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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
CAROLINA POWER & LIGHT COMPANY	)	
AND NORTH CAROLINA EASTERN	)	Docket Nos. 50-400 OL
MUNICIPAL POWER AGENCY	)	50-401 OL
	)	
(Shearon Harris Nuclear Power Plant,	)	
Units 1 & 2)	)	

APPLICANTS' MOTION FOR SUMMARY DISPOSITION OF EDDLEMAN CONTENTION 45 (WATER HAMMER)

Carolina Power & Light Company and North Carolina Eastern Municipal Power Agency ("Applicants") hereby move the Atomic Safety and Licensing Board ("Board"), pursuant to 10 CFR §2.749, for summary disposition in Applicants' favor of Eddleman Contention 45. For the reasons set forth herein, Applicants respectfully submit that there is no genuine issue as to any fact material to Eddleman Contention 45, and that Applicants are entitled to a decision in their favor on Eddleman Contention 45 as a matter of law.

This motion is supported by:

1. "Applicants' Statement of Material Facts as to Which There Is No Genuine Issue to be Heard on Eddleman Contention 45";
2. "Affidavit of Robert W. Carlson" ("Carlson affidavit");
3. "Affidavit of Dean Shah" ("Shah affidavit");
4. "Affidavit of Joseph M. Collins ("Collins affidavit");
5. "Affidavit of C. S. Hinnant" ("Hinnant affidavit");
6. "Affidavit of David C. McCarthy" ("McCarthy affidavit");

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7. "Affidavit of Roland M. Parsons ("Parsons affidavit") and

8. "Applicants' Memorandum of Law in Support of Motions for Summary Disposition on Intervenor Eddleman's Contentions 64(f), 75, 80 and 83/84" dated September 1, 1983.

I. PROCEDURAL BACKGROUND

Eddleman Contention 45 was admitted as a contention in this proceeding in the Board's "Memorandum and Order (Reflecting Decisions Made Following Prehearing Conference)," Carolina Power & Light Co. (Shearon Harris Nuclear Power Plants, Units 1 and 2), LBP-82-119A, 16 N.R.C. 2069, 2097 (1982). As accepted by the Board, Eddleman Contention 45 is worded as follows:

> SHNPP design cannot comply with the results of the Plant Water Hammer Experience Report, PWR S.G. (steam generator), feedwater, ECCS and Main Steam System water hammer events evaluation (including systems effect) and potential resolutions now being prepared by NRC, and the CR and NUREG reports on the water hammer question.

In admitting Contention 45, the Board stated that ". . . the portion of Eddleman 45 that alleges a safety problem because the feedwater, ECCS, main steam system, and their components are not properly designed, constructed and tested against water hammer is accepted." 16 NRC at 2097.

Eddleman Contention 45 is classified as a safety contention to be addressed during the second phase of the safety hearing. Written direct testimony on this contention is scheduled to be filed on August 9, 1984 and testimony is scheduled to begin on October 10, 1984. Discovery on this contention commenced on September 23, 1982. 16 N.R.C. at 2113. Since then, Applicants have served one set of interrogatories and request for production of documents on Mr. Eddleman. "Applicants' Interrogatories and Request for Production of Documents to Intervenor Wells Eddleman (First Set)" dated January 31, 1983. Mr. Eddleman responded to this request for discovery on March 21, 1983. "Wells Eddleman's Response to Applicants' First Set of Interrogatories and Request for Production of Documents."

Mr. Eddleman served two sets of interrogatories and request for production of documents on Applicants on March 21, 1983 and March 26, 1984. "Wells Eddleman's General Interrogatories and Interrogatories on Contentions 22A, 22B, 41, 45, 65, 75, 80 and 83/84 to Applicants Carolina Power & Light et al. (First Set)" and "Wells Eddleman's General Interrogatories and Interrogatories on Contentions 9, 11, 41, 45, 116 and 132(c)(2) to Applicants Carolina Power & Light et al. (Eighth Set)." Applicants responded on June 3, 1983 and April 17, 1984 respectively. "Applicants' Answers to Wells Eddleman's General Interrogatories and Interrogatories on Contention 45 to Applicants Carolina Power & Light Company et al. (First Set)" and "Applicants' Responses to Wells Eddleman General Interrogatories and Interrogatories on Contentions 9, 11, 41, 45, 116 and 132C(II) to Applicants Carolina Power & Light Company et al. (Eighth Set)."

Mr. Eddleman and the NRC Staff have also engaged in discovery of each other during that time.

The last date for responding to discovery requests on Contention 45 was April 16, 1984. Discovery on this contention is, therefore, complete.

In addition to formal discovery, Applicants' lawyers and technical experts met with Mr. Eddleman for several hours on May 8, 1984 in order to provide additional information to Mr. Eddleman concerning Contention 45 in an effort to reach a settlement of the issue. This effort, however, has not been successful. Eddleman Contention 45 is, therefore, ripe for summary disposition.[1]

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[1] According to the schedule agreed to by the parties and accepted by the Board, the date for filing summary disposition of all safety contentions was May 16, 1984. Memorandum and Order (Reflecting Decisions Made Following Second Prehearing Conference) dated March 10, 1983. In view of the fact that settlement discussions were being held on Eddleman Contentions 11, 45 and 116, however, Applicants filed a motion with the Board, which was consented to by Mr. Eddleman and the NRC Staff for an extension of time until May 25, 1984 to file any motions for summary disposition on those three contentions. Applicants' Motion for Extension of Time to File Motions for Summary Disposition of Eddleman 11, 45 and 116, dated May 14, 1984. By telephone on May 24, 1984, Chairman Kelly advised S. F. Flynn, counsel for Applicants, that this revised schedule was acceptable. In addition, Chairman Kelly granted Ms. Flynn's request, consented to by Mr. Eddleman for an additional extension until May 30, 1984 to file for summary disposition of Eddleman Contention 116.

Applicants wish to emphasize that Eddleman Contention 45 raises the issue of the adequacy of the design, construction and preoperational testing of the Harris plant's main steam, feedwater and ECCS systems and their components to withstand water hammer events in a manner that will ensure the safe operation of the plant. The contention as admitted does not extend to post-operational practices or maintenance procedures. This scope of Contention 45 was clarified by the Board in resolving a discovery dispute between Applicants and Mr. Eddleman which was initiated by a motion by Mr. Eddleman to compel Applicants to respond to interrogatories relating to planned operating and maintenance practices at Harris. In denying the motion to compel, the Board stated: "Contention 45 alleges a safety problem because the feedwater, ECCS, main steam system and their components are not properly designed, constructed, and tested against water hammer." Memorandum and Order (Ruling on Discovery Disputes) dated October 6, 1983 at p. 13. The Board also stated: "Contention 45 addresses only design and preoperational testing." Id.

Notwithstanding this ruling, during the settlement discussions on May 8, Applicants, in an effort to ease Mr. Eddleman's concerns, did discuss with him in some depth their planned operating and maintenance practices that will be in effect to protect against and detect potential water hammer events in the three systems at issue. As Applicants have advised Mr. Eddleman, it is their intention to operate and maintain the Harris plant in the proper manner to assure its safe operation. For purposes of this contention, however, the issue is whether, assuming proper operational and maintenance practices, the design, construction and preoperational testing of the main steam, feedwater and ECCS systems and their components are adequate to minimize the potential for water hammer and to minimize the consequences of a water hammer event in one of those systems should one occur.

II. ARGUMENT

A. Introduction

When Eddleman Contention 45 was admitted in this proceeding, the subject of water hammer in nuclear power plants was classified as a generic Unresolved Safety Issue by the NRC Staff. Since that time, the NRC Staff has published its resolution of that issue in the Evaluation of Water Hammer Occurrence in Nuclear Power Plants, Technical Findings Relevant to Unresolved Safety Issue A-1, NUREG-0927, Revision 1, dated March 1984. In addition to NUREG-0927, the NRC Staff has published its Regulatory Analyses for USI A-1, "Water Hammer" (formerly Value-Impact Analyses for USI A-1, "Water Hammer"), dated March 1984 (NUREG-0993).

NUREG-0927 is the culmination of NRC Staff review and analysis of water hammer or suspected water hammer events which have been reported as having occurred in any pressurized water reactor (PWR) or boiling water reactor (BWR) in the United States. The Report also includes an evaluation of public comments on the draft report which had been published in May 1983.

The Staff made many significant findings and conclusions in NUREG-0927 and 0993 as a result of its evaluation. Some of the most significant findings contained in NUREG-0927 for purposes of this contention are the following:

- Water hammer is not as significant a safety issue as previously thought. NUREG-0927 at 1-4.
- None of the reported water hammer events placed a plant in a faulted or emergency condition and none resulted in a radioactive release. NUREG-0927 at 1-5.
- Water hammers continue to occur, but at low frequency. NUREG-0927 at 1-5.

- Total elimination of water hammer is not feasible due to design and operational conditions. NUREG-0927 at 1-5.
- The incidence of water hammer has declined over the years as a result of design and operational modifications. NUREG-0927 at 1-6.
- BWRs have a higher frequency of water hammer events than PWRs. NUREG-0927 at 1-6.
- Frequency and severity of water hammers can be significantly reduced through proper design features. NUREG-0927 at 1-6.
- In PWRs, where water hammers occurred in steam generators, none damaged the integrity of the reactor coolant boundary, and none resulted in loss of containment integrity or release of radioactivity outside the plant. In most of the reported events, damage was nonexistent or limited to the piping support system. NUREG-0927 at 2-8.
- In PWRs, in all areas other than the steam generators, no water hammer event has had an adverse effect on plant safety. No event rendered a safety system inoperable, damaged the integrity of the reactor coolant boundary, or resulted in loss of containment integrity or a release of radioactivity outside the plant. NUREG-0927 at 2-8.

In Section 2.5 and Chapter 3 of NUREG-0927, the Staff makes many recommendations for maintaining or enhancing design features and operational practices to reduce further the potential for water hammer. The Staff does not, however, recommend the imposition of any new design or operational requirements for existing plants or plants under construction. Rather, the Staff in NUREG-0993 recommends that NUREG-0927 be issued as an "informational document for use by the industry for feedback of design and operating experience to plant staff. NUREG-0993 at 4. The Staff further recommends some revisions to the Standard Review Plan for applications

for construction permits docketed after publication of NUREG-0927. NUREG-0993 at 5.

In summary, then, the NRC Staff has concluded that water hammer in nuclear power plants, particularly PWRs has not proven to be a significant safety issue. Water hammers cannot be totally eliminated due to conditions inherent as the design and operation of certain plant systems. The already low safety significance of water hammer has been reduced even further over the years by virtue of various design and operational modifications. In examining Mr. Eddleman's responses to Applicants' interrogatories, one finds that Mr. Eddleman's principal complaint is that Applicants have not adequately discussed in the FSAR the features of the Harris design and their plans for preoperational testing that are relevant to water hammer phenomena. What Mr. Eddleman did not, perhaps, understand is that there have been no NRC requirements with respect to the design or testing for water hammer. Thus, there has not been extensive discussion of those issues in the FSAR. What becomes apparent in light of the NRC Staff's resolution of the water hammer question is that Eddleman Contention 45 does not raise a true safety concern. As reported in NUREG-0927, no reported water hammer event in any nuclear plant in the United States has resulted in a loss of containment integrity or release of radioactivity outside the plant. None has ever had an adverse effect on plant safety. Nevertheless, as this motion and the supporting affidavits will show, the water hammer phenomenon has been seriously taken into account and factored into the design of these systems. Moreover, the Initial Test Program for Harris is tailored to verify all design features of these systems and to detect any design deficiencies including those that could create the potential for water hammer.

The affidavits in support of this motion by Robert W. Carlson of Westinghouse Electric Corporation and Dean Shah of Ebasco Services Incorporated will demonstrate that the Harris main steam, feedwater and ECCS systems and their components have been designed in a manner consistent with design features recognized in NUREG-0927 as

beneficial with respect to water hammer and that as a result of these designs, the potential for and consequences of water hammer in those systems have been minimized such that water hammer is not a safety concern for the Harris plant. In addition, the affidavits of David McCarthy, C. S. Hinnant and Roland M. Parsons of CP&L confirm that Applicants will verify that these systems have been constructed in accordance with design documents both through "as-constructed" reconciliation of design drawings and through CP&L's Initial Testing Program; and that Applicants operate in accordance with criteria provided by Westinghouse relative to protection against occurrence of water hammer in the steam generators.

Together with this motion, these affidavits show that the design and preoperational testing with respect to water hammer in the main steam, feedwater and ECCS systems in the Harris plant are adequate to ensure the safe operation of the Harris plant. These papers demonstrate, therefore, that as to the issues raised by Eddleman Contention 45 there is no material issue of fact to be resolved in a hearing before the Board. Applicants respectfully submit that summary disposition in Applicants' favor should, therefore, be granted.

Both the Carlson affidavit and the Shah affidavit contain definitions and explanations of the mechanisms which can create water hammer. They also describe in detail the systems at issue here and the design features which have been incorporated into these systems to minimize the potential and consequences of water hammer. This motion will summarize the substance of the affidavits.

B. The SHNPP Steam Generators

The steam generators are relevant to Contention 45 by virtue of their interfaces with the feedwater system and the main steam system. The Harris plant utilizes a Westinghouse designed nuclear steam supply system (NSSS) consisting of three recirculating reactor coolant loops. Each loop contains a Westinghouse Model D-4 steam

generator. Carlson affidavit at ¶ 1. The Harris steam generators are of the preheater type as opposed to the earlier type which used a top feedring. It was the feedring type of steam generator in which most of the reported water hammer events had occurred. See NUREG-0927 at 2-19 through 2-22; Carlson affidavit at ¶ ¶ 26-27. As discussed in the Carlson affidavit, and in NUREG-0927, the preheat steam generator design is different from the feedring design in that there are two feedwater nozzles. The lower main nozzle located at the preheat section is used for feedwater supply to the steam generator during power operations when hot main feedwater is available. By means of a feedwater bypass system, the upper (auxiliary) nozzle is used to supply feedwater when main feedwater is unavailable or is below a specified minimum temperature. Cold water can be introduced into the upper shell region because steam pockets cannot form in that region. Carlson affidavit at ¶ 17; NUREG-0927 at 2-22.

In addition, the preheat steam generator does not use a sparger. NUREG-0927 at 2-22. This eliminates the problem on feedring designs of sparger drainage. Carlson affidavit at ¶ 26.

The Staff has specifically concluded that occurrence of a steam generator water hammer during auxiliary feedwater (AFW) operation in a preheat steam generator is highly unlikely. NUREG-0927 at 2-22. Moreover, the Staff states that even if such an event occurred it is not expected to have an adverse effect on plant safety or AFW system operability.

The design of the feedwater bypass system in the Westinghouse preheat steam generator was the culmination of an extensive test program to evaluate bubble collapse water hammer carried out under Mr. Carlson's supervision in 1977 and 1978. Carlson Affidavit at ¶ ¶ 18 through 23.

In addition to evaluating the potential for water hammer, Mr. Carlson's team also provided bubble collapse water hammer loadings for input into the preheater structural

analysis. Carlson affidavit at ¶ 23. The results of this test indicate that the steam generator primary coolant pressure boundary is maintained under normal, upset and faulted bubble collapse water hammer loadings. Id.

In addition to the design features which minimize bubble collapse water hammer, the Harris Model D-4 steam generator is also designed to withstand classical water hammer loads resulting from events which could potentially originate in the feedwater or steam system. Carlson affidavit at ¶ 29. Two specific types of transients were analyzed by Westinghouse: a feedline rupture followed by rapid closure of the main feedwater check valve, and a steamline rupture resulting in a very high flow rate through the main feedwater nozzle into the preheater. Carlson affidavit at ¶ 30. The analysis demonstrated that the integrity of the steam generator is maintained and that safe operation of the steam generator is unaffected. Carlson affidavit at ¶ 31.

C. Main Feedwater and Feedwater Bypass System

The design of the feedwater system relative to bubble collapse water hammer is addressed by Mr. Carlson. Carlson affidavit at ¶ 33. The design of this system is also discussed by Mr. Shah. Shah affidavit at ¶ ¶ 12-17.

As indicated above, during plant startup, feedwater is supplied to the steam generator only through the auxiliary nozzle. Westinghouse specifies that during escalation in power, feedwater supply will be switched to the main nozzle only after the following five criteria have been met:

(1) A minimum feedwater flowrate of approximately 15% of the full power flowrate is provided.

(2) The feedwater temperature as measured at the low points in the main feedwater piping is 250°F or higher.

(3) The section of main feedwater piping between the bypass line branch point (Point A, Attachment 3) and the main feedwater nozzle has been purged of cold water.

(4) The steam generator pressure is greater than 700 psia.

(5) The steam generator water level is within a specified range.

Carlson affidavit at ¶ 34. During plant unloading, these criteria are also to be met except that feedwater is switched to only the auxiliary nozzle when the flowrate drops to approximately 15%. Carlson affidavit at ¶ 35. Applicants have committed to operate the Harris plant in accordance with these criteria. See Collins affidavit.

In designing the Harris feedwater bypass system, Westinghouse postulated the phenomenon of steam back leakage from the steam generaor into the feedwater bypass line and ultimately into the Auxiliary Feedwater System (AFS) piping. Carlson affidavit at ¶ 38. The feedwater control system is designed to maintain the steam generator water level above the top of the auxiliary feedwater discharge pipe inside the steam generator. During normal operation, with the discharge pipe covered, only hot water and not steam could leak back into the bypass and AFS piping, thus greatly reducing the potential for water hammer.[2] Carlson affidavit at ¶ 40.

Moreover, even assuming leaking check valves and a lower than normal water level, steam back leakage and, hence, water hammer, is very unlikely because the system is

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[2]Applicants are aware of a water-hammer event in a feedwater bypass line at a non-U.S. Westinghouse PWR—the Krsko Plant in Yugoslavia. See NUREG/CR-3090, "Evaluation of Water Hammer Potential in Preheat Steam Generators," (December 1982). The implications of the Krsko water-hammer event were considered exhaustively in the Byron operating licensing proceeding. Commonwealth Edison Co. (Byron Nuclear Power Station, Units 1 and 2) LBP-84-2, 17 N.R.C. _____ (January 13, 1984) (slip opinion at 8-9, 49-73). There the Board noted the NRC's consultants' report that "the Krsko event was a plant specific incident involving unusual test conditions and what appears to be multiple component failures (check valve gross leakage). . . . [E]xperience has shown that check valves are an effective means of preventing backleadage." Id. at 70 (citing NUREG/CR 3090 at 4-1). For a variety of reasons, the Board found "bubble-collapse water hammer in the Byron feedwater bypass lines very unlikely." Id. at 72. This, of course, is consistent with the analysis of Mr. Carlson regarding the low probability of a water-hammer in the feedwater bypass line at Harris. Carlson affidavit at ¶ ¶ 37-45. Furthermore, the Byron Board pointed out that even if such an event were to occur and assuming enough force to rupture a feedwater bypass pipe (which did not happen at Krsko), no radiation would be released and the auxiliary feedwater system would still provide cooling to at least two effective steam generators. Id. at 73.

designed to provide continuous flow through the auxiliary nozzle. Carlson affidavit at ¶41. During heat up, cooldown and standby operations, relatively small amounts of feedwater are supplied to the steam generator by the AFS through the auxiliary nozzle. This system is designed to provide continuous feed, to the extent possible, thus minimizing the potential for steam back leakage. Carlson affidavit at ¶42.

An additional design feature of the feedwater bypass system to minimize the potential for water hammer of this type is the installation of two temperature sensors on the bypass piping inside containment close to the auxiliary feedwater nozzle of each steam generator. If measured temperature values exceed a predetermined setpoint, an alarm will be activated in the control room. Carlson affidavit at ¶43.

The major cause of water hammer event in PWR feedwater systems has been feedwater control valve instability. Shah affidavit at ¶13. This problem has been corrected for Harris by trimming the feedwater pump impeller and by making certain modifications of the feedwater control valve described by Mr. Shah. Shah affidavit at ¶13a. These changes are designed to provide smooth and effective flow control. Id. In addition a bypass control valve has been added to ensure more stable operation at low power. Id.

As stated in Mr. Shah's affidavit, other features intended to minimize the potential consequences of water hammer have been incorporated into the design of the feedwater system.

The piping arrangement is designed to minimize the volume of piping external to the steam generator which could pocket with steam by using the shortest possible horizontal run of inlet piping and a downward elbow welded directly to each steam generator feedwater nozzle. This configuration minimizes slug formation. Shah affidavit at ¶13b.

In addition, design features such as vents at high points and drains at low points are

provided to minimize water hammer. Shah affidavit at ¶ 13c.

The feedwater system has been analyzed for anticipated water hammer due to feedwater isolation and feedwater control valve closure. Piping and supports are designed to accommodate dynamic loads. Id.

Finally, the feedwater system has been analyzed for various unanticipated water hammer transients including a feedline check valve slam following a line break and a feedline snapping pressure transient. These analyses assure that at least two of the three steam generators will be available for safe shutdown. Id.

It should also be noted that the steam supply line to the auxiliary feedwater turbine has been designed to slope in the direction of the steam flow. Shah affidavit at ¶ 17d.

Applicants will verify that this piping has been constructed in accordance with Ebasco's specifications prior to loading fuel. McCarthy affidavit at ¶ 5.

D. The Main Steam System

In NUREG-0927, the NRC Staff has reported that water hammer in a PWR main steam system is of low safety significance. NUREG-0927 at 1-8. No event occurring in main steam lines has been severe enough to cause piping damage. Shah affidavit at ¶ 9.

Most of the reported water hammer events occurring in PWR main steam systems were caused by rapidly closing valves. See NUREG-0927 at 2-14 and Shah affidavit at ¶ 10a. The NRC Staff concluded that the damage that did occur in most of these events could have been prevented by adequate support design. NUREG-0927 at 2-14 and 2-15. The Harris piping and supports have been designed to accommodate dynamic hammer loads from transients of this type. Id. In addition, the Harris main steam piping and supports are designed to accommodate dynamic forces resulting from valve actuation. Shah affidavit at ¶ 10c.

Design features intended to minimize the occurrence of water hammer in the main steam system include automatic drain pots to collect and discharge steam condensation,

thus preventing the formation of water slugs and minimizing, therefore, the likelihood of water hammer events. In addition, a small bypass valve has been provided around the main steam stop valve to prevent water hammer occurring during start-up of cold lines. Shah affidavit at ¶ 10b.

E. The ECCS System

Water hammer has been a design consideration for the Westinghouse three-loop emergency core cooling system (ECCS). Carlson affidavit at 46. As a result of this design, the Harris ECCS is not susceptible to water hammers resulting from sudden check valve closure, sudden pump start-ups and stops, fast-acting isolation valves and relief valve operation. Id.

To minimize the potential of voids within the ECCS, Westinghouse has made certain recommendations to Ebasco which is the piping designer for the Harris plant. These include a recommendation to provide pump suction piping which is self-venting and free of potential gas pockets and to provide vents in high points of piping loops where gas could collect. Carlson affidavit at ¶ ¶ 47 and 48. Ebasco has incorporated these criteria into the design of the ECCS piping. Shah affidavit at ¶ 18.

F. Preoperational Testing

Preoperational testing is conducted as part of Applicants' Initial Test Program for the Harris plant. As discussed in the affidavit of C. S. Hinnant, Applicants' Initial Test

Program meets the requirements of 10 CFR part 50, Appendix B, Section XI.[3] Hinnant affidavit at ¶ 5.

The Initial Test Program is comprised of the Component Testing and Initial Operation Program; the Preoperational Test Program; and the Start-up Power Test program. Hinnant affidavit at ¶ 6.

The Initial Test Program is designed to provide assurance that Harris plant can be operated in accordance with design requirements and technical specifications, in part, by assuring that each plant system performs in accordance with its design criteria. Hinnant affidavit at ¶ 16.

Preoperational tests provide a safe and systematic method of demonstrating that plant equipment and systems perform as designed. Hinnant affidavit at ¶ 17. This is accomplished through: (a) verification of automatic operation of instrumentation, switches and system operation logic; (b) verification of pump operation, flowrate, design head and performance curve; and verification that operations specific to each system occur properly. Hinnant affidavit at ¶ 18.

There is no NRC regulation or Regulatory Guide which specifically requires preoperational testing for water hammer. Hinnant affidavit at ¶ 19. It is, however,

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[3]Section XI of Appendix B to 10 CFR, Part 50 provides:

> A test program shall be established to assure that all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents. The test program shall include, as appropriate, proof tests prior to installation, preoperational tests and operational tests during nuclear power plant or fuel reprocessing plant operation, of structures, systems, and components. Test procedures shall include provisions for assuring that all prerequisites for the given test have been met, that adequate test instrumentation is available and used, and that the test is performed under suitable environmental conditions. Test results shall be documented and evaluated to assure that test requirements have been satisfied.

inherent in the very definition of a preoperational test as described in the FSAR and the Hinnant affidavit that any abnormal system condition, such as water hammer, will be revealed during preoperational testing. This is necessarily true because the Initial Test Program is designed to ensure that all systems will perform in accordance with their design bases. The comprehensive testing program discussed in Chapter 14 of the FSAR which will be supplemented with over 250 test procedures provides ample opportunity for the test team to observe the operation of all systems in all modes in which water hammer events resulting from system design might occur. Hinnant affidavit at ¶ 20.

Moreover, Applicants will perform certain preoperational and start-up tests which specifically address the possibility of abnormal events such as water hammer. Hinnant affidavit at ¶ 22. These are referenced in Hinnant affidavit at ¶ 22.

IV. Conclusion

Applicants respectfully submit that this Motion and the supporting affidavits demonstrate that the Harris plant main steam system, the ECCS system, the feedwater system and their components have been designed so as to minimize the potential and consequences of water hammer in these systems such that water hammer in these systems is not an issue of safety significance for the Harris plant. Moreover, Applicants' Initial Test Program has been established to ensure that all equipment and systems at SHNPP will perform in accordance with their design bases, including those relevant to water hammer and to detect any design deficiencies that might exist. Further, Applicants will verify prior to commercial operation of the Harris plant that these systems have been constructed in accordance with design documents. Applicants submit that this Motion and the supporting affidavits make clear that in light of the NRC Staff's resolution of the water hammer issue, Eddleman Contention 45 does not raise genuine safety issue.

For all of the reasons set forth above, Applicants request that the Board grant summary disposition of Eddleman Contention 45 in Applicants' favor.

Respectfully submitted,

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