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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

January 8, 1985
(extension of time approved by Staff, Applicants and Board Jan 2, 1985)

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD
Glenn O. Bright
Dr. James H. Carpenter
James L. Kelley, Chairman

In the Matter of CAROLINA POWER AND LIGHT CO. et al. (Shearon Harris Nuclear Power Plant, Unit 1)	Docket 50-400 OL ASLBP No. 82-468-01 OL

Wells Eddleman's Proposed Findings on Contentions 41 (Pipe Hangers QA/QC), 116 (Fire Protection) and 9 (Environmental Qualification of Electrical Equipment)
(With Conclusions and Orders Included)

Under the Board's order of November 15, 1984 (Tr. 7367-7369) Wells Eddleman hereby files proposed findings of fact as follow:

CONTENTION 41:

1. The quality assurance requirements of 10 CFR 50 Appendix B are mandatory and admit of no exceptions. 10 CFR 50 App B at I:

> The applicant shall be responsible for the establishment and execution of the quality assurance program. The applicant may delegate to others, such as contractors, agents, or consultants, the work of establishing and executing the quality assurance program, or any part thereof, but shall retain responsibility therefor. (emphasis added)

The mandatory language "shall" is used throughout Appendix B. The pipe hanger quality assurance ("QA") program at the Shearon Harris Nuclear Power Plant was established and carried out by Carolina Power & Light Company (prefiled testimony of Applicants, passim, following Tr. 6663).

2. In spite of these clear requirements, CP&L's pipe hanger QA program at the Harris plant went through several longstanding programmatic failures; one of the possible "root causes" of these failures (see Finding 4 below) was still being revised at the time of the hearing

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in November, 1984, or shortly before then (see Tr. 7334, also 7335-6), i.e. unclear weld inspection criteria. This was so in spite of the fact that pipe hanger inspection had been going on at the Harris plant since early 1979 (Tr. 6673), over 5 years, and in spite of the clear requirement of 10 CFR 50 Appendix B. XVI to assure that "the cause of the condition is determined and corrective action taken to preclude repetition."

3. Significant longstanding programmatic QA failures by CP&L include: (1) From the beginning of the hanger program in 1979 (Tr. 6673) through at least September 1980 (see, e.g. Maxwell testimony at 7241-42 and 7243 in the transcript), unclear welding symbols, missing symbols and improper welding (vs. both design requirements and quality acceptance criteria) occurred. See Applicants' prefiled at p.15 following Tr. 6663. These failures continued at least until inspector George Maxwell of the NRC found them on 3 September 1980 and a subsequent CP&L investigation revealed their widespread scope. 617 of 1786 hanger drawings included unclear symbols (tr. 7243) and of approximately 1085 hangers installed by the time of reinspection, 598 were rejected upon reinspection (a failure rate of over 55%). See Tr.7243. Concerning the timing of this inspection and the reasons for Maxwell looking into this hanger area, see below.

(2) extensive failures by contractors to properly inspect vendor-supplied shop welds. This was complicated by lack of training of personnel, and incorrect training of CP&L inspectors, at the Harris plant site, concerning such welds, e.g. skewed-tee fillet welds. These persisted well into 1982, (A.27 apps' prefiled) months after inspections began to show the problems. (A29 ibid) See Tr. ; see also Q&A #s 27, 28 and 29 (pp 17-19) of Applicants' prefiled testimony as revised November 5, 1984. There was also "inaccurate and incomplete QC documentation" on these welds (Fuller, A. 28, ibid, Applicants' prefiled)

(3) improper fabrication of welds (see NRC inspection report 80-15-01, Staff prefiled testimony at 9 following Tr. 7217) (1980)

(4) failure to follow procedures for visual examination of welds, failure to follow procedures/instructions for reporting of discrepancies, and failure of inspector to identify and inspect all welds. (Staff inspection report 82-01-03, ibid.) (1982)

(5) Also in 1982, two NRC inspection reports (82-03-01 and -02, Staff prefiled testimony at 10, ibid.) document the use of uncertified welding inspectors. See Tr 7339.

(6) noncompliance with applicable requirements continued well into 1983 (NRC inspection report #83-25 -02, see Eddleman Exhibit 49 also) and the Staff testified (prefiled at G/A #11 pp 10-11, ff. Tr. 7217) that CP&L "never adequately addressed" the root cause of these problems over the years. By June of 1983, the problems had been going on for more than four years since pipe hanger inspection began in 1979 (see finding 1, supra, and Tr. 6673). Thus, at least until June of 1983, CP&L was not complying with 10 CFR 50 Appendix B with respect to pipe hangers at the Shaaron Harris nuclear plant. Even Applicants' witness Haté acknowledged there were times the requirements were not complied with (Tr. 6672). Noncompliance with the requirement of Appendix B XVI to address the root cause continued for four years at least, and there are further problems concerning whether the root cause has been addressed (see Finding 4, below)

4. When asked what the root cause of the problem was, the four Staff withesses gave at least three different answers (see Tr. 7321-7327). Witness Hallstrom, who has only looked at a "very small sample" of the Harris pipe hangers (Tr. 7357) believes the root cause was differences in inspection criteria (Tr. 7321-22; see Finding 5 below); Witness Maxwell believed it was having the acceptance criteria in more than one document (Tr. 7323-24); Maxwell was the resident

NRC construction inspector from mid-1980 through late 1982 (see his qualifications, filed in the management phase transcript).

Paul Bemis of NRC Staff said the root cause was that the inspection "criteria was too broadly interpreted " Tr. 7326, But he conceded that clear criteria are required by 10 CFR 50 Appendix B, and that Appendix B has always applied to the Shearon Harris nuclear plant. Tr. 7327.

Thus, even though the Staff now claims CP&L has addressed the root cause of its pervasive hanger inspection problems, they do not agree on what that root cause is. (See also Staff prefiled Answer 22 following Tr. 7217). CP&L was still clearing up (or trying to clear up) weld inspection criteria at the time of the hearing or thereabouts, November 1984 (see Finding 2 above; Tr. 7334, also 7335-36).

5. Despite the above claims as to root causes of the problems CP&L persistently had and failed to correct (see Finding 3, above), "<u>virtually all weld acceptance QC criteria are things you can measure</u>". Subpoenaed witness GG "Pete" Tingen, weld inspector at Shearon Harris, Tr. 7166 (emphasis added). Inspectors have standard tools and measuring devices to do this at Harris. Tr. 7159-7167, CP&L inspectors' testimony.

Measurable criteria are about as objective as can be found. Logically, this testimony of the inspectors themselves shows that these objective criteria, and tools to measure them with, were always available for Harris hanger inspections. Thus, the "root causes" claimed by witnesses Hallstrom and Maxwell (differences in inspection criteria, and having inspection criteria in more than one document) may be valid, but the "cause" claimed by witness Bemis is not credible.

Given the requirement of 10 CFR 50 Appendix B criterion V for well-documented criteria, having two inconsistent sets for years is a serious programmatic failure. It also shows CP&L was ineffective

at best in dealing with the requirement of Appendix B II to"regularly review the status and adequacy"of the QA program since this inadequacy persisted in some form even up to the hearing (unclear acceptance criteria, see Hallstrom Tr. 7334-7336 and Finding 4, p.4, above).

6.Nor was unclear or inconsistent criteria the only major programmatic failure in CP&L's Shearon Harris pipe hanger QA program. In spite of the identification in 1982 of improper inspections and the use of uncertified inspectors (see Finding 3 items (4) and (5), p. 3 above), CP&L did not begin supervisory checks on the work of pipe hanger inspectors until the middle of 1982 (Applicants' witness Haté, Tr. 7056)

7.CP&L's inspection philosophy seems to be to wait until a problem is made obvious and then begin to look for it. This is certainly reflected in their not identifying the unclear weld symbols, missing weld symbols, and improper work on hangers before the NRC inspector found hanger problems in September 1980 (see Finding 3 item (1)p.2 above). It is equally evident concerning defective vendor-supplied welds in 1982 (defective vendor supplied welds had been identified by the Staff as a noncompliance with NRC regulations in 1980 -- see Finding 3 item (4) p.3 above). Witness Haté testified (Applicants' prefiled, Answer 21, p.13, ffg. Tr. 6663) that sampling of vendor welds (skewed-tee fillet, etc.) began in May 1982 after problems were first identified early in 1982. That is a gap of a month or perhaps several months in even beginning sampling. Then, due to "high reject rate" the CP&L sampling went to 100% inspection in June of 1982.(ibid) This same "sample until you see a problem" strategy continues even now for the "enhanced" CP&L inspection program (see Tr. 7039 and 7444-45) despite its failure in the past. Even with the enhanced program, defects still get by QC inspection (Weld Monitor KA Douglas, Tr. 7192). While

The sampling currently indicates 98.78% of QC-inspected attributes that are reinspected are OK (Tr. 6671,7042) this would have been a minimal inspection quality (if that) to begin with, much less after 5 years.

8. CP&L's QA expert described CP&L's actions on Harris pipe hanger QA as "planned and systematic" (Tr. 6673). Yet the CP&L panel of witnesses didn't know if Shearon Harris personnel were trained in the matters covered in Eddleman Exhibit 37 (which, see) before 1 September 1980 (Tr. 6955. On 3 September 1980, NRC inspector Maxwell discovered the pipe hanger problems related to these matters for the first time. (See Tr. 7241-42, 7252, Eddleman Exhibit 58). CP&L failed to have an adequate "trending program" to "not just stumble over one problem and fix it; and stumble over another one and fix that ..." (Staff, Tr. 7328; see also Answer 11 in Staff prefiled at pp 10-11 following Tr. 7217, and Finding 3 item (6) and concluding discussion on p.3 above). Instead, the NRC continued to find problems (tr. 7328). The program wasn't working and "we knew it every time we wrote a violation" (Bemis, Staff, Tr. 7329)

9. Applicants' prefiled testimony states (A.15, p.7, ffg. Tr. 6663):

> Early in the hanger erection effort, CP&L studied the hanger erection problems being reported in the industry and visited several other sites to gain a better understanding of current hanger erection and inspection problems. It was concluded that many of the problems ... at other sites ... could be avoided if inspection started as early as possible * * * Based on these considerations, the initial hanger inspection program was set up ... (emphasis added)

It is clear than hanger inspections at Harris began in early 1979 (Applicants' witness, Tr. 6673; and Finding 2, above). But it was revealed on further cross-examination that the visits to other sites were made, and this study was done, in the spring of 1982 -- three years later! (Tr. 7328, Haté for Applicants). It is equally clear that the decision to set up the initial inspection program was made in early 1979 (see Tr. 6673). The above testimony is definitely contradictory, if not actively misleading.

Taken on its face, it appears it took the Applicants three years to recognize that there were pipe hanger problems in the industry and that they could learn from them (and needed to!). This is the same

slow reaction to problems that has plagued the CP&L Harris pipe hanger QA program (see Findings 3, 6, 7 and 8 above).

Such problems were common knowledge to NRC inspectors even in 1980. (Maxwell,Tr. 7260). Indeed, soon after he arrived at the Harris site (Tr. 7259), Maxwell testified, he "felt compelled" to inspect pipe hangers at Harris "having noticed the industry experiencing some problems with welding on pipe supports". (see Tr. 7258-60) As noted above, Maxwell was the first to identify pipe hanger problems at the Harris plant.

At mimimum, this finding suggests slow reaction by CP&L to a persistent problem of their hanger program failing to meet NRC qualify assurance requirements of 10 CFR 50 Appendix B. It is noted that some of the CP&L panel of witnesses, all of whom were involved heavily in running the Harris pipe hanger program (or training inspectors) visited plants when CP&L finally did look at other plants for pipe hanger problems (Tr. 7023 ff).

10. Quality assurance is an unconditional commitment by applicants for NRC licenses (10 CFR 50 Appendix B, e.g. at I). It depends on the commitment the utility itself made (Maxwell, Tr. 7350) and it is basic that the licensee keep those commitments (ibid) Nevertheless, CP&L let a programmatic breakdown continue for at least four years in pipe hanger QA, and after 5½ years was still having trouble clarifying weld inspection criteria (a possible root cause of CP&L's problem). (See Finding 3, above, and Findings 2 and 5 above, respectively) This is true even though objective criteria were used (see Finding 5).

Nevertheless, the supervisors heavily involved in the failures documented in this record are still in their jobs at CP&L and were even presented as principal witnesses on the contention (see qualifications and work experience of the CP&L panel, attached to their testimony following Tr. 6663). CP&L has not been keeping its commitments to Quality Assurance at Shearon Harris and thus lacks the requisite

character to establish fitness to receive an operating license for the Harris plant.

Contention 116

11. Staff witness Kubicki testified (December 17, 1984 conference call (see Tr. 7416 & following) that for the fire doors listed on pp 1 of 5 (enclosure 1) and pp 2,3,4, and 5 of 5 in that same enclosure (Tr. 7418) to Applicants' 10-10-84 fire door and other info submission to the NRC on fire protection (and highlighted in the November 8, 1984 submission to the Staff, Tr. 7419) (this submission is Eddleman Exh 61-Tr. 7420, 7421), which have not been tested (Staff hearing testimony), the following apply to his analysis:

(A) a yield point of 1100 degrees F for the Steel of the doors, Tr. 7423

(B) the Staff uses the ASTM E-119 criteria (time temperature curve) to qualify certain fire rated assemblies, such as fire rated doors (Tr. 7424-25, see at 7425)

(C) no check was made on the heat capacities or coefficient of thermal expansion for the steel of those doors (Tr. 7425)

(D) the fire brigade, by standard assumption, is assumed to extinguish the fire within 30 minutes (Tr. 7426-27), and is never assumed to be delayed beyond 30 minutes (Tr. 7427). However, no specific analysis of fire brigade response time for these doors was made by the Staff (Tr. 7427) (Neither did Applicants. Tr. 4306, nor others on the Staff, Tr.4685, 4687-88 (Eberly)).

12. The ASTM E-119 time temperature curve as given in Applicants' Serbanescu prefiled of 8-09-84 at p.10 (follows 10/10/84 supplemental Serbanescu testimony following Tr. 4256), not challenged by any party, shows 1000 degrees F in 5 minutes, 1300 degrees in 10 minutes, and 1550 degrees F in 30 minutes.

13. The Board takes official notice of the relatively high thermal conductivity of steel and its modest heat capacity. (see Tr 7425) These factors, found in standard references, indicate that steel doors can heat up rapidly when exposed to ASTM E-119 temperature conditions. The Harris special fire doors are not protected by other fireproofing. Tr. 7423.

14. The Staff's "analysis" of fire detection near these doors was basically standard and does not contradict the above (Tr. 7427-28). Although it is witness Kubicki's opinion that the fire would not reach an intensity able to significantly impact one of these untested fire doors, before the fire brigade arrived (Tr. 7428), his lack of analysis of fire brigade response times (Finding 11 (D) above) and the fact that the assumed yield point of the door and frame steel, 1100 degrees F (Tr. 7423) is less than would be achieved within 10 minutes in an ASTM E-119 fire (Finding 12, above), and not much above the 5-minute temperature in such a fire, indicate there is no reliable assurance one of these doors will not fail if a fire occurs.

15. The frequency of fires significant enough to be reported to the NRC is 32 in 250 reactor years (Staff Exhibit 6, NUREG-0800, Standard Review Plan section 9.5.1, Fire Protection, ass p. 9.5.1-9, item B), or about 1 every 8 years. This suggests 4 or 5 fires in a 30 or 40 year Harris plant operating life, fires that could be significant. One of these fires could reasonably be in an area near one of the approximately 15 fire doors in question here, the untested steel ones. Because yielding steel can collapse (as well as warp -- see Tr. 7430-31 re warpage), these doors are insufficiently prepared against fire and need to be tested. This testing can be done with appropriate physical arrangements in the approximately 10 by 18 foot opening (see Tr. 4725) in a standard test furnace. Such testing is hereby ordered for each door in question.

16. Applicants' chief fire protection engineer, Margareta Serbanescu of Ebasco Services, knew before August 9, 1984 that diesel fuel oil has a heat content of about 140,000 BTU per gallon. (Tr. 4258, see also 4266). Nevertheless, the FSAR indicated 95,000 BTU per gallon at and prior to that time (Applicants' Exhibit 6 and FSAR 9.5.1 & 9.5A);

17. Witness Serbanescu also knew that NFPA (National Fire Protection Association) code #37, issued in 1979 (TR. 4381) was applicable to Harris, before prefiling testimony on 8-09-84, applied to the Harris diesel day tanks. (Tr. 4381-82); the FSAR did not list it even though it says it lists all applicable codes (Tr. 4382). The Staff believes NFPA 37, (similar to NFPA 30 (see Tr. 4386-4391, 4900 etc)) wasn't listed. Tr 4650 4691

18. Witness Eberly of NRC Staff said he did not question the 95,000 BTU per gallon figure in the FSAR for diesel fuel, though he knew it was really about 140,000 BTU per gallon for diesel fuel. Tr. 4699-4700.

19. Applicants updated their BTU per foot of cable insulation for the Harris plant in October, 1984 (Supplemental testimony, ffg. Tr. 4256) even though there was cable installed at Harris well before the testimony prefiling dated (Tr. 4265) and it could have been measured before August 9, 1984, the prefiling date (Tr. 4272-73; see also 4279).

20. The fact that there are exceptions to the enclosure of all fire areas within 3-hour rated fire barriers on all sides, was only added into the October 1984 supplemental testimony; it was not stated in the prefiled of August 9, though it was known. (See, e.g. Waters, Tr. 4248-49)

21. While fact 20 above may be in the nature of a correction, the other omissions are more important and logically raise the question of what else may have been left out of the Harris FSAR on fire protection, and thus not analyzed or checked against. This is an open question.

For example, the Staff testified its analysis was complete except for fire doors (Tr. 4714) but did not specify how they had considered the new heat content of cable insulation (Cf. Fact 19 above). See Tr 4731-32, They have not here are a number of cable deviations at Harris, Tr. 4749.

22. Applicants' witness Waters learned fire protection on-the-job (Tr. 4305); he doesn't do fire brigade training himself (4312) and there is only one independent fire drill critique for the Harris plant planned or required every three years. (Tr. 4310). The typical nuclear plant fire is an interior, structural fire, but the fire brigade has not yet been trained in a facility that has "the types of things that are typical of a power plant there." Tr. 4330-31. Thus, fire brigade training is now inadequate; it must be assured on facilities typical of power plants before the Harris plant is allowed to operate.

23. The seals between fire areas are not yet installed at the Harris plant (Tr. 4314-15) and witness Waters, heading the Harris fire protection program, doesn't know when they will be (Tr. 4315). (cf. Ans. 6, Waters prefiled, Tr. 4250) These seals must have the same rating (by test) as the fire barrier(s) they penetrate (Tr. 4314). Unless they are verified in place by NRC walkdown with great care in inspection, the Harris plant cannot be allowed to operate because it has inadequate measures against the spread of fires. (Contention 116 criticues the FSAR "analysis" of spread of fires as being just a rationalization. A missing or defective or improperly installed seal is a way for a fire to spread between fire areas, thus imperiling redundant safety equipment trains required to shut down the plant and avoid a nuclear accident. Cf. 10 CFR 50.48)

24. The flame temperature of burning diesel fuel is about 2000 degrees F. (Tr. 4736, 4700) The diesel generator day tanks contain about 3000 gallons of this fuel each (Tr. 4692, 4694-95). This is a deviation from NFPA 37 requirements forbidding tanks above 1100 gallons inside buildings (Tr. 4697-98, also 4692, 4694-95). The Staff approved the deviation (Tr. 4714-17) but the Staff doesn't know where the manual release for the diesel day tank areas sprinklers is (Tr. 4762). Logically, if the automatic sprinklers fail (or spatter fuel to create an explosive mixture which could blow out a door), or a door to the

day tank area were left open, a very large fire could result, given 3000 gallons and 140,000 BTU per gallon.

25. Therefore, unusually careful analysis of this tank area is necessary. It is also necessary because the diesel generators are the main backup source of power to keep the nuclear plant under control when its other sources of power are lost. It is not clear from the evidence that sufficient careful analysis has been done, especially in light of the variance on the tank size. Applicants and Staff are instructed to submit additional analysis of these tanks and fire suppression,detection, and explosion prevention in their areas. The doors to the day tank areas should have alarms to indicate if they are open. This indication should appear in security stations and in the control room.

26. The Staff depends on Applic .cs Quality Assurance for: redundant fire protection seals and construction, Tr. 4744; installation of suppression and detection systems (Tr. 4753). As found above in Fact 10, Applicants' QA program is suspect. Therefore the Staff should conduct special audits and additional inspections in these areas.

27. The Staff does not know if suppression and detection systems for the Harris plant are designed in conformance with (the required) guidance (Tr. 4752-53). This should also be the subject of additional inspections and audits by the Staff.

28. There is considerable additional information (important to fire protection) that is not in the Safe Shutdown Analysis and FSAR 9.5.1 and FSAR 9.5A (what the Staff reviews, see e.g. Tr. 4683): Technical Specifications, Fire Protection QA Program, procedures for fighting fires in the plant, pre-fire plans, etc. (Tr. 4706-7). These items should be produced as soon as practicable and then inspected, checked and audited by the Staff carefully. No license should issue to such an incomplete program, and certainly not without review.

29. Contention 116 is also literally true in a considerable number of respects. Among the more significant are:

(A) FSAR 9.5A (and 9.5.1.1.1) usually (gives) no analysis of location of (fire) detection instruments. (All extracts from the contention are from Staff testimony pp 5-6 following Tr. 4653, where the contention is reproduced). This is literally true not just for these sections, but also for the SSA (Safe Shutdown Analysis), FSAR 9.5.1 and 9.5A (Tr. 4683). Locations are not checked yet by NRC and can't be until the plant is completed. Tr. 4683-84. This is logical also because construction often results in relocating objects from their designed places, and this may well apply to fire detection instruments or devices.

(B) FSAR 9.5A (and 9.5.1.1.1) *** assumes ... the fire brigade will respond rapidly ... the time it takes to get people ... to the fire (is) not well analyzed ( )). The Staff has done no analysis of fire brigade response time. Tr. 4685, see also 4687-88. Applicants' faith in rapid response is the personal opinion (Tr. 4306) of a person who learned fire protection through being assigned to work on it (Tr. 4305). There just is not the kind of analysis necessary to show that the brigade can get to fires within the times postulated.

(C) FSAR 9.5A (and 9.5.1.1.1) *** estimates BTU of combustible material (in an area) *** and assumes ... the fire brigade will ... put out the fire, or the automatic equipment will work.

Serbanescu, 8/09-/84 prefiled at 17-18, states that "by using calorific values for classes of materials", they "simplify" the calculation. Vi (Follows Tr. 4256 and 10-10-8r supplemental testimony). Applicants' witness Waters does not agree with the word "estimated" (Tr. 4523) but the use of general values for specific substances clearly can lead to errors. Consider the 95,000 BTU/gallon for combustible liquids, applied to diesel fuel with a value of 140,000 (Finding 16 above).

Further, the Staff has performed no Shearon-Harris-specific analysis of the temperature curve for combustibles in the Shearon Harris plant. (Tr. 4686-87).

(D) The effect of a fire in a fire zone or area with a combustible loading of over 240,000 BTU per square foot doesn't get dealt with in realistic terms.

Not only has the staff not analyzed the time-temperature curve for such combustibles,(Tr. 4686-87), there is no specific analysis (other than generalities) about the effects of a fire in the diesel day tank area in the record.

(E) In establishing fire resistance ratings of fire barriers with respect to fires in cable trays, Applicants have not established that qualification tests represent actual plant conditions or comparable conditions.

The Staff testified (Tr. 4656 ff) that in 1977, they had studies made of tests done vis-a-vis conditions, and accepted the ASTM E-119 time temperature curve as representative of such a fire (tr. 4657 lines 7-11) but they didn't make any specific determination for Harris (ibid, lines 16-17). This is more significant in light of the Staff's not having reviewed the cable insulation heat values for Harris yet (See Tr. 4731-32, 4749 and Finding 21 above). The NRC Staff also relies on CP&L's QA program for product (installed)-test(sample) being the same (Tr. 4662, lines 19-24). Applicants have not selected and informed NRC of other fire barrier material (Tr. 4663-64) and the Staff has no control over this process (Tr. ?4663). The NRC doesn't check specifics (Tr. 4664) and has done no formal study to see if higher temperatures (than the ASTM E-119 curve) can be generated (4667) though they did "some studies" (4666).

(F) Another vague statement is that fire barriers are used "where practical" without defining practical or stating the criteria to decide where a fire barrier is or is not practical (and what type of fire barrier is to be used).

Such criteria are not laid out in FSAR 9.5.1 -- "nowhere" (Tr. 4670, lines 3-17). Practicality of fire barriers in Safe Shutdown Analysis is not directly described (Tr. 4672, lines 10-12). The only example (not an example of criteria for practicality) cited was there being no barrier in the middle of the control room; rather, another shutdown panel is in another location (Tr. 4673, lines 20-24).

(G) The Harris FSAR assumes fire detection devices and automatic suppression systems will work. Applicants practically concur: Tr. 4521, "our analysis does assume detectors and suppression systems will have power supplied to them" (Waters). But there is no basis for this assumption. All systems fail, so failures in fire protection should be analysed.

(H) FSAR 9.5.A * * * estimates smoke generation and removal rate.

Most of this analysis was removed (See Applicants' Exhibit 6 and Tr. 4687), but Applicants are required to analyze the need for smoke removal per Branch Technical Position CMEB 9.5.1 (Eberly, Tr. 4677).

The Harris fire dampers are designed to totally shut off flow in ducts (Tr. 4460; see also 4465, 4678). There is automatic shut off of HVAC fans if smoke is detected in ducts at the plant (Tr. 4679-80), and smoke removal capability is now reduced (Tr. 4681), but there is not an <u>analysis</u> of why this is done and why it is OK in all cases, or even of whether it is better overall, except in the most general possible terms. Plant specific analysis is required, and is ordered, on this issue.

Contention 9

30. The Harris plant program for environmental qualification of electrical equipment is inadequately documented. The Board takes official notice of Staff questions 270.1 through 270.9 (copy attached) concerning this program, transmitted on 5 December 1984, after the close of the hearing. The fact that these basic questions were asked is beyond dispute. That they are basic information is equally beyond dispute and undermines all assertions that the Harris EQ program is adequate.

31. Finding 30 is true even though Applicants testified (Prunty and Yandow, Contention 9, prefiled of 8-09-84 following Tr. 4971) (answer 12, pp 10-11) about detailed documentation they had to prepare for NRC Staff review. See item 7, p.11, etc.

32. There have been significant problems with covering up failed tests, and "qualification by similarity" for Rockbestos cable. (See, e.g. Sandia National Laboratories FY 1983 Annual Report, as cited in Contention 9G). The Staff has not reviewed Rockbestos cable documents (Masciantonio, Tr. 5624, and has to verify later, Tr. 5627). Because several types of cable which had failed tests were "qualified" by similarity to RSS-6-104 (which passed one test, but may have failed others), CP&L cannot rely on qualification by similarity for its Rockbestos cable unless they track down all EQ tests of (1) the "Qualified" cable to be sure it has not failed in any EQ tests; and (2) the "similar" cables of each type, to be sure none of them have failed. Otherwise, CP&L cannot assure that its Rockbestos cables are really environmentally qualified. The Staff considered 9G (fraudulent testing) not fully resolved (Answer 9, p.22 at bottom, Masciantonio prefiled following Tr. 5567; see also Tr. 5691). The Board concurs and orders that the above-required action be taken by Applicants and reviewed by the Staff.

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Additional Information Required for
SHNPP Environmental Qualification Program

Please Note: In all cases in the following questions and comments, the environmental qualification (EQ) program referred to is the harsh environment environmental program in response to 10 CFR 50.49.

270.1 (SRP 3.11) Please describe in detail the methodology used to select equipment to be included in the SHNPP EQ program developed in response to 10 CFR 50.49. Your response should address the internal review process used to assure the accuracy and completeness of the list of equipment and the criteria used for excluding any equipment item from the program.

270.2 (SRP 3.11) Page 3.11.1-1 of the FSAR states that plant safety related systems are identified in Table 3.2.1-1. Please correlate the systems listed on Table 3.2.1-1 with the systems included in the EQ program. For any system listed in Table 3.2.1-1 which is not included in the EQ program, provide the justification for exclusion of the system (e.g., all system components located in a mild environment, etc.). Indicate the safety functions of the systems included in the EQ program.

270.3 (SRP 3.11) Provide information which demonstrates how the SHNPP EQ program complies with the scope of 10 CFR 50.49. Specifically you must address how the EQ program is in compliance with 10 CFR 50.49 (b)(2) and (b)(3) and the requirement that all design basis events have been considered in the development of the list of equipment in the EQ program.

270.4 (SRP 3.11) Provide a description of the surveillance/maintenance program which will be used to assure that the qualification status of equipment is maintained. Describe also the specific surveillance/maintenance activities to be performed on the following types of equipment: cables located inside primary containment, ASCO solenoid valves, Limitorque motor operators, Barton pressure transmitters.

270.5 (SRP 3.11) Provide detailed descriptions of the methods and assumptions used to take credit for radiation dose reduction at specific equipment locations and methods used to calculate the surface temperature of equipment for which credit is taken for thermal lag.

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270.6 (SRP 3.11) Provide a description of the program used in the environmental qualification of safety related mechanical equipment in response to the guidance provided in the SHNPP SER. As a minimum, the following information should also be submitted in order to establish compliance:

(a) A list of all safety related mechanical equipment items which includes the component description, manufacturer, model number and location in the SHNPP.
(b) The qualification status of each item as established by the review of qualification documents.
(c) If the qualification status has not been determined, briefly describe the tasks that still must be performed.

Please note that the information requested in (a) and (b) above can be effectively submitted in the form of individual Summary Component Evaluation sheets.

270.7 (SRP 3.11) Indicate compliance with a one hour time margin for equipment items with operability times less than ten hours, or provide justification for reduced margin.

270.8 (SRP 3.11) Please provide details of the assumptions made and an example of the calculations used to determine the environmental conditions due to a high energy line break in areas outside containment. In your response you should address the range of breaks considered in the analysis and assumptions made regarding isolation of pipe breaks.

270.9 (SRP 3.11) Identify, by categories listed in NUREG-0737, the components included in the qualification program in response to TMI Action Plan Requirements.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

DEC 5 1984

Docket No.: 50-400

Mr. E. E. Utley, Executive Vice President
Power Supply & Engineer & Construction
Carolina Power & Light Company
Raleigh, NC 27602

Dear Mr. Utley:

Subject: Shearon Harris, Unit 1 - Request for Additional Information in regard to Environmental Qualification Program Audit Schedule

Based on our review of Section 3.11 (Environmental Design of Electric and Mechanical Equipment) of the Shearon Harris Final Safety Analysis Report, the enclosed questions and comments must be satisfactorily resolved before an audit can be scheduled. Please contact Mr. Bart Buckley (301-492-8379) if you should have any questions on this matter.

Sincerely,

George W. Knighton, Chief
Licensing Branch No. 3
Division of Licensing

Enclosure:
As stated

cc: See next page

35. Other specific findings re contention 9:

(A) Cable deterioration detection depends on Applicants' QA (Tr. 5686-87). QA is already found suspect and unreliable above. Periodic recalibration of Resistance Temperature Detectors (RTDs) also depends on CP&L's QA (Tr. 4963) and maintenance specifications are up to CP&L (Tr. 4963).

(B) While Dr. Dakin testified that no significant integrity damage from epoxy-water interaction (chemical reaction) would occur until after a few years (Tr. 4964), Staff witness Masciantonio pointed out that humidity cannot be simulated or considered in the pre-aging, and the Arrhenius methodology cannot take into account effects of creep or mechanical stress; therefore accelerated aging information is only qualitative (Tr. 5647-48). Since the temperatures measured by the RTDs are important measures of primary coolant temperature (Anps testimony and XE), it is vital that these RTDs be accurately tested and maintained.

(C) Applicants are still working on the Limitorque qualification (Applicants' witnesses Prunty and Yandow, Tr. 4905-06). These valves must be fully qualified if a license were to issue for the Harris plant.

(D) Contention 9G is broader than just Rockbestos cable problems (Tr. 5660); although witness Masciantonio testified "The staff is <u>keenly aware</u> of <u>all</u> the concerns raised by Sandia National Laboratories" in their Fiscal Year 1983 findings (prefiled p.21 following Tr. 5567), when he was asked about the document, he didn't know whether items 3, 4 or 5 of those findings applied to the Shearon Harris plant (Tr. 5661, 5662, see also 5664), though he believed he could get the identification of companies with those EQ problems (Tr. 5659; see also 5663-5664). The Staff has not done any tests of Harris electronic equipment (Tr. 5654)

(E) All orientation and nonwelding inspections of environmentally-qualified equipment positions etc. at Harris are by CI (Construction Inspection) (Tr. 5379-80, witness McLean). But as Eddleman Exhibit 49 (admission ruling to come, see Tr. 7361; see also Tr. 6994, 7021, 7073-7085, 7207-7214) establishes, NRC inspectors have found CI did not have sufficient independence to perform their duties in accordance with an adequate 10 CFR 50 Appendix B QA program.

Further, the Limitorque interface requirements (also orientation) have not been properly addressed (Masciantonio, Tr. 5688). The staff intends to check orientations later.

(F) Concerning lubricants and seals, the whole device is not qualified (by test) if the drive or connected component is not electrical (Tr. 5454-55, witness Yandow). The Mobil study (Applicants' prefiled at pp 6-7, following Tr. 5441) covers lubricants to be used on equipment where the lubricant was not qualified with the equipment; see also Tr. 5443. Discussion of which euipment has lubricants and seals, as listed in Applicants' Exhibit 8 (i.e. identifying equipment in this list which does have lubricants and seals) is at pages 5459 and following. (Tr. 5459 & ffg.) The Staff has not reviewed the Mobil study and has no plans to review it (Tr. 5690). The environmental qualification packages concerning lubricants are not done yet (Yandow, prefiled A.17 at p.7 following Tr. 5441). All of this evaluation needs to be reviewed by the Staff with care and in depth before any license for Harris operation can issue.

(G) Applicants' witness Bucci testified that the qualification (of electrical equipment) is demonstrated when the documentation package is completely assembled and the equipment (test) and the method is sent to the NRC as part of the master list and they have an opportunity to review the package. (Tr. 5519-20). This must be done before operation.

CONCLUSION: An operating license is provisionally denied on the basis of Contention 41; other matters re Contentions 116 and 9 must be fully resolved per the above findings, orders, and this Order.