They were written to permit qualification of existing equipment in operating plants for which qualification testing had preceded establishment of specific qualification criteria.

The DOR Guidelines allow limited separate effects testing because existing (pre-1980) test reports often had limitations such as failure to irradiate the LOCA steam test specimens, and could not substantiate qualification to higher level criteria. (Separate effects testing involves simulating a LOCA by multiple tests, each of which includes only some of the LOCA harsh environment parameters.) Radiation and chemical spray normally may be addressed separately, by test or analysis, and thermal aging of test specimens is normally not required.

The DOR Guidelines do not endorse qualification by analysis or evaluation with respect to temperature, pressure, and steam. Section 5.1 states that

> "type testing is the preferred method of qualification for electrical equipment located inside containment required to mitigate the consequences of design basis events.... As a minimum, the qualification for severe temperature, pressure, and steam service conditions for Class IE equipment should be based on type testing."

Again, section 5.3 states that "an item of Class IE equipment may be shown to be qualified ... even though it was only type tested for high temperature, pressure and steam."

The DOR Guidelines have limited, but very clear, criteria for supplementing partial-effects tests with analysis. Section 5.1 states:

> Qualification for other service conditions [other than the combined LOCA temperature, pressure, steam test] such as radiation and chemical spray may be by analysis (evaluation) supported by test data (see Section 5.3 below). Exceptions to these general guidelines must be justified on a case by case basis."

Section 8.0 states:

> "Complete and auditable records must be available for qualification by any of the methods described in Section 5.0 above to be considered valid. These records should describe the qualification method in sufficient detail to verify that all of the guidelines have been satisfied.

The DOR Guidelines do not endorse the concept of "qualified materials" as advanced by the licensee. Section 5.2.2 states:

> The test specimen should be the same model as the equipment being qualified. The type test should only be considered valid for equipment identical in design and material construction to the test specimen. Any deviations should be evaluated as part of the qualification documentation.

None of the environmental qualification criteria make any provision for generic qualification of any materials.

The DOR Guidelines have additional restrictions for installation interfaces such as seals. Section 5.2.6 states that,

> ...seals used during the type test shall be . . esentative of the actual installation for the test to be considered conclusive. The equipment qualification program shall include an as-built inspection in the field to verify that equipment was installed as it was tested.... Particular emphasis should be placed on common problems such as penetrations in equipment housings for electrical connections being left unsealed.

Section 5.3.2 states:

> The effects of chemical sprays on the pressure integrity of any gaskets or seals present should be considered in the analysis.

The DOR Guidelines do not allow qualification credit for failed tests. Section 5.2.5 states:

> If a component fails at any time during the test ... the test should be considered inconclusive with regard to demonstrating the ability of the component to function....

In other words, test failures are not a basis for qualification. This requirement prohibits the sort of argument that says, there were test failures, but we know what caused them and fixed it, so there is no need to retest. The reasons are that a) another failure mode may have been masked by the observed failure and b) another failure mode might have occurred if the test had run to completion.

Q8. To which standard has APCo attempted to demonstrate qualification of the Chico A/Raychem Seals?

A. During the NRC inspection on November 18, 1987, I asked the qualification level of the seals and the licensee responded NUREG-0588 Category II only. APCo testimony filed in January 1992, however, addresses the DOR Guidelines.

Q9. Mr. Love asserts that the concerns regarding the Chico A/Raychem Seals in the inspection report from the November 1987 inspection (Staff Exh. 12) have no technical basis. What is your response? (L/S/J Q&A 139, p. 156).

A. I will focus my answer on the importance that sections 5.2.2 and 5.2.6 of the DOR Guidelines (APCo Exh. 3) place on the similarity between installed

equipment and test specimens. Item (1) in the inspection report (quoted on page 14 of my Direct Testimony) stated that the installation instructions do not control the minimum quantity of Chico mixture. APCO has never disputed that. However, Mr. Love testified that the Chico cement would be visible. (Tr. 998 and 991). Even if the view through the limit switch permitted that, APCO provided no instructions directing the installer to perform a visual inspection or to take any action based on observations.

Item (2) of the inspection report stated that the procedures provided during the inspection did not cover details known to be important in Raychem-designed applications of its seals. The response to rebuttal Q11 below shows that APCO still has not adequately addressed the differences pertaining to installing Raychem materials over a steel pipe nipple.

Item (3) in the inspection report stated that Bechtel's test plan references different drawings and revisions than were provided to me as plant installation drawings, and that the installation drawings showed that pertinent information had been changed by drawing revision. APCO has never addressed these concerns.

Item (4) in the inspection report documented differences in various APCO descriptions of the compression adapter applied over the Raychem sleeve. Contrary to the DOR Guidelines, none of these characterizations provide a model number or other descriptive information. APCO has never addressed this concern. When questioned by the Licensing Board, Mr. Love testified that the

primary purpose of the coupling was to reconnect the conduit to the limit switch assembly. He stated that the connecting force would be exerted against the Raychem sleeve. (Tr. 989). Thus, the torque available from several feet of cable conduit is applied to the conduit's end support through the Raychem sleeve, with potential for damaging the Raychem material.

Q10. Does APCo's qualification argument meet even the less stringent requirements of the DOR Guidelines?

A. APCo's qualification argument for the Chico A/Raychem seals does not satisfy any applicable regulatory requirements for environmental qualification including the DOR Guidelines. The NRC Staff's position is not based on technicalities with respect to when an argument was made or whether documentation is sufficient. The NRC Staff's position is based on the simple fact that, more than six years after the EQ deadline and more than four years after the Farley inspection, there is no credible basis for qualification to even the most lenient EQ criteria for the argument stated in the response by Mr. Love to O130 (L/S/J p. 146), that (a) Raychem Report EDR 5033 demonstrated qualification of the boot materials; (b) the 1981 Farley submergence test demonstrated the seal's ability to exclude moisture; and (c) the 1981 Bechtel test demonstrated that the Chico backing resolved the moisture problem.

Q11. Let us take these reports one at a time. Why is APCo mistaken in its reliance on Raychem Report EDR 5033?

A. Raychem Report EDR 5033 is also known as Wyle Report 58442-2 and is dated April 3, 1981 (APCO Exh. 60). This report covers qualification testing of cables with Raychem's basic cable breakout boots, where each boot provided an environmental seal between the jacket of a cable and the insulators of the cable's individual conductors. Each breakout had a Raychem keeper sleeve. Testing was conducted in accordance with IEEE Standard 323-1974. Each test specimen was subjected to thermal aging, radiation exposure, and a simulated LOCA test that combined temperature-pressure-steam-chemical spray.

The NRC Staff contends that even the lenient DOR Guidelines require documented evaluation beyond what the licensee has provided. The Farley Chico A/Raychem seal uses the Raychem material in a very different application than in the Wyle tests for Raychem. For Farley, the boot is installed over a metal pipe nipple, clamped against the nipple under a metal conduit fitting, and lacks the (non-metallic) plastic and elastomeric backing provided in a cable application. With the exception of Sandia tests (NUREG/CR-2812 and NUREG/CR-3361) that included no Raychem material or electrical application, and other test reports marred by failures, the licensee has provided no basis except qualitative rhetoric for applying the cable test reports to the Farley seal.

The NRC Staff has long accepted reports such as Wyle Report No. 58442-2 as the basis for plant-specific qualification of Raychem products on many types of cables. We have not reviewed this particular report with respect to Farley plant conditions (and we note that the licensee should document the evaluation as part of his files), but the NRC Staff recognizes that Raychem breakout boots on cables have been qualified for many plants with harsh environments comparable to Farley.

There is no test of the Farley Chico A/Raychem seal design in the LOCA temperature, pressure, and steam environment. Wyle report 58442-2 is the only steam or chemical spray test used for in-containment qualification of the Chico A/Raychem seals at Farley. (I note that failures invalidate every known LOCA test involving Raychem boots on metal pipe nipples; cf. DOR Guidelines section 5.2.5.) DOR Guidelines section 5.1 specifies a combined temperature-pressure-steam test for LOCA conditions. Section 5.2.2 specifies that the plant equipment must be identical to the test specimen in design and material construction; evaluation of any deviations should be documented.

Mr. Love's description of APCo Exh. 103, (Tr. 987) describes how the Raychem breakout boot is shrunk over the steel pipe nipple with a hot air gun. Mr. Love testified that Raychem provided instructions for installing the breakout boot on the steel pipe nipple. (Tr. 1091).

I am unaware of any successful LOCA test of a Raychem boot over a steel pipe nipple. Further, Raychem did not market such a configuration for in-containment use. Thus, when Farley installed the breakout boot kits in 1980-81 there was no basis for an environmentally qualified installation instruction for such a design, as Mr. Love's testimony suggests.

The tautness and thickness of the Raychem boot across the open end of the steel pipe nipple are direct functions of heating during installation. APCo has testified that LOCA test failures of this design were caused by "the material weakness of the boot in the center of the boot legs." (L/S/J p. 144). While I contend that APCo does not necessarily know the exact failure mode, the test failures certainly occurred in the Raychem material stretched across the open end of the steel pipe nipple, which includes the base of the legs. Where in that region the failures initiated is not clear.

APCo has never provided the installation instructions for the Raychem boots over steel pipe nipples at Farley. But it is clear that, unless the instructions specified heat-shrinkage control more precisely than is necessary for a qualified cable installation, Raychem material thinning and weakening could result. Further, Wyle LOCA tests for Raychem (Staff Exh. 35) and APCo's pressure-temperature test in 1981 (Staff Exh. 33) both produced catastrophic failures, again suggesting that 1980-81 instructions for installing Raychem boots over steel pipe

nipples were not based on successful harsh-environment tests and would not produce a qualified seal.

Mr. Love testified further that no special preparation of the steel pipe nipple was necessary before installing the Raychem materials on it. (Tr. 1006, 1076, and 1084). Fittings such as pipe nipples often are coated with chemical residue from manufacturing operations that could interfere with bonding of the Raychem adhesive to the steel. In addition to the absence of a cleaning procedure, the Farley plant drawings provided to the NRC Staff do not specify the use of degreased pipe nipples. Pipe fittings often have burrs or sharp edges that could cut the Raychem material, but the Farley procedures do not specify any smoothing. The drawings provided during the NRC inspection merely specify a '1" nipple,' and the 1981 Farley test procedure specifies a '1" pipe nipple (4" long).' The effects of possible chemical contamination of the steel pipe nipple on the Raychem adhesive bonding or of sharp steel edges on the Raychem material should also be addressed in any analysis of specimen differences between cable and steel pipe nipple configurations.

The NRC Staff did not place APCo in the predicament of having to analyze large deviations between plant and test specimens and conditions. By its selection of the test specimens and conditions, APCo determined the scope of analysis required. The DOR Guidelines were applicable to Farley Unit 1, and NUREG-0588 to Unit 2, before APCo made the decision not to LOCA-test the

seal design. Even the 1979-80 testing reported in Wyle report 58442-2 was performed to the high level qualification procedures of IEEE Standard 323-1974 (referenced by NUREG-0588 Category I). The licensee's direct testimony states that no testing of the Farley metal pipe nipple seal was planned (except a submergence test unrelated to in-containment service) because its qualification was considered assured. (L/S/J pp. 144-146). Fortunately, Raychem then had Wyle LOCA-test a metal-nipple configuration, which failed catastrophically. Even then, the licensee did not perform a LOCA test. Instead, APCo assumed a failure mode, added Chico cement as a fix, and performed the simple 1981 Bechtel temperature and pressure test to demonstrate that the Chico backing resolved the moisture problem.

Q12. Before we get to that test, can you explain why is APCo mistaken in its reliance on the 1981 Farley submergence test to demonstrate the seal's ability to exclude moisture?

A. The 1981 Farley submergence test report 2BE-1049-3 (APCO Exh. 61) reports testing of a Namco limit switch with an attached cable entrance seal. The seal is somewhat like those used in the Farley plant, with several differences: the test specimen and plant equipment have different Raychem kit numbers; the test specimen has no conduit clamp bearing down on the Raychem sleeve; and the test specimen contains no Chico cement. The test specimen was submerged in 10 feet

of 210°F water for 24 hours. The limit switch was periodically actuated, and continuity and insulation resistance measurements were made for the limit switch contact circuits.

This test falls far short of the temperature-pressure-steam test required by section 5.1 of the DOR Guidelines, and no analysis of test condition differences has been provided by the licensee. Analysis of design differences has not been documented as required by section 5.2.2. The test does not demonstrate the moisture resistance of the seal for in-containment use for numerous reasons, but primarily because the test specimen simply never saw the LOCA harsh environment conditions of high temperature, high pressure, and chemical spray. The test is subject to the same types of deficiencies cited in the response to my Direct Testimony Question 8: no steam; no chemical spray; temperatures and pressures well below LOCA conditions; differences between installed and tested equipment; and APCO's failure to analyze all of these differences (APCO merely claims credit for favorable features and ignores differences). This evaluation, and that of Wyle report 58442-2 above, can be added to those presented in the response to Question 8 of my Direct Testimony to provide a summary evaluation of all of the seal tests reports advanced by APCo through January 1992.

Q13. Why is APCo mistaken in its reliance on the 1981 Bechtel test (Staff Exh. 33) to demonstrate that the Chico backing resolved the moisture problem?

A. Specifically in terms of DOR Guidelines requirements, Section 5.1 specifies a combined temperature-pressure-steam test for LOCA conditions. Section 5.2.2 specifies that the plant equipment must be identical to the test specimen in design and material construction; evaluation of any deviations should be documented.

The 1981 Bechtel test did not include steam or any other moisture; it did not simulate the initial temperature rise of the specimen that would be produced in a LOCA; there was no adequate method of assessing seal performance; and, as specified in the NRC inspection report (Staff Exh. 12 and page 14 of my Direct Testimony), the test specimen was built according to different instructions than the plant equipment. The licensee has not provided analyses of any of these deviations with the NRC identified in the inspection report.

In a LOCA, saturated steam will impinge on the room-temperature seal. The steam will condense on the surface of the seal, transferring heat because of both temperature differe and latent heat of vaporization. The condensed steam in turn will enhance heat transfer from additional steam to the seal, resulting in rapid heating and intimate contact with moisture containing chemical spray. Most LOCA tests simulate this effect; the 1981 Bechtel test did not. In the Bechtel test, the seal could be heated only by dry stagnant air or by conduction from a test chamber with undocumented dimensions and materials, and with undefined electrical heaters as a heat source. As the room-temperature

thermal mass of the seal and chamber cover absorbed heat, they would tend to reduce the chamber ambient temperature.

Because of the large differences between test and accident conditions, thermal lag calculations comparing the Bechtel test with LOCA conditions are appropriate. The calculations would be very difficult, however, because they would have to take into account the behavior of the Raychem material stretched across the open end of the steel pipe nipple.

Q14. The licensee has testified at length regarding the design evolution of the Chico A/Raychem seal design, and has extensively argued about postulated failure modes for untested situations. Why is this not sufficient for qualification?

A. Documentation of qualification is not a design review process, in which the design is critiqued and a judgment concerning acceptability is reached. APCo unsuccessfully tried that approach with the seal assembly designed with Raychem without Chico cement that subsequently failed when tested under LOCA conditions. Environmental qualification relies on proving by test, supplemented by analysis, that safety-related components in fact can perform their harsh environment safety functions according to published regulatory requirements.

This proceeding does not address whether the seal design makes sense, or was developed in a logical manner, or has a reasonable chance of performing its

harsh-environment safety function. It addresses whether the licensee has satisfied the published qualification requirements for the seal. Whether or not a violation occurred should be based on whether the licensee satisfied the environmental qualification requirements, not on design reviews or exercises in speculating on what might happen if the accident situation occurs.

Q15. APCo's witnesses have criticized the NRC Staff's review of the Chico A/Raychem seals as incomplete and biased, indicating a sense of unfairness on the part of the NRC Staff toward APCo regarding inspection of the Chico A/Raychem Seal environmental qualification. (L/S/J Q&A 139, p. 156; L/S/J Q&A 151, pp. 176-77; DiBenedetto Q&A 115, pp. 94-97). How do you respond to this?

A. APCo was not treated unfairly in the NRC Staff's review of environmental qualification of the Chico A/Raychem Seal or any other item of equipment during the November 1987 inspection. I exerted extra effort to review the seal design at Farley. As the inspection report (Staff Exh. 12) and my Direct Testimony document, the qualification documentation for the Chico A/Raychem Seals at Farley was incomplete and unorganized during the inspection. Because of the lack of an auditable qualification file two years after the November 30, 1985 deadline, I conducted the inspection primarily by oral questions and answers, and discussions with licensee representatives, supplemented by review of all documents APCo was able to produce and even a drawing I made during the

inspection on a whiteboard. I, in fact, used a similar approach during the Farley inspection for ASCO solenoid valves and instrument accuracy issues, as described on pages 35-37 and 42-44 of the inspection report (Staff Exh. 12). I considered all the information APCo could produce regardless of whether it was in the qualification file. In the case of the other two issues, after extensive review, no violation was recommended. However, in the case of the Chico A/Raychem Seals, APCo's information, as I have testified, was clearly inadequate.

The testimony in this hearing shows that I found an incomplete EQ file for the Chico A/Raychem Seals and that I attempted to obtain whatever information APCo could provide to support qualification of the seals. Notwithstanding my consideration of all the arguments advanced by APCo, both during and subsequent to the inspection, APCo has not demonstrated qualification of the Chico A/Raychem seals as they were installed at Farley.

HEARING TESTIMONY REBUTTAL

Q16. Mr. Love supported the argument that Chico cement need not be compressed during installation by testifying that the Crouse-Hinds explosion-proof fitting tested in the Southwest Research Institute (SwRI) test was not intended to compress the Chico cement. (Tr. 1087-88). What does the SwRI test report in the EQ file for Chico A/Raychem seals indicate?

A. The July 13, 1979 letter report (Attachment 3 to Staff Exh. 40) states in item 5 of Attachment No. 1 (Bates No. 005580 of Staff Exh. 40):

> The [Chico] compound was then poured through the large opening in the fitting making sure no air pockets developed during the pour. Both plugs were then screwed in flush with the body of the fitting forcing the excess sealing compound to exert pressure on the fiber dams at each end of the fitting.

In contrast to the concern about air pockets cited in this quotation, Mr. Love testified that the length of tygon tubing used for inserting Chico cement from the veterinary syringe, through the side of the limit switch, into Farley plant seals was not specified. (Tr. 1096). This testimony is consistent with installation instructions provided to the NRC Staff. However, the unspecified tubing length ~~and the failure to specify the position of the bottom of the tubing during cement insertion constitute~~, additional examples of assembly operations that were not procedurally controlled.

Mr. Love testified that he was unaware of problems with the release of water from Chico cement at elevated temperatures in explosion-proof fittings. (Tr. 1096). With respect to the SwRI testing, I note that the fittings involved "pass-through" cables with intact jackets presumed impervious to moisture, and that no moisture measurements were made.

Q17. Could the fact that the Chico cement is not compressed in the Farley Chico A/Raychem seal impact its performance under LOCA conditions?

A. Absent a test of the seal under LOCA conditions, I do not know. APCo has not established that the Chico cement bonds to the steel pipe nipple for Farley LOCA conditions, particularly if not compressed. The upper end of the Chico mass in the seal is not restrained. If the Chico mass moves, it will not perform its design function of backing the Raychem material stretched across the open end of the steel pipe nipple. Since APCo has not performed a temperature-pressure-steam test of the seal, one may readily speculate that the approximations of the simplified test that was performed do not challenge the seal as would a LOCA, particularly at the beginning of the accident where the test simulation is least accurate.

Q18. Messrs. Love and Sundergill refer to analysis that was performed to show why temperature-pressure-steam testing of the Farley seal design was not performed, and why LOCA testing of Raychem's cable breakout boot applied to the Farley seal design using a steel pipe nipple. (Tr. 1079-83). Is documentation of these analyses required?

A. Sections 5.1, 5.2.2, and 8.0 of the DOR Guidelines require documentation of such analysis. No documentation has been provided by APCo.

Q19. Does this complete your testimony regarding this matter?

A. Yes.

JUDGE BOLLWERK: Mr. Miller?

MR. MILLER: Thank you.

PHILIP A. DIBENEDETTO,

JAMES E. SUNDERGILL,

DAVID H. JONES,

JESSE E. LOVE

DIRECT EXAMINATION

BY MR. MILLER:

Q Would each of the members of the panel identify themselves, starting with Mr. DiBenedetto?

A [Witness DiBenedetto] Philip A. DiBenedetto.

A [Witness Sundergill] James E. Sundergill.

A [Witness Love] Jesse E. Love.

A [Witness Jones] David Hubert Jones.

Q Have you prepared surrebuttal testimony on behalf of Alabama Power Company in this proceeding?

A [Witness DiBenedetto] Yes, I did.

A [Witness Sundergill] Yes, I did.

A [Witness Love] Yes.

A [Witness Jones] Yes.

Q And does anyone have any corrections, amendments or changes to that testimony?

A [Witness DiBenedetto] I do not.

A [Witness Sundergill] I do not.

A [Witness Love] I have just two corrections.

Q Would you make those for us, please, Mr. Love?

A [Witness Love] The first one is on page 73. It would be the second paragraph on that page, the third sentence which starts, "This backing was not present in the original configuration which failed," where it says "... the pressure ..," I would like to change that to say "... the pressure/temperature test."

And then in the next sentence, where the word, "pressure," appears, I would also like to replace that with "pressure/temperature."

JUDGE BOLLWERK: Let me stop you. Could you do that again? I missed the first part.

WITNESS LOVE: Sure. Where the sentence starts, "This backing was not present in the original configuration ...," which is, I believe, the third sentence in the second paragraph.

JUDGE BOLLWERK: Okay, I see. All right.

WITNESS LOVE: Okay? And the next correction then is on page 100, and it would be the second full paragraph on page 100. The last word in the second sentence which says, "bond," I would like to replace "bond" with the words, "complete filling of the nipple without voids." And I have no more corrections.

BY MR. MILLER:

Q Does anyone else have any other corrections or

changes?

A [Witness Jones] No, I do not.

Q If I asked you the same questions that are shown there in the prepared testimony, would your answers be the same?

A [Witness DiBenedetto] Yes, they would.

A [Witness Sundergill] Yes, they would.

A [Witness Love] Yes, they would.

A [Witness Jones] Yes.

MR. MILLER: We move the admission of the surrebuttal testimony of this panel, and note for the record that copies have been provided to the Court Reporter, and those are corrected copies.

JUDGE BOLLWERK: I thank you. Is there any objection?

MR. HOLLER: I have no objection, sir.

JUDGE BOLLWERK: Then the Surrebuttal Staff of Mr. Love, Mr. Sundergill, Mr. Jones and Mr. DiBenedetto on the Chico A/Raychem Seals will be received and bound with the record.

[Surrebuttal Testimony of Philip A. DiBenedetto, James E. Sundergill, Jesse E. Love, and David H. Jones follows:]

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:	)	
	)	Docket Nos. 50-348-CivP
ALABAMA POWER COMPANY	)	50-364-CivP
	)	
(Joseph M. Farley Nuclear Plant, Units 1 and 2)	)	ASLBP No. 91-626-02-CivP

SURREBUTTAL TESTIMONY OF JESSE E. LOVE,
JAMES E. SUNDERGILL, DAVID H. JONES,
AND PHILIP A. DIBENEDETTO
ON BEHALF OF ALABAMA POWER COMPANY
CONCERNING CHICO A/RAYCHEM SEALS

Q. State your full name.

A. (Love) My name is Jesse E. Love. I am employed by Bechtel Corporation as a Project Engineer for the Farley Project.

(Sundergill) My name is James E. Sundergill. I am employed by Bechtel Corporation as the Engineering Supervisor of the Electrical and Control Systems Group of the Farley Project.

(Jones) My name is David Huber Jones. I am currently Manager of Engineering Support, Farley Nuclear Plant, for Southern Nuclear Operating Company, Inc.

(DiBenedetto) My name is Philip A. DiBenedetto. I am president of DiBenedetto Associates, Inc., which is an

engineering and management services company that provides services to utility clients related to equipment qualification, quality assurance, and nuclear regulatory licensing. I am responsible for the technical and administrative management of the company, including participation in, and supervision of, the extensive environmental qualification (EQ) services that DiBenedetto Associates offers.

Q. Have you previously testified in this proceeding?

A. (Love, Sundergill, Jones, DiBenedetto) Yes. We have previously testified on various technical issues raised by this enforcement proceeding.

Q. What is the purpose of your present testimony?

A. (Love, Sundergill, Jones, DiBenedetto) Our present surrebuttal testimony is offered to address the rebuttal testimony of the various NRC Staff panels on the technical issues in this proceeding.

IV. CHICO A/RAYCHEM SEALS

A. Overview

Q47. The next issue concerns the Chico A/Raychem seals on NAMCO limit switches. Mr. Wilson of the NRC Staff has provided Rebuttal Testimony. Have you reviewed that testimony?

A. (Love, Sundergill, Jones, DiBenedetto) Yes.

Q48. In general, what is your response to that testimony?

A. (Love, Sundergill, Jones, DiBenedetto) We disagree completely. What follows highlights a few areas of disagreement:

(Love, Jones) (1) Alabama Power Company's position on the qualification of these seals has not changed since 1981. All of the qualification reports referred to in our Direct Testimony on this issue were available to Mr. Wilson and the NRC Staff during the 1987 inspections.

(Love, Sundergill, Jones) (2) The qualification approach we took for these seals is consistent with both DOR Guidelines and NUREG-0588, Category II (IEEE 323-1971) (the applicable standards for the Farley units). Mr. Wilson's assertions

regarding our use of separate effects testing, taking "qualification credit for failed tests," and basing qualification on "design reviews or exercises," are either mischaracterizations of our qualification approach or are simply not correct or supported by the applicable requirements.

(3) We agree that this issue does not turn on "technicalities with respect to when an argument was made or whether documentation is sufficient" (Rebuttal Testimony, at page 9). This is a purely technical qualification dispute. It is simply our position that these seals were qualified, that documentation was sufficient by any reasonable standard (including that articulated by the Staff), and that Mr. Wilson's speculations (at the inspection and in this proceeding) regarding failure modes are not technically valid.

Let us also add that Mr. Wilson, in his Rebuttal Testimony, has added even more speculative failure modes for these seals to those previously articulated. These latest concerns also have no merit. However, they continue to illustrate how the issue has been treated by the Staff since the inspection. There is apparently an unending string of questions to be answered. We continue to believe that Mr. Wilson would be satisfied only by a LOCA test of the complete seal assembly. While we are sure such a test would validate our position, the

fact is that such a test was not required prior to the EQ deadline, either technically or under the appropriate requirements since partial testing in conjunction with analysis is acceptable. We also note that if we had tested this seal to satisfy Mr. Wilson, the Staff still would not have accepted the test, likely calling it "after-the-fact" as they did on the V-type termination issue. Alabama Power Company chose instead to change out this equipment in 1987 to resolve the issue (using a NAMCO EC 210 connector first made available March 19, 1984).

Q49. Let's flesh out your responses to Mr. Wilson's Rebuttal Testimony in more detail. First, in his Rebuttal Testimony, Q/A 4 and 5 on pages 2-3, Mr. Wilson summarizes Alabama Power Company's position. What is your reaction?

A. (Love, Jones) Mr. Wilson characterizes our Direct Testimony as relying on three reports: (1) Raychem Report EDR 5033 (Wyle Test Report 58442-2), (Staff Exhibit 39) demonstrating qualification of the Raychem boot; (2) the 1981 Farley submergence test demonstrating the seal's ability to exclude moisture (Test Report 2BE-1049-3), (APCo Exhibit 61); and (3) the December 1981 testing at Farley to demonstrate that the Chico A resolved the pressure/temperature problem demonstrated by Raychem (Staff Exhibit 33). This is correct, although it neglects to mention the Southwest Research Institute (SWRI)

radiation testing that was available for the Chico A compound (Staff Exhibit 40).

Nonetheless, we find it astounding that Mr. Wilson can state, as he does on page 3, that "[t]wo of the three test reports on which Alabama Power Company now bases qualification of the seal were not introduced into this issue until Alabama Power Company filed its direct testimony in January, 1992." As stated above, our position on this issue has not changed since 1981. We have always based qualification on the reports mentioned by Mr. Wilson. All three of the reports were available in plant document files for NAMCO limit switches at the time of the inspection. Mr. Wilson was informed, or should have been aware from the file, of the existence of these reports at that time.

In fact, Rayche' Report EDR 5033 (Wyle Test Report 58442-2, Staff Exhibit 39) was specifically addressed by Mr. Wilson in Inspection Report 50-348, as referenced in Q/A 9 of his Direct Testimony (page 10). The Inspection Report then goes on to refer to all of the other reports we referenced in our Direct Testimony (Id. at 10-11). This simply is not consistent with Mr. Wilson's current testimony. In addition, at the follow-up EQ inspection conducted by NRC Region II inspectors at the Farley Nuclear Plant in March 1988, the submergence test (Test Report 2BE-1049-3, APCo Exhibit 61) was specifically

discussed. We cannot speculate why Mr. Wilson now claims he was not aware of these reports or did not understand the basis for qualification. It certainly seems that he should have been clear on this before citing a violation.

B. Compliance With Applicable Standards

Q50. Turning to his specific arguments, Mr. Wilson first objects to the basic qualification approach taken with respect to these seals. In Q/A 6-8, at pages 4-7, he takes issue with, among other things, separate effects testing. What is your response?

A. (Love, Sundergill) The qualification approach used for these seals was completely consistent with both DOR Guidelines (applicable to Unit 1) and NUREG-0588 Category II, IEEE 323-1971 (applicable to Unit 2).

Separate effects testing involves multiple tests, each of which includes only some of the relevant harsh environment parameters. This approach, under DOR Guidelines, allows for tests that do not involve a combined temperature/pressure/steam/radiation/chemical spray test on one sample. Mr. Wilson asserts that our testing was inadequate because it did not include a combined test of temperature, pressure, and steam.

(See also Mr. Wilson's hearing testimony, Tr. 864.) However, Mr. Wilson is missing the point.

The Raychem test on the Raychem boot, essentially in the configuration that we utilized for the limit switch seal, was a combined temperature, pressure, and steam test. This was documented in EDR 5033, Wyle Test Report 58442-2 (Staff Exhibit 39), a report Mr. Wilson now maintains that he did not review until this proceeding. (Rebuttal Testimony, at pages 3-4). This test met DOR Guidelines. In this test, there was no exception taken to the minimum testing conditions (pressure, temperature, steam). To address Mr. Wilson's position, we also request that the Board review our testimony at Tr. 1081-1083.

As with all type testing, deviations between the tested sample and installed configuration are allowable if addressed by further testing or analysis. See DOR Guidelines, Section 5.2.2. Here, the only potentially relevant difference between the tested sample and the installed configuration was that the boot was installed over a pipe nipple rather than a cable. That difference was addressed in the subsequent test reports and is discussed further below.

Finally, to be clear, DOR Guidelines do not state that the minimum type tested conditions need to be in combination.

Section 5.1 simply says that these parameters should be tested, rather than qualified by analysis. IEEE 323-1971 (APCo Exhibit 37) sheds no meaningful light on this issue, but again, clearly allows for augmenting partial type tests by analysis (Paragraph 4.3). The issue, however, is irrelevant since there was a combined temperature/pressure/steam test performed for the Raychem boot.

Q51. But Mr. Wilson seems concerned, in his Rebuttal Testimony at page 6, that DOR Guidelines "do not endorse the concept of 'qualified materials' as advanced by the licensee." This seems to address the Raychem testing on the Raychem boot. Can you respond?

A. (Love, Sundergill) Mr. Wilson seems to be referring to Mr. Love's Direct Testimony, Q/A 126, on page 136, which states that for this seal, we utilized tested materials supplemented with analysis and partial testing. There was nothing wrong with our approach to qualifying this equipment. Perhaps it will help if we clarify what was meant in saying that we utilized tested materials.

Essentially, this seal had two major components: the Raychem boot and the Chico A backing. Both were tested for their relevant environmental parameters. Hence, the seal was made of qualified components and materials. However, with respect

to the Raychem boot, we were not relying upon some "generic qualification of . . . materials," as implied by Mr. Wilson (Rebuttal Testimony, at page 6). None of the three tests on the boot which are relied upon for qualification (the Raychem test, the submergence test, and the test with Chico installed) were tests of random Raychem materials. They were all tests of a Raychem boot identical to that installed in the seal application, as required by DOR Guidelines Section 5.2.2.

The only deviation between the tested and installed Raychem boot, as previously noted, was that the Raychem pressure/temperature/steam test utilized a boot installed over a cable rather than a pipe nipple. The relevant difference between the two initial configurations was that the cable provided a backing to the Raychem boot. This backing was not present in the original configuration which failed the pressure/temperature test. Thus, when the Chico A material was added to provide the backing material, only the pressure/temperature portion of the testing needed to be re-done.

The subsequent tests utilized the boot over a pipe nipple (first for submergence testing and, second, for testing of the Chico backing). We believe, consistent with DOR Guidelines Section 5.2.2., that the difference between the installation over a cable, rather than a pipe nipple, was addressed by the subsequent testing and by the engineering judgment that the

difference was irrelevant to seal performance. Some of the specific concerns Mr. Wilson has regarding the difference are discussed below and in previous testimony. We continue to believe that, based on any reasonable documentation standard, further documentation on these issues was unwarranted -- especially prior to November 30, 1985. An engineer versed in EQ could understand our logic and approach based on the documents in our files.

Also, note that Mr. Wilson, in his Rebuttal Testimony on page 6, highlights that DOR Guidelines, Section 5.2.6. states that type tests of seals "shall be representative of the actual installation for the test to be considered conclusive." In our opinion, all of the tests relied upon were representative of the intended installation. With respect to actual installed configurations, we have addressed this at length in our Direct Testimony, Q/A 149, at pages 170-175. We believe there were adequate installation controls to assure that the tests remained representative. Moreover, even the NRC's November 1987 Inspection Report does not indicate any actual installed seals that deviated from the tested, qualified configurations. Mr. Wilson is merely speculating that there could have been such deviations, but he cannot state that there were deviations.

Q52. Mr. Wilson, on page 6 of his Rebuttal Testimony, also references DOR Guidelines Section 5.3.2. This states that the "effects of chemical sprays on the pressure integrity of any gaskets or seals present should be considered in the analysis." What is the significance of this reference?

A. (Love) Mr. Wilson never actually explains himself on this point. However, we did precisely what Section 5.3.2 suggests.

As stated in our Direct Testimony, the effects of chemical sprays on pressure integrity were addressed in at least two different contexts. First, the original Raychem testing on the boot (EDR 5033) (Staff Exhibit 19) included not only a pressure/temperature/steam test, but also a chemical spray test. (See Rebuttal Testimony, at page 10, where Mr. Wilson acknowledges this fact.) This showed the integrity of not only the Raychem material, but also that of the Raychem boot configuration identical to that used at Farley for these seals.

Second, in performing the final December 1981 testing on the complete seal configuration (including the Chico backing), chemical spray was considered. However, as explained in my Direct Testimony, Q/A 138 at page 155, chemical spray testing was not necessary at that time since it was shown that there was no failure mode by which chemical spray could reach the

Chico compound. The pressure/temperature test showed that the Raychem boot, backed by Chico, was a positive leak-tight moisture exclusion seal which would prevent ingress of chemical spray.

I know that Mr. Wilson has raised subsequent concerns related to bonding of the Raychem boot to the pipe nipple based on chemical spray induced corrosion. However, as addressed in previous testimony (see, e.g., our Direct Testimony at pages 158-161), all of these concerns are simply unfounded. The very test report Mr. Wilson relies upon as a basis for pipe corrosion concerns (Wyle Test Report 58730) failed to validate the concern -- there were no documented Raychem boot failures due to corrosion. (See also Tr. 837-839, wherein Mr. Wilson fails to support his hypothesis.)

Q53. Mr. Wilson, on page 7 of his Rebuttal Testimony, also asserts that "DOR Guidelines do not allow qualification for failed tests." Did Alabama Power Company use this approach?

A. (Love, Sundergill) No. Our qualification approach was amply described in our Direct Testimony. Our approach was one of testing, supplemented by analysis as allowed by the DOR Guidelines and NUREG-0588. (See also 10 CFR 50.49(f)(3) and (4)).

The fact that we chose to organize our Direct Testimony in a chronological fashion is irrelevant to the merits of this issue (notwithstanding the inference of Q/A 14, on page 17 of the Rebuttal Testimony). The evolution of the seal design happens to be a useful means to explain the qualification approach taken and the justification for that approach.

Mr. Wilson, on page 7 of his Rebuttal Testimony, cites DOR Guidelines, Section 5.2.5., as follows:

> If a component fails at any time during the test . . . the test should be considered inconclusive with regard to demonstrating the ability of the component to function . . . .

This is a correct statement of the guideline. However, there were no failures in any of the tests credited for qualification of this equipment. The Raychem boot was successfully tested in the Raychem testing. Bechtel's submergence test on the seal configuration was successful. And the credited test specimen (test specimen 4, as discussed in my Direct Testimony) of the December 1981 testing of the complete Chico A/Raychem seal was a successful test. Contrary to Mr. Wilson's claim, we were not and are not using test failures as a basis for qualification.

In fact, the only failure of the Raychem boot relevant to this issue was the failure observed by Raychem, and recreated by Alabama Power Company, of the boot under pressure/temperature

conditions without Chico. Obviously, this failure was relevant to our design evolution. We addressed it by adding the Chico backing. Since the assembly was then tested, there is absolutely no significance to Mr. Wilson's observation that "another failure mode may have been masked by the observed failure." (Rebuttal Testimony, at page 7).

Mr. Wilson, in fact, blatantly mischaracterizes our approach. He states (at page 7) that DOR Guidelines, Section 5.2.5., "prohibits the sort of argument that says, there were test failures, but we know what caused them and fixed it, so there is no need to retest" (emphasis added). With respect to the only failure ever observed (again, the Raychem boot breach), we suspected the cause, duplicated the failure to prove the cause, designed a fix, and retested after the fix under identical conditions to demonstrate no further failure, thus qualifying the final design.

There also is absolutely no significance to Mr. Wilson's observation that "another failure mode might have occurred if the test had run to completion." (Rebuttal Testimony, at page 7). All the credited qualification tests on this seal ran to completion. Mr. Wilson is simply in error regarding the facts and continues to attempt to confuse the issue.

Q54. A similar concern appears in Mr. Wilson's Rebuttal Testimony at page 11. He states that "failures invalidate every known LOCA test involving Raychem boots on metal pipe nipples." Is he correct?

A. (Love, Sundergill) No. Again, the tests we relied upon for qualification were not failures. Moreover, Mr. Wilson appears to be alluding here to the failures noted in the test report he has relied upon -- Wyle Test Report 58730. However, as stated previously, none of those failures were germane to our seal. None involved corrosion in the way Mr. Wilson implies (See our discussion in Q/A 6 above).

Q55. Mr. Wilson, in Q/A 14 on pages 17-18, also states that documentation of qualification is "not a design review process," implying that Alabama Power Company's approach was deficient. What is your response?

A. (Love) Again, I think Mr. Wilson is mischaracterizing our qualification approach. Our approach was a positive qualification approach, as previously described, consistent with applicable criteria and requirements. As also stated above, the fact that we chose to organize our Direct Testimony on this issue in a chronological fashion is irrelevant to the merits of the issue.

Mr. Wilson, in Q/A 14 at pages 17-18, states that, "[t]his proceeding does not address whether the seal design makes sense, or was developed in a logical manner, or has a reasonable chance of performing its harsh environment safety function." With all due respect to Mr. Wilson, these issues are exactly what this proceeding is about, in addition to the issue of "whether the licensee satisfied the environmental qualification requirements." After all, the matters dismissed so blithely by Mr. Wilson are exactly what engineering is all about. And the issue of whether or not EQ requirements were met cannot be addressed without first addressing these valid engineering considerations.

Q56. Mr. DiBenedetto, you were with the NRC Staff in the early years of the EQ regulatory work. Can you add any perspective on the issues raised by Mr. Wilson regarding test failures?

A. (DiBenedetto) Yes. When considering the Chico A/Raychem configuration, it is helpful to reflect on and revisit the early reviews performed by the NRC Staff on various industry equipment test reports. During the 1979 to 1981 time frame, one of the major and most common shortcomings of licensees' qualification reviews was the lack of technical justification provided when a tested specimen experienced or exhibited anomalous behavior during testing in a test credited for qualification. The anomalous behavior did not always result

in failure of the equipment; however, the NRC Staff insisted (and rightfully so) that the utility verify or provide assurance that any test anomalies, observed or recorded, did not affect the intended operation, capability, or qualification of the equipment as installed in its specific location to perform its specific function.

In the situation here with the Chico A/Raychem seals, Alabama Power Company found that during testing, a pressure-related anomaly occurred which ruptured the Raychem boot seal. Alabama Power Company evaluated the failure mechanism of the tested configuration and engineered a solution. There were no other anomalies observed or experienced. This approach to addressing test anomalies was not only appropriate, but beyond what was the norm in the industry. Alabama Power Company took positive action to fix an identified deficiency while most utilities had to be prodded to address and evaluate test anomalies.

C. Specific Technical Concerns

Q57. Let's turn to Mr. Wilson's asserted technical concerns with the seals as articulated in the Rebuttal Testimony. Can you summarize these concerns as you understand them?

A. (Love, Sundergill, Jones) Focusing only on the Rebuttal Testimony, we have attempted to identify the technical concerns and speculations raised by Mr. Wilson. They are listed below:

(1) For the Farley seals, the Raychem boot was installed over a pipe nipple rather than over a cable as utilized in the Raychem testing (EDR 5033). (Staff Exhibit 39). (Rebuttal Testimony, at pages 8 and 10).

(2) There was insufficient surface preparation of the pipe nipple. Specific concerns include the absence of a cleaning procedure, the possible presence of burrs or sharp edges, and the possibility of chemical contaminants that might interfere with bonding between the pipe and the boot (Rebuttal Testimony, at pages 12-13).

(3) The submergence test was inadequate because it was not a temperature/pressure/steam test. (Rebuttal Testimony, at page 15).

(4) The 1981 Bechtel test with the Chico backing was inadequate in that: (a) it did not include steam or moisture; (b) it did not simulate the initial temperature rise of the specimen that would occur in a LOCA; and (c) the test specimen

was built according to different instructions than the plant equipment. (Rebuttal Testimony, at page 16).

(5) Installation instructions did not control the minimum quantity of Chico mixture and there were no instructions directing the installer to perform a visual inspection. (Rebuttal Testimony, at page 8).

(6) The installation procedures were inadequate in that they did not specify the length of tygon tubing to be used and they failed to specify the position of the bottom of the tubing during cement insertion. (Rebuttal Testimony, at page 20).

(7) The installation instructions needed to specify heat shrinkage control for the Raychem boot more precisely than is necessary for a cable installation. Otherwise, Raychem material thinning and weakening could result. (Rebuttal Testimony, at page 12).

(8) The fact that the Chico cement is not compressed in the Farley seal could allow it to move, adversely affecting its performance. (Rebuttal Testimony, at pages 20-21).

(9) The Bechtel test plan for the December 1981 testing refers to different installation drawings and revisions than

those available during the inspection. (Rebuttal Testimony, at page 8).

(10) The compression adapter applied over the Raychem sleeve in the final seal lacked a model number or other descriptive information, contrary to DOR Guidelines. (Rebuttal Testimony, at page 8).

(11) The compression adapter, which connected conduit to the limit switch assembly, could cut the Raychem sleeve. The postulated failure mode is now one of torque on the sleeve due to "several feet of cable conduit." (Rebuttal Testimony, at pages 8-9).

Q58. To your knowledge, are any of these new concerns?

A. (Love, Sundergill, Jones) Several of them are new issues or new variations on old issues. For example, take the last item listed above. Mr. Wilson previously speculated that the compression adapter might cut the Raychem sleeve. However, the previous failure mode offered by Mr. Wilson was differential expansion of the various seal components. Since we have addressed that issue, he now speculates on cutting due to torque of the cable conduit.

Another new concern is Issue (7). Mr. Wilson has not previously asserted the possibility for Raychem material thinning and weakening due to lack of heat shrinkage control. We address this below.

Another new concern is Issue (8). To the best of our knowledge, this concern has not been previously articulated. Again, we believe this concern to be without merit as addressed below.

Issue (2) above was also a new issue when first raised in oral testimony. All of these examples aptly illustrate the debate between the parties on this issue. The focus seems to be ever-shifting. Even during the hearing, issues of prior minor (or unstated) concern then grew into major issues. An example of this is the alleged difference between adding Chico to the switches by pouring versus insertion by tygon tubing. (Tr. 873-74).

We attempt below to address all of the concerns and speculations of which we are now aware, which we did not have the opportunity to address in our Direct Testimony because they were not yet known to us. We do not believe that a violation has been proven -- or that a violation should be considered to exist based on speculation or imaginative "concerns."

In this light, we found Mr. Wilson's Rebuttal Testimony on page 18 to be misdirected. He states that satisfying EQ requirements turns "not on design reviews or exercises in speculating on what might happen if the accident situation occurs." We are not using and have never utilized speculation as a basis for qualification of these seals. The speculation on this issue has come from Mr. Wilson. He has speculated on concerns with these seals since the 1987 inspection, with no real engineering basis or documented support.

Q59. Let us turn now to the concerns Mr. Wilson has raised. Referring to your list above, Issue (1), based on the Rebuttal Testimony at pages 8 and 10, concerns the alleged difference between installation of a Raychem boot over a pipe versus a cable. Would you please respond?

A. (Love, Sundergill) We discussed the Raychem testing (EDR 5033) above. In our review, this testing -- including pressure, temperature, steam, radiation, and chemical spray -- satisfied DOR Guidelines, Section 5.2.2.

(Love) The differences between the Farley application and the cable application tested in EDR 5033 (Staff Exhibit 33) were: (1) the application over a galvanized steel pipe nipple; and (2) the cable fillers in a cable application provide a backing to the crotch of the breakout boot. I do not consider these

to be significant differences and, in past testimony, have addressed these matters and Mr. Wilson's concerns. Let me now amplify my basis for this conclusion.

The Raychem boot kit utilized for this seal, and as tested, is selected for an application and procured from Raychem based on the outside diameter range of the cable or pipe nipple over which it is to be installed. In our application, the outside diameter use range of the boot was 0.78 - 1.2 inches. This is specified in the Raychem product control document and installation instructions provided with each kit. (APCo Exhibit 118). Whether the kit is installed over a cable or a pipe is not significant. The critical parameter is that the diameter of the pipe nipple or cable is within the specified use range of the boot kit. This assures that the shrinking process will achieve an effective seal, and that no unacceptable material thinning or stresses will exist after shrinking. Suffice it to say, we utilized an appropriate Raychem boot for the diameter of the pipe nipple on the limit switch.

With respect to shrinkage over a pipe rather than a cable, there is no real difference. Mr. Wilson's point in his Rebuttal Testimony seems to focus on the difference between application over plastic versus steel. (Rebuttal Testimony, at page 10.) However, we have addressed in our Direct

Testimony the issue of adhesion or bonding to a galvanized pipe. (See Direct Testimony, at pages 159-160.) We have also addressed concerns regarding differences in expansion coefficients. (See Direct Testimony, at pages 166-167.) The basic point here remains that an approximately 1-inch diameter pipe versus an approximately 1-inch diameter cable is not a significantly different application. This was also effectively demonstrated by the Bechtel submergence test (utilizing the Raychem boot over a pipe) and in the Alabama Power/Bechtel 1981 pressure/temperature testing.

With respect to the bonding issue, I would like to explain one other consideration. Mr. Wilson, on page 10 of his Rebuttal Testimony, references two Sandia tests (NUREG/CR-2812 and NUREG/CR-3361) that we relied upon, but then faults the reports because they "included no Raychem material or electrical application." Mr. Wilson seems to be confused and I believe the record should be clarified. These Sandia reports were never part of our basis for qualification of these seals. However, after Mr. Wilson raised a corrosion/bonding concern at the inspection, we did refer him to these reports for the limited proposition that there will not be extensive corrosion of a galvanized steel pipe in the postulated Farley design basis accident environment. These reports involved tests of galvanized material under accident conditions and supported that proposition. Therefore, these

reports support our view that there will not be significant corrosion of the galvanized pipe on the NAMCO limit switch that would interfere with Raychem bonding.

Finally, with respect to the lack of cable filler in the pipe application, this difference was addressed by the addition of the Chico. (See Direct Testimony, at pages 144-145).

Q60. Issue (2) above, based on the Rebuttal Testimony at pages 12-13, concerns surface preparation of the pipe nipple and the absence of cleaning procedures. Please describe what was involved here.

A. (Love) As I testified at the hearing, there were no special procedures utilized for preparation of the pipe prior to applying the Raychem boot. (Tr. 1006; 1076-1078). I testified that Raychem provided installation instructions for nuclear cable breakout kits with each kit (Tr. 1077-1078), and these instructions were followed. The instructions did not involve any "special" sanding, filing or preparation of the nipple. (Tr. 1078).

Q61. Were these instructions sufficient to address chemical contaminants burrs, or sharp edges?

A. (Love) Yes. To address Mr. Wilson's concerns for preparation of the pipe nipple, I will refer to the Raychem installation procedures. (APCo Exhibit 118). Notwithstanding that these standard instructions referred to applications over cable, they were followed for these limit switch seals and they provide for sufficient surface preparation. As shown on the first page of APCo Exhibit 118, a copy of the installation instructions was provided with each kit. The kit number is NCBK-04-04, and the instructions are designated as PII-57009. Preparation Step 3 is "Clean and Degrease." It states that, "[a]ll surfaces must be free of grease, oils or other contaminants brought into contact with Raychem products." This instruction would have applied to the pipe nipple and would have addressed any concern for grease or other chemical contaminants that might interfere with bonding.

(Love, Jones) We have also spoken with one of the lead electricians who installed these seals in the field. We asked about procedures for cleaning the nipple. He explained that the cleaning was performed with a solvent specifically to remove machine oils that might have been on the pipe threads. He also informed us that if there were any sharp edges or burrs, they would have been detected during the cleaning process. Although it was not required by procedure, he explained that the electricians would have smoothed down any such imperfections prior to installing the Raychem boot.

(Love) With respect to burrs and sharp edges, I will also note that properly machined pipe nipples (the threads) should not have these problems. The threads themselves were standard threads. In our testing, and in all of our handling of the material, we observed no problems due to tearing or cutting of the Raychem material -- including when exposed to thermal aging and to design basis thermal/pressure testing.

I also concur with an observation made by Judge Carpenter. (Tr. 852-54.) Given the heat shrinking process, application of the boot over the threads rather than an unthreaded pipe (or cable) is actually a more secure approach. The heat shrink Raychem material will form a thread mating with the pipe nipples. We historically considered, in designing this seal, whether to use unthreaded pipes or threaded pipes, and selected the latter for precisely this reason.

(Sundergill) I would also like to add a comment. In his oral testimony (Tr. 845, at line 3; Tr. 854), Mr. Wilson expressed concern that the threads of the nipple or any burrs that might exist could nick or cut the Raychem material. He stated that nicking of the material was a well-known mechanism which results in the material splitting at the nick. However, this failure mechanism has only been reported when the nick has been on the outside surface of the Raychem boot. It has never been reported as a result of an internal nick. From a

mechanistic point of view, it is straight-forward to observe that an external nick will experience forces of stress that [illegible] to open up the nick. Such is not the case for an internal nick. Since such a failure has not been reported, Mr. Wilson is engaging in speculation once again.

Q62. Issue (3), raised by Mr. Wilson in his Rebuttal Testimony at page 15, concerns the submergence test. He states that it was not an adequate pressure/temperature/steam test. Please respond.

A. (Love) The submergence test, documented in Bechtel 2BE-1049-3 (APCo Exhibit 61), was not intended to be a pressure/temperature/steam test for containment application. I discussed this test and its purpose in Q/A 131-132 on pages 146-148 of our Direct Testimony.

Again, we are basing qualification of this equipment on a combination of four tests. Mr. Wilson seems to want each test to serve all purposes. The specific deficiencies referred to by Mr. Wilson on page 15 simply are not relevant to what was intended to be demonstrated in the submergence test. All of the issues he cites have been addressed by other test documentation. Specifically, Staff Exhibits 33, 39, and 40 addressed acceptability for containment applications.

Q63. Issue (4), from Mr. Wilson's Rebuttal Testimony at page 16, raises three concerns regarding the Chico backing in the seal. Have you addressed these matters before?

A. (Lowe) Yes, we have previously addressed all three of these points in our Direct Testimony, Q/A 139-149, at pages 156-175. The Rebuttal Testimony here simply restates old arguments in a new -- and still invalid -- way.

To summarize, the December 1981 Bechtel test (the Chico test) challenged here by Mr. Wilson did not need to include steam or moisture. The 1981 test was designed to address the specific pressure/temperature problem observed by Raychem and resolved by the addition of Chico to the design. The test bounded Farley pressure/temperature conditions as addressed in Direct Testimony, Q/A 136 at pages 150-152, and Figures 4 and 5.

Initial temperature rise of the specimen was also adequately simulated to bound the required design basis pressure/temperature profiles as shown in Figures 4 and 5 of the Direct Testimony. As we stated previously, we believe our temperature ramp was more severe than would be achieved in a commercial test chamber. (Direct Testimony, at page 162-163). Mr. Wilson now suggests that LOCA steam conditions will heat the test specimen more rapidly than dry stagnant air. (See also Tr. 861). This is a new variation on the previous

concern, and Mr. Wilson offers no thermodynamic heat transfer analysis to support the assertion. In any event, this restatement of the issue does not alter my previous conclusion that the December 1981 test adequately demonstrated that the temperature/pressure effect experienced in the early Raychem test failures would not exist for our Chico/Raychem version of the seal. (See Direct Testimony, Q/A 135-136, at pages 149-152.)

Finally, Mr. Wilson here alleges that the test specimen was built according to different instructions than the plant equipment. As I have addressed previously in my Direct Testimony, Q/A 149 at pages 170-175, adequate installation controls existed for these seals. The installation instructions, including the Raychem boot instructions, were fairly specific and were certainly adequate given the fairly simple nature of the task.

At the hearing, Mr. Wilson added a new twist to this last issue. He argued that in the test specimen subject to the December 1981 test, the Chico was added to the test specimen by "pouring it into the pipe nipple." (Tr. 873). He contrasted this with the tygon tube installation methodology used in the field, apparently maintaining that this difference was meaningful to qualification. (Tr. 874). In my Direct Testimony referenced above, I explained that there was nothing

crude or imprecise about the tygon tube methodology for inserting Chico. Also, as I explained to Judge Carpenter (Tr. 989-990), the Chico prior to curing has good fluid characteristics for eliminating voids. The slightly expansive curing process also lends itself to elimination of voids. Given these characteristics, I simply see no legitimacy in Mr. Wilson's distinction.

Finally, this issue is probably completely beside the point. Mr. Wilson relies on notes attached to the report for the 1981 test. As I acknowledged in hearing testimony, one of the quality control inspectors states in his notes that the Chico was "poured" into the test specimen. (Tr. 1004-1005). However, the report itself describes the fix for the seal as injection of Chico with a syringe, implying that the syringe was the installation method. (Staff Exhibit 33, at page 3). Also, as I testified, my recollection was -- and I was present at the 1981 tests -- that the test specimens were made by injecting the Chico by syringe.

(Love, Jones) Also, in our recent conversation with one of the lead electricians who helped make these seals, he stated that his recollection of the 1981 tests was that the Chico was added by injection. Regardless, however, in our judgment, for the reasons testified to previously, it is completely

irrelevant for this application whether the Chico was injected or poured.

Q64. Let's move on to Issue (5) listed above. This again concerns installation instructions. Mr. Wilson's claim (Rebuttal Testimony, at page 8) is that the instructions did not control the minimum quantity of Chico mixture. Can you respo .?

A. (Love) The insta .lation procedure is APCo Exhibit 104. The procedure (step 5) calls for withdrawing "2-3 oz. (35-50 cc) of the liquid Chico mixture into the syringe." The procedure (step 7) then calls for "injecting 1½ oz. into the pipe nipple." This procedure is explicit and adequate.

Q65. As part of this concern, Mr. Wilson (Rebuttal Testimony, at page 8) complains that there is no instruction directing the installer to perform a visual inspection.

A. (Love) A visual inspection seems to me to be self-evident for this task. The installer must look at the switch and pipe nipple to inject the Chico. If the Chico were not adequately inserted, it would spill out into the switch housing. This would be obvious. In addition, the procedure (APCo Exhibit 104) includes a "Note" specifying that "it is important that no more than 1½ oz. of Chico is applied to each switch, and that no Chico finds its way to switch materials." To satisfy

this Note, the electrician must be watching as he performs the operation.

(Love, Jones) Also note, the 1½ oz. specified in the procedure was based on the volume of the pipe nipple. The electricians in the field have verified for us that they would assure that adequate Chico was inserted by visually verifying that the Chico filled the nipple up to the level defined by the housing. Given all of this, we do not believe that an explicit "visual inspection" step needed to be in the procedure to assure proper preparation of the seal. This seems to be an allegation motivated by something other than a genuine, realistic technical concern.

Q66. Issue (6) above is taken from Mr. Wilson's Rebuttal Testimony at page 20. This issue again concerns the installation procedures, this time criticizing the lack of specification of the length of the tygon tubing and the failure to specify where the bottom of the tubing should be inserted in the pipe nipple. Please respond.

A. (Love, Jones) Step 6 of the procedure (AFCo Exhibit 104, emphasis added) clearly states: "Through open side of the switch, carefully insert the free end of the tygon tubing into the pipe nipple attached to the switch <u>until it bottoms on the Raychem breakout seal</u>. Insure that the Chico mixture does not

get in the switch internals." This seems fairly clear to us. Moreover, from discussions with the electricians, we have absolutely no reason to believe that the procedure was not followed.

The allegation of a lack of specificity regarding the length of tygon tubing is, in our opinion, an example of incredible nit-picking and is without substance. Any reasonably skilled electrician would use a tygon tube of an appropriate length -- that is, long enough to complete the job in accordance with procedures (including the Note discussed above). The same can be said for where the bottom of the tube needs to be positioned.

In addition, the viscosity and pour characteristics of the uncured Chico which were discussed earlier would also address any concern in this area. Chico will flow to fill voids regardless of how deeply the tubing is inserted in the pipe nipple or the length of the tygon tube. (See also Tr. 989-990).

Q67. Issue (7), drawn from Mr. Wilson's Rebuttal Testimony at page 12, again focuses on installation instructions. The complaint here relates to the Raychem boot rather than the Chico. Please describe the issue as you understand it.

A. (Love) On page 12 of his Rebuttal Testimony, Mr. Wilson is concerned that heat shrinkage control needs to be specified in instructions. With no cited support, he argues that Raychem material thinning and weakening could otherwise result.

Q68. Do you agree?

A. (Love) No. As discussed earlier, the pipe nipple was within the usage (outside diameter) range for the Raychem breakout boot kit. The Raychem instructions (APCo Exhibit 118) supplied with the kit specify, in steps 1 through 5, the appropriate heat shrinkage method. These steps are adequate regardless of whether the boot is applied over a cable or pipe nipple (assuming an application inside the appropriate outside diameter usage range). We see no basis for Mr. Wilson's speculative claims, nor has he offered any.

Q69. Issue (8) above concerns compression of the Chico compound. Mr. Wilson argues (Rebuttal Testimony, at pages 20-21) that, unlike the SWRI tests on Chico, the Chico in the Farley application was not compressed. Do you understand this concern?

A. (Love) I understand that Mr. Wilson has articulated a concern. I do not agree that it has technical merit for the Farley application, as I have already testified. (See Tr.

1087-1088; Tr. 989-990). However, I will emphasize a few points here.

First, let me clarify that Q16 in the Rebuttal Testimony mischaracterizes my earlier testimony. At Tr. 1088, I did not state that the Crouse-Hinds explosion-proof fitting was not intended to compress the Chico. I stated that the specific intent of the plug was not to compress the Chico. I also stated that there will be some compression due to the plug in the application. However, this issue is irrelevant. I went on to testify that there is no significance to the compression. (Tr. 1089).

Compression of the Chico for the Farley application is not necessary for obtaining an adequate seal. As I explained to Judge Carpenter (Tr. 989-990), the viscosity of the uncured Chico and the fact that Chico is slightly expansive in nature will assure a bond. Furthermore, there is absolutely no observational or empirical evidence to support Mr. Wilson's speculation (Rebuttal Testimony, at page 21) that the Chico mass in the Farley seal will move.

Mr. Wilson's speculation is perhaps based on the fact that the expansion coefficient for steel differs from that for the Chico compound so that the steel could expand away from the Chico as temperatures increase. This phenomenon would be a

function of the absolute value of the higher temperature as opposed to the rate of heating. That is, the effect would be greatest at the peak temperature regardless of how fast it took to achieve that peak. Since the Farley test was at peak temperatures and the Chico either did not move in that test or the movement was insufficient to affect the integrity of the Raychem material, Mr. Wilson's concerns have been shown to be groundless by virtue of testing.

Also, Mr Wilson relies on the SWRI testing of the explosion-proof fittings for the idea that compression is necessary. However, the procedures used for installation of the Farley seal (APCo Exhibit 104), and the application itself, are completely different from those involved in the SWRI-tested fittings. First, at Farley, the switches were placed in the vertical position prior to adding Chico so gravity would allow the Chico to fill the cavity. When SWRI added Chico to the much larger explosion-proof fittings it tested, given the arrangement (which I will not belabor here), the fittings were essentially filled from the top and middle of the fitting through the plug opening. Compression from the plug was needed to ensure packing of the Chico against the internal cable dams at both ends of the fitting.

Second, the Farley cavity was quite small and crossed by four wires. The SWRI-tested fillings were much larger, and filled

with many more, or much larger, cables. Given this arrangement, some compression was required to fill the cavity of the explosion-proof fittings. Mr. Wilson is comparing apples to oranges.

Q70. While we are on the subject of Chico, let me digress briefly to an issue first raised by Judge Carpenter at the hearing. He wondered about the moisture in the Chico that would be released during curing. (Tr. 1095-96). Mr. Wilson has now apparently adopted that issue as his own. (Rebuttal Testimony, Q/A 16, at page 20). Can you address this?

A. (Love) This is another good example of how this issue constantly changes. When Judge Carpenter asked the question, he acknowledged that it was not an issue here. (Tr. 1096). Now, Mr. Wilson somewhat obliquely refers to the issue, making the inference that this is an important issue that has never been addressed in testimony.

First, during the curing process, the majority of the water in the Chico compound will be transformed by hydration (the chemical process by which the compound solidifies) and remain in the final compound. The small amount of moisture that evaporates during curing is immaterial to the functioning of the switch. Also, after initial curing, as with concrete, exposure of the Chico to elevated temperatures postulated to

occur in the Farley-specific Design Basis Events (DBEs) will actually result in additional hydration assuming that there remains any non-hydrated water in the compound.

Another issue raised by Judge Carpenter was whether moisture will be released by the compound at high (e.g., accident) temperatures. I have already testified that UL tests have been performed on explosion-proof fittings, giving no indication of breakdowns of the compound at high temperature. (Tr. 1095-97). However, even more directly, in our December 1981 testing, the Chico/Raychem seal was subjected to elevated temperatures. A physical examination of the sample after testing showed no evidence of compound breakdown (or release of moisture). The SWRI testing is another conclusive indication of this characteristic. The Chico there was tested to elevated design basis accident profiles and the reports indicate no significant breakdown of the compound.

In addition, we have reviewed the Material Safety Data Sheet for Chico compound filed with the U. S. Department of Labor. (APCo Exhibit 119). The data sheet specifies, for occupational safety reasons, performance characteristics of the compound for the purpose of identifying when hazardous substances might be released. The data sheet shows that the melting point of Chico is 1300°C - 1450°C. These are, of

course, temperatures much in excess of any postulated for Farley Nuclear Plant.

We do not believe, based upon the documented information, that the compound will release significant amounts of moisture at the elevated temperatures to be expected for the Farley-specific design basis accident. Even if, however, small amounts of moisture were, or could somehow be, released, it would be of no significance to performance of the switch. We have already testified as to the ruggedness of these types of switches and their ability to function in industrial environments without any special sealing. (Tr. 1049-95). Also, the NAMCO EA-180 limit switches are used at Farley in 125 volt DC and 120 volt AC control and indication circuitry. This circuitry is not sensitive to small amounts of leakage current and provides only an on/off conductive state, as opposed to an analog indication.

Q71. Issue (9) listed above, as raised in Mr. Wilson's Rebuttal Testimony, concerns the installation drawings and revisions referenced in the December 1981 Bechtel test plan. Are you familiar with this issue?

A. (Love) Yes. It is an old issue from the Direct Testimony. I addressed it at length in my prior testimony, specifically in answer to Q149 on pages 171-72. The installation drawings

were living documents, and therefore the 1987 version reviewed by Mr. Wilson may not have matched that referenced in the 1981 test plan. However, the earlier revisions remained in plant files and were available for review. Also, as I have previously discussed, these instructions were at all times more than adequate to ensure that the seals were properly installed and that installed seals were bounded by the tested sample.

Q72. Mr. Wilson's Issue (10), as listed above, concerns the compression adapter over the Raychem keeper sleeve. Please address this issue.

A. (Love) The compression adapter is applied over a Raychem keeper sleeve and the pipe nipple to connect the flexible cable conduit. Mr. Wilson's assertion is that seal qualification was somehow incomplete because the compression adapter lacked a specific model number or other descriptive information. However, there is no substance to this claim.

I described the compression adapter on pages 140-41 of my Direct Testimony. The compression adapter is <u>not</u> part of the seal in that it is not intended to serve any sealing function. It serves only to attach the flexible conduit. The fact is that in the field, several different manufacturers' clamps were used on these limit switches to attach the flexible

conduit. All were equivalent in design and served the purpose intended. The fact that one specific clamp was not called out simply is not relevant to qualification of the seal assembly.

Q73. Mr. Wilson has speculated that the compression adapter could cut the Raychem keeper sleeve. Are you aware of this?

A. (Love) Yes, I am, and I have addressed such a concern previously in my Direct Testimony at page 166. This is not a valid concern.

In his Rebuttal Testimony, Mr. Wilson seems to change, or supplement, his previous version of this concern by proposing a new cutting mode. He postulates cutting of the sleeve by the compression adapter due to the torque of the cable conduit. (Rebuttal Testimony, at page 9). However, the fact remains -- regardless of the postulated cutting mode -- that there is simply no evidence to support the concern. From all of our testing of this configuration, and in all of our observations of installed limit switches, I am aware of no evidence of cutting problems such as those posed by Mr. Wilson.

Moreover, the adapter clamps to the Raychem keeper sleeve, not to the Raychem boot. See Diagram 2 and the related discussion, pages 140-41 of my Direct Testimony on this issue.

The keeper sleeve is not the important component for seal integrity. The seal is provided by the Raychem boot. Therefore, a nick or a cut in the keeper sleeve would not present a qualification problem.

Finally, I would observe that there is no basis to assume that the cable and conduits will be moving around exerting excessive torque on the adapter. In general, I do not believe that these cables move, or are moved, during normal operation, and they are not such that they will move excessively during an accident.

Q74. Have you now addressed all of the concerns of which you presently are aware regarding these seals?

A. (Love) Yes, I have, either in my original testimony, oral testimony, or this Surrebuttal Testimony.

D. Conclusions

Q75. Overall, what is your conclusion regarding this issue?

A. (Love) First, in conclusion, I want to respond to an inference Mr. Wilson has raised at the hearing and in his testimony. He has implied that these seals would have failed catastrophically. I want to emphasize that I disagree very

strongly. Based on all of my experience in electrical engineering and electrical design of equipment conduit and cable sealing systems, equipment qualification, and my work in developing and testing these seals, it is my strong position that they would not fail under the applicab'e design basis accident conditions.

Second, I want to address the paperwork aspect of qualification. I believe that at the time of the inspection, Alabama Power Company's files contained sufficient, auditable information documenting the basis for qualification of these seals. Obviously, many of Mr. Wilson's specific concerns were not addressed in the files. It is extremely difficult to even understand how one would or could predict Mr. Wilson's concerns in order to address or document responses in sufficient detail to satisfy Mr. Wilson. Mr. Wilson appears to be extremely capable in the area of technical, scientific, and theoretical speculation of hypothetical mechanisms for failure. However, he does not appear to be capable of making any engineering judgments as to the validity of his speculated failure mechanisms based upon the available documented information. For the reasons I have discussed, these speculative concerns lack technical merit.

However, even if these concerns were reasonably foreseeable, I do not believe they are of a type that can or needs to be

specifically addressed in qualification documentation. Equipment qualification, at least as originally conceived and practiced, was a means of providing reasonable assurance based on known technical data and sound engineering judgment that equipment would operate when called upon. The focus was on hardware capabilities and the required functions. The basis for the reasonable assurance that equipment would operate does indeed need to be maintained in an auditable form. However, the documentation requirement simply should not be read to overshadow the original purpose of EQ. A reasonable engineer does not need documentation to the most microscopic level of detail. Documentation must be based on a real world, rather than a hypothetical, perspective. In my view, the documentation for these seals was adequate to meet applicable standards and was adequate to demonstrate to a knowledgeable engineer that the seals would function properly.

Q76. Mr. Sundergill, Mr. Jones, and Mr. DiBenedetto, do you agree with Mr. Love's conclusions?

A. (Sundergill, Jones, DiBenedetto) Yes, we do, on all points.

JUDGE BOLLWERK: As Mr. Holler indicated, Mr. Wilson, you were previously sworn and remain under oath. At this time, I think the Staff Panel is available for cross examination.

CROSS EXAMINATION

BY MR. MILLER:

Q Mr. Wilson, one of your changes was that the -- you're referencing one of the exhibits, Wylie report, APCo Exhibit 60, was not included in a qualification rationale until 1992; is that the change that you made for us this morning?

A [Witness Wilson] That's correct.

Q What do you mean by saying -- when you use the phrase, "included in a qualification rationale?"

A [Witness Wilson] That report was shown to me during the November, 1987 inspection. There was no discussion of its relevance to qualifying the Farley seal design which is quite different than the design tested by that report.

Q But you were provided a copy of that report while you were at the Farley site?

A [Witness Wilson] Yes, I was, and my inspection report input so states.

Q What you meant to tell us this morning is that when you were provided a copy of that report, no one said to

you, this is the reason you're being given a copy of the report?

A [Witness Wilson] It may have been identified as relevant, however, what it's relevancy was, was not addressed.

Q No one took you through the report and told you the relevancy of either its parts or the whole document?

A [Witness Wilson] No. That is not correct. No one provided any sort of analysis to apply that report to the Farley field design.

Q I take it, then, you got a copy of the report, and do I understand correctly that someone indicated to you that it was relevant to the seal issue?

A [Witness Wilson] I am not certain of that point, but it is possible. I certainly saw the report during the inspection, and I recognized it as a report that I had previously reviewed.

Q So you had seen that report somewhere else?

A [Witness Wilson] Yes.

Q You were familiar with its contents?

A [Witness Wilson] I have seen several Raychem qualification reports including that one. The specific detail as to which Raychem report covered what, I didn't retain in memory.

Q I see.

But when you got the report, did you undertake to read it and review it?

A [Witness Wilson] I believe I glanced through it to confirm the design that the report was qualifying, or the design that was tested as reported in the report, yes.

Q And the sole undertaking that you did when you received the report was to look at the design in the report?

A [Witness Wilson] That pretty much is what I recall, and I recall also writing in the inspection report and a portion which is included in my direct testimony that I considered the report irrelevant because it tested something very different than the Farley seal, and there had been no analysis to apply it to the Farley design.

Q So as far as you were concerned that report was irrelevant to the task of qualifying those seals at the Farley Nuclear Plant?

A [Witness Wilson] It had not been made relevant by the licensee, and I could not for myself determine its significant relevance in the absence of any analysis of differences between what the report covered and what the plant had installed.

Q Let's take it one step at a time.

As I understand you, what you are telling us is that you saw this report, and you, based on your background, training, qualification and experience, could not find any

relevance between what it said and the seals there at Farley?

A [Witness Wilson] I think I just answered that question in not quite the same words.

Q Forgive me, but that is the best I can do. Do you agree or disagree with me?

A [Witness Wilson] I somewhat disagree. I said that I did not see a direct relevance in the absence of analysis, and that there was no demonstration by the licensee of relevance.

Q Let's back up and ask it to you this way, can you see either then or now any relevance of that particular report to the Chico A/Raychem seals used at the Farley Plant in November 1987?

A [Witness Wilson] The report certainly could be made relevant by appropriate analysis.

Q Could you do that appropriate analysis, if called upon to do so?

A [Witness Wilson] Not to my satisfaction with regard to qualifying the seal design at Farley using that report.

Q You say that there could be some analysis of the report, but even you could not satisfy yourself?

A [Witness Wilson] I think the difference between what was tested and what was installed in the plant was too

great to cover by any type of analysis other than the one supported by additional data which has not been presented.

Q I see.

Do I understand, though, that some portion of the report can be used for the seals that we are here discussing today?

A [Witness Wilson] Given the appropriate analysis to apply it.

Q And what kind of analysis is that, please, sir?

A [Witness Wilson] An evaluation of the differences between the test report and the plant application.

Q So if the test report is the starting point, and an analysis of the differences between the test report and the Farley design were conducted, then it would be relevant?

A [Witness Wilson] It could be made relevant by an appropriate analysis, yes.

Q Have you undertaken at any time to do that kind of analysis?

A [Witness Wilson] Only conceptually, sketchily, as I say, I feel the differences are considerable.

Q You say you have undertaken to do it conceptually?

A [Witness Wilson] Yes, and I think the inspection report addresses that.

Q Has this conceptual undertaking been reduced to a written form other than in the inspection report?

A [Witness Wilson] Not to my knowledge, and I have never been aware of any need to do that.

Q So your answer is no, it is not in writing anywhere?

A [Witness Wilson] Not to my knowledge.

Q Let's see if we can put some of this in context. Since we have started with you at the Farley Plant, let me ask you this, you had been on other EQ inspections before you came to the Farley Plant in '87?

A [Witness Wilson] Yes.

Q Just remind us, Mr. Wilson, were you there during September, or was November your first visit?

A [Witness Wilson] I was not there until November 16th, during the plant walk-down at Farley, I was leading Palo Verde in an EQ inspection, which, incidentally, took place at the time of the Sandia Training Session, and the Farley inspection.

Q Was that the only one that took place between the Sandia Training Session and the Farley inspection?

A [Witness Wilson] That is the only one that I led during that period. I wouldn't have records of others.

Q Did you go on any others besides the Palo Verde one you just told us about?

A [Witness Wilson] I personally did not.

Q So what you are telling us is that right after the

Sandia Seminar, the Farley inspection was your second EQ inspection?

A [Witness Wilson] Personally, it was my second one. Yes.

Q And at Palo Verde, it was part of your task to review the seals such as in use at Farley?

A [Witness Wilson] As the team leader, it was my responsibility to have them reviewed, if we so selected, as part of the sample that we reviewed.

Q Were these seals for the NAMCO limit switches at Palo Verde?

A [Witness Wilson] I don't remember the detail of what seals we looked at in Palo Verde.

Q Can you say, though, that you had seen the Raychem boot in use at other utilities and other power plants?

A [Witness Wilson] Never on a metal pipe nipple.

Q You have seen it at use in other aspects, have you?

A [Witness Wilson] Only on cables.

Q That is the only place you had ever seen it before you got to Farley?

A [Witness Wilson] Yes.

Q I think, and you can correct me if I am wrong, that it is an NEIS kit, is that how it is described?

A [Witness Wilson] They have included such a kit in

their catalogue, yes.

Q Is that the kind of kit you saw in use at Farley?

A [Witness Wilson] With the addition of the Chico cement and the metal pipe nipple, which are not part of the kit, and with the addition of a conduit compression adapter, which is not part of the kit, I guess I can say Raychem provided some portions of the Farley seal, yes.

Q But the portion there that Raychem provided came from this NEIS kit?

A [Witness Wilson] I am not certain of that. They provided a cable breakout kit, and to the best of my knowledge, that was what Farley had. I am not aware that Farley bought an NEIS kit.

Perhaps they did, and perhaps they didn't. I don't know.

Q Just by way of inquiry, Mr. Wilson, what does the NEIS stand for?

A [Witness Wilson] Nuclear Environmental Interface Seal.

Q Did I understand you correctly that this particular kit is in wide use throughout the nuclear power industry?

A [Witness Wilson] No, I don't think it is at all.

Q So you have seen it in other places, but not frequently?

A [Witness Wilson] I didn't say I had seen it anywhere. I am aware it is Raychem's product line.

Q So you have not seen that kit anywhere else in the nuclear power industry on your various inspections?

A [Witness Wilson] I cannot recall ever seeing it in the frame work of arguing that it is environmentally qualified for inside containment use.

Q Let's take them one at a time.

A [Witness Wilson] I don't believe I have run across it at all, but I would not have been looking at non-safety related applications, for example.

Q Does that mean that when you got to Farley this was the first you had heard of this particular Raychem breakout kit being used for environmentally qualified equipment?

A [Witness Wilson] Not at all.

Q Tell me about your prior experience then?

A [Witness Wilson] I don't recall. From roughly 1980 through the late '80s, I maintained an on-going relationship with Raychem to keep abreast of their product line and their qualification bases for it, partly at the NRC, partly while I was in private industry.

Q And who at Raychem was your contact?

A [Witnesr Wilson] I had several local representatives, and two factory personnel.

Q Did you learn as a result of those contacts that the Raychem breakout kit such as was used at Farley was in use for environmentally qualified equipment throughout the nuclear power industry?

A [Witness Wilson] I did not learn it was in use throughout the nuclear power industry. The impression that I have in my memory is not strong enough, such that there were limited applications. And my impression, further, is that they were only outside containment and not for LOCA conditions.

Q Is that the extent of the knowledge that you brought with you to the Farley plant in November '87 about these particular Raychem Kits?

A [Witness Wilson] I cannot remember. It's been four and a half years.

Q Okay. How about Chico? Have you seen the Chico in use anywhere else in the nuclear power industry?

A [Witness Wilson] Not prior to the Raychem EQ -- the Farley EQ inspection, no.

Q I think then, what I understand you is that the combination of Raychem Breakout boot and the Chico cement was new to you when you saw it at Farley for the first time?

A [Witness Wilson] Yes. And it's still new to me today for any application other than Farley. I'm aware of no other plant ever using it.

Q Okay. Are you telling us though that it's impossible, in your opinion, to qualify this particular configuration?

A [Witness Wilson] Not at all.

Q Okay. It can be done? In your opinion, it just hasn't been done?

A [Witness Wilson] One could attempt to do it. I don't want to predict the results of proper qualification effort. But one certainly could be undertaken.

Q Okay. When did you first learn you were going to Farley?

A [Witness Wilson] I was asked that earlier perhaps in a deposition. I simply can't remember. It was probably a month or six weeks before the inspection, but I really don't know.

Q Okay. And did you learn at that time one of your responsibilities would be the NAMCO limit switches and the seals?

A [Witness Wilson] No. The scope of what I reviewed at Farley was not discussed until after the Palo Verde inspection was completed. We began that discussion in November 9, 1987.

Q Okay. By the time you got to the Farley plant did you understand that one of your assignments was to be the seals on the NAMCO limit switches?

A [Witness Wilson] Yes.

Q What purpose does the seal perform?

A [Witness Wilson] I think the bottomline on the seal is to support the NAMCO requirement on customers and users of the limit switch -- that the interior of the limit switch be separated from the LOCA environment, in order to duplicate the conditions under which they environmentally qualified the limit switch.

Q All right. Moisture intrusion would be a function that the seal is designed to prevent?

A [Witness Wilson] Yes.

Q Okay. Now, when you were at Farley, did you have a habit of keeping notes about the things you saw and discussions you had?

A [Witness Wilson] Fairly detailed notes, yes.

Q Is that a common practice of yours generally when you go on these EQ inspections?

A [Witness Wilson] Yes. It's a common practice of any NRC inspector.

Q I see. Has it been that way for NRC inspectors as long as you've known about them?

A [Witness Wilson] Yes.

Q Okay. For example, back in 1980 when Mr. Gibbons came to the Farley plant, it would be his practice to keep fairly detailed notes?

A [Witness Wilson] I've never met Mr. Gibbons. I don't know how he operated.

Q Okay. And what is the purpose of your keeping your fairly detailed notes?

A [Witness Wilson] To prepare an inspection report, which, among other functions, would serve as the basis for any enforcement action that may be taken as a result of the inspection.

Q I see. So the notes need to an inspection report, which may or may not lead to an enforcement action?

A [Witness Wilson] Yes.

Q I take it then the notes are very important to you?

A [Witness Wilson] They're important until they have served their purpose, at which point they are discarded.

Q Okay. I understand that. But at the time -- if I interrupted you, I didn't mean to.

A [Witness Wilson] No, I'm done.

Q At the time that these notes are being recorded and you're making them, you're writing down the things that are important to you because you know of their subsequent significance in the inspection report and enforcement arena?

A [Witness Wilson] Possible importance. At the time I take the notes, what I am doing is documenting the

facts regarding what I looked at.

Q Okay.

A [Witness Wilson] I am not forming a conclusion as to where those facts may lead when I write the notes.

Q Can we say though that they are the most contemporaneous expression of your thought process at the time the notes are made?

A [Witness Wilson] No, I don't think we can. The purpose of the notes is not to document a thought process, it's to document facts.

Q Perhaps there's another place then where you document your concerns or thought processes or facts?

A [Witness Wilson] Yes, there is.

Q And where is that?

A [Witness Wilson] The inspection report.

Q Okay. I understood that the notes come before the inspection report; is that so?

A [Witness Wilson] Yes.

Q Okay.

A [Witness Wilson] In the case of Farley, the report I believe was issued in November of '88.

Q Yes.

A [Witness Wilson] I'm sorry, February of '88.

Q Yes.

A [Witness Wilson] I believe I wrote my input for

it in December of '87.

Q Would it be fair to say though that at the time you're making these notes, among other things, you're anticipating an inspection report input requirement that you'll have to fulfill; is that correct?

A [Witness Wilson] Yes.

Q And anticipating possible enforcement action?

A [Witness Wilson] Possible, yes.

Q Okay. You certainly would not leave out something that's important for either of those two documents, would you?

A [Witness Wilson] I would attempt not to.

Q You're going to put in what you think is important for your subsequent use in the inspection report and wherever that takes it?

A [Witness Wilson] Yes.

Q Have you a copy of your handwritten notes that you made while at the Farley plant?

A [Witness Wilson] No, I don't. I did submit them under discovery, but I don't have a copy with me.

Q You did make some while you were there? I think we've established that, have we not?

A [Witness Wilson] Yes. And I did submit them under discovery.

Q Sure.

MR. MILLER: We're going to mark for purposes of identification Alabama Power Company Exhibit 125 and ask you if you'll hand that over to -- Mr. Wilson, take a moment to look at that.

BY MR. MILLER:

Q Let me just first ask you, is that a copy of at least one of the notes you made during the Farley inspection?

A [Witness Wilson] Yes, but I wouldn't call them inspection notes. What they are is notes that were taken during a feedback session.

Q Okay.

A [Witness Wilson] In the middle of the inspection. They are not notes based on review of anything on my part.

Q Okay. I want you to feel free to look at any part of it but just so you'll know, I want to call your attention to about the fourth line or so down where it says Rayco and Chico seal because I would like to ask you about that.

A [Witness Wilson] Raychem and Chico seals.

Q What did I say? If I said it wrong -- okay.

JUDGE BOLLWERK: Do you want o go on and identify those one more time?

MR. MILLER: Why don't I do this, and, Mr. Wilson, you correct me if I'm wrong but the Alabama Power Company Exhibit 125 marked for identification purposes are notes

entitled "Wednesday Feedback, 11/18/87, 23 people, 50 minutes," Bates stamp number 0102443.

JUDGE BOLLWERK: Let the record reflect that APCo Exhibit 125 has been identified.

[APCo Exhibit No. 125 was marked for identification.]

BY MR. MILLER:

Q And Mr. Wilson, you just tell us when you have had a chance to look at that.

A [Witness Wilson] I have read the upper portion of it here. Are you going to be restricted to the upper portion?

Q I want you to feel comfortable in reading all of it if you would like to. I don't intend to ask questions about the lower portion, but --

A [Witness Wilson] Okay, I'm comfortable then.

Q I guess this is just a point of curiosity; 23 people, 50 minutes? I take it you counted the people in the room when you made these notes?

A [Witness Wilson] I probably did. I tend not to estimate in round numbers like 23.

Q Precision is a virtue. I mean you wrote down 50 minutes. I take it that's how long the meeting lasted.

A [Witness Wilson] I would expect it did.

Q This Wilson here I see in the first line, I take

it that's you?

A [Witness Wilson] Yes.

Q And then it says Raychem and Chico seal, "early in review."

A [Witness Wilson] Uh-huh.

Q And this is Wednesday. Did I understand correctly that you arrived on Monday?

A [Witness Wilson] That's correct.

Q Okay, so you started your Raychem review either Wednesday or sometime late Tuesday I take it.

A [Witness Wilson] Yes, and my recollection was not Tuesday. It was Wednesday.

Q Okay. "Qs out," does that mean questions out?

A [Witness Wilson] Yes.

Q "Need drawings and plant" -- will you help us on that last word?

A [Witness Wilson] It's slightly truncated from xeroxing. I'm sure it was a shorthand abbreviation, plant procedures.

Q I see -- "will be a 50.49 qualification problem."

A [Witness Wilson] And what that line means is with respect to the target reactor vent valves, which are not an issue in this hearing.

Q Okay.

A [Witness Wilson] That was the only 50.49 high

level qualification concern for the seals.

Q I see, all right. Let me ask this. This is a feedback. Tell me about -- what do you mean by a "feedback?"

A [Witness Wilson] It was a daily meeting conducted by the team leader, Mr. Merriweather to review the status of the inspection on an interim basis. The idea of the feedback sessions in general, and different team leaders conducted them slightly differently, but the general idea was an informal review of the status of the inspection and normally it would attempt to focus licensee management attention and potential issues as they were being developed and reviewed during the inspection.

[APCo Exhibit No. 126 was marked for identification.]

BY MR. MILLER:

Q Okay. I'll hand you a copy of what we have marked for identification purposes as Alabama Power Company Exhibit 126. I'll identify them for the record.

They are entitled "RCW Open Areas, 11/19/87, 2:45 p.m.," Bates stamp No. 0102441.

JUDGE BOLLWERK: Let the record reflect that APCo Exhibit 126 has been marked for identification.

BY MR. MILLER:

Q Mr. Wilson, take a moment and look at that and I don't mind -- as usual, you feel comfortable in looking at

all of it but we intend to talk about the part marked "seals."

A [Witness Wilson] Well, all right.

Q I see there that it says "Raychem/Chico similarity demonstration, bonding to metal vs. cable jacket." How's that?

A [Witness Wilson] Yes, it says that and adjacent to it is a -- it's the word "unresolved" with a star and I believe several underlines.

Q Right.

A [Witness Wilson] And an arrow.

Q It must have been particularly significant to you that the bonding to metal vs. cable jacket was unresolved. It got a star and an arrow --

A [Witness Wilson] It got a star along with "similarity demonstration," which precedes yes.

Q I see.

A [Witness Wilson] On the same line.

Q I see it there. Okay. All right now this shows a Thursday afternoon, 2:45 --

A [Witness Wilson] Well, may I add one thing?

Q Yes.

A [Witness Wilson] I don't want to forget Item B there, which indicates "Miscellaneous Lesser Questions."

Q Have you any remembrance of what those lesser

questions were?

A [Witness Wilson] My guess at this point would be that they would relate to concerns which the review had not addressed at that point, possibly because additional material was not available for review, possibly because there had been a considerable question in my mind regarding the similar issue between the tests performed by Alabama Power on which the review had concentrated, versus the plant LOCA conditions.

I'd like to explain that just briefly, if I may.

Q You would like to explain the similarity analysis?

A [Witness Wilson] Yes.

Q Or the concerns you had about the similarity?

A [Witness Wilson] My mental frame at the time that I wrote these notes, the review had concentrated on discussing the December, 1981 Bechtel test for Alabama Power. I had been given a portion of that test report and Wednesday I'd been given the rest of it and Thursday.

My concerns primarily related to whether that report qualified the Raychem/Chico seal for Farley because that was the qualification argument that I had heard, that that report did to qualify. These notes were written from that context.

Q As I understood it, Mr. Wilson, you had been given that report and were told in some way that it provided a

qualification basis for the Farley seals?

A [Witness Wilson] Yes.

Q All right.

JUDGE BOLLWERK: Let me ask one question. That's the report that's marked Staff Exhibit 33?

MR. MILLER: Let's make sure that we've got a number for the December '81. And I believe that is the correct number.

WITNESS WILSON: I'm not sure what the number is.

MR. MILLER: I think it's Exhibit 33.

WITNESS WILSON: It was a pressure/temperature test that was conducted by Bechtel for Farley; not the submergence test and not any Raychem test.

MR. MILLER: Okay.

BY MR. MILLER:

Q All right. And the phrase "similarity demonstration" here I think you explained to mean that it expressed your concern that the Exhibit 33, also known as the 1981 Bechtel qualification report was not similar to Farley LOCA conditions?

A [Witness Wilson] I would guess that. I can't recall precisely --

Q Okay.

A [Witness Wilson] -- what I meant when I wrote this. I'm sure this was a quickly written summary as an

input for a feedback session.

Q That's your best judgment at this time?

A [Witness Wilson] Yes. And it was certainly not intended to be a judgment, a conclusion or anything of this sort. It was intended to indicate to the team leader, for feedback purposes, some idea of where this particular review had been -- where it was headed at that time, what its status was.

Q Help us understand what you meant when you said "bonding to metal, versus cable jacket."

A [Witness Wilson] That's obviously related to the difference between the Farley seal and the conventional, let me say, use of the Raychem breakout boot and a cable. I was familiar with the qualification of the Raychem boot on cables.

Q I see.

A [Witness Wilson] I was concerned about establishing that the Raychem adhesive could bond to the metal pipe nipple, since that had not been addressed in any of the Raychem Wyle tests.

Q Is that what that phrase that I just read was meant to convey?

A [Witness Wilson] I'm fairly sure it was, yes.

Q Incidentally, when you said you were familiar with the Raychem kit and its use for cable, did you mean to imply

that you knew the Raychem kit could be used in EQ situations on cable?

A [Witness Wilson] There were -- yes, there were a number of Wyle and Raychem tests which established -- well, which covered testing of that breakout boot and a variety of cables, particularly different cable jacket materials. And those reports had been used by probably every licensee that I've run across, or certainly the great majority of them to qualify use of that breakout kit and cables in those licensee's plants.

Q Okay. And what you meant to convey here is that since you saw it on use on a metal pipe nipple, you were, I'll use the phrase concerned about its bonding?

A [Witness Wilson] Yes.

Q Okay. The unresolved, with the star and the underline, does that mean that questions had been asked, but satisfactory answers had not been given?

A [Witness Wilson] No. I believe that what it was referring to was the way that we classified inspection findings at that time. Possible violations were characterized as unresolved/potential enforcement items, something of that sort. The intent of the unresolved was to indicate this was a possible inspection finding.

Q I see. So, you were thinking ahead to the inspection report and possible enforcement matters?

A [Witness Wilson] At that point, yes.

Q I see. Incidentally, this shows RCW open areas -- of course, gives the date and the time. Did you report on these at some meeting held on or about 2:45 p.m?

A [Witness Wilson] No. I probably handed a copy of that Farley original to Norm Merriweather about that time. My guess would be there was another feedback session later in the day in which either Norm or I presented the information on this sheet. I don't recall which of us did.

Q Okay.

A [Witness Wilson] The chances are good that I did, but I don't remember.

Q All right. Let me show you what we've marked for identification purposes as Alabama Power Exhibit No. 127, and I'll identify it for the record.

MR. MILLER: It's Alabama Power Company Exhibit Number 127. I'll identify it, for the record, as handwritten note. At the top line it says: "Farley Exhibit Meeting Input, R.C. Wilson, 11-20-87, 8:35 a.m." Bates Number 0102538.

I'll ask you to take a look at that, please, sir.

JUDGE BOLLWERK: Let the record that APCo Exhibit Number 127 has been identified.

[APCo Exhibit No. 127 is marked for identification.]

MR. MILLER: As always, you're free to read the entire notes. But, clearly, I'm going to ask you about item number one there.

WITNESS WILSON: [Perusing document.]

All right. This is truncated at the bottom of the page, which identifies additional concerns in the Chico seal area.

MR. MILLER: I wish I could help you, but that is the best we can do. Perhaps you can look at it, and fill in, using your memory, some of the words that aren't there.

WITNESS WILSON: I think it indicates some of the other concerns that are raised in the inspection report, concerns of Chico seals.

What I can read is the following: "No drawing/sketch of Chico test in file or provided during inspection. Inspector drew on," and then the report talks about the inspector drawing a sketch of the seal design on the light board for discussion purposes.

There is an arrow that points down to what would have followed that discussion, I believe, an arrow minus the arrowhead.

Plant equipment drawing provided plus procedure. They were not in the file. Then the tail end of the lower right-hand corner of the page is talking about the target/rack solenoid valve application.

BY MR. MILLER:

Q Is what you told us your best judgment of what this missing line would say if we had a better copy?

A [Witness Wilson] What the middle of that line, the bottom line, said I don't know, and whether there were further lines lower on the page I don't know.

May I explained the reason I am pointing at those words?

Q Yes, sir.

A [Witness Wilson] In our typical EQ inspection, and I want to briefly indicate what I mean by typical. By the time of the Farley inspection, we had been using our draft temporary instructions for more than two-and-a-half years. I had been the lead engineer responsible for that instruction from the time that we began using it. At that point, I had led about 15 EQ inspections, participated in a few others.

In every one of those inspections, the purpose of the exit meeting was to review the findings of the inspection. It was not to debate them. It was not to enter into a technical review of the issue. It was an attempt to summarize for management purposes what the findings of the inspection were.

Typically, there would be a meeting of the minds between the NRC and the licensee prior to the exit meeting

concerning the findings. This meeting of the minds would not mean that there was agreement on each area as to what the ultimate conclusion would be. The intent of the meeting of the meeting of the minds was to establish agreement that each side understood the other side's position on potential issues from the inspection prior to the exit meeting.

In that spirit, I wrote No. 1 on this sheet, which indicated that the Raychem Chico seals were a potential inspection finding, and a very brief statement of a concern regarding those seals was written.

Again, this was intended to be input only to a listing of inspection findings in order to identify areas that had been discussed prior to and outside of the exit meeting.

I am done.

Q Just so that I can keep it in context for my own purposes, though process, Mr. Wilson, as I understood what you said, it is this, it was your practice and, indeed, the staff's practice to have an exit meeting at the conclusion of each EQ inspection?

A [Witness Wilson] Yes.

Q And one of the functions of that exit meeting was to have a meeting of the minds, not an agreement, but a meeting of the minds between the inspectors and the licensee?

A [Witness Wilson] Concerning what were the issues, and the fact that they had been discussed, yes.

Q And by meeting of the minds, what you mean to describe is a summary of the findings, concerns, issues of the inspectors, and assurance that the licensee at least understood those findings, concerns and issues?

A [Witness Wilson] Yes.

Q And it was in that spirit, I think you told us, that you drew up No. 1 shown here on Exhibit 127?

A [Witness Wilson] That's correct.

Q And that No. 1 indicates in summary fashion that bonding to the metal pipe nipple under LOCA conditions has not been addressed?

A [Witness Wilson] Yes. The word "summary" may be a little bit misleading, but it is close in terms of what I had in mind.

Q It says at the top, "Farley exit meeting input," is this what you intended to tell the licensee at the exit meeting?

A [Witness Wilson] No. The exit meetings for EQ inspections were conducted by the team leader, and team members normally did not speak at all in the exit meetings.

Q And is it the purpose of this particular handwritten note to give to the team leader so he can convey it to the licensee?

A [Witness Wilson] Yes, exactly.

Q Knowing that one of your goals was to have a meeting of the minds, you wrote this No. 1 so Mr. Merriweather could then convey it to the licensee?

A [Witness Wilson] That's correct.

JUDGE MORRIS: Just so there are no loose ends, can you tell me what "Package 29G" means?

WITNESS WILSON: That was the licensee's number for their EQ file for the Chico sale, the Raychem Chico sale.

BY MR. MILLER:

Q Let's go to what we have marked for identification purposes as Alabama Power Company Exhibit 128, and I will describe them as additional handwritten notes of Mr. Wilson. At the top, it says, "Farley Exit Meeting 10:00 a.m., 11/20/87" -- this is actually page 2, Bates No. 0102436.

Mr. Wilson, it is the Item V3 that I would like to call your attention to.

JUDGE BOLLWERK: Let the record reflect that APCO Exhibit 128 has been identified.

[APCO Exhibit No. 128 was marked for identification.]

BY MR. MILLER:

Q Were these notes that you took during the exit meeting?

A [Witness Wilson] Yes.

Q Is what is written by V3, "Raychem Chico relates to Raychem bond to metal - believe can show not a problem," is that what was conveyed to Alabama Power Company at the exit meeting?

A [Witness Wilson] No, not at all.

Q Tell me what that means?

A [Witness Wilson] You are giving me page 2 of a document. I don't know all of the headings for that, but let's go to the secord line on that page which says, "Licensee recap of NRC list:," and then we go through V1 on to V8.

What this list is are my notes of what the licensee told us during the inspection meeting, and like the other three exhibits that you just handed me, none of these four exhibits are inspection notes.

Q This by the V3 is what the licensee said to the staff during the exit meeting?

A [Witness Wilson] That is my paraphrasing of what he said for purposes of personal notes. Yes.

Q I think we know the answer to this, but when you wrote, "relates to Raychem bond to metal," you meant to describe the same concern we have on the prior exhibit about bonding of the Raychem material to the metal pipe nipple under LOCA conditions?

A [Witness Wilson] I would expect so, yes. Again, that would be my paraphrase for what was said.

This was a very long meeting, and I didn't attempt to write very word.

Q Well, since we're at this point, Mr. Wilson, what I'm going to ask you to do is describe as best you can your understanding of Alabama Power Company's position on why this particular seal was environmentally qualified as of the November '87 exit meeting.

A [Witness Wilson] My understanding was that the licensee believed that the December 1981 test of the seal was adequate to qualify the seal for the application, together with undocumented engineering judgement concerning the applicability of other information to the issue.

The qualification file -- I referred to as a file in the inspection report -- simply didn't look like the file -- during the inspection -- did not look like the file that was submitted under discovery for this proceeding.

There was no overall sheet to tie together references. There was no rationale whatsoever to apply any document to the qualification of the seal. There was no definition of the plant equipment in terms of defining installation drawings, procedures, or whatever.

Given that situation, I was not presented a file to review. I asked for information. I got some. I looked

at what I was given. I asked for more. I asked questions. I could only speculate at to what the complete rationale for this qualification was.

It wasn't until the licensee's written testimony in January of this year that we were told it rested on three documents.

When I addressed that in my rebuttal testimony, I was reminded there was a fourth one which doesn't relate to the LOCA issue that we're talking about. It related only to radiation. But there was no assembled rationale for the qualification of the seal.

This put me in the position of looking at the information presented to me, asking questions, attempting to determine if I could construct a possible scenario, a possible rationale for qualification.

The main document that I saw as being applicable was this December 1981 report. I'd never seen it before. I was very interested in what it did and did not cover. Any -- any tentative conclusions that I would have been drawing during the inspection would have related heavily to that.

I think I'm wandering afield here, but I think it's important that we understand it. I did not review a qualification rationale, because there wasn't any. I was attempting to determine what was in the plant, whether there was a basis for qualifying it.

Q All right.

You have told us at least your understanding and thought processes in November '87 about this issue while you were at the Farley nuclear plant, true?

A [Witness Wilson] I have certainly told you some of it. I certainly don't remember all of it.

Q Okay.

You cannot remember all of the information that Alabama Power gave you about how and why it believed these seals were environmentally qualified.

A [Witness Wilson] I think that's correct, and there are two documents that would refresh my memory considerably.

One would be the inspection report itself, which is in evidence. The other one would be my notes from my review of this subject during the inspection, which you have -- have handed me here.

You've given me four different exhibits about notes that I took in summary meetings. You have not given me my notes that I took during the review of the subject, and now you're asking me what I remember of that review.

Q Well, here's another way --

A [Witness Wilson] I don't remember everything I looked at four-and-a-half years ago.

MR. MILLER: Here is another way to do it. Why

don't we ask our panel to describe what they conveyed to you and the information they provided to you on the qualification issue?

And I think it would be -- we can get Mr. Love to tell us -- and perhaps Mr. Sundergill -- on what basis and what information was provided and made available to Mr. Wilson while he was conducting the inspection on this particular issue.

WITNESS SUNDERGILL: I, personally, didn't discuss this particular issue with Mr. Wilson during the audit, however, Package 29-G which covered the Raychem Chico seals, as submitted under discovery, is a true reflection of what existed at Farley Nuclear Plant during the audit, and for my own personal information, I know that that package had to be given to the inspectors.

Now, whether or not Mr. Wilson reviewed it, I can't testify because, as I say, I didn't talk about this issue with him, but that package did include a cover sheet with an index of all of the material attached to the package, so it was in a very organized form.

MR. MILLER: Tell the Board what the basis for qualification was as conveyed to the NRC inspection staff back in November of '87.

WITNESS SUNDERGILL: Well, the basic philosophy of qualification is that the only difference between the Farley

configuration and the configuration used in the rest of the industry is the fact that in the Farley test or in the Farley configuration, it is over a pipe nipple as opposed to a cable jacket.

The two primary differences have to do with the bonding between the steel and the Raychem adhesion and the bonding between the plastic of a cable jacket and the adhesion and the backing inside the boot. In essence, the physical configuration is identical, except that there was no backing, so the matter is really fairly simple, even though it sounds somewhat complex.

We, in essence, made two engineering judgments; an engineering judgment that the bonding to the galvanized steel nipple would not be a problem, and an engineering judgment that the Chico compound would provide the same backing as did the cable filler. Other than that, we felt there was no difference.

Based on those two judgments, then we conducted our test to confirm our judgment. Raychem had already done a full LOCA test on their cable configuration, so we felt it was only necessary to do the test that we did to prove our two engineering judgments.

JUDGE BOLLWERK: Let me just inquire, Mr. Wilson; were those the concerns that were expressed to you as Mr. Sundergill has described them?

WITNESS WILSON: No, and, in fact, I have several other problems with what Mr. Sundergill just said. If could go into them?

MR. MILLER: By any chance, are these new problems?

JUDGE BOLLWERK: I think what we're trying to focus on right now is what at the time of the inspection, Mr. Sundergill and the dialogue between the Staff and APCo, expressed in giving the documentation -- in the documentation that was given to you, the questions you raised; what were the focus of the concerns?

WITNESS WILSON: There was discussion of the bonding issue, certainly. There was discussion of the backing issue, and I think there was certainly no resolution of those two issues.

What I'd like to do is point out that things didn't happen as neatly as Mr. Sundergill has just indicated. The file that was submitted under discovery is a Revision 3, dated March 23, 1988.

I never saw any revision of this file during the inspection. I think we heard testimony yesterday that the NRC inspectors did not have access to the licensee's files. We asked for information, they got it out of their files off their shelves and gave it to us.

In my direct testimony in page 3, I stated that

when I began review of this issue, I asked for all of the file information. I can initially only recall the -- I can recall initially only being given a portion of the 1981 Bechtel test report.

Within the next day, I believe the licensee provided the remainder of that report and some other things. I stand by what I have said consistently, that I was not presented an integrated rationale for qualification.

Now, with regard to the basis for qualification that Mr. Sundergill just volunteered, I don't agree the only two differences between application of this boot on a cable and then the Raychem Chico seal or bonding and backing. The inspection report raised the issue of the conduit adapter bearing on the Raychem material, and that issue still remains.

I questioned why the drawings of the test specimen in that December 1981 test were different than the drawings I was given as the plant installation drawings. I got no answer to that. I haven't heard the differences addressed specifically.

I think that the atmosphere of this review during the inspection is very different from what we just heard implied by the licensee's contractor. Now, in addition, I want to point out that I have reviewed every argument presented by the licensee, right up to this minute.

There was no cutoff in review of this Chico seal qualification. I didn't say the inspection is over, we're going to give you violation, we're done with it. The licensees had every opportunity to present a rationale consisting of tests supported by analysis.

MR. MILLER: I have a couple of things, Mr. Wilson, if you're done.

WITNESS WILSON: Yes.

MR. MILLER: Let me ask our panel: Mr. Wilson seems to suggest that he did not have access to our file materials nor did he have access to what he described as an integrated rationale. Do you agree or disagree with what Mr. Wilson said? We'll take either Mr. Sundergill, Love, or anyone.

WITNESS LOVE: I think he had access to whatever he wanted to request. If it was -- if it was requested, it would have been provided from the EQ files or from the plant documentation.

WITNESS JONES: He had access to any information he wanted, and we provided all the information that we had.

WITNESS WILSON: I think we're playing a semantics game here. I heard testimony yesterday from Mr. Jones that the NRC inspectors did not walk up to the shelves where this information was stored. We would make a request, and the information was provided to us.

Now, if I wasn't provided a complete file, it's not because I didn't take a complete file off the shelf. I looked at what was given to me. I asked for more. I repeatedly asked for more.

JUDGE MORRIS: Mr. Wilson, I believe Mr. Sundergill said that, in the package, there was a cover sheet that listed everything in the file. Did you see that cover sheet?

WITNESS WILSON: I did not see such a cover sheet during the inspection, absolutely not.

JUDGE BOLLWERK: He also mentioned that he thought the file was given to someone other than you and that it was passed along to you. Did you receive the file from someone from Alabama Power or was it given to you by another member of the inspection team?

WITNESS WILSON: Well, as my testimony indicated, I was given something the first day. I was given more the next day. I asked for more and received that.

The only thing I remembe being presented by any member of our inspection team was when Mr. Levis showed me a drawing of the seal without the Chico cement, as it was to be applied to the target reactor head vent valves, which are not an issue here.

I don't remember any other member of the inspection team giving me any file information. I have a

vague recollection that Mr. Levis and I paralleled our review briefly.

There was a question concerning measurements that were taken during the December 1981 Bechtel test, where Mr. Levis and I were separately provided portions of the response, as I recall.

There may have been more than one question which overlapped, something of that sort. But this was restricted solely to pressure measurements taken during the December 1981 test.

Other than that, the only information I received on the seal was from the licensee's representatives, in response to my request for information on the seal qualification.

JUDGE MORRIS: You answered my question, that you did not see a cover sheet at the time of the inspection.

WITNESS WILSON: I absolutely did not.

JUDGE MORRIS: Have you ever seen the cover sheet?

WITNESS WILSON: Yes. It was submitted during discovery. That's what I just referring to here.

JUDGE MORRIS: Are you able, from that, to determine those things which you did see and which you did not see which were present in the file?

WITNESS WILSON: I don't believe that I specifically tried to do that.

The one thing that I did check for was whether there was any reference to the submergence test report, which in the licensee's testimony was made one of their three references for the LOCA and non-radiation qualification of the seal, and there is no mention of that submergence test report in this package.

Now, the package has a Revision 3 on it, dated, as I said earlier, March 1988. There was a very large multi-sheet drawing included in that package, which included sheets dated well into 1989.

So, what was submitted during discovery is apparently a 1989 version of the package. It still did not mention that submergence test report at all. That was the only direct check I made of relevance between this report and the other arguments.

My report only lists four references. One is a Raychem report with regard to aging data on their material. One is the Southwest Research Institute report, which talked about irradiation of the Chico cement, which the inspection report says is not a concern of the staff.

The other two are the Wyle/Raychem report of the boot on the cable and the December '81 Bechtel test for Farley. Those are the only four references in this package as of 1988 or 1989.

BY MR. MILLER:

Q Do you have a test report number for the submergence report that you say was not provided to you?

A [Witness Wilson] Not offhand. It's referred to in your testimony, which is the first time I ever heard of it.

MR. MILLER: Can somebody give us the test report?

WITNESS LOVE. 2BE-1049-3.

MR. MILLER: Okay. And what about the exhibit number on that?

JUDGE BOLLWERK: APCo 61.

WITNESS JONES: Yes.

WITNESS LOVE: That's correct.

BY MR. MILLER:

Q Do I understand correctly, Mr. Wilson, that you never saw -- it's your testimony that you did not see the submergence test report while you were at the Farley plant in 1987?

A [Witness Wilson] I never heard of it or saw it until this year.

Q How about someone else from the NRC? Do you know whether or not they saw it or heard of it?

A [Witness Wilson] Yes, I do.

Q And tell me who that was.

A [Witness Wilson] Your surrebuttal testimony indicates that it was shown to the Region II inspectors that

performed the follow-up inspection at Farley in the spring of 1982.

Once I learned that, I told Mr. Merriweather to inquire into that inspection, and I obtained a copy of their inspection report from our document database.

During that spring 1988 inspection, the regional inspectors were, indeed, told about the inspection -- about the submergence test report.

My understanding, from reading that report and from talking to Mr. Merriweather, who led that follow-up inspection, was that that report was presented for one and only one purpose.

That was to attempt to qualify these seals without the Chico cement for use in the main steam valve room, which is not a LOCA qualification condition.

During that follow-up inspection, the regional inspectors told the licensee that that report did not qualify those seals for that application.

That report, to the best of my knowledge, was never introduced into the qualification argument of in-containment Raychem/Chico seals until 1992.

MR. MILLER: Mr. Love, have you a response?

WITNESS LOVE: Yes. I would like to comment on the 2BE submergence testing.

I agree that the submergence testing that was

conducted was to qualify the Raychem boot for the application in the main steam valve room for submergence due to feedwater line breaks, and we have already testified to that fact.

I do not believe that it was our intent nor did we, in our testimony, indicate that that particular test report was for in-containment qualification.

So, I believe that's clear. I am not sure why the confusion exists on that.

WITNESS WILSON: The confusion exists because, in your direct testimony, filed in 1992, you said there were three reports that you relied upon for qualifying these seals for in-containment use, and that was one of the three.

When I commented on that in my rebuttal testimony, the licensee then proceeded to state that is correct, except there were actually four reports, and the fourth one was the Southwest Research Institute test on an explosion-proof fitting that contained Chico cement.

MR. MILLER: Go ahead, Mr. Love.

WITNESS WILSON: That was where my conclusion came from.

WITNESS LOVE: Well, for the Farley Nuclear Plant, and I believe this has been stated since the 7901(b) submittals, the main steam valve room, as well as the containment are the too harsh environment areas for EQ

purposes on Farley Nuclear Plant, so the relevance of this is in the arena of EQ and the requirements of 10 CFR 50.49 as they relate back to the DR guidelines and NUREG 0588.

Beyond that, I agree that the Chico submergence test was applicable to the main steam valve remodeling. It was not intended to be applicable to containment and I didn't think that we caused confusion on an issue, but if we did, I was not aware of that.

WITNESS WILSON: The harshness -- excuse me, are you through? The harshness of the main steam valve accident environment is trivial compared to the LOCA environment, and that's why I didn't review it at all.

MR. MILLER: Anything else?

[No response.]

JUDGE BOLLWERK: Let me just clarify one thing: This exhibit we've been talking about, is APCo asserting that this was given to Mr. Wilson or are they -- during the inspection in November or are you agreeing with him that it was not given to the NRC until March?

WITNESS LOVE: The 2BE document?

JUDGE BOLLWERK: Yes.

WITNESS SUNDERGILL: The submergence document?

WITNESS LOVE: Yes, that's what he's asking, I believe.

WITNESS SUNDERGILL: The submergence document

wasn't part of the package.

JUDGE BOLLWERK: So it was not part of the November inspections.

WITNESS LOVE: That's correct, because I don't believe it was reviewed. It was available, however, in the plant documentation system as a record document.

JUDGE BOLLWERK: But it was not actually given - -

WITNESS LOVE: It was not, that is correct.

JUDGE BOLLWERK: All right.

MR. MILLER: To bring us into focus on the basis for qualification in 1987, of these seals and explain what APCo Exhibit 61 was not in the file, just so we don't get lost on that point.

WITNESS SUNDERGILL: Right, as I say, the Raychem report tested the breakout kit over a cable. In our engineering judgment, the two issues of concern were bonding and backing, and we had Southwest Research tests showing that the backing material was sufficient and we conducted our tests in December of '81 to address the other issues, and those were the pertinent reports.

MR. MILLER: Mr. Wilson?

WITNESS WILSON: Can I comment on that? With regard to the Southwest Research Institute tests showing that the backing material was sufficient, that was a totally

different application. In my mind, the only thing that showed was that cement was suitable with respect to radiation.

I doubt that I would have questioned that anyway because it's an inorganic material and they're rarely affected by radiation. I don't believe that there is any other credit that can be taken from that Southwest Research Institute test. With regard, again, to the applicability of the Raychem test of the boot on cable, I haven't seen any analysis to apply that test to the Farley design. I've only heard engineering judgment.

We had a standard in those days for engineering analysis -- for analysis. It was IEEE Standard 323, 1971, the lowest level of IEEE qualification standards. That document contained a definition of analysis, and it described the kind of analysis that should be provided in EEE's eyes to supplement testing for qualification purposes.

323-71 was invoked by NUREG 0588, Category II, which Farley 2 was subject to it. It was not directly invoked by the DOR guidelines, but it was very pertinent. I'd like to read what it says about analysis. It's quite brief. I think it will indicate the contemporary standard for the kind of analysis that was desired to supplement testing.

This is Licensee Exhibit No. 37. It is in

evidence, if anybody would like to read along with me. It's a very short standard. On page 5, Section 3, Definitions, IEEE 323-71 says the following, "Analysis, a process of mathematical or other logical reasoning that leads from stated premises to the conclusion concerning specitic capabilities of equipment and its adequacy for particular applications."

Now, on page 6 -- and we're under the general heading now of 5, Method and Documentatic' Section 5.4 is titled Analysis. "The data used to support the qualification of equipment by analysis shall be pertinent to the application and organized in an auditable form. The data shall be presented as a step-by-step description, so persons reasonably skilled in this type of analysis can follow the reasoning as well as the computations. The data shall contain ...," and it lists seven things now.

One of these is the assumptions and -- values and mathematical models used, together with appropriate justifications for their use. Another is description of analytical methods or computer programs used. This is the type of analysis that was industry standard at the time to the lowest level of our qualification criteria.

And it's the type of analysis the DOR guidelines and NUREG 0588, Category II, both required to be documented.

JUDGE BOLLWERK: Let me just ask the applicant; do

you have any disagreement with the appl'cation of that standard in this instance?

WITNESS LOVE: Well, I guess the question is still in my mind. I need to back up a little bit in order to answer this question, but I'm going to go all the way back to when the documentation was created, which was done in the 1980-81 timeframe.

The intent of the December 1981 report that we were referring to here, which is APCo Exhibit 62, the intent of that was to be a supplemental test and to describe the reason for performing that test and to make the link back to the original Raychem test report that we've been discussing here.

So, that was documented, including on the back sheet of that, a reference to the Wylie test report. Now, that was the level of documentation that was done to link that partial testing the Wylie report and that was done and executed in that timeframe. The problem I'm having is, I'm not sure what mathematical analysis or what type of information Mr. Wilson is looking for, because if I knew what that was, then perhaps I could direct to other places where something may exist.

I'm not sure what the issue is in terms of -- in the execution of design for a nuclear power plant which I have been involved in for many years.

We have document control filing systems where we keep our mathematical analysis, where we keep our computer programs, where we document the assumptions for those analysis and those computer calculations. These are all maintained in the files, and they can be retrieved. And they meet the elements of the types of things that are talked about in that IEEE report.

However, they are not typically kept in one location. They are kept in -- calculations are kept in calculation binders. Drawings are kept in the drawing files. They are not typically all in one place, and they do not typically have a very nice, neat roadmap let's say for someone to find how to get from one to the other. But there are systems available that allow an engineer who is reasonably understanding of t. systems and the processes to find the applicable documents to put this together.

So, I've gotten a little bit off base here. But, I guess my problem is I'm not sure what Mr. Wilson thinks -- needed that analysis.

Go ahead, David. I'm sorry.

WITNESS JONES: I just wanted to add just historical -- my perspective of sequence of events. In fact, during the inspection, the documenta.ion or qualification package for Raychem Chico was asked to be reviewed. We supplied that package that had its

correponding index in front of it. And that was typically supplied to the room where the group was doing the review of the package.

Through discussion with Mr. Wilson and answering of a number of questions at the exit meeting, it was my understanding that his concern was lack of analysis to address the chemical bonding as a result of caustic spray, which we, based on engineering judgment, deemed it wasn't necessary to have that analysis in our documentation. So, at the exit meeting we felt like -- our response was we feel like we can put analysis together to satisfy you on that issue. We developed that -- made that submittal in January of '88 for NRC review.

Subsequent to that, there has been a question raised by Mr. Wilson regarding lack of moisture in our December '81 test, proving a Raychem/Chico backing to that seal. So, at that time to address that new question about moisture is when we identified -- we have already done that through out 2BE-1049 test, which had already qualified that configuration for submergence.

WITNESS WILSON: I'd like to just briefly comment on that digression, following which I'd like to go back to the subject we were discussing before the digression came in.

BY MR. MILLER:

Q Excuse me, Mr. Wilson. In your discussion that's going to follow, one of our goals is to have you state today what your understanding was of Alabama Power Company's position on the Chico A/Raychem seals when you were down there and then get them to say it, so we can try and identify any difference. So, when -- in your discussion, will you tell us as succinctly as you can, Alabama Power Company's position, as you understood it?

A [Witness Wilson] I believe I've answered that twice.

JUDGE BOLLWERK: I am interested as well -- and I think I actually have put this question to Mr. Wilson before. But we do want to know what his understanding of APCo's position was at the time. So, I think that's --

MR. HOLLER: Is Mr. Wilson being precluded, at this time, from responding to the APCo witness' testimony?

JUDGE BOLLWERK: Right.

MR. HOLLER: Which is fine, we'll bring it up later.

JUDGE BOLLWERK: Let's go ahead and take care of it first.

MR. HOLLER: Yes, sir. Thank you.

JUDGE BOLLWERK: That is a point we need to bear in mind. What we want to know -- one of the things we want to know is what was your understanding of APCo's position at

the time? Why don't you respond?

WITNESS WILSON: May I do that first?

JUDGE BOLLWERK: I don't want to also preclude you from -- you said you wanted to respond to their --

WITNESS WILSON: I think I can address your question first.

I've already indicated today and previously, I didn't see an organized rationale on the part of the licensee. I addressed what he presented during the inspection. I have attempted to address everything he has presented since.

I, frankly, seldom in my EQ inspections saw a device that was claimed to be qualified for which there was less in the way of documentation of rationale.

My impression at the time I can talk about. I think that's what Mr. Miller is asking me -- what I believe to be the licensee's argument. My impression was that the licensee had the belief that this was the boot which had been qualified on other applications, that he could apply engineering judgment to design a supplementary test that would complete a qualification rationale. Apparently he didn't believe that he had to document anything but the actual testing that was performed. I didn't see any rationale documented.

The discussions that we held during the

inspection, I think are consistent with the view that I just stated. This was a pretty good seal, and there was a supplementary test run for the Farley application. I want to mention, again, that I haven't attempted to stop with what was presented during the inspection. I've looked at everything that's come in since. I still haven't seen a simple-minded, logical trail which says here's the task, here's the application, here are the differences, here's our analysis of these differences, here's another test, here's the application, here's our analysis of the identified differences. I haven't got that.

JUDGE BOLLWERK: Right. Let me try it this way. Mr. Jones indicated that his understanding of the staff's major problem -- if I'm misstating what you're saying, clarify it -- was a problem of chemical bonding because of the chemical spray.

WITNESS JONES: That's correct.

JUDGE BOLLWERK: That was your understanding of what the staff's primary problem was? Now, was he correct or incorrect in that assumption?

WITNESS WILSON: He's incorrect. That's the digression that I wanted to address.

JUDGE BOLLWERK: Why is he incorrect then?

WITNESS WILSON: My concern was bonding. It was not chemical, it was not corrosion of galvanized steel. The

inspection report points out that the licensee raised a question about corrosion and galvanized steel. The licensee's testimony has attempted to confuse the bonding issue with a chemical corrosion issue. They are separate. I don't care about corrosion. Except the licensee raised the concern during the inspection, and there is an Amphenol test report of this boot on a galvanized steel nipple which reported that 12 test specimens suffered substantial corrosion, even under the Raychem material.

My concern was bonding. How do we know the Raychem adhesive bonds to the galvanized steel and remains bonded during and after the LOCA? They made a submittal in January 1988 that talked about a Sandia test showing data concerning hydrogen generation from galvanized steel that's supposed to look at chemical spray.

It has nothing to do with bonding. It has nothing to do with any Raychem material test. I haven't heard what tests shows that this Raychem adhesive bonds to the galvanized steel and remains bonded during and after LOCA. That is the bonding concern. I have never heard of a test or an analysis.

JUDGE BOLLWERK: Let me just interrupt one second.

That was the concern at the exit meeting that was expressed to Alabama Power by the staff?

WITNESS WILSON: Exactly, as written in -- what

was the exhibit we just got --

JUDGE BOLLWERK: 128, perhaps?

WITNESS WILSON: 127, my input to the exit meeting, "Qualification not demonstrated because bonding of the Raychem material to the metal pipe nipple under LOCA conditions (including chemical spray) has not been addressed." Chemical spray may be a contributing factor to a bonding problem. I don't know.

But the point is, the bonding has not been addressed by test or analysis.

JUDGE BOLLWERK: You acknowledge, and it says, including chemical sprays?

WITNESS WILSON: Yes, because that is one of the LOCA conditions that they haven't addressed. They chemical spray could attack the bond between the Raychem adhesive and galvanized steel. I don't know. Nobody has told me anything about it.

JUDGE BOLLWERK: Let's have any response from APCO?

MR. MILLER: Let's make our starting point, bonding is the issue. Mr. Wilson says that is his concern.

WITNESS WILSON: No. I have a problem there. It is an issue. It is a difference between what test and analysis covered, and the Farley application, DOR Guidelines IEEE-323 1971.

MR. MILLER: Let's respond to bonding.

WITNESS SUNDERGILL: We only addressed the chemical spray because during the test that we conducted chemical spray was the only parameter of concern that was not there. The boot was applied over a galvanized nipple. We ran through the test and there was no bonding concern.

We felt that the only thing Mr. Wilson was concerned about was chemical spray because that was not present in the Farley test. We relied on engineering judgment to say that there would not be a sufficient amount of corrosion to defeat the integrity of the seal.

WITNESS WILSON: Can I ask, as a clarification, what is the test that is being addressed?

WITNESS SUNDERGILL: The December '81 test.

WITNESS WILSON: There was also no steam in that test. There was also the question of specimen heat up rate compared with the real LOCA where you have steam very quickly heating the test specimen.

There was reference earlier to their being computer programs and results available. I would like to see the thermal-hydraulic analysis that showed that the December '81 test heated the specimen equivalent to a LOCA, because it was intended to represent LOCA conditions.

Regardless of whether that test addressed chemical spray or not, it didn't address the bonding issue because it

wasn't a LOCA test. There was no steam in it. There was no measurement of whether moisture would penetrate the seal because there was no moisture in it. The time versus temperature, and pressure versus temperature curve would have a different relation than a LOCA would.

These are the types of things that I would like to see addressed by either a test or analysis.

MR. MILLER: Mr. Love, give your response.

WITNESS LOVE: I will give a very brief one.

We have attempted to address at the time, and through everything that has happened after the inspection, whatever the issues have been that have come up, and we have tried to do it in this testimony.

I believe some of the issues that Mr. Wilson is referring to right now we have addressed in our written testimony already, as we understood them.

WITNESS WILSON: I would like to see more than engineering judgment to address these concerns. I would like to see tests supplemented by analysis.

JUDGE BOLLWERK: I think we could go on like this forever.

MR. MILLER: I think we could on that point, if nothing else.

JUDGE BOLLWERK: Right.

Why don't we go ahead and take our break for

fifteen minutes, and we will come back at five until 11:00.

[Brief recess.]

JUDGE BOLLWERK: Why don't we go back into session? I'll just make an observation.

What we are trying to understand and some of our questions are directed at it and I think some of Mr. Miller's questions are directed at is within the bounds of the inspection and the inspection period, what the Staff was presented with, what concerns the Staff expressed to Alabama Power Company, what responses were given by Alabama Power Company to those concerns, and I think we are getting some -- the light is beginning to shine a little bit but I am not sure that that is as clear as I would like it to be, so I am just sort of telling the witnesses that is what the Board is looking for. Am I misstating anything? I think that's pretty much with the agreement of the Board, so again to the degree you help us with that, that is what we are really looking for.

What Mr. Wilson -- his concerns were, what he was shown, do we address those concerns, why he found that whatever he was given during the time of the inspection was inadequate -- that's what we are trying to understand, and I'll leave it at that at this point.

Mr. Miller.

MR. MILLER: There is a common goal there, Judge,

and we're going to try and do that.

BY MR. MILLER:

Q Mr. Wilson, I am going to show you Alabama Power Company Exhibit 102 and ask you if you will look at that.

I will represent to you that is a cross-section of the Chico A/Raychem seal such as is at issue here.

Are you with me so far?

A [Witness Wilson] Yes.

Q Now --

A [Witness Wilson] Except that it is not all here.

Q Well, the limit switch is not there.

A [Witness Wilson] Neither is the conduit compression adapter.

JUDGE BOLLWERK: Would he prefer to see the whole limit switch?

MR. MILLER: Yes.

WITNESS WILSON: I believe we did this last time around.

BY MR. MILLER:

Q I am also going to show you Alabama Power Company Exhibit 103.

A [Witness Wilson] They're getting bigger.

Q We are going to get there, Mr. Wilson, I promise you. We are going to get there.

Now you have got that before you, do you not?

A [Witness Wilson] Yes.

Q Now in your inspection reports and in our discussion we have talked about the issue of bonding. Are you with me so far?

A [Witness Wilson] Yes.

Q Now let me say this. As I understand it, you agree that this Raychem boot, which just for purposes of the record is this black material, if it were on a cable with a plastic covering, it would be environmentally qualified. Is that a correct statement?

A [Witness Wilson] No.

Q All right.

A [Witness Wilson] It could be environmentally qualified.

Q Could be.

A [Witness Wilson] The licensee has to perform that activity.

Q I see.

A [Witness Wilson] Raychem does not do it for the licensee.

Q Okay. That's -- I'm all right there but as we look at this, the bonding concern you have finds its basis in the fact that this boot is on a metal pipe nipple.

Is that a correct statement?

A [Witness Wilson] Yes, and the reason for that is

that that is the difference from the configuration that was qualified by testing of the boot on a cable.

Q Okay, all right, but our starting point is because the boot is on a metal pipe nipple, your concern as expressed in 1987, the Farley plant, was bonding.

A [Witness Wilson] That was a concern that I expressed, yes.

Q I'm sorry, sir, but I thought that was "the" concern.

A [Witness Wilson] I think we were there half an hour ago. It's a concern.

Q Can it be expressed this way to get it to the point of being "the" concern -- bonding because of -- bonding under LOCA conditions, how's that?

A [Witness Wilson] It is a concern.

Q Okay.

A [Witness Wilson] Differences between what was tested and what is in the plant I expect to see identified and analyzed.

Q And it would identify and analyze the fact that the Raychem boot is over a metal pipe nipple, not a cable as in the Raychem test report -- I'm sorry, in the Wylie test report?

A [Witness Wilson] Well, you could put it that way or you could say that what Raychem tested was a boot on a

cable and what Farley has installed is a boot on a metal pipe nipple with a compression adaptor over it.

Q Okay. All right, we are getting closer, I think, but the root concern is bonding?

A [Witness Wilson] It is one of the concerns.

Q Then tell me the others. I can't resist.

A [Witness Wilson] The root, the source of the concerns is the difference between what was tested and what is in the plant. I would like to see those differences identified. I would like to see them addressed by analysis and where I am coming from with that is the DOR guidelines.

We can speculate as to what differences might be and what their effects might be.

Q All right. Let's stop there. Mr. Love and Mr. Sundergill, let's do the differences. Let's say what the differences are between what was in the plant and what was tested, as best you can.

A [Witness Sundergill] The two differences that we have identified are the installation over the metal pipe nipple and the backing to the boot. The rest of the configuration we feel is enveloped by the Raychem test that was done for a breakout over a cable. That was a full LOCA test, temperature, spray, steam, radiation, aging -- so we feel that the only two differences that need to be addressed were the issue of the installation over the metal nipple and

the backing material that was used.

In our test that was done in 1981, there is a several page writeup explaining what we were doing which we felt under the terms of IEEE 323-74 satisfied the requirements for analysis. We had set forth the purpose of what we were doing, explaining what we wanted to achieve in the test and then of course gave the test results and the data taken during the test.

The Raychem test proved that there was no problem with the adhesive itself under the steam pressure temperature environment on the plastic cable jacket.

We had worked with Raychem for this design. They were not unaware of what we were doing and in fact were very interested in what we were doing and it was also their opinion that this design could be installed over a metal pipe nipple, so we felt that we had addressed all of the bonding questions of concern prior to November of '87 and the issue that was brought up in '87 that we had addressed completely by engineering judgment was one of corrosion due to a caustic spray and that is why in January of '88 we wrote an analysis and submitted it to the NRC which dealt just with corrosive effects included in the published data such as the Sandia report, information from Chemical Engineers Handbook on corrosion, and made reference to a test that Raychem had subsequently run with the boot over

stainless steel and galvanized steel nipples in which they did show some corrosion but not sufficient corrosion to defeat the seal.

We felt that that, all taken together -- the initial Raychem test, the Bechtel test, and the analysis that was submitted in January of '88 -- completely addressed the entire issue of bonding.

MR. MILLER: All right.

BY MR. MILLER:

Q Mr. Wilson, you have heard what Mr. Sundergill said. If we wrote that down and put it in the file, would that meet your standards for a written similarity analysis?

A [Witness Wilson] It will at least provide something to evaluate. I have attempted to consider all of that information prior to sitting down here today.

I would like to address several of the things that Mr. Sundergill just said, in fact, that indicate why I don't consider that to be an adequate demonstration of qualification.

Q I'm satisfied that --

A Two points, for example:

He mentioned the Raychem tests showed there is no problem with the adhesive itself. He mentioned that they believed there was only a caustic spray concern with regard to bonding. So, they made a submittal in January 1988 which

addressed corrosion of the metal pipe nipple.

What they didn't address was whether this adhesive will stay bonded to that metal pipe nipple. I would continue to have that same problem whether you wrote that down or whether the court report writes it down.

Q I would like Mr. Love to respond to that, and then you can go on.

A All right.

MR. MILLER: Go ahead, Mr. Love.

WITNESS LOVE: Well, again, it was our engineering judgement that the Raychem testing adequately demonstrated that the adhesive, which is a portion of the Raychem boot, which is in contact with a cable, that their complete qualification analysis demonstrated that that material would not degrade under the full LOCA conditions, including chemical sprays.

It was our understanding, from the inspection, that the concern the NRC staff inspector had was that somehow chemical sprays were going to have an effect on the bond to the pipe nipple substrate, since it was not now a cable.

That is what led us to evaluating that aspect, which we thought was the issue, and that's what led us to looking at the pipe nipple, or the galvanized pipe nipple, because in our judgement, what could happen to the pipe

nipple which might affect the bond would simply have to be some type of corrosion with the galvanized nipple, and that's what we were evaluating because we believed that was the inspector's concern, and that's what we were documenting in our submittal.

BY MR. MILLER:

Q Back to you, Mr. Wilson.

A [Witness Wilson] I can only say that I have had failed glue joints where both the materials being bonded and also the bonding agent appeared to be in great shape, but the bond wasn't there.

Regardless of what misunderstanding the licensee may have had four years ago, I continue to say, if he wants to address the bonding concern, which is a difference between the test they are relying on and the plant condition, a difference that was expressed during the inspection and in the inspection report, he is welcome to present his testing or analysis or both, and I'd be happy to consider them.

Q If he wrote down what he just said on the record, would that meet your standards

A [Witness Wilson] Mr. Love used the word -- the phrase "engineering judgement." Mr. Sundergill twice said "we feel." That wouldn't meet my standards.

Q It has to be written down, and they can't write

down "we feel"?

A [Witness Wilson] With regard to that type of a difference, I feel that IEEE-323 1971 talks about analysis.

Q Will you only be satisfied if a test is conducted?

A [Witness Wilson] I don't think I can categorically answer that. I think I've said it would be difficult, in my mind, to bridge the gap between the existing test reports that I know of and the plant application using only analysis. It is possible.

Q Okay.

A [Witness Wilson] By using engineering judgement, I don't think I could ever buy it.

Q All right, sir.

Can we say, though, that although you conceptually will say it's possible to satisfy you without a test, it would be difficult to satisfy you without a test?

A [Witness Wilson] Yes. In principle, it's possible. As I said, I think it would be difficult.

I would like to comment on several other things that Mr. Sundergill indicated.

Q If you don't mind, sir, let's take them one at a time so that we can at least get your side, and their side, and your side, and their side.

A [Witness Wilson] That's fine.

Q Go ahead.

WITNESS LOVE: Before you --

MR. MILLER: Wait. I am sorry. I cut off Mr. Love, and I shouldn't have done that, go ahead.

WITNESS SUNDERGILL: I am just trying to understand also.

Before we left bonding, would Mr. Wilson consider the documentation that we provided in January of '88, which was that level of detail addressing the possible or showing the corrosion, or the affect that would change the substrate on the galvanized nipple was not concern.

Would you consider that level of detail an analysis?

MR. MILLER: Mr. Wilson?

WITNESS WILSON: No. I would consider it to be data that could be used in an analysis, and I think you provided an analysis in the January 1988 letter to apply those data to the corrosion of the galvanized nipple. I don't have a problem there.

WITNESS SUNDERGILL: So you would consider that an analysis?

WITNESS WILSON: Yes, in any sense of the term.

I will also take that information in the context that we were aware of a Raychem/Wyle report from early 1982, which I mentioned earlier, where they tested twelve galvanized nipples with boots on them, and found extensive

degradation of the galvanized material, even under the Raychem material, and I would say here is two sources of information on what can happen there. Hopefully, the analysis will take that into account.

The place that I got that report of the Wyle/Raychem test was at Farley during the November 1987 inspection. That is how I had awareness of it.

MR. MILLER: We are going to get the exhibit number of that report, and while we do that, I have Mr. Sundergill, Mr. Jones, and perhaps Mr. DiBenedetto, who wish to speak to that point.

WITNESS SUNDERGILL: The report that Mr. Wilson is referring to is a LOCA test that Raychem did using the breakout boot NEIS kit over galvanized steel conduit nipples. This was subjected to full LOCA conditions, which we reviewed and enveloped those for Farley. In fact, they significantly enveloped those for Farley in that the chemical spray during that test was run for the full 30 days of the test, while the Farley chemical spray is postulated to run a maximum of 24 hours under the worst case situation.

Therefore, the test at Raychem exposed the samples to chemical interaction for 29 days longer then would be at Farley. That is why I say, we feel that significantly envelopes the Farley conditions, especially in the particular area of corrosion.

During that test, there was extensive corrosion underneath the Raychem boot material, but it did not fail the seal. The purpose of the seal is to seal off the harsh environment from the components inside.

Any degradation to the seal itself is acceptable as long as the environment doesn't get inside the seal. There was no indication in that test that the seals themselves had failed. There were failures recorded in the test, and consequently, as Mr. Wilson has explained earlier, we can not rely on that test.

However, the failures were not attributed to any design of the boot over the seal. They, in fact, were attributed largely to the way the conduit nipples were threaded into the bulkhead of the test chamber. There was leakage around there, and Raychem terminated the testing program with the completion of that test.

The bonding issue is, however, addressed completely in that test. It is a valid data point in that the entire samples were subjected to the full LOCA profile, the full spray, and, as I say, the seals themselves were not breached during that test, and we feel that is a valid basis for engineering judgment.

BY MR. MILLER:

Q Mr. Wilson, if he wrote that down, what he just said, would that satisfy your standards?

A [Witness Wilson] It helps. When I raised this report in the testimony, the licensee's response was that it wasn't fairly raised. Now, at least, he is addressing it.

I would like to comment on the manner in which he addresses that now.

Q Would it be efficient to do that now, or do you want to hear from --

WITNESS JONES: He answered my question.

MR. MILLER: Okay.

Mr. DiBenedetto?

WITNESS WILSON: Let me just point out that I have four other responses pending from what your people said earlier, and I would hate to get three pending responses. I would like the opportunity to rebut somewhere along the line.

WITNESS DiBENEDETTO: Excuse me, before he --

WITNESS WILSON: What I would like to do is continue rebutting what was just said before that becomes the third level that I have to rebut.

May I do that?

MR. MILLER: I feel something like a traffic [illegible] iceman here, but at least let's try and get it all out from one side, and then we will just turn you loose, Mr. Wilson.

WITNESS WILSON: All right.

Briefly, with regard to this 1982 Raychem --

JUDGE BOLLWERK: I don't think that is what he meant.

MR. MILLER: There goes my badge.

JUDGE BOLLWERK: Let's deal with this subject first, and Mr. DiBenedetto has one point and let's let him make that, and then you can deal with the question of the Raychem report that we are talking about, the Wyle report, and th· we will go back.

WITNESS WILSON: We will go back to my comments on the earlier testimony that was from Mr. Sundergill of which I have several?

MR. MILLER: We haven't gotten out of November 1987 yet, Mr. Wilson. We are going to go back, and we are going to stay until it is done.

WITNESS WILSON: Let's stick to this Raychem test, Mr. Miller.

MR. MILLER: Let's get what Mr. DiBenedetto has.

WITNESS WILSON: That is all we are talking about.

MR. MILLER: Make good notes, and we are going to give you your chance to do that.

Go ahead, Mr. DiBenedetto.

WITNESS DiBENEDETTO: I just want to bring this again back into its proper context. We are talking about a .ile and a document that was developed for qualification in

the 1979 to '81 time period, at which time I was on the staff. I was the First Level Manager of the Equipment Qualification Branch.

I want to go back to Mr. Wilson's discussion contained within 323 1971, which talks about logical and reasonable judgments as well as analysis.

In that time period, we had a lot of information, a lot of knowledge, about the application of Raychem products, how it was tested, what its endurance levels were, what its capabilities were.

For the Farley application, there were two differences, and I think you have heard Mr. Love and Mr. Sundergill talk about those differences, basically applying that Raychem boot to a pipe nipple, and applying a Chico/A compound in there to make up for a deficiency that was identified within testing.

That level of detail at that time -- the test that showed that the Raychem material adhered to that pipe nipple. The test had showed that -- that Chico A/Raychem provided and overcame the pressure deficiency would have been more than sufficient to satisfy us that period of time. Now, remember, this was done in the 1981 timeframe, and reviewed in the 1987 timeframe.

To me, I don't think this is a very complex technical design. It's a seal. They had a deficiency in

it, they responded to that deficiency. Those certainly make up logical and reasonable steps, without getting into computer-designed calculations and analysis.

MR. MILLER: All right, Mr. Wilson.

WITNESS WILSON: Do I have other witnesses that would like to repeat the same statements that I want to rebut before I get the opportunity to rebut, or is that all of them?

MR. MILLER: Check your venom at the gate, Mr. Wilson, we're here on a professional level.

WITNESS WILSON: I would expect that.

MR. MILLER: Careful. You know what you did at the plant, and we have not gone into that, but we will do that.

MR. HOLLER: Objection.

JUDGE BOLLWERK: I don't want to get into this. I warned everybody about it. Let's just keep this as a professional discussion, all right.

MR. MILLER: It's your turn, Mr. Wilson.

WITNESS WILSON: Thank you. Going back to the last concern that was brought in. I believe it was Mr. Love, I don't remember now -- was talking about the spring 1982 Raychem test of the breakout boot and the galvanized steel pipe nipple. There were 12 specimens tested. Six of the 12 were not considered by the authors of the test report

to have been successful. They did not attribute any of the failures to the bond, between the boot and the metal pipe nipple. Given failures due to other causes, I don't believe we can take credit for those six specimens demonstrating that that was a good bond. It may or may not have been, as far as those six specimens were concerned.

I have a bit of a problem there.

JUDGE MORRIS: Which six?

WITNESS WILSON: The six that did --

JUDGE MORRIS: The six that failed?

WITNESS WILSON: -- not pass the test, yes.

MR. MILLER: It may help the record to note that's Staff Exhibit 34.

JUDGE BOLLWERK: Thank you.

MR. MILLER: Go ahead, Mr. Wilson.

WITNESS WILSON: Three of those six, I believe, we covered during the previous hearing. And, as the licensee's witness just testified, failed due to a problem in threading the pipe nipple into the test chamber.

When I look at differences between testing the boot on a cable and on a pipe nipple, that's another difference. The pipe nipple has to be threaded into something. At Farley it has to be threaded into the limit switch. We [illegible] one indication from this test that here is another difference between putting a boot on a cable and

putting it on a pipe nipple threaded into the limit switch, which is a difference between the Raychem Wyle test and the Farley plant configuration. It's, again, the type of difference I'd like to see addressed. I didn't raise that particular concern previously, but it's there in the test report. It is a difference.

Earlier Mr. Sundergill referred to the two differences between the boot on a cable and the boot on a pipe nipple. There is still another difference in the Farley seal application, and that's the conduit compression adaptor, bearing down on the Raychem sleeve.

We heard multiple witnesses testify this morning there are only two differences between putting a boot on a cable and putting it into the Farley Chico A/Raychem seal. I think there's more than two.

With regard to testing for the differences between the Raychem test of the boot on a cable and Farley plant application, I'll again at what didn't get under the final test that was run for Farley, the December '81 test -- didn't have steam, didn't have chemicals, didn't have electrical venture points.

I think the differences in those test conditions need somewhat more analysis than what I have seen to date.

One final point that Mr. Sundergill went into. He indicated that Raychem was consulted during the development

of the seal. Raychem was of the opinion that the breakout boot design could be installed over a metal pipe nipple. My believe is that Raychem also made it clear that the licensee and not Raychem had the responsibility for demonstrating qualification of whatever use the licensee made of this Raychem material. That's the case whether there are boot seals down a cable or anything else. Raychem provides material, instructions, certifications, test reports. The licensee had the burden of demonstrating qualification.

I believe I'm caught up on the comments I'd like to make now.

MR. MILLER: Go ahead, Mr. Sundergill.

WITNESS SUNDERGILL: Just addressing that last issue about Raychem stating the responsibility of the licensee to demonstrate the qualification, that's completely true and that's what Mr. Wilson's already said in response to the application of the Raychem boot over the cable. It applies no matter which piece of equipment is installed in a power plant. The manufacturer either tests the equipment themselves or relegates the testing to some other agency, but it is up to the user to prove that that testing applies to the plant. So this is no different in this situation than in any situation. It's still our responsibility to prove it. We felt we had done that.

WITNESS LOVE: I think we heard a new issue here,

too, in terms of the threading of the nipple into the NAMCO switch. I would just like to comment that in looking at the functioning of the switch, even when NAMCO performed the test -- in fact, this is what led us into the complete issue of how much sealing is required is that NAMCO threaded a conduit into the switch and threaded the other side of the conduit into the test chamber, thus providing a fairly high level of questions in terms of how much seal is enough seal. That's the way they performed the test.

But my point is it was threaded. That was the standard connection to the NAMCO switch. So that was tested by NAMCO in conjunction with the switch. The switch was designed to have a conduit threaded into it. The pipe nipple is for all practical purposes the same as a conduit from the standpoint of threading it into the NAMCO switch.

WITNESS WILSON: That's correct, and at least one of the major sales manufacturers includes in its instructions for threading a seal into the component instructions for what sort of thread sealing compound to use with its threaded adaptor. I think in the world of EQ, we can't assume that a threaded joint is going to be adequately tied without testing it.

WITNESS JONES: I mean, our files are at the point they speak for themselves. I think we used the qualified sealant material, and he's welcome to go back and look at

that if he'd like to.

WITNESS SUNDERGILL: The only issue apparently here is the fact that Raychem in their test didn't use an adequate procedure for threading the nipple, and that doesn't reflect on whether NAMCO has done that or whether we have done that. It's just a fact that Raychem failed to do that.

WITNESS WILSON: In the installation instructions for these seals at Farley, I saw no reference to a thread loop retainer sealing device.

WITNESS LOVE: It does exist. I'd have to look at that yellow sticker on there, but I believe it may say something on that yellow sticker. I may be incorrect in that.

WITNESS WILSON: What's the relevance? It says the plant qualified thread sealant. That's the very first installation instruction on the yellow sticker.

WITNESS LOVE: Yes. I thought that was correct.

WITNESS WILSON: I ask again when the specimen was made. I believe it was within the last few years.

MR. MILLER: This Exhibit 103?

WITNESS WILSON: Yes.

MR. MILLER: Who knows the answer to when this was put together?

WITNESS JONES: I believe it was put together for

purposes of this hearing at the request of the Board.

WITNESS WILSON: And I believe that the nipples and Raychem boots were installed in the Farley plant in 1980, possibly early '81.

WITNESS JONES: Let me just try to address that point. We have the same person that still works at Farley. He's a supervisor in the electrical group that put the majority of all the Raychem/Chico seals in the plant. Not only has Jesse Love and myself personally talked to him; he was the same person that was personally involved in putting that component together there that you are looking at. So I don't think that there could be any concern relative to different people, different time frames, putting that specimen together versus what was installed. Specifically quite the contrary; we - ed the same person.

WITNESS WILSON: And did he at that time know what was a qualified thread sealant?

WITNESS JONES: Absolutely.

WITNESS WILSON: How would he know that, I wonder?

WITNESS JONES: From his experience as an electrician and understanding installation details and following instructions.

WITNESS WILSON: I'm not trying to pick on the electrician. I don't know how anybody would know it was a qualified thread sealant for this purpose in 1980.

WITNESS SUNDERGILL: In the particular case of the NAMCO, the EQ package for the NAMCO limit switches addresses qualification of the thread sealant.

WITNESS JONES: And there were plant procedures that documented the type of thread sealants to be used.

WITNESS WILSON: NAMCO didn't take responsibility for the cable entrance seal.

WITNESS JONES: I thought we were talking about thread sealants here.

WITNESS WILSON: That's the same thing.

WITNESS LOVE: I would just like to say this is not the only threaded coupling that exists in Farley Nuclear Plant, and there were qualified sealants used in those applications.

JUDGE BOLLWERK: Is there something on your master list? Do you have -- can you see what was on there?

WITNESS LOVE: No. That detail was beyond the necessity of documenting in this document.

BY MR. MILLER:

Q Mr. Wilson, have we ventilated your concerns about bonding?

A [Witness Wilson] Yes, within the framework that my concerns relate to the analysis made of the supplement test reports to demonstrate qualification, and bonding is a possible and likely example of the types of differences.

Yes, we have.

MR. MILLER: All right. It may be -- I'm going to turn to the Board. It looks like we're at a point where we can move to something else, if the Board wants to ask some questions now.

JUDGE MORRIS: I just have one question of Alabama Power. In this case, it seems that the complete qualification package for the Raychem seals was not just handed over to the inspectors. Is that correct?

WITNESS JONES: Yes. The intent was to turn the entire package over to the inspector, with the index.

JUDGE MORRIS: The intent was.

WITNESS JONES: Yes.

JUDGE MORRIS: My question was --

WITNESS JONES: I think the question that was raised is something that was not in the package relative to moisture of lack of humidity included in the test.

Originally, it was deemed by Alabama Power Company that wasn't necessary to be included in the package. Once the issue was raised, we added that to the package to address that particular concern.

JUDGE MORRIS: It's your position that the entire package was given to Mr. Wilson when he was the site during the inspection?

WITNESS JONES: Yes.

JUDGE BOLLWERK: Including the index, which he says he hasn't seen.

WITNESS JONES: Yes.

JUDGE MORRIS: Mr. Wilson, you refute that.

WITNESS WILSON: I, again, thought that my -- that I was given the cover sheet or the overall rationale. I have thought of another example that I can raise in partial support of my point.

I referred earlier to the detailed notes that I made during the inspection for inspecting the seals.

Those notes included considerable xerox copies of considerable material that was given to me: the complete 1981 test report, copies of the plant installation drawings which reflected differences from how the test specimen was built.

That package did not include any sort of a cover sheet or overall rationale, again, for qualification of the seal. If it had been there, I believe that I would have got a xerox copy and retained it.

JUDGE MORRIS: Mr. Jones, with respect to other components that had qualification packages, were the complete packages turned over to the inspectors? Was that your standard practice?

WITNESS JONES: Yes, sir. That was the standard.

As I mentioned yesterday, Mr. Merriweather would

go down the index, which would give a number and a corresponding title of the package. We would physically pull that entire package, which was in an expandable binder and turn that over, stack that up in the room for the inspectors' review.

So, the intent not only for the NAMCO limit switch or Raychem/Chico issue but for all of the packages that they were to inspect -- we gave them the entire package to review as we had it in our files.

JUDGE MORRIS: So, from your point of view, the inspectors should have known the complete contents of any EQ package. Is that correct?

WITNESS JONES: Yes, sir, if they were looking at the index sheet, which would be in the front of the package.

WITNESS WILSON: I could point out one difference between this package and the majority of them.

The Chico seal had never been identified to the NRC. I don't believe it was on the master list that we were given. I may be wrong there, but it's possible that that package was simply not in the same state of preparation or listing or identification. I don't know.

But I know that we were not aware of the seal until the plant walkdown two weeks before the final -- the failed inspection.

JUDGE BOLLWERK: There was something called

package 29-G, which I think you have identified.

WITNESS WILSON: Yes.

WITNESS SUNDERGILL: Package 29-G was in the same shape format as all the other packages and was on the list.

WITNESS JONES: And the fact that it wasn't on the master list -- the point here is, during the entrance meeting, Mr. Merriweather was given an index of listing, as I said, numeric numbers and titles of every package we had in the file, regardless of whether they were identified on the master list or not, and that's what was used as his basis, as I understand it, in requesting which packages he would like to review.

JUDGE BOLLWERK: I guess the bottom line is APCo says they gave it to him, and Mr. Wilson says he never got it. I don't know how we'll have to resolve that, but we will, I guess, to the degree it's relevant.

Do you have any other questions along that line?

JUDGE MORRIS: No.

JUDGE BOLLWERK: All right.

Mr. Miller, do you want to proceed?

MR. MILLER: All right.

BY MR. MILLER:

Q We're trying to make sure that we've got a thorough airing of the differences, Mr. Wilson, and let's take the next step.

After the inspection, you took your notes -- and we understand that there is an internal process that results in an inspection report. Is that correct?

A [Witness Wilson] Yes.

Q Now, did you participate in drafting the inspection report, Staff Exhibit 12, dated February 4, 1988?

A [Witness Wilson] Yes. I provided input for that.

Q All right.

Is the input you provided represented by the notes that we have identified for the record this morning?

A [Witness Wilson] I'm not sure to what you're referring now.

Q Well, I call your attention to Alabama Power Company Exhibit 127 and to page two of the inspection report.

A [Witness Wilson] Page two of the report was a very small portion of my input for it, yes.

Q All right.

A [Witness Wilson] The last several pages of the report were also my input.

Q We'll get there. We need to take it one step at a time.

A [Witness Wilson] I have to correct what I just said. I don't believe that I contributed to writing page two. It's possible that I did. I don't recall. If those

words like it's said at 127, then I obviously did.

Q Well, that is the reason for this inquiry.

A [Witness Wilson] Excuse me. They are the same. So, I apparently input part of two, yes.

Q Okay. And then -- it shows there -- we go to paragraph 6(i)(32), which obviously is in here in the inspection report, is it not? It's shown page 38.

A [Witness Wilson] Okay.

Q To make sure that we understand it correctly, you wrote paragraph -- these pages --

A [Witness Wilson] I wrote all of page 38.

Q All of page 38, 39?

A [Witness Wilson] Yes, all the way from, I think -- from the middle of page 35 to the end of the report, I wrote everything.

Q The middle of page 35, there on paragraph -- I'm sorry -- parenthetical 29.

A [Witness Wilson] Right.

Q And you wrote all the way to end of what page?

A [Witness Wilson] Forty-four, except for the attachment.

Q Particularly with the issue that we have been discussing, is it parenthetical 32?

A [Witness Wilson] Yes.

Q Okay. Now, the next step in the process, as we

understand it, is preparation of the notice of violation. Now, what role, if any, did you play in preparation of the notice of violation?

A [Witness Wilson] Very little. I can't recall inputting beyond what's here. I may have contributed at some early stage, but that would have been the extent of it.

Q Can you tell us whether or not someone within the NRC and perhaps your management chain or otherwise, took the information provided here in the inspection report and used that to determine what issues would be pursued on an enforcement action?

A [Witness Wilson] I am sure that was done, yes.

Q Okay. Was there, if you recall, and you may not -- was there any consultation with you about parenthetical 32, the concerns raised in it and which one of those were -- or should be pursued for enforcement action.

A [Witness Wilson] As far as the general subject, I believe there was agreement that the subject would be pursued. As far as wording to be used, and specific approach, I don't recall participating in any discussion.

Q All right.

A [Witness Wilson] I may have. It certainly doesn't stick in my memory.

Q You wrote parenthetical 32. Someone else made a determination whether all or a part of that parenthetical

would be pursued for enforcement action?

A [Witness Wilson] Yes.

Q All right. And do we understand -- or I'll ask you, sir, if you don't, do you have Staff Exhibit No. 2 there with you, which is a copy of the NOV?

A [Witness Wilson] Yes, I do, or at least a pertinent page of it, I think.

Q Do you have page two of the --

A [Witness Wilson] Yes, I do.

Q All right. Under item B2 it says -- the second sentence says: "Specifically, the testing performed did not consider possible chemical interactions, and the temperature profile used in the testing did not simulate the initial thermal shock of a loss-of-coolant transient."

And I know I read it right.

A [Witness Wilson] I agree.

Q Okay.

A [Witness Wilson] You read the second sentence correctly. There was a first sentence.

Q I understand. But it's right there in the exhibit. Can you identify for us who wrote that sentence?

A [Witness Wilson] No, I cannot. The NOV was issued out of the region office rather than headquarters. So, I certainly was nowhere near in the middle of issuing it. I -- I don't know who wrote it, and I don't recall what

input I may or may not have had.

Q Okay.

A [Witness Wilson] I don't want to imply that I differ with the wording of the NOV.

Q Okay. Do you agree with it?

A [Witness Wilson] Yes.

Q The process works through -- and help us on this if you can. Is it fair to say then that someone at the region made some determination about what they wish to pursue -- what specifics of Chico A/Raychem seals they wished to pursue for enforcement action, and wrote that here in this paragraph B2?

MR. HOLLER: If I may, sir? I'm going to object to this line of questioning. The witness has answered that he has no knowledge of who wrote the NOV. This is outside the scope of his rebuttal testimony which is here for cross examination. The licensee has had the opportunity during the direct testimony to explore this when the full panel was present, including the enforcement specialist.

MR. MILLER: I think the basis for the NOV is clearly a relevant inquiry.

JUDGE BOLLWERK: I would agree that it's a relevant inquiry, given what has been focused on in the rebuttal in terms of old issues and new issues.

I'm going to allow the question. Again, it asks

for his knowledge, what he knows. If he doesn't know anything he will state that.

BY MR. MILLER:

Q If you know, Mr. Wilson?

A [Witness Wilson] It was certainly region products, so the final call on what it says would have been determined by the region. It could have been written anywhere by anyone.

Q The order imposing a civil monetary penalty, was that also a region product, as far as you know?

A [Witness Wilson] I would feel sure that headquarters had a major role in it.

Q Okay.

A [Witness Wilson] I, personally, had a very minor role.

Q Can you tell us what your very minor role was?

A [Witness Wilson] Probably commenting on earlier -- early drafts of it or possibly providing early in[illegible].

Q Okay. And with all of that input, obviously it was issued out in August of 1990?

A [Witness Wilson] Whatever date it has on it, yes.

MR. MILLER: It might be appropriate to take our lunch break now, sir.

JUDGE HOLLWERK: All right. We can go ahead and do that. You have further cross examination you want to

pursue after lunch?

MR. MILLER: Yes, sir, I think so.

JUDGE BOLLWERK: All right.

MR. MILLER: I didn't mean to say that the Board shouldn't ask questions now, but we'll be moving to something else, and this is as good a break time as any.

JUDGE BOLLWERK: All right. I recognize that.

Anybody have any questions they want to ask at this point?

JUDGE MORRIS: I'd just like to ask Mr. Miller if it's your intent to continue using your cross examination plan after lunch.

MR. MILLER: Yes, sir.

JUDGE MORRIS: Thank you.

JUDGE BOLLWERK: All right. Why don't go ahead and take our luncheon break and this point, and let's come back at 1:15.

[Whereupon, at 11:50 a.m., the hearing recessed for lunch, to reconvene this same day, Wednesday, May 20, 1992, at 1:15 p.m.]

AFTERNOON SESSION

[1:20 p.m.]

JUDGE BOLLWERK: Good afternoon, everyone. I guess we're ready to continue with the APCo cross examination regarding the Raychem Cnico seals.

Whereupon,

RICHARD C. WILSON,

JESSE E. LOVE,

JAMES E. SUNDERGILL,

DAVID H. JONES,

AND PHILIP A DiBENEDETTO,

witnesses, having been previously called for examination, and, having been previously duly sworn, was examined and testified as follows:

CONTINUED CROSS EXAMINATION

BY MR. MILLER [Resuming]:

Q Mr. Wilson, would you turn to page 8 of your rebuttal testimony? This would be your answer to Question 9, which actually begins on page 7.

A [Witness Wilson] All right.

Q At about the fifth line down, sixth line down, you state there that APCo provided no instructions directing the installer to perform a visual inspection or to take any action based on the observations.

A [Witness Wilson] With respect to a minimum

quantity of Chico cement, yes.

Q All right, sir, when did that first become a concern of your's?

A [Witness Wilson] When during the testimony, Mr. Love testified that the technician would take action based upon inspecting the installation visually.

Q Okay, during the testimony then?

A [Witness Wilson] Yes.

Q All right, then you --

A [Witness Wilson] There was no prior attempt that I know of for the licensee to take credit for visual inspection.

Q Okay. Item 2 that you have there which starts the next paragraph, -- I'm sorry. Let me -- the procedures provided during the inspection did not cover details known to be important in Raychem design application of its seals, right?

A [Witness Wilson] It says that Item 2 in the inspection report stated that, yes.

Q I see. Now, I'll ask you if you -- what were those details?

A [Witness Wilson] One was the preparation of the material to which the splice would -- well, let me give an overview of this response first.

At the time this rebuttal testimony was written,

the licensee had not indicated that he used any Raychem installation instructions for installing these Raychem boots on the pipe nipples. The plant procedures in the form of drawings that I was given, did not refer to Raychem installation instructions.

The licensee, subsequent to my writing this rebuttal testimony, has provided Raychem installation instructions. I think I'd rather phrase my answer that way, if I may.

I was not aware that Raychem installation instructions had been used at the time I wrote the rebuttal testimony.

Q I see.

A [Witness Wilson] They had not been introduced or shown to me by the licensee.

Q Have your concerns in that regard now been satisfied?

A [Witness Wilson] No.

Q All right, tell me what it is that remains unsatisfied?

A [Witness Wilson] The instructions say nothing specific about preparing a steel pipe nipple for installation of a Raychem boot.

Q All right.

MR. MILLER: I'll ask the panel if they have a

response to that.

WITNESS LOVE: Well, we have it in our surrebuttal testimony, but basically the instructions refer to degreasing the substrate over which the boot would be installed. In this case, it is the pipe nipple.

They also refer to and provide instructions for using a heat gun or a torch for shrinking the material onto the substrate, or the pipe nipple, in this case.

WITNESS JONES: I'll just add, in addition, we discussed with the electrician that installed the majority of these, and he said when degreasing, that he would sand down any burrs or abnormalities on the nipple before installing the Raychem boot.

WITNESS WILSON: I'd like to make two comments on that.

MR. MILLER: Go ahead, Mr. Wilson.

WITNESS WILSON: As soon as I make some notes. In referring to that -- 118, which was recently provided, this is the Raychem installation instructions for their nuclear capable breakout kit dated October 8, 1981.

At the bottom of the first page of the installation instructions proper, which is the second page of this exhibit, Item 3 says clean and degrease cable jacket and wire installation with a solvent. Item 2 says remove all non-qualified or graded jacketing material from the

jacket cutback, et cetera. There isn't any mention of preparing anything but cable.

The second comment I'd like to make: I don't believe the way to get an environmentally qualified installation is to ask the technician after the fact, what he did. I believe there should be instructions consistent with Appendix B to 10 CFR Part 50 that tell him what to do.

MR. MILLER: Go ahead, Mr. Love.

WITNESS LOVE: These instructions were provided with the cable breakout boot and over-sleeves, the kit, as they were provided from the storeroom, so the instructions that he's referring to here were a part of the kit which would have been issued to the electrician, so those directions were not relied upon as verbal; they were relied upon in writing as a part of the kit when the kit was issued ot the electrician.

And the notes and details which we have referred to here, refer to the kit number which is to be installed and on which switches the application should be applied to. So, we don t believe that this is leaving a lot of speculation or a lot of options open to the installer.

WITNESS JONES: I'll just add that, prior to installation, Raychem was onsite and did train our electricians on their product and things to look for.

WITNESS WILSON: The instructions don't address

how to install the boot on the steel pipe nipple, period. They do say words like the following: clean and degrease cable jacket and wire installation with a solvent such as 1, 1, 1, trichlorethane, which is approved by the cable manufacturer, not which is selected by the electrician.

BY MR. MILLER:

Q And your concern is that because the instructions say cable jacket instead of metal pipe nipple, then this is an invalid way of preparing a pipe nipple to receive the Raychem boot?

A [Witness Wilson] My concern is, I disagree with testimony which states that this installation instruction addresses installing the boot on a pipe nipple.

Q You cannot read these installation instructions and make any kind of judgment whatsoever that these same preparatory steps should be taken to put it on a steel pipe nipple?

A [Witness Wilson] When I'm told to use a solvent approved by the cable manufacturer, I don't know what that means with regard to the pipe nipple.

Q You can't figure that out with any of the resources that are available to you in your current position?

A [Witness Wilson] No, sir. I read in the licensee's testimony that a solvent was selected to remove

machine oil from the pipe nipple.

Q I see.

A [Witness Wilson] I can't relate that to a cable cleaning solvent.

BY MR. MILLER:

Q All right. So you're critical of the fact that the instructions say 1,1,1 --

A [Witness Wilson] It says such as, yes.

Q Such as what it says, how's that?

A I have no evidence that that specific solvent is what was used. I've never seen any instructions that call for its use.

Q You would not consider the qualification package complete unless somebody had a piece of paper in it that said, you know, we had a different kind of degreaser, different kind of cleaning solvent. Here's our analysis of what it does on metal and here's our analysis of why it is good for degreasing.

Is that a true statement?

A [Witness Wilson] I might be interested in what color of this, Mr. Miller. My point is that the installation instructions should specify how to prepare the steel pipe nipple if you are going to rely on Raychem instructions for obtaining a qualified seal.

Q All right.

A [Witness Wilson] Raychem in fact did not state to the best of my knowledge and I welcome a challenger here that if these instructions were used, the seal would be environmentally qualified in the application of Farley. I do not believe Raychem ever said that.

Q All right. You understand of course that Alabama Power Company takes that position?

A [Witness Wilson] I'm welcoming disagreement with that statement.

Q My question to you was you understand that Alabama Power Company takes that position?

A [Witness Wilson] I understand that Alabama Power Company takes the position that in its opinion the seal is qualified, yes.

Q All right, Item 3. We are still on page 8 of your rebuttal testimony.

Item 3 references the fact that you had different drawings and revisions than the installation drawings -- I summarized it slightly but is that accurate?

A [Witness Wilson] Yes. The references in the test plant describing how the December, 1981 test specimen was assembled were different than the drawings given to me and purported to be the plant installation instructions.

A [Witness Love.] Might I ask different in what regard? Was it the part number of the boot or what was the

difference

A [Witness Wilson] I'd be happy to answer that.

The inspection report gave the details of both drawings and invited the licensee to identify and analyze whatever differences were there.

A [Witness Love.] May I address something?

MR. MILLER: Go ahead.

A [Witness Love.] From my review of that, the only difference that I was able to note were that in the original revision of the drawing that was applicable at the time the seals were installed, Raychem had not yet created a specific -- they had not created a new kit number, which appeared in their catalogs at a later time frame, so the part number on the drawings was done by indicating, if you will, the part number of the breakout boot plus the part number of the sleeve that would go over the brake-out boot as opposed to the different part number which reflects the combination of both those components in one kit.

I believe that was one difference that I observed which really is inconsequential. It's just a labelling of the part numbers and the new part number had a tied to the previous two part numbers.

The only other difference that I recall is I believe there may have been a particular reference to the compression fitting or the conduit coupling clamp, the C-

clamp that's over top of the assembly to connect the conduit to the nipple. I believe that there may have been a specific name, manufacturer's name, at one point and then that may have been revised to allow the use of a different equivalent clamp as opposed to that particular manufacturer's. Beyond that, I am not sure of any or I was not aware of any other differences.

A [Witness Wilson] Item 4 on the inspection report addresses the compressor and adaptor and it is also addressed again in the licensee's surrebuttal testimony, which raised new concerns about it.

I would like to stay with Item 3 for the moment.

I am looking at the inspection report and I would like to read an excerpt from Item 3 in the inspection report, which is what we are talking about here.

It pointed out different drawing numbers and revisions. It then goes on to say the following: "The inspectors noted that the quantity and type of Chico cement are included in clouds on two of the three drawings and the Raychem cable breakout kept number N-1. No explanation of differences was provided."

My point here in this particular context, when information is shown on a drawing and surrounded by a cloud, an irregular circular or oval boundary, by the draftsman, the cloud indicates that the information within that

boundary will change during preparation of the current revision of that drawings.

The information on previous versions of the plant drawings was not available to me. It was concealed by the cloud, if you will, and that's a very bad pun and I apologize for it.

The point is that I was simply given drawings for building a test specimen, drawings for building plant equipment. They were different. I could not from looking at the drawings determine the history of building the plant equipment.

As far as this being a nebulous concern, I am looking at the inspection report for the December 1987 inspection.

BY MR. MILLER:

Q Before I get our panel to respond, let me ask you one question.

We can see that in the inspection report. If I look at the NOV, do I see that concern restated in Item B2 of the Notice of Violation?

A [Witness Wilson] Only in the first sentence which starts about the available file being incomplete.

Q So the first sentence is where you say this particular concern is expressed?

A [Witness Wilson] Only under the general

statement, yes. It was not culled out as an example, or a specific instance.

MR. MILLER: Go ahead.

WITNESS JONES: A two-part answer. First, a direct response to the question. Typically, in any drawing revision, it is true that you file it in to show that that section of the drawing has been revised, but also at the bottom of the drawing there is revision blocks that reference you back to a base document, or another document that will give you the background or the information you need if you want to know why that drawing was revised, and what the basis was for the revision.

Clearly not every reason for every revision of every drawing is listed and justified on the drawing itself, but it will tie you back to the base document that caused that revision to take place.

Secondly, on the installation drawings, while I was not with Mr. Wilson full-time during the total inspection, at the end of each day, as he mentioned earlier this morning, there would be a debriefing between the staff and us, the licensee. At that debriefing on a daily basis, we would be told the issues that they were concerned about, and continued to pursue further.

To my knowledge, this was not an issue that they would want to pursue during an inspection, or at the agency.

WITNESS WILSON: Two responses. First, the licensee has had four years to do that document retrieval, and establish its case for similarity.

Secondly, in general, we did not treat daily feedback sessions as forums for exhaustive analysis of every single question that was spoken on every single review item.

In the interest of efficiency of time, I think we joked this morning about my notes from one of these meetings indicating 23 people were present, and the meeting took almost an hour.

Secondly, in the second part there, I am looking at APCO Exhibit 127, Farley Exit Meeting Input, November 20, 8:35 a.m. I talked earlier today about these notes at the very bottom of that page. There is mention there again of the plan equipment drawings being provided. There was no drawing or sketch of the test specimen.

I believe, in that context, the part that is missing here may have referred to the discrepancy there. I don't know that, but I do know the inspection report documents exactly which drawings were cited for both applications, and they are different. Some of the numbers are different. Some of the revisions are different.

MR. MILLER: Go ahead, Mr. Love.

WITNESS LOVE: I would like to just further try to explain beyond what Mr. Jones has said.

I think there are words to this in our testimony through this proceeding as well. The documents in the power plant are a living document. That means that revisions will continue, and they will be done as changes are required on the documents, and as changes are implemented in the plant.

If we would have been aware, at the time, that this was a critical item to Mr. Wilson, it would have been possible in the plant document control system to have gone back, and it wouldn't have taken a lot of time. The previous revisions of the documents were available. We could have extracted those, and that item could have been reviewed to look at the drawing as they existed at the time frame when the seals were installed, and the progression of changes on the drawings could have been evaluated.

I just simply do not believe we were aware that that was an issue, or we could have retrieved the drawings and established that trail, and done that review with Mr. Wilson. I just simply don't believe we recognized that that was an issue that he wanted to do through for whatever reason.

WITNESS WILSON: Are you through?

WITNESS LOVE: Yes.

WITNESS WILSON: I have another two-part response.

Even given that the licensee may not have been aware of that concern during an inspection, it has been

aware of it for the more than four years that the inspection report has been available.

Secondly, with regard to the plant installation drawings being living documents, indeed, they are. If there are changes in the way that something like this seal is installed in the plant, the drawings will be changed because the revised configuration should not be installed until there is an approved drawing governing it.

However, the fact that the drawings may be changed from time to time does not relieve the licensee of the responsibility to show that the test specimens adequately reflect the installed plant equipment for environmental qualification purposes. You can't simply say they are living documents.

I am concerned, and the staff would be concerned, are the changes in these living documents causing a difference between the qualification basis for installed equipment, and the way that equipment is being installed.

JUDGE BOLLWERK: Mr. Jones had indicated that the documents had a reference, the file would have a reference to an earlier document. Did I understand you to be saying that?

WITNESS LOVE: Yes, sir.

If I just may, if we are going to change the plant, it has to go through a design change process, and

that carries along with it all the documented phases, and the safety evaluations that are documented and referenced in the revision block of the drawing.

JUDGE BOLLWERK: Did these documents that you mentioned, did they have a reference back to the earlier documentation?

WITNESS WILSON: The drawings do have a reference to a controlling document for the design change.

JUDGE BOLLWERK: Did you ask for that?

WITNESS WILSON: No. Time was becoming limited by the time I got this drawing, so I didn't get them until the next to the last day of the inspection.

I probably asked about differences. I can't specifically recall doing that. I did it on hundreds of other occasions, and I probably would have done it then.

JUDGE BOLLWERK: It's your contention that documents should have been with the file, as opposed to simply referenced in the document that had the cloud on it?

WITNESS WILSON: I'm sure that I expressed a concern about a difference between installed plant equipment and test specimens. I think those documents are part of addressing that concern. I would have expected them to be produced as part of satisfying that particular concern.

JUDGE BOLLWERK: Do you have any doubt that, if you had asked for them, they would have been produced?

WITNESS WILSON: Not on a categoric basis, no.

I don't know if time permitted doing that at the time the concern came up, but as I have indicated before, I have looked at everything that has been submitted in the four years since the inspection report, and that concern was in the report.

JUDGE MORRIS: But during that four years, you haven't requested those preceding documents.

WITNESS WILSON: Not specifically, no.

I have indicated at various times along the way that the concerns in the inspection report had never been addressed, including the enforcement conference at Region II in the spring of 1988 and again in my either rebuttal or testimony. I don't recall which.

BY MR. MILLER:

Q Anything else, Mr. Wilson?

A [Witness Wilson] No.

Q The next thing I show here is a concern that the compression adapter over the Raychem sleeve didn't have a model number or other descriptive information, looking down at the bottom of your rebuttal testimony.

A [Witness Wilson] That's right.

Q All right.

Now, does that concern appear in the NOV, item B2?

A [Witness Wilson] No, it does not.

Q All right.

A [Witness Wilson] Not specifically, only in the same sense as item 3.

Q Let's go to page 12, top of the page. This appears to be a concern that you are unaware of any successful LOCA test of a Raychem boot over a steel pipe nipple.

A [Witness Wilson] I believe you read the statement accurately, yes.

Q Okay.

A [Witness Wilson] I am unaware of any successful LOCA test of a Raychem boot over a steel pipe nipple.

Q Okay. Is that your current testimony?

A [Witness Wilson] Yes, it is.

MR. MILLER: All right. I'll ask the panel.

Do we consider our testing to be a successful LOCA test? Well, let me strike that. Let me go back to Mr. Wilson.

BY MR. MILLER:

Q By that, do you mean -- when you say "successful LOCA test," you mean where the test chamber sees all of the LOCA conditions?

A [Witness Wilson] That's correct.

MR. MILLER: All right.

I'll ask the panel to at least provide an

explanation of how we conclude that our Raychem boot over a steel pipe nipple meets the requisite LOCA conditions.

WITNESS SUNDERGILL: We've gone over that this morning. I'll just try and be very brief about it.

The Raychem test over a cable, in conjunction with a Southwest Research test for radiation capability, in conjunction with the Bechtel December '81 test, provided us with the assurance of qualification.

BY MR. MILLER:

Q Mr. Wilson, down at the bottom of page 12, in that last paragraph, you -- it appears to me, in any event, that you have a concern that heat shrinkage control instructions may result in Raychem material thinning and weakening. Have I stated your concern accurately?

A [Witness Wilson] Yes, and again, this is prior to the licensee telling me that APCo -- that Raychem installation instructions were to use a stronger boot.

My concern at this point would be somewhat different than this, and it would be the concern I stated a bit ago, that I don't believe there is evidence that following Raychem's installation instructions over a metal pipe nipple will result in an environmentally-qualified seal.

Q All right.

So, your concern today is different from what we

show there on page 12 of your rebuttal testimony?

A [Witness Wilson] Yes, based on additional information supplied by the licensee.

Q All right.

If you said, I didn't catch it. When did this particular concern shown on page 12 -- when did it first arise? In the testimony phase?

A [Witness Wilson] My guess would be the inspection report, where we framed items three and four. Did we refer to item two in the inspection report?

Item two says procedures provided to inspectors did not cover details known to be important in Raychem-designed applications of their seals, such as surface preparation, detailed use of a heat gun, and selection of properly-dimensioned kits.

Q All right.

A [Witness Wilson] I presume that concern was raised during the inspection.

Q And has that particular concern found its way to the NOV?

A [Witness Wilson] No, it has not, not specifically.

Q Turn to page 13. Your concern here, again somewhat a paraphrase, is that no special preparation of steel pipe nipple was necessary, and you translate that into

a bonding concern. Am I right about that?

A [Witness Wilson] I don't think so, no. First of all, that paragraph begins, "Mr. Love testified further that no special preparation of the steel pipe nipple is necessary before installing the Raychem materials on it."

This paragraph was written in rebuttal to that testimony by Mr. Love.

Q I see.

A [Witness Wilson] The inspection report itself raised the bonding concern. It did not suddenly arise in 1992.

Q All right.

The preparation, then, concern arose as a result of Mr. Love's testimony.

A [Witness Wilson] No, not at all. I just stated the inspection report raised that concern, and I believe I just read the item two from the inspection report that did it.

Q Okay. That you did. All right.

Just so I'll understand it, you say this is what is depicted there in item two, page 41 of the inspection report?

A [Witness Wilson] Yes. What I just read is verbatim.

Q All right.

Pipe fittings, reading down, have -- sorry. I will try it again.

Pipe fittings often have burrs or sharp edges that could cut the Raychem material. Can you tell us whether or not that is also covered by this item two?

A [Witness Wilson] I could continue it under the general heading of surface preparation, yes. It was not my intent in Item 2 to speculate on every possible failure mechanism due to differences between plant installations and environmental qualification bases.

Q All right.

A [Witness Wilson] And I haven't attempted to do that during this hearing. I have tried to resist attempts to pressure me into doing that.

Q This is a comparatively specific concern, burs or sharp edges. Now, can you tell us whether or not you raised this concern -- that is, burs or sharp edges, while you were at the Farley plant in November 1987?

A [Witness Wilson] I do not recall.

Q All right.

MR. MILLER: I'll ask the panel if they have any knowledge of this concern, burs or sharp edges, as a result of the EQ inspection in 1987.

WITNESS JONES: No.

WITNESS LOVE: I'm not aware of it.

WITNESS SUNDERGILL: I have no knowledge.

WITNESS WILSON: I recall something that I undoubtedly did raise, and that would be my concern that this Raychem boot, which I was used to seeing installed over cables, was now being installed over a mechanical conduit fitting, electrical conduit, but the fitting nature itself mechanical. The inspection report and I think my testimony certainly makes clear -- makes it clear that I have been concerned from the beginning about differences in those two applications.

BY MR. MILLER:

Q All right, sir. Let's go to Page 16 and the seventh line down: There was no adequate method of assessing seal performance. I read that accurately, I know.

A [Witness Wilson] Yes, I agree.

Q All right. Tell me what you mean or -- I'm sorry. Strike that and I'll ask it to you this way.

Describe the concern you have that is resulting from this adequate method of assessing seal performance.

A [Witness Wilson] Well, again, I'd like to go back to the inspection report, if you will bear with me a minute, and read it --

Q All right. I've got it right here.

A [Witness Wilson] On Page 40 of the inspection report, there is an Item A, no steam or moisture -- this is

talking about the December 1981 Bechtel test.

Q Yes, sir.

A [Witness Wilson] No steam or moisture of any sort was present even though moisture leakage is a frequent cause of electrical equipment LOCA test failures. And then on Page 41, Item -- there are two Item Number 1s there. This is the first one commenting on the data taken during the test and why it did not support seal qualification.

Item one says the dry chamber atmosphere and lack of any electrical performance measurements of any type constitute a failure to monitor the performance of the seal design and its major function -- keeping electrical circuits dry.

Q That's what you mean when you say no adequate method of assessing seal performance?

A [Witness Wilson] That's the heart of it. It goes on to talk about the pressure measurements that were made during the test as a substitute for perfc mance measurements.

Q Okay. Anything else?

A [Witness Wilson] There may be, but I'll stand by that.

Q All right, sir.

MR. MILLER: I'll ask the panel. What do we have to say to that?

WITNESS LOVE: In response to it technically or -

- MR. MILLER: Yes, sir.

WITNESS LOVE: I think we have already provided much testimony on this topic, but basically, the 1981 test was conducted as a partial test to resolve what appeared to be the only potential failure mode, and that was, in the Raychem testing, as they were trying to develop the NEIS kit, they found that a temperature pressure effect created an implosion of the breakout boot when there was no backing provided in the center of the four legs or, if you will, in the crotch of the boot.

The purpose of the 1981 test was to explore that failure mode, in which case we in fact did recreate that failure mode, and we then proceeded to find a solution for that, which was to provide a backing to the breakout boot in the area of the failure. That backing material was installed. The testing was repeated with the backing material and the testing demonstrated that the failure mode that we were also able to create was not present, the temperature-pressure effect was not present after the backing was installed.

With no pathway or no breach of the Raychem breakout boot material, there is no pathway for moisture into the interior of the conduit nipple, and thus no pathway into the limit switch, and that was the basis for that test

and the significance of that test.

MR. MILLER: Go ahead, Mr. DiDenedetto.

WITNESS DiBENEDETTO: Yes. I'd like to add to what Mr. Love is talking about. What Mr. Love just described basically is a separate effects test which again during the time period '79 to '81 was very permissible for a utility to augment its qualification file and supply data information, test information, to something that was deficient in the original file.

For example, if a piece of equipment was tested and the utility neglected to include radiation data, it was perfectly permissible for them to take that particular material and test it to radiation only and then add that information to the file.

What Mr. Love just described was basically Farley or Alabama Power's attempt to make up for the pressure deficiency, and it was perfectly acceptable in that time period to augment files and permitted separate effect testing.

MR. MILLER: Go ahead, Mr. Jones.

WITNESS JONES: If I might just add one point, at that time when we were conducting the test, keep in mind that the EQ deadline was June 30, 1982. It was not November 30, '85. So we were up against a deadline that we needed to develop whatever was necessary as far as supplemental

qualification to justify these seals, and that's what we did.

BY MR. MILLER:

Q Mr. Wilson, if you're ready, let's turn to page 20.

A [Witness Wilson] No, I'm not ready.

Q All right.

A [Witness Wilson] And I do not have a two-part response. I have quite a lengthy response.

Q Go right ahead, Mr. Wilson.

A [Witness Wilson] First of all, Mr. Love testified that Raychem found that a temperature pressure effect caused failure of the boot during the Raychem testing. I don't concede that point at all.

Raychem ran a LOCA test. They had temperature, they had pressure, they had steam, they had chemicals. They experienced a failure of the boot. Analysis postulated the reason for that failure was temperature and pressure.

Bechtel then performed a temperature and pressure test without steam, without chemicals, without any moisture, on a Raychem boot on a steel pipe nipple, and they succeeded in rupturing the boot, as had the Raychem test.

I don't begin to accept that this shows that the Bechtel test produced the same stresses and forces on the seal that the Raychem test did, and there are two main

reasons for that.

One is I don't believe the effect of steam and chemicals in the Raychem test can be brushed off that lightly. I believe that analysis of that difference is required.

I think we have heard from both sides at great length that the licensee's engineering judgement says they were in good shape, and I have said I don't agree. I think further analysis would be necessary.

JUDGE BOLLWERK: What specific concerns do you have that you can -- I mean that you can tell us, why the steam or the chemicals might have a different effect?

WITNESS WILSON: Again, this gets into speculating and postulating failure mechanisms. My concern relates to qualification being established by tests supplemented by analysis.

I think that is the spirit of EQ, to demonstrate that this design, which everybody believes is a good design, can produce and perform its safety function when called upon to do that.

I could speculate, in that regard, for example, something else Mr. Love said. Without breaching the Raychem material, there is no path for moisture to enter the limit switch. I don't agree. I think we've got the bonding concern again.

If moisture can enter underneath the Raychem material, it need not breach.

So, I haven't got a specific mechanism that I can say causes failure of this seal due to steam or chemicals. My concern is I haven't got the evidence that there is no such mechanism. The regulatory criteria for demonstration and documenting qualification have not been satisfied.

Secondly, with regard to the temperature and pressure test and how adequately it simulated a true LOCA test, as Raychem and Wyle had attempted to perform, the inspection report questioned -- and during the previous hearing testimony, rebuttal, surrebuttal, we have had the question of whether the December 1981 Bechtel test heated the test specimen in the same manner as a LOCA test would.

This is a very good example of a place where a quantitative analysis, in my view, would be appropriate.

You can do heat transfer calculations to determine whether placing a room temperature specimen into an electrically heated test chamber will heat that specimen as rapidly as supplying a large quantity of steam directly to the specimen will heat it.

There are questions of this sort regarding whether this test adequately simulated the pressure and temperature effects of the LOCA. I have a concern in this regard.

Once you've ruptured the boot with that test,

there's not much more you can do it, because there is no pressure differential being maintained across it anymore.

I don't know if the Bechtel test had just enough stress in it to rupture the boot and no more, where the Wyle test may have had considerable extra capability in that direction.

So, I am concerned with the severity of the pressure/temperature test. I am concerned with the absence of steam and chemicals, and most of all, I am concerned about the absence of quantitative analysis or anything resembling the IEEE-323-71 definition of analysis being applied to this picture.

Now, with regard to Mr. DiBenedetto's statement that separate effects testing is permissible, indeed it is under DOR guidelines, in particular.

I cited in my rebuttal testimony the particular portions of the DOR guidelines that state that testing for a temperature/pressure/steam environment is preferred by the guidelines.

The licensee's surrebuttal indicated that, at that point, the DOR guidelines does not say those three parameters must be addressed in the same test. I agree that, at that point, it did not say that. I have never ever heard that interpretation before.

I have asked several other people within the

agency who have not heard the interpretation.

The main thing that I can offer in that regard is to read one more sentence from the DOR guidelines. Section 5.2.3, which talks about test sequence, begins with the following sentence.

"The component being tested should be exposed to (a) steam/air environment at elevated temperature and pressure in the sequence defined for its service conditions," and then it goes on to talk about radiation and other things as being separable.

This is simply one more place where the DOR guidelines, I believe, clearly contemplates a single test for temperature, pressure, and steam.

With regard to Mr. Jones' comment concerning a June 30, 1982 deadline for environmental qualification, there, indeed was one. And earlier this week we heard about testimony regarding a license condition for Farley Unit Two. And testimony indicated that deadline was lifted. Nonetheless, the deadline was in place during 1981. I will not question that at all.

By the same token, there was another deadline in 10 CFR 50.49 in the spring of 1985 roughly, the second refueling outage after issue of the SER or something of that sort. There was another deadline in 10 CFR 50.49 for, I believe, September of 1985, at which point, requests for

extensions of the deadline had to go to the Director of the Office of Nuclear Reactor Regulation for a response. There was another deadline in 10 CFR 50.49 for November 30, 1985, beyond which the requests for extension would have to go to the Commissioners themselves.

The entire industry was made well aware, in particularly in the fall of 1985, that that November 30, 1985 deadline was for real. You had to meet it. There weren't going to be any more extensions. You had to meet 10 CFR 50.49 -- what's called for documentation and qualification of equipment within the scope of that section.

Whatever happened prior to that date, there was a clear deadline of November 30, 1985 to document qualification. I think I am through with my response now.

JUDGE BOLLWERK: All right. let me just ask one question. So, if I understand what you are saying, it is your position, and tell me whether you believe it's the Agency's position that, consistent with IEEE-323-1971, that a test that qualifies -- an environmental qualification test has to be one that encompasses all the relevant environments at one time. You cannot do separate testing and come up with the proper analysis.

WITNESS WILSON: No. We definitely allow separate effects testing. What I am trying to cite there are the DOR Guidelines. IEEE-323-71 doesn't say much on that point.

My concern is that the licensee, during this proceeding, unique in my experience, has raised a concern that the DOR Guidelines may not require you to combine in a single test three of the LOCA parameters; those three parameters being temperature, pressure, and steam. This is the only place where I am claiming that we want to see combined testing. We have allowed separate effects testing on everything else.

JUDGE BOLLWERK: So, for pressure, temperature and steam, they all have to be in the same test?

WITNESS WILSON: Yes. I don't mean to interrupt. But, Dr. Morris, in fact, asked me a question along those lines at the previous hearings. And, as I recall, my answer was something like it stated my position perfectly, with one quibble. And the quibble was I wanted to see those parameters in the same test. I don't believe this is personal opinion. I believe I speak for the Agency there.

JUDGE BOLLWERK: I don't have anything further.

WITNESS DiBENEDETTO: I would like to respond or add a comment to that, sir.

I agree with Mr. Wilson that, within the DOR guidelines, it definitely says that -- that the preferred method is as he stated: Temperature, steam, the various parameters and qualification. And, indeed, the test that was relied on for the initial qualification of this

configuration was a steam, temperature, pressure test. It was one that was observed that there was an anomaly within that test that separate effects testing was used to correct that anomaly or to demonstrate it.

The Alabama people, with the assistance of Bechtel, reinitiated that pressure problem, repeated it, fixed it, retested it and corrected it. So, the original test conformed to both the DOR guidelines; conformed to 323-71, or Category Two of NUREG 0588. It had all of the elements, including radiation.

What was missing, again, was the bonding to the nipple and the pressure backup. And it was previously demonstrated that the bond was not a problem.

WITNESS WILSON: I think we covered most of that just a few minutes ago. By the original test, I assume Mr. DiBenedetto is referring to the test of the boot on a cable, where there was steam temperature pressure.

WITNESS DiBENEDETTO: I'm referring to the testing performed by Raychem on their product, yes, on a cable. And, as I indicated, and as this panel has continued to indicate from the beginning, the only differences that we noted were that we were now on a pipe nipple and we now had a pressure problem that had to be rectified. It was tested on a pipe nipple. No bond deterioration was exhibited. And the cementing, the Chico A provided an adequate pressure

backup to resolve the pressure anomaly.

MR. MILLER: I take it, Mr. Wilson, that you --

WITNESS WILSON: Let me just say one thing to that. I believe I addressed everything in that statement just a few minutes ago. So maybe the record can show that I still believe what I said a few minutes ago.

MR. MILLER: Okay. That's all right.

JUDGE MORRIS: May I interject a question?

MR. MILLER: Please do.

JUDGE MORRIS: I think I have heard or seen in the testimony somewhere, and I don't recall whether it was in IEEE standards or in the commission's rules or whatever, that if an environmental test is conducted and presumably, as we have discussed, it needs to have the three elements at a minimum, pressure, temperature and steam -- there is a failure, then that test is considered a failure.

WITNESS WILSON: It isn't quite that severe. Let me read you a --

JUDGE MORRIS: I want to go on and ask, if that were the case, does it also follow that -- what I believe Mr. DiBenedetto is alleging -- is that you can determine the cause of that failure and run another test on just that aspect?

WITNESS WILSON: I don't interpret it that way. The wording, from the DOR guidelines says: "If a component

fails at any time during the test, even in a so-called 'fail-safe' mode. the test should be considered inconclusive, with regard to demonstrating the ability of the component to function for the entire period prior to the failure."

In other words, it's saying that if you have a test failure, you can't take credit for the test for qualifying even for a time period prior to the failure.

In attempting to learn from that test, I would not be so harsh as to say you cannot do that. I would be inclined to say you certainly can learn from that test. It's there. I hope that people will learn from it and go from there.

But I do have trouble saying that that test took care of steam and chemicals and I do have trouble saying that that test took care of any differences between the specimen in that test and the plant equipment. I have those problems.

JUDGE MORRIS: That's a separate issue, I take it.

WITNESS WILSON: Yes, but I certainly am not against people learning from tests.

JUDGE MORRIS: But I'm trying to get at Mr. DiBenedetto's point that, to make it oversimplified, that you're testing under three variable conditions; let's say pressure, temperature and steam, and the test successfully

is run for steam and temperature, but there's a pressure failure.

Can you then run a test under pressure conditions only and supplement the original test?

WITNESS WILSON: I think you could if you were able to show that pressure was, indeed, the sole cause of failure of that design under the combined conditions.

JUDGE MORRIS: And that could be done by analysis, at least theoretically?

WITNESS WILSON: In principle, theoretically, I would agree, and I'm back to where I was this morning with Mr. Miller. I think it might be difficult to do that in this particular case.

JUDGE MORRIS: Okay, thank you.

MR. MILLER: It's been the subject of some testimony, but just to make the record cohesive, at least, now would be a good time to explain the basis for our pressure/temperature/steam and our earlier -- and the Raychem test. Someone may be getting ready to do this. Make sure that is explained while we're on this topic.

WITNESS DiBENEDETTO: What I wanted to comment on, Judge Morris, is that you asked if the failure or anomalous behavior could be followed up with additional analysis or testing?

JUDGE MORRIS: Right.

WITNESS DiBENEDETTO: Again, during the timeframe of the '79, '81 -- and I think this one is -- it's in my surrebuttal testimony -- we failed or rejected a lot of test reports evaluated by utilities because they didn't go detailed enough in addressing anomalous behavior during tests.

Whether the piece of equipment actually failed or just didn't meet the acceptance criteria, or there was some anomalous readings like large swings in insulation resistance, swelling of cable ends, we asked the utilities to define and defend those anomalies. Could they occur in the plant?

Typically, the utilities came back with a written analysis. The contrast I'm trying to make here is that Alabama Power Company observed an anomaly in their testing, they narrowed it down to what they believed was a pressure problem, they isolated that problem, they tested that, which is, again, beyond the norm of what was happening there.

They resolved to their satisfaction that the pressure problem was gone. I would like to add one other point. Per Mr. Wilson's testimony, he would have you believe that the test is performed strictly in temperature and pressure, and, again, I repeat, this is not so.

The test that Alabama Power and Bechtel relied upon was a full blown LOCA test of the Raychem product, and

when the anomaly was discovered, they isolated that to the pressure problem and retested that. That's similar to, as I explained earlier, when a utility was deficient in perhaps a radiation test, regardless of the performance of the piece of equipment through the steam/temperature/ pressure, et cetera, spray; they went out and just took the material of concern and subjected it only to radiation and supplemented their files saying, okay, now I've got a complete file. I've discussed all of the parameters and elements of qualification.

MR. MILLER: Okay, Jesse, let's make sure that we give a succinct explanation because we've heard about tests, we've heard about anomalies and let's make sure that the record at this point right here, is perfectly clear on where there were failures and where there weren't. Let's start with Staff Exhibit 39, --

WITNESS WILSON: Before we go to that, could I clarify just one detail?

MR. MILLER: Time out. I'm talking to Mr. Love, and we've been very free with letting you speak, but this is my time to speak with him. Let's start with EDR 50.33, Wylie test report 58442-2.

MR. HOLLER: If I may, are we considering here -- and I know the particular arrangement is that of latitude, but I'm confused on whether Mr. Miller is now conducting

redirect testimony of his witnes , if he's still conducting a cross examination of Mr. Wilson, or just where we're at.

I'm interested in this as well, but I think that it's time to regroup and clarify where we are.

MR. MILLER: I'd like to respond. It started out as a Board question, and we've heard about tests, we've heard about anomalies, and we've got to make sure this record does not create confusion instead of creating order, and that's what I'm attempting to do. We want to make sure that the record is clear about which test had the anomalies and which didn't.

[Board confers off the record.]

JUDGE BOLLWERK: I guess the feeling is, to the degree that it is tied to this question of separate effects testing, and that what you are going to talk about now are examples of -- I will let you explain.

JUDGE MORRIS: How anomalies were dealt with.

JUDGE BOLLWERK: In that context, I guess we are interested in hearing what the panel has to say.

MR. MILLER: All right, sir.

WITNESS LOVE: I will start then with Staff Exhibit 39, which is the Wyle Laboratories test that was conducted for Raychem of a cable breakout boot installed over a cable.

In this test, it was a full LOCA test combining steam, pressure, temperature, chemical sprays during the LOCA part, the assemblies were pre-aged both thermally and to put them in an end-of-life condition as well as from a radiation standpoint prior to conducting the LOCA test, and there were no failures on the breakout boot in that application.

MR. MILLER: That is our DOR Guideline test.

WITNESS LOVE: That is the DOR Guideline test, yes.

MR. MILLER: Within the bounds of what the Board has said, let's go ahead and finish the response.

WITNESS LOVE: Subsequent to this, we became aware -- remember, as I testified to earlier, Raychem was aware of our application, and interested in using this for the application over pipe nipple. They also were interested in this application, and were pursuing it on their own as a potential product.

As a part of that, they conducted a test of the same type breakout boot over a pipe nipple, and in that test experienced the temperature and pressure effect of thinning the material in the center of the crotch, and developed a blow-through in the center of the crotch. That was the anomaly that occurred, if you will, due to testing conducted by Raychem

The engineers that we had in Bechtel were aware of that, and were made aware of that by Raychem, since they knew we were applying this product. As a result of that, and as a result of discussions and evaluations that Raychem had conducted on the failure mode, the conclusion that Raychem and we had arrived at was that that was, indeed, a portion of the breakout boot which, due to the manufacturing process of the boot, and the extrusion process of the boot, the material is thinner in the crotch area, and when it was installed in the DOR Guideline Wyle test qualification over a cable, there was sufficient backing due to the fillers in the cable material that the thinner material in that area, when it became heated, would be supported by the cable fillers when the pressure transient, or the pressure profile occurred and, therefore, no tearing in that area would occur. This was an evaluated phenomenon.

We then, in conjunction with Alabama Power Company, conducted the December 1981 testing, which is the air testing, temperature/pressure test that we have been talking about, with the breakout boot over a pipe nipple, and we monitored the leakage in this test. We monitored for leakage in this test.

When we conducted this test, we had four specimens. The first specimen in that test was with no Chico backing. We experienced a temperature/pressure effect

essentially identical to what Raychem had relayed to us. At that point in time -- and what I am explaining now is explained in the December 1981 document.

As a result of that, we reexamined our own methods to make sure that we were conducting the test properly, that we hadn't thermally soaked the specimen too much before we applied the pressure, and we made adjustments to the test specimen to more rapidly insert the specimen to simulate a more rapid rate of change of temperature on the specimen, more like that which would be experienced in a LOCA.

In doing that, we, again, did it with a Raychem breakout boot over a tight nipple with no Chico backing, and we experienced failure.

We conducted this again. So we actually conducted three tests without Chico backing. In the third test, we made a few more fine-tuning to the -- and I don't mean fine-tuning in terms of trying to make it pass. We made fine-tuning to try to simulate the LOCA profile as it would be experienced. In the third specimen without the Chico backing, we also experienced a failure.

The time frames were different, however, when the failures occurred. We then were conclusively convinced that this effect was, indeed, a real effect.

So to solve that effect, we introduced the Chico backing. We re-conducted the test simulating the same

profiles as we did in our third specimen, which had failed without the backing, and there were no failures experienced in this area of the breakout boot.

The fourth specimen test of that report is the test specimen that we rely upon for the qualification, that part of the pressure temperature qualification of this material for the Farley Nuclear Plant.

JUDGE BOLLWERK: I guess the question I then have for Mr. Wilson is, why do their attempts to isolate this as a pressure temperature effect not satisfy your concerns about having analysis, and sufficient to make then the next test that they ran and passed sufficient to qualify the equipment?

WITNESS WILSON: I believe all they presented is a design rationale to explain how they came up with the specimen to be qualified. I believe that the analysis, or the differences between the test specimens in the Raychem test with the cable, and the Farley test with boot and the metal pipe nipple conduit adapter over it, I believe those analyses of the differences did not exist. I continue to hear of only two differences, and I think we have listed at least four that exist in the test specimen.

In addition, I indicated a few minutes ago, I am not at all convinced that it was simply pressure that caused the failure in the Raychem test of the boot on a nipple, or

in the Farley test. I am not convinced that the Farley test adequately simulated the LOCA with regard to what could be done to the seal.

With respect to Raychem's failure of the boot on a pipe nipple during a LOCA test, I believe that failure occurred relatively early in the test. I don't know what might have happened if that failure had not occurred, what else might have happened later on in the test.

I have indicated earlier that I am not convinced of the stress on the seal during the Bechtel test was comparable to what it would be during a LOCA test.

I simply would like to take these tests one at a time, and see the differences between what was tested and how it was tested spelled out, identified and analyzed to whatever extent the licensee believes is appropriate.

At that point, I am ready to make my judgment, the agency is ready to make its judgment as to whether they have satisfied the regulations for environmental qualification.

JUDGE BOLLWERK: Okay, thank you.

WITNESS WILSON: I hate to give you such a "beat around the bush" answer, but --

JUDGE BOLLWERK: Mr. Holler, you want to say something?

MR. HOLLER: May I be heard, sir?

With the indulgence of Mr. Miller, the Staff does

have cross examination that goes right to this matter and I believe there are some things that can be brought to light through the cross examination set forth and would be willing to wait. However, the Board might find it more helpful now that we freshly have the testimony of Mr. Love and Mr. DiBenedetto on this one point.

We are prepared to cross on that point now. Any objections?

JUDGE BOLLWERK: Mr. Miller?

MR. MILLER: Now is the time. We're here, they're here. Let's do it. I mean after our break.

[Judges conferring.]

JUDGE MORRIS: We are appreciative of the fact that we have cross examination planned so that gives us some idea of where things might proceed but we seem to get off on tangents quite a bit and we are terribly repetitive, as everyone I'm sure has noticed, and so I would hope that both parties during this short break would review their own and the other parties' positions and try to focus on the essential differences and just bear down and get those defined.

We are not seeking agreement among the parties. We are seeking to understand exactly what the differences are and the bases for those differences.

Alabama has in their surrebuttal testimony listed

15 points which they feel distill the issues raised by Mr. Wilson and they attempt to rebut them.

I would hope that Mr. Wilson has reviewed those and he nods his head that he has, and therefore we ought to be able to come to grips with those fairly quickly and incisively, and I ask you, please try.

JUDGE BOLLWERK: Why don't we come back at quarter to 3:00.

[Recess.]

JUDGE BOLLWERK: I think we would like to go ahead and allow the staff to conduct its cross examination, which I take it is going to deal with the question of why these various tests that Alabama Power ran are not sufficient as an analysis of -- or analysis sufficient to establish that the anomaly with these switches was caused by a pressure-temperature problem.

MR. HOLLER: Yes, sir.

JUDGE BOLLWERK: All right.

CROSS EXAMINATION

BY MR. HOLLER:

Q Okay. We're ready. Gentlemen, if I may -- Mr. Love, let me just refer to your testimony you gave before the break. As I understand it, the first test you referred to, the Raychem on a cable, is Staff Exhibit 39. Is that correct, sir?

A [Witness Love] Staff Exhibit 39. Yes, I believe that's correct. That's the Wylie report? Can you give me the Wylie report.

Q I have it right here.

A [Witness Love] 58442-2? Is that the --

Q Well, let's be absolutely certain on that.

A [Witness Love] It's Staff Exhibit 39.

Q Yes, sir. Staff Exhibit 39, 58442-2.

A [Witness Love] Yes.

MR. HOLLER: Also at this point -- it just may be helpful -- I believe earlier on in the proceeding, and we may have referred to that by its APCo designation, which is APCo Exhibit 60 just so there's not a confusion.

[Pause.]

MR. HOLLER: Yes, that's correct. But for the record, so we're clear, this is Staff Exhibit 39.

BY MR. HOLLER:

Q You then, sir, referred to a Raychem test on a nipple, and I noticed you didn't identify that by exhibit number. That's correct?

A [Witness Love] That is correct.

Q And am I correct in my understanding, sir, that that has not been marked for identification or introduced into this hearing yet?

A [Witness Love] That is correct.

Q And also, sir, is it not true that that has not been provided to the staff as of this point in the proceeding?

A [Witness Love] I believe I have testified to this all before, but that was -- that was a preliminary test being done by Raychem preceding their NEIC qualification documentation that was introduced into this hearing. So it was not -- it was not formally documented as a test report, to my knowledge.

Q Yes, sir. But my question to you was, that has not been provided to the staff. Is that a true statement?

A [Witness Love] That is correct.

Q It's also true that it's not available for the Board to look at in assessing the analysis performed by Alabama Power Company would -- or assessing it against a standard of 323 1971 or DOR guidelines. Is that fair to say?

A [Witness Love] The Raychem test that produced this anomaly that we've discussed is not available to the Board. That's correct.

Q Now, let me turn to Mr. DiBenedetto. Did I understand your testimony correctly, Mr. DiBenedetto, when you said that APCo relied on a Raychem test that had an anomaly, you were referring to what has not been identified but this unidentified Raychem test on the nipple. Is that

correct, sir?

A [Witness DiBenedetto] They relied on the information provided of the failure, yes.

Q And my question to you is referring back to the test that has not been introduced.

A [Witness DiBenedetto] Yes.

Q Okay.

And then I'll go to your testimony, and I thought we had cleared this up morning, referring to Question Number 49 on Page 68, and I'll synopsize. You're responding to Mr. Wilson's characterization of your direct testimony as relying on three reports -- oh, I'm sorry, I'll wait until you get that.

A [Witness Love] What was the page number?

Q Page 68, sir.

A [Witness Love] Okay. I'm there.

Q Okay. Mr. Wilson characterizing your direct testimony as relying on three reports, and you then correct him by saying, "That is correct, although it neglects to mention the Southwest Research Institute Report." Is that correct?

A [Witness Love] That is correct.

Q Okay. So is it fair to say, then, at least when we started this, the tests that Alabama Power Company relied on, not withstanding Mr. DiBenedetto's testimony, were

Staff 39, the Raychem test on the cable, the 1981 Farley submergence test which has been identified as APCo 61, the December 1981 testing at Farley to demonstrate that the Chico A resolved the pressure temperature problem, and that was identified as Staff 33, and the Southwest Institute test was identified as Staff Exhibit 40. Is that correct, sir?

A [Witness Love] Those are the test reports which we were relying upon for qualification. That is correct.

Q Okay. And that brings me to the point, then, and this is the moment of truth, yes or no, is APCo relying on the unidentified Raychem test that had a failure?

A [Witness Love] No, we are not.

Q Okay. And without that test, is it your testimony -- again, the testimony I'm referring to is without the Raychem test on the nipple -- is it your testimony that the test reports show qualification of the Raychem seal as it was installed at Farley?

A [Witness Love] The composite of the test reports we just described here, yes.

Q And again, the four test reports.

A [Witness Love] The composite of all of them, yes.

Q Okay.

I'll ask Mr. DiBenedetto if he could explain to me how you rely on a test that you don't rely on. Am I missing --

A [Witness DiBenedetto] I think the point that we're trying to make there is that additional information about a potential failure mechanism was introduced by the additional testing done by Raychem, and that's what spurred off these other tests, all right?

As responsible utility people develop qualification documents, you've got to stay abreast of new information or information that's available to you. Bechtel found that there was a potential problem with the boot seal test run by Raychem. They investigated it. I don't think they were relying on that test as a qualification test; they're relying on their analysis in their subsequent testing to demonstrate qualification for the application at Farley Nuclear.

Q Okay. Fair enough, sir. Let me go back, then, to what we've identified as Staff Exhibit 33, which is the Bechtel 1981 test. Am I right so far?

A [Witness Love] Staff Exhibit 33 is the Bechtel 1981 test. That is correct.

Q Yes, sir. And you have explained for us, I think very clearly, that that test was a temperature pressure test but did not include steam. Is that correct, sir?

A [Witness Love] That is correct.

Q And I would ask you, sir, is there an analysis included in that test such that the test plus the analysis

explains the application of that test to the Chico seals installed at Farley. What I'm getting at, sir, does it explain the absence of the steam?

A [Witness Love] Well, you've asked me the question slightly different ways there. The 1981 document does explain why it was performed and how it relates to the Staff Exhibit 39 or APCo Exhibit 60, which was the base qualification document.

Q Staff Exhibit 39, so we're not confused again, is the Raychem on the cable.

A [Witness Love] That's correct.

Q I would ask you, sir, is there anything in Staff Exhibit 39 that explains the difference between the Raychem-taped cable and the Raychem on a nipple?

A [Witness Love] Staff Exhibit 39 is the Raychem report for the boot, as we have said, over a cable.

Q Yes, sir.

A [Witness Love] It does not explain the use over a pipe nipple.

Q Okay.

Then I'll go over to Staff Exhibit 33, which is the Bechtel 1981 test.

A [Witness Love] Yes.

Q And is it your testimony that that explains the Raychem on a nipple, as opposed to the Raychem on a cable?

A [Witness Love] Yes, it does, and it relates back to the Raychem/Wyle test report, Staff Exhibit 39.

Q Okay.

Now, my original question to you, still staying on Staff Exhibit 33, does that explain why that test, Staff Exhibit 33, employs only two of the three -- may I use the term -- prime parameters of the LOCA environment?

A [Witness Love] It explains the basis for that, yes.

Q And so, it's your position, then, that that was the analysis the staff should look at, that the Board should look at, against the standards of the DOR guidelines and IEEE-323 1971 to assess whether those tests support the qualification of the seals.

A [Witness Love] That is the document which ties in the base document, yes. It is the analysis, yes, of the test.

Q And there was no other analysis. That's it. If we look at those two documents with regard to steam, pressure, temperature, then we should be able to come up with the conclusion, by a reasonable environmental qualification engineer, that the Raychem seal is qualified.

A [Witness Love] For the LOCA in-containment testing, that is correct.

Q Okay.

Let me go back, then, to Staff Exhibit 33, and I'll ask you, sir -- your testimony on page 77 refers to section 5.2.5 of the DOR guidelines, and I'm referring to the quote from the guidelines.

"If a component fails at any time during the test, the test should be considered inconclusive with regard to demonstrating the ability to perform the function."

A [Witness Love] Yes, I see the words.

Q Is it fair to say you agree with the statement in the guidelines? I believe you say that in your testimony. This is a correct statement in the guidelines.

A [Witness Love] Yes.

Q Okay.

So, your testimony is that -- in conducting the tests in the Bechtel 1981 test, Staff Exhibit 33, is it your testimony that, by eliminating one failure mode, that you have eliminated all the failure modes that might be associated with the seal in the steam/pressure/temperature environment?

A [Witness Love] There was only one failure mode. That failure mode was eliminated.

Q And again, my question to you, then, it's your testimony that you have eliminated it by eliminating that one.

A [Witness Love] That is correct.

Q Okay.

Before I leave that, just to clarify one last point -- this is still on the test -- the Board had asked us to try to focus in on what was presented to the staff and, then, secondly, what APCo's response was to concerns of the staff. Do you recall that, sir?

A [Witness Love] Yes.

Q Just to make it clear, is it fair to say the four tests that we have outlined, with reference to your question on page 68, are the tests as of this point in the proceedings that APCo relies on for qualification of the seals?

A [Witness Love] Yes, that's correct.

Q Okay.

Then my next question to you would be, is it fair to say that, in 1987, the tests relied on by Alabama Power Company were the Raychem tests on the cable, which we have identified as Staff Exhibit 39, the December 1981 Bechtel test, which we have identified as Staff Exhibit 33, and the Southwest Research Institute test, which is identified in Staff Exhibit 40?

A [Witness Love] Well, you've excluded the main steam valve room flooding.

Q I have, sir.

A [Witness Love] But for in-containment, that is

correct.

Q Just to be crystal clear, for the Chico A/Raychem seals that are at issue here, they were the tests at the time of the inspection that were presented to the inspector and relied on.

A [Witness Love] That is correct.

Q Okay.

JUDGE BOLLWERK: Let me just clarify one point. The Southwest Research Institute test was not presented until January of 1988 or is this a different test that I'm confusing now.

WITNESS JONES: The Southwest Research Institute, that should have -- that was in our file.

JUDGE BOLLWERK: That was in the file. Okay. I'm sorry.

BY MR. HOLLER:

Q So that it's absolutely clear, I think we can agree, gentlemen, that Staff Exhibit -- strike that -- APCO Exhibit 61, the Farley emergence test, is a test which you agree, sir, we have said was not presented to the inspectors or listed at the time of the 1987 inspection.

A [Witness Jones] That's correct. I think I testified to that earlier. Yes.

MR. HOLLER: With the indulgence of the Board, that would conclude the cross examination I had particular

to the test and the identification of the test. So we may refer back on our normal cross to standards and so on and so forth. The Staff is satisfied now with the point that we wanted to make at this point.

JUDGE BOLLWERK: Mr. Miller, do you have any redirect on that?

CROSS EXAMINATION

BY MR. MILLER:

Q Mr. Wilson, you and I need to try and be as efficient, and let me ask you this question. From what I've heard you say today and on other occasions, I think that your principal concern, your number one concern is that there is no written piece of paper that outlines the analysis linking the test reports together in the manner that Mr. Love has described in this hearing room today.

Is that true or false?

A [Witness Wilson] I have that concern and I have one more; namely, that the analyses that need to be linked by that piece of paper, in many cases, do not appear to exist. And I'm speaking specifically here's a test report, what analyses are needed to apply it to the plant equipment, do they exist.

So it's a roadmap and also the substance of the analyses. The roadmap I understand from what I've heard in the two hearings and reading the testimony. So I guess my

answer is it's the analyses themselves that are my concern.

Q If we wrote out on an analysis that linked these test reports together and explained how we got from one step to another, would that satisfy you?

A [Witness Wilson] It could. I have the concern that you're going to continue to approach this from a design evolution direction as opposed to a demonstration of satisfyirg the regulatory criteria for environmental qualification.

I'm less interested in why you ran the December 1981 test than I am in the demonstration that that test was adequate to complete the qualification of the seal design.

Q Is the only way we would ever be able to satisfy you is to take the Chico A and put it in a full-blown LOCA test, the configuration we've been discussing here? Is that the only way we can satisfy you?

A [Witness Wilson] When you say Chico A, you're talking about the entire seal?

Q Yes, sir. A shorthand version to describe the issue we're here on today.

A [Witness Wilson] I think I said earlier today, in principle, that's not required. But given the information that's available, as I understand it, it would be difficult to satisfy the regulatory criteria otherwise.

Q Difficult, if not impossible.

A [Witness Wilson] In principle, it could be done.

MR. MILLER: Just to see if we can have one point of clear difference, I want to ask our panel in your opinion, is it necessary to do a full-blown LOCA test on this item of equipment that we have been talking about today?

WITNESS DiBENEDETTO: No.

WITNESS LOVE: No.

WITNESS SUNDERGILL: No.

WITNESS JONES: No, for completeness.

JUDGE MORRIS: Off the record.

[Discussion off the record.]

MR. MILLER: Let me try this to see if we can continue our search for crisp differences.

BY MR. MILLER:

Q You have obviously read our surrebuttal testimony.

A [Witness Wilson] Yes, I have.

Q Is there a way that you can succinctly tell us where you either agree or disagree with the surrebuttal testimony and particularly the attempt in it to set out your concerns and to answer them.

The question is -- let's not get started down that road unless you can tell me -- unless there is a way we can do this succinctly.

A [Witness Wilson] I think, succinctly stated, my

concern is that the surrebuttal testimony, rather than providing the type of analysis that IEEE-323-1971 describes and addressing differences between tests and Farley plant conditions, instead does the following repeatedly.

It addresses a postulated failure mode that might be associated with a difference and states the opinion that that failure mode is inconsequential. I believe, succinctly, that's my view of the arguments and the surrebuttal testimony.

I'm being asked to take on faith statements of opinion.

JUDGE BOLLWERK: I take it, Mr. Miller, you're referring to the points that are made on Pages 82 through 84 of the testimony, the 11 points.

MR. MILLER: No.

JUDGE BOLLWERK: Or is there more to it than that?

MR. MILLER: Yes, sir. That's where we attempt to identify the technical concerns, and then, of course, the testimony that follows.

JUDGE BOLLWERK: Right.

MR. MILLER: Let me try the other side of that question.

BY MR. MILLER:

Q Are there areas in the surrebuttal testimony that, in a succinct fashion, you can tell us that you agree with

as we attempted to list your technical concerns and our responses?

A [Witness Wilson] Let's see. Unfortunately, they list the concerns on a few pages, but the position stated with regard to them occupy a lot of pages. And there are quite a number of statements in those pages that I do not agree with.

Q I understand that. Maybe you just can't do it.

A [Witness Wilson] I could make a statement regarding these conditions. I have not raised them as conditions that need to be satisfied to document qualification of the seal design for Farley.

During the hearing testimony, at one point, I attempted, quite forcibly, to distinguish between regulatory concerns and speculated failure modes, and that is still where I and the agency are coming from.

These are speculated failure modes that were primarily either elaborations of items in the inspection report or that were drawn out from me during the hearing the first time around.

I made a statement during that hearing that I didn't believe the licensee had to address all of these concerns. The transcript indicates that in the middle of that sentence, I was interrupted. So only the beginning and the end of the sentence are in the transcript.

But I've attempted to make that clarification repeatedly. Speculative concerns are not what EQ is about.

MR. MILLER: Go ahead, David.

WITNESS JONES: I am just appalled that I am being drug through irrelevant issues that don't apply to qualification of this component.

MR. MILLER: I think Mr. Wilson just gave us something, but we're not exactly sure what.

JUDGE BOLLWERK: Let me try a question and see where it leads. You've drawn the distinction between problems that rise to the regulatory level and those that are dealing in speculation. Am I correct in that -- drawing that distinction?

WITNESS WILSON: Well, the distinction I'm trying to draw is between satisfying regulatory criteria that are set forth in documentation and attempting to postulate how the seal might fail if it were tested or if it were analyzed. That's the distinction that I'm trying to draw.

JUDGE BOLLWERK: What we're concerned here with is a violation of the regulations that has been asserted by the staff. Maybe you can then tell us what concerns that you've identified make this equipment unqualified and, therefore, not in compliance with the regulation.

WITNESS WILSON: The DOR guidelines indicate that you must test for pressure temperature, steam. It states

that the test specimen must be identical to the plant equipment. It allows analysis for other parameters, which, incidentally, are not in issue because I have accepted that.

It requires documentation of those analyses. So what we are looking at is two types of areas where analysis is required to satisfy the DOR guidelines. One is where a test itself differs from the plant LOCA conditions. The other one is for what was tested in that test differs from the plant specimens.

I looked at IEEE-323-1971 to provide some level of guidance concerning the type of analysis that is required. It talks about identifying premises, having calculations, having data to be supported by the analysis.

When I looked at the tests that are provided now for the licensee as its basis for qualification, there's two more than there were during the inspection. This is one confusion factor. The submergence test wasn't mentioned at all during the inspection.

The applicability of the Raychem test of the boot over the cable was discussed very little. In the inspection report, in the NOV, we attempted to address the type of concern that was lacking in applying analysis to bridge the gap between the December 1981 Bechtel test and the plant conditions.

There was a test run in December of 1981. It did

not have steam; it did not have moisture; it did not have chemical spray. I think the analysis that's been provided to address the absence of those simply doesn't hold up. We've heard, for example, that there was a Raychem test in which a boot failed on a nipple.

It was determined in that test -- determined from that test that the only way the boot could fail on a pipe nipple in LOCA tests would be due to pressure due to the absence of backing for the boot.

I simply don't believe we have an analysis adequate to limit the differences between the test and the plant equipment in that case. That's a test report that isn't documented. We don't know what happened in it I subsequently have been told.

The differences with the Raychem test on a cable are substantial. I simply have seen the analyses to address those differences. The bond of the Raychem adhesive to the metal has not been addressed. We've heard about the adhesive being good. We've heard about the metal being good. We haven't heard about the bond.

The impact of the conduit compression adapter bearing on the Raychem material, we haven't heard what that does to the material. There is no indication of what it might do.

JUDGE BOLLWERK: Is that a regulatory matter or is

that a speculative matter, as you've described it?

WITNESS WILSON: To me, it's a matter of analyzing differences between the test specimen; namely, the boot on the cable, and the plant equipment. It is, to me, a regulatory concern. It's one of the differences.

JUDGE BOLLWERK: Can you give me any others?

WITNESS WILSON: It's not a speculative failure mode. Well, we talked about the metal versus the cable. We talked about the bonding. We talked about the backing. We talked about that.

These are examples of the sort of differences that exist. There may be more. In 1992, we started talking about the pipe threads or the pipe nipple threads into the limit switch. Our inspection did not attempt to exhaustively list the kinds of differences that should occur. The inspection was two years after the deadline. Documentation was required.

The purpose of the inspection was to review the documentation and then take advantage of the opportunity of the parties being together to discuss any concerns that arose.

In the absence of suitable documentation, that was very difficult. Similarly, in the December 1981 Bechtel test, there was no limit switch. The pressure and temperature were there, but in a simulated mode, not in the

mode that steam would provide.

We didn't have electrical measurements to determine what happened. I don't know what the acceptance criteria could be for a test like that yet. Again, this is the type of thing I think there should be some analysis for.

JUDGE BOLLWERK: Can you give me an example of what you consider a speculative -- as you've described, the difference --something that's speculative as opposed to regulatory.

WITNESS WILSON: Yes. When I was asked, for example, to postulate moisture intrusion modes through the seal into the limit switch, I could speculate as to how moisture could enter. To me, that is not the concern. The concern is to have the demonstration that moisture does not enter when push comes to shove.

I think for probably any of the issues that are listed here in the licensee's surrebuttal --

JUDGE BOLLWERK: On Pages 82 through 84?

WITNESS WILSON: Yes. I think probably for every one of them, what we're doing is addressing a speculative failure mode by opinion.

JUDGE BOLLWERK: So how those do or do not relate to the regulatory violations we're concerned with here.

WITNESS WILSON: As examples of the types of failure modes that could occur with the seal in a LOCA

environment. And the concern is if you don't test the seal in the LOCA environment, then you have to address the differences between what your tests do cover and what the LOCA environment could cause.

JUDGE BOLLWERK: I guess I'm confused because it sounds to me like the speculations are supporting the regulatory violations, but maybe I'll just leave it at this and we'll go on.

Mr. Miller?

MR. MILLER: All right. I'm going to try this.

BY MR. MILLER:

Q If -- well, no. Let me try it this way. Suppose we wrote out the engineering judgment and analysis that has been described throughout the testimony, both oral and written in this hearing. If we did that, would you agree that, in principle, it could qualify the item we've been discussing?

A [Witness Wilson] Not unless there is a factual content that I have not heard as yet.

Q We couldn't write anything about this configuration that would satisfy you, then.

A [Witness Wilson] Not unless you introduce new information in that I've heard to date.

Q All right. And we're going to do a slight change. What you've told us is that we cannot qualify this

configuration unless we do a full-blown LOCA test.

A [Witness Wilson] No, I haven't told you that.

Q In principle, Mr. Wilson, can a reasonable EQ engineer take the documents that Mr. Love testified we rely on for qualification and write an analysis of his engineering judgment that would satisfy the regulatory requirement?

A [Witness Wilson] If the analysis only encompassed engineering judgment, I would be very skeptical.

MR. MILLER: Mr. DiBenedetto, same question -- well, let me back up. I take it your position is that you don't have to write anything else. The reasonable EQ engineer can take those reports and reach the qualification conclusions.

WITNESS DiBENEDETTO: Based on the criteria that was in force in the [illegible] to 1981 time period, that's correct. In today's standards, more would have to be written. I agree.

MR. MILLER: Fine.

BY MR. MILLER:

Q I want you to turn to Page 20 of your rebuttal testimony.

A [Witness Wilson] I'd like to throw in a comment, by the way. I have no quarrel with what Mr. DiBenedetto just said.

Q That the level of documentation expected now is far more detailed than it was back before 1985.

A [Witness Wilson] No. He said 1981.

Q How about -- I'll ask you this. Is the level of documentation expected now more detailed than back in -- November 30, 1985 and --

A [Witness Wilson] No, not in my opinion.

WITNESS DiBENEDETTO: Can I just add to that?

MR. MILLER: Yes.

WITNESS DiBENEDETTO: What I was alluding to basically -- at the time period when this document was prepared, and for all intents and purposes, Alabama Power Company concluded that when they had finished preparing that document, that piece of equipment was qualified and that was the end of the issue. Unless something new came up, that level of documentation would have sufficed for qualification even in the 1985 timeframe, not in the 1992 timeframe.

MR. MILLER: All right.

BY MR. MILLER:

Q Mr. Wilson, one of your corrections referred to the unspecified tubing length as an additional example of assembly operations.

A [Witness Wilson] This was Page 20.

Q Page 20. Yes, sir.

A [Witness Wilson] Of the sur -- of the rebuttal.

Q Yes, sir. Drawing on your category of speculative, is this an example of speculation as opposed to a regulatory requirement.

A [Witness Wilson] The position of the bottom of the tubing?

Q Yes, sir.

A [Witness Wilson] The drawing I was presented during the inspection, as your surrebuttal pointed out, said bottom of the tubing in the cavity. So when I stated otherwise in my rebuttal, that was simply an incorrect statement.

Q Well, okay.

A [Witness Wilson] The unspecified tubing length, now, is one little example of the path that we've gone down which is under the overall heading of controlling the design in the plant to be the same as the design that was tested. It's just one very small example of that.

Q Is it an example of one of what you have described as your speculations or is it an example of a regulatory requirement?

A [Witness Wilson] There's a requirement in the DOR guidelines that the plant equipment and the test specimen be identical or the differences analyzed and the analysis documented, Section 5.2.2.

Q Okay. All right. Let's see if we can get to the

end of this. Do you have any -- I won't ask it that way. Let's try this. Have you done any investigatory work about the bonding issue of the Raychem sleeve on metal that we have not already heard about?

A [Witness Wilson] I contacted Raychem to ask them about the bonding concern.

Q And to whom did you speak at Raychem?

A [Witness Wilson] When I called them, I talked to John Hoffman, who is their Nuclear Marketing Manager. The following week, I was called by Ken Baker, who is their Product Manager.

Q And did Mr. Baker tell you that Raychem was -- would invalidate Alabama Power Company's test?

A [Witness Wilson] Basically, I think he and I concluded two things. One was that they have no information that, by itself, would invalidate your position on the seal. The other conclusion we made was that they have no information that would establish environmental qualification of your seal.

Q He told you that qualifying the seal is not up to them, is that true?

A [Witness Wilson] Correct.

Q All right. And you also said that Raychem, when contacted by you, said they have no information that would invalidate our position on bonding.

A [Witness Wilson] In fact, on overall qualification of the seal, yes.

Q When did that occur?

A [Witness Wilson] I called them early this month. They called me back last week.

Q Having gotten that piece of information from Raychem, do you still contend today that the bonding problem justifies the civil penalty that is at issue here?

MR. HOLLER: I object to that. Mr. Wilson is here to testify to the technical aspects of the violation, not to have the civil penalty --

MR. MILLER: Why don't I change the question slightly.

BY MR. MILLER:

Q Justifies a violation of EQ requirements. That the bonding problem justifies a violation of EQ requirements.

A [Witness Wilson] If that were the only concern that I, as the reviewer on the seal, had? If that were the solitary concern?

Q Yes, sir.

A [Witness Wilson] I don't believe that it would be my opinion that that would be a Severity Level 3 violation by itself.

Q Would it be an EQ regulatory violation? Having

learned what you learned from Raychem last week, focusing on bonding, can you tell us whether or not you still contend that bonding problem is an EQ regulatory violation?

A [Witness Wilson] Yes. In the absence of the demonstration of it, I would. It's critical to the function of the seal.

Q And the reason you so contend on the bonding problem is there has been no demonstration such as you've described.

A [Witness Wilson] That's correct. Either a test or a test supplemented by analysis to show that the bonding would be present.

MR. MILLER: I'm going to show you what we've marked for identification purposes as Alabama Power Company Exhibit 129 and ask you to look at that, please, sir.

I will identify it for the record as a three-page document, Page 1 being the fact sheet from Raychem to Mr. DiBenedetto; Pages 2 and 3 being the results of a -- I'm sorry -- documents from the Raychem telephone log reporting on the conversation between Mr. Wilson and Mr. Baker.

I ask you to look at that, Mr. Wilson, and the purpose of your examination is to tell us whether or not this document accurately and fairly reports on the results of your conversation.

JUDGE BOLLWERK: Let the record reflect that APCO

Exhibit 129 has been identified.

[APCO Exhibit No. 129 was marked for identification.]

MR. MILLER: We have copies for the Board.

WITNESS WILSON: Yes. I think that's fair.

BY MR. MILLER:

Q Mr. Wilson, I'm sorry. I was distracted. Did you say, yes, that does accurately depict the conversation?

A [Witness Wilson] Yes. I think that's fair.

MR. MILLER: Judge Bollwerk, could we have just a few minutes? Could we have just a few minutes?

JUDGE BOLLWERK: Yes. Long enough for a five-minute break?

MR. MILLER: Yes. Why don't we do that.

JUDGE BOLLWERK: Let's take a five-minute break and be back in approximately five minutes.

[Recess.]

MR. MILLER: We have no further cross examination.

JUDGE BOLLWERK: You still wanted this marked as Exhibit 129, then?

MR. MILLER: I'm sorry. We did have it marked, I thought, for identification purposes as Exhibit 129.

JUDGE BOLLWERK: Right. But you had no other questions on it, other than the one you asked him.

MR. MILLER: I think he said that does accurately

depict this conversation.

BY MR. MILLER:

Q Mr. Wilson, let's make sure that the record is clear.

A [Witness Wilson] Yes. We discussed some other things, but these are basically the conclusions that we agreed to. Yes.

MR. MILLER: At this time, then, we would move the admission of Alabama Power Company Exhibits 126, 127, 128 and 129.

MR. HOLLER: No objection.

JUDGE BOLLWERK: All right. Then the record will reflect that Alabama Power Company Exhibits 125, 126, 127, 128 and 129 are received into evidence.

[APCO Exhibit Nos. 125 through 129, inclusive, were received into evidence.]

JUDGE BOLLWERK: I think, Mr. Holler, if you have additional cross examination for the APCO panel, why don't you go -- I'm sorry. Do you have any redirect?

MR. HOLLER: Yes, I do.

JUDGE BOLLWERK: Redirect first. I apologize.

MR. HOLLER: If I may, just a few redirect.

REDIRECT EXAMINATION

BY MR. HOLLER:

Q Mr. Wilson, let me stay on APCO-129, since that's the most recent thing you've discussed. I'll ask you, on Page 1 of the telephone conversation memo, under the section entitled "Action, Raychem has no EQ data on breakouts over pipe threads or failure of product; i.e., splitting" -- am I reading this correctly -- "through the sharp edges during type tests."

I would ask you, sir, in your opinion, having spoken to Raychem on a number of occasions, what does that statement say to you?

A [Witness Wilson] I think it says that they have no information that would categorically refute a demonstration of qualification by a stomer of this boot on a metal pipe nipple. From the negative direction, it's open-ended with regard to whether Raychem has that demonstration of qualification or not. And that was why we had another conclusion regarding qualification.

Q When you say "we," sir, meaning?

A [Witness Wilson] Ken Baker, of Raychem, and I. Conclusion 2, it says -- I'm sorry. Conclusion 2 basically said they cannot show environmental qualification.

Q Any other comments that you have with regard to this telephone conversation that's been identified as APCO Exhibit -- admitted into evidence as APCO Exhibit 129, sir?

A [Witness Wilson] No.

Q Mr. Wilson, in your testimony during cross examination, several times you referred to "my standards." I wonder if you could clarify for the Board what you meant by that statement.

A [Witness Wilson] Yes. Mr. Miller's questions were generally of the nature of, Mr. Wilson, what is your standard for thus-and-so-on. In responding, I presented what I believed to be the agency's position and not merely a personal approach.

Q Finally, Mr. Wilson, let me ask you a question that's been asked several times, but we've had a number -- an additional amount of testimony afterwards. So with that in mind, I'll ask you at this point if you could succinctly state for us what your concern is and, if possible, distinguish that from what I believe you referred to as the failure mechanisms that have been discussed.

A [Witness Wilson] My concern is that the licensee has not satisfied the regulatory criteria for documenting qualification of the Raychem/Chico seals. We've discussed a number of possible failure mechanisms that could result from that lack of demonstration.

MR. HOLLER: That's all I have for redirect, sir.

RECROSS EXAMINATION

BY MR. MILLER:

Q It's a document question, right, Mr. Wilson?

That's what we're here on, a document question.

A [Witness Wilson] I think not at this point, where there's been four years to present a story. I think it's a question of whether there is a story. There's been ample opportunity to document what the story is.

Q All right. November 1987, it was a document question. A piece of paper wasn't there.

A [Witness Wilson] No. Demonstration of qualification wasn't there. The technical argument was not there. The test data were not there.

MR. MILLER: Okay. Nothing else, Mr. Wilson.

JUDGE BOLLWERK: Is there anything further?

MR. MILLER: NO.

JUDGE BOLLWERK: All right. If you'd like, do your cross examination now of the APCO Board and then we'll have Board questions.

MR. HOLLER: Yes, sir.

CROSS EXAMINATION

BY MR. HOLLER:

Q Mr. Miller began this morning with a clean, unplowed field, and I kind of look here -- there's a lot of tractor marks, but let me see. I think there's still a few questions just by way of clarification.

I will ask this of the APCO panel. Reference was made in your testimony on Page 70 to the IEEE Standard 323-

1971, and I believe at least Mr. Sundergill, if not others, have, at one point, referred to IEEE-323-1974.

Just so we're clear, does APCO agree that IEEE-323-1971 is the standard of concern here with regard to the discussion?

A [Witness Sundergill] Yes That's the standard of concern.

Q Let me direct your attention to your testimony at Pages 96 to 97, and, in particular, your testimony regarding Chico A. Is it fair -- I'm sorry. I'm particularly referring to questions numbered 64 and 65.

I notice that, Mr. Love, I believe you point out that the procedures call for withdrawing a certain amount of Chico A, two to three ounces. That's correct?

A [Witness Love] Yes, as stated here.

Q And the procedure calls for injecting one-and-a-half ounces into the pipe nipple.

A [Witness Love] That is correct, as stated here.

Q And then you also point out that if the installer were to inject more than an ounce-and-a-half, it would spill out. Is that correct? It would overfill the [illegible]nt --

A [Witness Love] I don't believe I said that here, but --

Q I'm sorry. I don't mean to put words in your mouth, but is that --

A [Witness Love] I think what we were talking about here is there was a -- Mr. Wilson, I believe, had raised a question in his rebuttal testimony concerning no instructions to direct the installer to perform a visual inspection.

And what we were talking about here was why we felt that visual inspection was self-evident by the procedure itself and the fact that the installer had to be looking at the injection process and there were instructions to tell him not to overfill the nipple so that the Chico would go into the switch housing.

Q Is it fair to say, though, that there were no instructions that cautioned the installer about putting in -- pardon me -- not under-filling the switch, of putting in not enough Chico into the switch or into the assembly?

A [Witness Love] That's where the injection of one-and-a-half ounces. The quantity was specified.

Q As no more than one-and-a-half ounces.

A [Witness Love] Well, you asked me about under-filling.

Q That's correct, sir. I understand your testimony that there was an instruction that no more than one-and-a-half ounces be put in.

A [Witness Love] The basis for that is that one-and-a-half ounces would provide an adequate fill.

Q I understand that, sir. My question to you is was there a similar caution to make sure that at least one-and-a-half ounces or no less than?

A [Witness Love] I believe it says that. I believe the procedure says that.

Q I think I'm miscommunicating with you. I'll try it once more. You were referring to the statement here, the inclusive note specifying that it is important that no more than one-and-a-half ounces of Chico is applied to each switch and that no Chico finds its way to the switch materials.

Is that correct, sir?

A [Witness Love] The implication is that one-and-a-half ounces is the minimum quantity into the pipe nipple.

Q Is the minimum quantity, even though the statement is no more than one-and-a-half.

A [Witness Love] The only reason for the no more than statement was just to avoid overfilling the switch and that -- so that -- overfilling the nipple so that no Chico would go into the switch housing, and that was also a cautionary note.

A [Witness Jones] Just to add. When this question was raised by Mr. Wilson, in addition, we went back, as we have testified in our surrebuttal, discussed this with the electricians and they have verified and assured us that

after they inserted the Chico, they did a visual verification that the Chico filled up the nipple up to the level defined by the housing.

A [Witness Love] And I would also like to say, I don't have the whole procedure sitting here in front of me, but I believe the Step 7 is the step that indicates injecting one-and-a-half ounces, as I've stated in my answer.

Q This is APCO Exhibit 104 that's been marked and admitted into evidence here.

A [Witness Love] APCO Exhibit 104. I'm now looking at it and Step 7 does, in fact, say inject one-and-a-half ounces into the pipe nipple, then carefully withdraw the tube.

Q Fair enough. So your testimony, then, that would be the instruction that would ensure that it would be a minimum of one-and-a-half ounces.

A [Witness Love] Of one-and-a-half ounces. That is correct.

Q Let me go to Mr. Jones. Mr. Jones, you mentioned that you spoke to the electricians very briefly. Can you tell the Board how many electricians were involved in the initial installation at Farley?

A [Witness Jones] I can't tell you the specific number, but talking to the lead electrician that did the

installation and also went over to Region II in early 1988 with me, there was a very few number. Basically, one guy that we discussed did all of the Unit 1 work and he and a couple of other guys, in his term, did all the Unit 2 work, the reason being they wanted to make sure that we were consistent in our installation.

Q So it is your testimony that one -- one and two?

A [Witness Jones] Yes. A very few number.

Q And you spoke to the one electrician from that very few number.

A [Witness Jones] Yes.

Q Okay. Do you recall how many assemblies, seal assemblies were involved that were filled for the units, if you know, sir, or if it came up in your conversation with the electrician.

A [Witness Jones] I can give you another ballpark number. In the range of, I believe, 75 per unit.

Q Do you recall, sir, if this was the number when you discussed it with the one electrician?

A [Witness Jones] I didn't specifically ask how many he installed specifically, but I related to you earlier what our discussion was.

Q But you can tell us that at least for the ones, however it may have been, that he installed, he related to you that he would conduct this -- let me characterize it as

-- would take a visual look at it in the field, visually verify that Chico filled up the nipple.

A [Witness Jones] Yes, sir.

Q Before I leave that, on Page 97 of Mr. Love's and Mr. Jones' testimony, that first full paragraph, there's a sentence at the end of it. This seems to be an allegation motivated by something other than a genuine realistic technical concern.

Are you with me where I'm at?

A [Witness Jones] Yes, sir.

Q And I just wanted to clarify something. You're not suggesting to me that Mr. Wilson is alleging that technicians didn't follow the procedure by this, are you? I'm a little troubled, I guess, by what that statement means.

A [Witness Jones] What we're saying here is that this issue came up well as in -- did not come up until we got well into this hearing proceeding, as I understand. It was raised during the inspection. I don't know why it was brought up. It wasn't a relevant issue at the time of the inspection, as far as I knew.

Q And that's the intent of what that statement is to meant to mean.

A [Witness Jones] Yes. Just another speculative argument, not related to meeting the regulatory

requirements.

Q Okay. Let me pick up on a couple of other items.

WITNESS WILSON: May I comment before we leave this item behind?

MR. HOLLER: Please do, sir.

WITNESS WILSON: The inspection report, on Page 41, the second item No. 1, says that drawing number umpty-ump does not control a minimum quantity of Chico mixture. It specifies injecting one-and-one-half ounces into the pipe nipple and it cautions against using more than one-and-a-half ounces to ensure against forcing the mixture into the limit switch housing.

The point of the concern here was that first a nominal quantity was specified without tolerance. There was no minimum quantity specified; merely a nominal without tolerance. Secondly, there was a caution against using too much. I still don't concede that there is an implied visual inspection requirement here, not to use too little.

There is no minimum quantity specified. There's no caution not to use too little.

WITNESS JONES: I submit if this issue had been raised during the inspection, we would have brought the electrician to talk to Mr. Wilson, discuss this and about how he visually inspected it.

When it came up in 19-whenever, not only myself,

but this lead electrician and his supervisor went to Region II and discussed how we put these things together, because I did not want to leave any room for interpretation between my discussion and the NRC. I wanted them to hear it from the electrician, and that's what we did.

So I don't understand why it keeps being brought up.

WITNESS LOVE: I think another thing that we've already talked about previously in these proceedings are that the nature of the purpose of the Chico in the seal does not make it such that we have to be measuring this to very, very precise scientific graduations around one-and-a-half ounces.

I mean, it just simply does not warrant that type of a measurement. And I believe we've talked about that previously.

WITNESS WILSON: I think the procedure speaks for itself, regardless of what technicians testified to what they may actually have done. With regard to being precise and scientific, I agree this is not that type of an installation.

I think the fact remains that the procedure specifies no minimum quantity and it does specify a caution against using too much.

WITNESS LOVE: I will simply say --

WITNESS WILSON: And the concern again was raised in the inspection report, not yesterday.

MR. HOLLER: Why don't we move on and let me move to a different area. Just a few questions to tidy up on the compression adapter. I refer you gentlemen to your testimony on Page 105.

BY MR. HOLLER:

Q In particular, Question 72 and your answer, Mr. Love, particularly your second paragraph of your answer.

A [Witness Love] This is Question 72.

Q Yes, sir. Is it fair to say that the -- in your testimony, you testified that the compression adapter is not part of the seal and it is not intended to serve any sealing function, is that correct?

A [Witness Love] That is correct.

Q Does it provide any moisture barrier?

A [Witness Love] No, it does not.

Q During the testimony, I believe you, as well as Mr. Sundergill and, before, Mr. Jones had referred to a January 1988 letter, Staff Exhibit 47. This is the January 8, 1988 letter. I don't know if you have that there.

A [Witness Jones] What staff exhibit is that?

Q Staff Exhibit 47.

A [Witness Jones] I think it's in this book.

Q If all of you gentlemen have that, in particular,

I'm referring to what would be the Attachment 1 to that letter. Let me strike that and ask, first of all, is that the letter that you have made reference to before as describing the seal and answers regarding the seal? Start with Mr. Jones.

A [Witness Jones] You're talking about the --

Q January 8, 1988 letter to Mr. Varelli from Mr. R. Keith McDonald.

A [Witness Jones] Yes. This letter provides our argument on ceiling integrity of the Raychem/Chico configuration, that's correct.

Q Okay.

A [Witness Jones] As we understood the issue at the exit meeting. This letter tried to address that concern.

Q Okay. Now I direct your attention to Attachment 1. In particular, on Page 2 of Attachment 1, the discussion begins under Roman II, FNP Configuration.

A [Witness Jones] Yes.

Q I'll ask you to read the third sentence under Section II that begins with "To provide additional."

A [Witness Sundergill] To provide additional assurance that moisture will not enter the limit switch, three additional barriers have been applied to the FNP configuration." Do you want me to keep on?

Q Yes. Just continue with what those three

additional ones are.

A [Witness Sundergill] They are, one, Raychem breakout boot, Part No. 502A823-52/144; Item 2, keeper sleeve (Raychem); Item 3, compression adapter clamp.

Q Am I correct that that's the same compression adapter clamp as the compression adapter that's referred to in Mr. -- I'll ask Mr. Love -- in Mr. Love's testimony?

A [Witness Love] This is referring to the complete assembly. May I have a minute to read this?

Q Surely.

A [Witness Love] We've had We've had a chance to look at this. If I might, these particular words were prepared by Mr. Sundergill, if I could let him explain those. Then I'll direct any additional comments back to my testimony that you have on my testimony in relation to this document.

Q That's fine. The question before you is are we talking about the same compression and adapter.

A [Witness Love] Yes. This is the configuration of the assembly. That is correct.

Q So then I'll ask Mr. Love -- pardon me -- Mr. Sundergill, when you put these words down in January of 1988, was your intention to convey that the compression adapter clamp provided part of the moisture seal or was at least an additional barrier applied to the Chico/Raychem -

-

A [Witness Sundergill] As we've stated here, this is an additional barrier. It's another conservatism that we haven't discussed in our conversation. The configuration at Farley has the Raychem boot, as shown in a cutaway example -- I don't have the example exhibit number -- it has that configuration. Then on top of it is what Raychem calls a keeper sleeve, a straight cylindrical piece of heat shrink material which is put over top of the entire assembly. That's Item No. 2 that's shown here on Page 2 of the attachment to Staff Exhibit 47.

Over top of that keeper sleeve is a compression clamp assembly which clamps around the keeper sleeve so that flex conduit can go into it. By virtue of this configuration, spray and any forms of moisture are significantly cut down from impacting the Raychem boot itself.

For the purpose of this discussion, to try to simplify things, we haven't even talked about this additional margin of conservatism. But in the Raychem test that was done that we talked about earlier today with the 12 pipe failures or the 12 pipe specimens, this adapter wasn't there.

So we tried to limit our discussion comparing one configuration to another. Our configuration at Farley has

additional barriers, and that's what we have meant in this January 1988 letter, additional barriers above and beyond what is absolutely required.

Q Then I'll ask Mr. Love should the -- was it unreasonable for Mr. Wilson to question whether or not the qualification was incomplete because the compression adapter adopted a specific number. Is that not part of the seal?

A [Witness Love] No. What we're trying to contrast here is in terms of the test reports that we've discussed earlier, the barrier to the moisture is the cable breakout boot over the nipple. That is the qualified barrier to the moisture intrusion into the switch provided by the Chico backing.

What Mr. Sundergill is referring to is by the nature of the design, there are other aspects of it that one could take credit for for enhancing that barrier. The clamp, however, is not essential to the primary barrier, which is the cable breakout boot.

Q My question to Mr. Sundergill, then, is it unreasonable that the NRC would not have read this letter on January 8, 1988 and thought that you were taking advantage of that additional moisture barrier?

A [Witness Sundergill] Well, we certainly are taking advantage of it to the extent that the testing that was done in the three tests that we've talked about exposed

the conduit seal directly to the environment, and we are, in our installation at Farley, not exposing it directly to the environment. So there's an added measure of conservatism there.

That's why I would refer to this as additional barriers.

Q All right. Now let me go over to Page 106. I guess what I'm trying to get at, sir, is whether or not you tested it with or without.

A [Witness Love] In which test?

Q Let's go back and see what's been identified as Staff Exhibit 39, one of the tests relied on, and that would be the Raychem test on cable.

Am I correct that there was not a compression adapter in that --

A [Witness Love] In the Raychem test, there was no compression adapter. That is correct.

Q Let me go down on the December 1981 Bechtel test. Was there a compression adapter?

A [Witness Love] Yes, there was.

Q But now the Bechtel test in 1981, which has been identified as Staff Exhibit 33, had an absence of steam. Is that correct?

A [Witness Love] The --

Q It was only a --

A [Witness Love] As we testified to earlier, the December 1981 test was a pressure/temperature test. That is correct.

Q One last question before I leave. It's fair enough to say, then, that with the compression adapter, the seal has not been tested for one of the -- what has been described as the three primary LOCA conditions -- temperature, pressure and steam.

A [Witness Love] I would like to make a comment on that.

Q Please.

A [Witness Love] In the cable configuration, by the nature of the breakout boot over the cable, the end of the portion of the Raychem boot where the failure was postulated to occur or did occur in the preliminary Raychem testing, that portion of the Raychem boot would have been exposed to all of the conditions of chemical spray, pressure, temperature, complete LOCA testing.

In our December 1981 test, that portion of the boot was also exposed to pressure, temperature, the mechanism which was demonstrated to have caused the failure.

Q Let me ask this. With a compression adapter in place, is it possible to see all of the boot?

A [Witness Love] I'm sorry?

Q With the compression adapter in place --

A [Witness Love] I believe by looking at it, you can see that the compression adapter does not enclose the -- it only comes in contact with the sleeve at the bottom and towards the switch end of the nipple. It is open basically to the environment other than that from the end there where Dick is pointing.

Q Okay. Open to the environment. But can one see -- physically, if one were to look for flaws or cuts or nicks on the boot, could one see it with the compression adapter in place?

A [Witness Love] If a cut or nick were there, it would be under the portion where the clamp attaches to -- well, actually further back. If you go back to the -- that way. Back one more. There you go. That is the only area where the clamp comes in contact with the keeper sleeve. So that would be the -- okay.

This area is the only area where the clamp comes in contact with the Raychem products, at this point right here, and this is the keeper sleeve. So it would come in contact with the keeper sleeve and be compressing the keeper sleeve to the nipple.

Again, I'm going to say if there were -- and I observed no such conditions in any of our installed applications. But if there were to be a nick that would result from this, it would be on the keeper sleeve in this

area right here, not on the boot which is under the keeper sleeve, which is in this area.

Does that answer the question?

Q I think. What I was getting at is that the compression adapter does cover a portion of the boot, though. Is that not true?

A [Witness Love] Yes. But it you -- not the boot. The Raychem boot is covered by the keeper sleeve. That keeper sleeve is up over the nipple. This compression fitting has one point of contact with the keeper sleeve, compressing it against the nipple.

MR. HOLLER: Okay. Let me ask Mr. Wilson, who is much more familiar with it, if he has any comment on that.

WITNESS WILSON: Back to a two-part comment. I'll try to keep this short.

JUDGE BOLLWERK: For the record, this is all referring to APCO Exhibit 103.

WITNESS LOVE: I'm referring to APCO Exhibit 103, that's correct.

WITNESS WILSON: I'm back to wanting to say the regulation is satisfied. Section 5.2.6 of the DOR guidelines, under the heading "Installation Interfaces," says the equipment mounting and electrical or mechanical seals used during the type test should be representative of the actual installation for the tests to be considered

conclusive.

Beginning with the Raychem/Wyle type test of the cable, it didn't have any compression adapter. So reliance on that test with respect to the compression adapter requires some analysis.

With respect to the Bechtel 1981 test of the design, it was only pressure and temperature, as we've discussed. I think the analysis of the impact of other environmental parameters on the adapter needs to be considered.

That's the first part of my comment. The second part, this concern about the adapter not being specified, again, it's in the inspection report at Page 42. In fact, it pointed out conflicting specifications for adapters in different documents that I saw.

On Page 40, the inspection report indicated that this adapter must be considered a negative influence on the integrity of the seal until shown otherwise.

The manner in which the adapter bears on the Raychem sleeve and the importance of that Raychem sleeve in the functioning of the seal, in my mind is a big question mark. It becomes worse.

When I look at the surrebuttal testimony, at the bottom of Page 105, and read that in the field, several different manufacturers' clamps were used on these limit

switches to attach the flexible conduit, this is bringing in elements of design control and analysis the differences between plant equipment and tests that were performed.

That's the end of my comment.

WITNESS LOVE: Let me just ask a question of the Board. I believe that we have addressed all of these issues before. If the Board will like, I will -- or if they have a specific question, I will address that specific question, however you want to do this.

But we have addressed all of these issues before.

JUDGE BOLLWERK: We don't have anything. If you feel that you've adequately said what you need to say --

WITNESS LOVE: In our written testimony.

JUDGE BOLLWERK: All right. We'll leave it at that, then.

BY MR. HOLLER:

Q Let me move on to another compression issue, but not the compression fitting. I'm referring to the testimony on Page 101 -- actually, it begins on Page 100. It's the answer to Question No. 69 regarding compression of the Chico compound.

A [Witness Love] I'm sorry. What page are you on?

Q Ninety-nine is where your answer began, sir. It actually was on Page 101 where you discuss -- the first full paragraph begins about the middle of that page and making

reference to Mr. Wilson relying on the Southwest Institute testing of the explosion-proof fittings, the idea that compression is necessary.

A [Witness Love] Okay.

Q Maybe I'll say this before -- refresh yourself, of course. But I'm asking, sir, first of all, at this point, is Alabama Power Company offering the Southwest Institute tests for other than radiation testing of the Chico compound?

A [Witness Love] No, sir.

Q Then I withdraw -- well. That's fine, then. If that portion of the test is -- I'll defer to Mr. Wilson if he has any comment on that.

WITNESS WILSON: That was my impression that the only reliance on the Southwest Research Institute test report was for radiation. I'd like to comment on the concerns just a bit.

I could again succinctly try to clarify something that we addressed earlier in this regard. We're talking about whether the Chico cement supplies adequate backing to overcome the concern that was raised by the undocumented Raychem test initially, where a boot failed over a pipe nipple.

In that case, the LOCA test -- let me call it A -- produced an effect, which I will call B; namely, rupture of

the boot. Bechtel then performed another test, which I'll call C, a December 1981 pressure/temperature test which produced the same effect B.

I don't believe this establishes that B equals A. Two things that produce the same result are not necessarily themselves equal.

I bring that up in this regard because I'm not convinced that --

JUDGE MORRIS: A technicality, Mr. Wilson. I think you meant C equals A.

WITNESS WILSON: Thank you, Judge Morris. You're keeping me honest. Yes, I did. The reason I bring it up here is I'm not convinced that the December 1981 test adequately challenged the ability of the Chico cement mass to remain in place and provide adequate backing during an actual LOCA.

It's one more area where we don't have the evidence. Specifically, there is no evidence that I've seen that shows that Chico cement will bond to the steel nipple.

WITNESS LOVE: I think we've already addressed this, but I'll be glad to comment on it, if you'd like.

JUDGE BOLLWERK: Again, it's up to you. If you think that what you've said is sufficient, then --

WITNESS LOVE: I think that what we've said is sufficient, unless you have a question.

MR. HOLLER: If I may have just two minutes.

[Pause.]

MR. HOLLER: I don't want to go over ground we've already gone over on the test, but I do have one question. That's, again, referring to what's been identified as Staff Exhibit 33, the 1981 Bechtel test.

WITNESS JONES: We're there.

MR. HOLLER: Let me refer you to Bates No. 005547.

WITNESS LOVE: I'm there.

BY MR. HOLLER:

Q If you would, sir, under Background Roman II, if you would read for me the first sentence.

A [Witness Love] On Background II?

Q Yes, sir.

A [Witness Love] Okay. On Bates 005547.

Q Correct.

A [Witness Love] "Information tests conducted by Raychem on a similar, but not identical configuration of the seal suggest a possible failure mode due to prolonged elevated temperature with a subsequent application of pressure."

Q Okay.

A [Witness Love] Do you want me to continue to read

Q No, sir. That's fine. I mean, please feel free,

as much as you'd like, but that's what I --

A [Witness Love] Although the Raychem --

Q If you want to.

A [Witness Love] I will. I'll read the whole sentence if -- I mean, the rest of the sentence. "Although the Raychem breakout is fully environmentally qualified, the configuration employed by FNP is somewhat different than the qualification configuration. This test will demonstrate the adequacy of the FNP configuration."

Q Earlier, you testified that your analysis to the test that was not -- has not been admitted as -- this is the Raychem test on the nipple that has not been admitted as an exhibit here, was included in APCO-33. Is that correct, sir?

A [Witness Love] It's referenced in this exhibit, as I've just read. Yes.

Q Yes, sir. My question to you is is this the extent of your analysis of that other test or am I missing something else?

A [Witness Love] I think if you go back and read the whole report, starting with the introduction, I believe that -- let me go to Paragraph 4 of the introduction on Page 1, which is Bates 005530.

Q 005[illegible] --

A [Witness Love] I believe that's it. It's

handwritten into my copy, 005530. I believe that's the Bates number.

A [Witness Jones] Three-four.

A [Witness Love] It may be 34. No, 34 is the first page. It's 35 then, excuse me. Yes, it's 35. Excuse me. It's handwritten into my copy.

Q I'm with you, if everyone else is. Yes, sir. Paragraph 4.

A [Witness Love] Well, I'll skip over the -- I mean, I can read the whole introduction, if you'd like.

Q No. Just the point of where --

A [Witness Love] The failure mode identified by Raychem occurred when the seal was at elevated temperature and pressure. Because of the elevated temperature in excess of 300 degrees Fahrenheit, the heat shrink material undergoes a phase change wherein the mechanical strength is reduced.

In addition, the adhesive becomes fluid and starts to flow. As a result, the unrestrained conductors of the Raychem test specimen were forced to the breakout due to the pressure. In some cases, the breakout legs were inverted. Also, the seal boundary was breached due to the over-stressing of breakout material.

After being informed of the matter, Alabama Power Company requested that tests be performed to establish the

adequacy of the Farley configuration.

Q Again, my question to you is that --

A [Witness Love] This whole -- let me just explain it this way. This complete document, Staff Exhibit 33, is it. That is what explains the relationship to the Raychem problem which was experienced in the informal testing and it makes the coupling to the original cable qualification report, which we've already talked about earlier.

So this is a part of the composite of all the test reports.

Q I understand that, sir. But I want to be absolutely clear that we're aware of those parts in Staff Exhibit 33 that form your analysis of this unidentified Raychem test. So if there are any other places in there, please identify them for us now.

A [Witness Love] You're going to have to give me a minute.

Q Yes, sir. Please do.

A [Witness Love] May I just ask for a clarification? Are you referring to the links to the original test that we are taking credit for --

Q No, sir.

A [Witness Love] -- or just regarding the anomaly.

Q Regarding the anomaly, yes, sir.

A [Witness Love] May I start again with the Bates

page?

Q Yes, sir. Just so we're clear, you're going to identify for us those portions of Staff Exhibit 33 that constitute your analysis of the anomaly in the --

A [Witness Love] Well, I don't want to say constitutes the analysis. I want to say constitutes the link. I thought you were asking for reference to or a link to the anomaly or the failure that Raychem had.

Q Just so we're clear, I think the earlier testimony was -- I had asked if I were to -- any analysis or any information I had or wanted to review would be in APCO-33.

A [Witness Love] I'm stating, though, from the standpoint of an analysis or information dealing with the total issue as it relates to this informal failure, then I would contend that that is the intent of Staff Exhibit 33. So you have to look at it in its entirety.

Q Okay. I just want to make sure, then, perhaps, then, if you want to refer to link parts, I want to see those parts that I would use if I were to go to the information or the data, the assumptions that I would apply per IEEE-323-1971 in applying this analysis.

I don't mean to confuse you with the question.

A [Witness Love] I think you have. You've asked me a different question now, I believe.

Q Let's make that the question, then. What I'm

looking for is the information that would be in here that, as an engineer, you would to into to look if you were to come upon this and try to determine the qualification of the seal using this as a basis, and, in particular, with reference to the anomaly in the Raychem test.

A [Witness Love] I would start with the introduction. I would say all of the introduction is applicable to that.

Q Okay.

A [Witness Love] I would say the test philosophy is applicable to that. I would say that the test procedure and results and conclusions are all applicable to that criteria.

Q Okay, sir. Again, so we're absolutely clear, I'm looking for things that -- the data used to support the qualification of the equipment by analysis. I'm just reading from what's been identified as APCO Exhibit 37, the IEEE-323-1971 standard, and, in particular, under 5.4 Analysis. I'm just looking for that information.

A [Witness Love] What I have defined, I believe, is the answer for that.

JUDGE BOLLWERK: Let me just ask one question. The reference of 005539, is that report referenced there?

WITNESS LOVE: It's referenced by Item No. 3, if I understand your question correctly.

JUDGE BOLLWERK: That Reference 3 is --

WITNESS LOVE: Is EDR-5033.

JUDGE BOLLWERK: -- the report that is not in evidence.

WITNESS LOVE: That is correct. This is the Wyle report. Hold on a second. I didn't understand your question. Repeat it.

JUDGE BOLLWERK: The report that has not been -- we talked about earlier -- has not been received in evidence here and that APCO is not relying on, is that in this reference?

WITNESS LOVE: No, it is not.

WITNESS SUNDERGILL: To the best of our knowledge, Raychem did not prepare a report on that. They did some testing. They had a failure during the testing. They informed us about it. If they've done a test, they haven't prepared a test report on it and they haven't informed us.

JUDGE BOLLWERK: All right.

BY MR. HOLLER:

Q Not to belabor it, sir. Specifically, with regard to failure mode, you directed me to all the introduction. I would ask you is there anything else besides that fourth paragraph that you initially identified with regard to failure modes?

A [Witness Love] The third paragraph starts that discussion. Yes. It's started by the third paragraph.

Q Okay.

A [Witness Love] And you've already previously identified the discussion on the test procedure, which alluded to the --

Q So that would form the analysis for the failure mode. It would be those three.

A [Witness Love] Not the analysis to the failure mode. The reference to the informal document that identified or the informal testing that -- not document -- the reference to the informal testing that pointed out the failure mode would be those paragraphs.

Q Yes, sir. And that's the information I would use, then.

A [Witness Love] From here, to understand that Raychem had such a failure, that would be the information that you would get, yes.

MR. HOLLER: Mr. Wilson?

WITNESS WILSON: If I could ask a question. Are those two paragraphs in the analyses justifying the December 1981 test on the temperature and pressure? Is that the analysis behind that test simplification?

WITNESS LOVE: The 1981 report which we were talking about here, Staff Exhibit 33, is the basis for the engineering judgment for that decision, yes, as it exists in APCO files.

MR. HOLLER: We have no further questions on cross examination.

JUDGE BOLLWERK: Any redirect?

REDIRECT EXAMINATION

BY MR. MILLER:

Q That, plus the fact that you recreated the failure.

A [Witness Love] That's discussed here. That's a part of this whole report that we're talking about.

RECROSS EXAMINATION

BY MR. HOLLER:

Q But just to be clear, sir, your recreation of the failure was in a test with conditions other than the conditions in the original test. No steam, is that correct?

A [Witness Love] We've already testified that the pressure, temperature -- we concluded from discussions with Raychem that the mechanism which caused the failure, which is discussed here as a pressure/temperature effect, and that was what was executed in this test, and it was demonstrated and it was solved.

MR. HOLLER: Thank you.

JUDGE BOLLWERK: Anything else?

MR. MILLER: No, sir.

JUDGE BOLLWERK: Judge Carpenter, any questions?

JUDGE CARPENTER: No.

JUDGE BOLLWERK: Judge Morris?

BOARD EXAMINATION

JULGE MORRIS: It's late in the day and I hate to go out on thin ice again, but I would like to try to be helpful to you, Mr. Wilson, to be helpful to Mr. Miller, to understand what he's been talking to you about for half the day of what it would take, back in 1967, to qualify a piece of electrical equipment, if the equipment tested was not the same as that in the plant or if the conditions under which it was tested were not the same as the LOCA environment, for example.

It's my understanding that you would like to see a systematic thorough evaluation of any differences in the environment or in the component itself, and, after identification of those differences, a thorough evaluation of the significance of those differences in terms of qualification under the rules, the standards, or the performance of the component in the accident environment, no matter whether these judgments were beneficial or detrimental.

And if they were judgmental, even though simple and in common sense observations, some documentation to that effect would be present.

Have I characterized it correctly so far?

WITNESS WILSON: In 1987?

JUDGE MORRIS: I'm sorry. Yes. I meant 1987, at the time of the inspection.

WITNESS WILSON: Yes. I think that would be the ultimate. I don't believe that we would go full bore with regard to identifying every nitpicking difference, but we would certainly not go full bore in the other direction saying that nothing but opinions is needed, to say that whatever differences there are, they don't matter, it's qualified.

The basis is certainly the DOR guidelines and what it calls for. We normally, in our inspections, give considerable leeway to people with regard to things that were not documented, provided that the story was available, the information existed somewhere.

JUDGE MORRIS: Even through oral discussion --

WITNESS WILSON: Absolutely.

JUDGE MORRIS: -- between the licensee and the inspector.

WITNESS WILSON: I can recall an inspection shortly after Farley where I pointed out to a licensee the existence of a test report that he didn't know about that qualified something one of our other inspectors was pursuing a violation on.

JUDGE MORRIS: I don't want to go any further, Mr. Miller, but I hope that's been helpful.

MR. MILLER: Thank you, sir.

RECROSS EXAMINATION

BY MR. MILLER:

Q Is visual examination, is that something that we can use? Can we, for example, look at Exhibit 102 and say this Chico is bonded to the pipe nipple? Is that something we're entitled to do?

A [Witness Wilson] Has the specimen been exposed to the LOCA conditions?

Q That's all right.

A [Witness Wilson] I hate to answer a question, but I think I communicated to you.

MR. MILLER: It's late in the day, Mr. Wilson. I'm sorry, sir. I didn't mean to interfere.

JUDGE BOLLWERK: Anything else?

JUDGE MORRIS: No.

JUDGE BOLLWERK: I'm going to venture one question, I think. Mr. Miller started to do this in his cross examination and it's something that I want to agree we can get clear in the record.

For Staff Exhibit 12, which is the inspection report, it was my understanding that you indicated that you were the drafter of Pages -- at least Pages 38 through, I believe, 44, which deal with the Chico Seals Package 29-G.

WITNESS WILSON: Yes.

JUDGE BOLLWERK: All right. And this lists a number, I guess, of problems or questions about the Chico seals. This is a contemporaneous, I take it, representation of what your concerns were at the time of the inspection.

WITNESS WILSON: During or shortly after the inspection.

JUDGE BOLLWERK: Well, let's take it shortly after. Since this was drafted after, that would be correct. All right. What about during the inspection?

WITNESS WILSON: During the inspection, I think the concerns in the report were not fully developed. We've indicated that the review of this matter didn't begin until probably Wednesday of the inspection and the review was pretty nearly over by the close of business Thursday.

In fact, the last thing Thursday was a meeting with Westinghouse people Thursday evening. So I think it's correct -- it's accurate to say that not all of these concerns were fully developed during that inspection.

The ones that were not were based on material that I took home from the inspection and used to prepare the report.

[Judges conferring off the record.]

JUDGE BOLLWERK: That's my next question. The ones that weren't fully developed, then, were not communicated to Alabama Power Company until the inspection

report, then.

WITNESS WILSON: I think it's fair to say there were some like that, yes. I think the general nature of the concern, though, was expressed during the inspection. The three areas in which these concerns are grouped, the similarity and design control, the nature of the December 1981 test and the data taken during the 1981 test, all three of those were work product during the inspection.

JUDGE BOLLWERK: If it's possible, could you take a quick look at the pages here and tell us which ones you feel were not fully developed with APCO? We're trying to understand what was placed in front of APCO at the time of the inspection and what was not.

WITNESS WILSON: I'm on Page 40, in the middle, a good starting point.

JUDGE BOLLWERK: Page 38, I think, is where it actually starts, if I'm reading it correctly.

WITNESS WILSON: Okay. What begins on Page 38 is a detailed description of what I saw because I felt it appropriate to document that in the report. There's not a clearly documented file available. So I took the burden on myself to document what I saw. So it's primarily, I think, a summary of what I saw up until Page 40.

JUDGE BOLLWERK: All right.

WITNESS WILSON: Believe it or not, I was trying

to help us along a little bit at that point. Now, on Page 40, the concerns about steam, moisture, chemical spray, the initial thermal transient, and, at the top of Page 41, relevance of the report to the Target Rock files, I would feel confident all of those points were at least mentioned during the inspection.

JUDGE BOLLWERK: So that's A through D, then.

WITNESS WILSON: Yes.

JUDGE BOLLWERK: All right. By the way, you might want to be looking at this if you have any response to it.

WITNESS JONES: Which exhibit is this?

JUDGE BOLLWERK: It's Staff Exhibit No. 12, starting on Page 40. So then your statement is that in some way or another, A through D were all expressed to Alabama Power Company.

WITNESS WILSON: Yes. I'm quite confident of that.

[Pause.]

MR. HOLLER: If I may, let me ask if Mr. Wilson is waiting for the Board or the Board is waiting for Mr. Wilson?

JUDGE BOLLWERK: I'm sorry. Are you still reviewing the document?

WITNESS WILSON: No. I was waiting for the --

JUDGE BOLLWERK: I'm sorry. Okay. On Page 41,

then, Nos. 1 and 2, were those expressed to Alabama Power Company or not?

WITNESS WILSON: Yes. Perhaps not in the exact detail presented here. I think in the earlier ones, probably not all of the details were presented, but the concerns were. And these, again, related to the data taken during the test.

JUDGE BOLLWERK: All right. Then as to 1, 2 and 3 at the bottom of the page and going onto 4 on the next page.

WITNESS WILSON: With respect to all four of those, I simply do not remember if we discussed them or, if we did, to what detail. They are all the type of things that I could have developed after the inspection with information that I took home with me.

And I simply don't recall whether we discussed them during the inspection. The general area was raised, is this the test specimen like the plant equipment, please get me the plant installation drawings so that we can look into that, but I'm blank as to what discussion we may have had in that area.

And I will concede that all four of these points could have been generated after the inspection, possibly.

JUDGE BOLLWERK: Does Alabama Power have any comments on the items -- any of the items we talked about in terms of whether they were identified to you during the

inspection?

WITNESS JONES: Yes, sir. I'd like to respond. I must admit that Mr. Wilson kept me very busy answering a lot of questions during the inspection.

But as I understand, as documented in Licensee's Exhibit No. 61, it was Alabama Power Company's understanding at the Farley exit meeting that the only issue relative to the Raychem/Chico seal and the reason why we're here today is that the qualification did not demonstrate bonding of the Raychem material to the metal pipe nipple under LOCA conditions, including chemical spray, has not been addressed.

That was my understanding and Alabama Power Company's understanding when we walked away from the exit meeting. There may have been other questions, but this was the only outstanding issue that we were aware of.

Based upon that, as I testified earlier, that was the basis for us responding during the exit, stating that we felt like we could resolve that concern, and, therefore, supplemented in a response on January 8, 1988 APCO's position to that concern.

MR. MILLER: David, I need to make one record clarification. He referred to Licensee Exhibit 61. That's been renumbered as Licensee Exhibit -- or Alabama Power Company Exhibit 127, Farley Exit Meeting Input, R.C. Wilson.

WITNESS JONES: Okay. Just one other clarification point. Target Rock's solenoid valve entrance seal was discussed at the exit, but, as we know, that was dropped from this hearing.

WITNESS WILSON: If I could comment, I don't disagree with what Mr. Jones just said. I might add I don't think in the exit meeting the violation was yet fully developed, but I believe I agree with what Mr. Jones just said concerning the exit meeting, just to try to clarify things.

JUDGE BOLLWERK: Let me ask you a more specific question, Mr. Jones. On Page 41, in terms of 1 through 4, do you have any recollection, since Mr. Wilson does not, as to whether those issues were raised? At least his recollection is not clear, let me put it that way.

WITNESS JONES: One through 3 being on Page 41.

JUDGE BOLLWERK: Page 41, the very bottom, and No. 4 on the top of Page 42.

WITNESS JONES: Okay. I do not recall these being addressed during the exit meeting. As a clarification, earlier, I was not with Mr. Wilson throughout the inspection, but at the daily exit meetings, I don't recall these issues being addressed.

JUDGE BOLLWERK: Anyone else that was with Mr. Wilson during that time recall these being addressed, 1

through 4?

WITNESS LOVE: I don't.

JUDGE BOLLWERK: You do not. Mr. Sundergill?

WITNESS SUNDERGILL: No.

JUDGE BOLLWERK: Mr. Love, were you with him?

WITNESS LOVE: I was primarily only with him on this topic in the exit meeting. So I don't recall them coming up.

JUDGE BOLLWERK: All right.

WITNESS WILSON: I could point out I did obtain the information necessary to draw these conclusions and we normally didn't fully develop violations statements during an inspection. In fact, we never did.

JUDGE BOLLWERK: These, I take it, concerns that are expressed in this part of the report, the inspection report was then used, I think as you indicated to Mr. Miller, to develop the notice of violation, although you did not personally write that, but it was used by regional officials.

WITNESS WILSON: Yes.

JUDGE BOLLWERK: So these are the basis on which the notice of violation arose.

WITNESS WILSON: Yes. And if I could say something again to help clarify and converge things, I hope this will.

These findings in the NOV were constructed to attempt to address what, at the time, we believed to be the qualification rationale. As time has gone on since 1987 and additional arguments and concerns have been introduced, obviously our view is the story has changed.

But the NOV and the inspection report were written based on what we believed to be the qualification rationale at that time.

JUDGE BOLLWERK: As the staff understood it.

WITNESS WILSON: Yes. That's correct.

JUDGE BOLLWERK: Any comment from Alabama Power on that?

WITNESS JONES: No.

JUDGE BOLLWERK: I don't think I have any further questions, if no one else does. Any redirect from either of the parties on the questions we posed? Mr. Miller?

MR. MILLER: I've got several hours of recross.

JUDGE BOLLWERK: We've got plenty of time.

MR. MILLER: I declare done.

JUDGE BOLLWERK: All right. At this point, then, I think we have moved all the exhibits in for these panels, have we not?

MR. MILLER: I recall that we have. If it will help, I will move all the exhibits in again just in case.

JUDGE BOLLWERK: I think they've all been

received, so I don't think that's necessary.

Then, Mr. Wilson, we thank you very much for your testimony and your service to the Board. At this point, we will go ahead and adjourn till 9:00 tomorrow morning. If we could see counsel up here for a second after we adjourn.

So thank you very much and we'll see you tomorrow morning at 9:00.

[Whereupon, at 5:00 p.m., the hearing was recessed, to reconvene the following day, Thursday, May 21, 1992, at 9:00 a.m.]

REPORTER'S CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission
in the matter of:

NAME OF PROCEEDING: Alabama Power Company

DOCKET NUMBER:

PLACE OF PROCEEDING: Bethesda, Maryland

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

Mark D. Windy

Official Reporter
Ann Riley & Associates, Ltd.