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April 17, 1984

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

APPLICANTS' RESPONSES TO WELLS EDDLEMAN'S GENERAL INTERROGATORIES AND INTERROGATORIES ON CONTENTIONS 9, 11, 41, 45, 116 AND 132C(II) TO APPLICANTS CAROLINA POWER & LIGHT COMPANY, ET AL. (EIGHTH SET)

Applicants Carolina Power & Light Company ("CP&L") and North Carolina Eastern Municipal Power Agency, pursuant to 10 C.F.R. § 2.740b, hereby submit the following responses to "Wells Eddleman's General Interrogatories and Interrogatories on Contentions 9, 11, 41, 45, 116 & 132(c)(2) to Applicants Carolina Power & Light et al. (Eighth Set)." The provision of answers to these interrogatories is not to be deemed a representation that Applicants consider the information sought to be relevant to the issues to be heard in this proceeding.

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GENERAL INTERROGATORIES

INTERROGATORY NO. G1(a). Which contentions of Wells Eddleman do Applicants agree are now admitted in this proceeding, NRC Dockets 50-400/401 O.L.?

ANSWER: The contentions of Intervenor Eddleman which are admitted to this proceeding are set forth in various memoranda and orders issued by the Atomic Safety and Licensing Board, all of which are available to Mr. Eddleman.

INTERROGATORY NO. G1(b). [F]or each such contention, provide for any answers to interrogatories by Wells Eddleman which Applicants have previously or presently received (except those suspended by Board order, if any), the following information:

ANSWER: The answers to General Interrogatories herein are restricted to Eddleman Contentions 9, 11, 41, 45, 116 and 132C(II).

INTERROGATORY NO. G1(c). Please state the name, present or last known address, and present or last known employer of each person whom Applicants believe or know (1) has first-hand knowledge of the facts alleged in each such answer; or (2) upon whom Applicants relied (other than their attorneys) in making such answer.

ANSWER: The following list identifies those persons who provided information upon which Applicants relied in answering the interrogatories on Contentions 9, 11, 41, 45, 116 and 132C(II) and indicates the particular interrogatory answers for which such person provided information:

PERSON	INTERROGATORY NO(S).
P. Yandow	9-2; 9-3(a), (c); 9-4; 9-5(b), (c), (d); 9-7; 9-8; 9-10(b), (d), (e); 9-11(a); 9-12; 11-1(1), (n), (o), (s), (t), (u); 11-2; 11-3.
R. Bucci	9-2; 9-3; 9-5(b), (c), (d); 9-6; 9-10(a), (d), (e), (f); 9-11(b), (c); 9-12; 11-1(a), (b), (c), (d), (e), (f), (g), (h), (j), (k), (m), (p), (q), (r), (u); 11-2; 11-3.
A. Fuller	41-20(184), (185), (186), (187), (189), (190), (192), (193); 41-21; 41-22; 41-23; 41-29; 41-34; 41-36.
R. M. Parsons	41-20(191), (194); 41-28.
V. Safarian	41-20 (187), (188), (195); 41-24; 41-32; 41-33; 41-35.
D. Timberlake	41-20(188); 41-29[2]; 41-30; 41-33; 41-35.
G. O. White	41-25; 41-26; 41-27.
J. Ferguson	132-c-2-22(c), (d)
D. Waters	132-c-2-22(c),(d)
R. Prunty	132-c-2-20; 132-c-2-21, 132-c-22(a), (b); 132-c-2-23; 132-c-2-24[223]; 132-c-2-25[224]; 132-c-2-26[225]; 132-c-2-27[226]; 132-c-2-28[227]; 132-c-2-29[228]; 132-c-2-30[229]; 132-c-2-31[230].
K. Shaw	45-19(197); 45-19(198); 45-19(199)
M. Gagliardi	45-19(196); 45-19(197); 45-20
D. Shah	45-19(196); 45-19(197); 45-20
S. Hardy	116-3(a), (h); 116-4(b), (c)
M. Serbanescu	116-1; 116-2; 116-2[sic]; 116-3; 116-4(a)

All of the above individuals are employees of Carolina Power & Light Company at the Shearon Harris Nuclear Power Plant, Route 1, Box 101, New Hill, North Carolina 27562, except for Messrs. Bucci, Gagliardi and Shah, and Ms. Serbanescu, who are employees of EBASCO, Two World Trade Center, New York, New York 10048.

INTERROGATORY NO. G1(d). [P]lease identify all facts concerning which each such person identified in response to G1(c)(1) above has first-hand knowledge.

ANSWER: See answer to Interrogatory No. G1(c).

INTERROGATORY NO. G1(e). [P]lease identify all facts and/or documents upon which each person identified in response to G1(c)(2) above relied in providing information to respond to the interrogatory, including the parts of such documents relied upon.

ANSWER: All facts or documents relied upon by those individuals identified above are indicated within each response to the specific interrogatories on Contentions 9, 11, 41, 45, 116 and 132C(II).

INTERROGATORY NO. G1(f). Please identify any other document(s) used or relied upon by Applicants in responding to the interrogatory.

ANSWER: See Answer G1(e).

INTERROGATORY NO. G1(g). Please state which specific fact each document, identified in response to G1(e) and G1(f) above, supports, in the opinion or belief of Applicants, or which Applicants allege such document supports.

ANSWER: Applicants have indicated which specific facts are supported by the documents identified, within each response

to the specific interrogatories on Contentions 9, 11, 41, 45, 116 and 132C(II).

INTERROGATORY NO. G1(h). Please state specifically what information each person identified in response to G1(c)(1) or G1(c)(2) above provided to or for Applicants' affiant in answering the interrogatory. If any of this information is not documented, please identify it as "undocumented" in responding to this section of General Interrogatory G1.

ANSWER: See Answer G1(c).

INTERROGATORY NO. G2(a). Please state the name, present or last known address, title (if any), and present or last known employer, and economic interest (shareholder, bondholder, contractor, employee, etc.) if any (beyond expert or other witness fees) such person holds in Applicants or any of them, for each person you intend or expect to call as an expert witness or a witness in this proceeding, if such information has not previously been supplied, or has changed since such information was last supplied, to Wells Eddleman. This applies to Eddleman and Joint Contentions as admitted, or stipulated by Applicants.

ANSWER: Applicants have not yet identified the expert or other witnesses they expect to call in this proceeding regarding these Eddleman contentions. When and if such witnesses are identified, Applicants will supplement this response in a timely manner.

INTERROGATORY NO. G2(b). Please identify each contention regarding which each such person is expected to testify.

ANSWER: See Answer G2(a).

INTERROGATORY NO. G2(c). Please state when you first contacted each such person with regard to the possibility of such person's testifying for Applicants, if you have contacted such person.

ANSWER: See Answer G2(a).

INTERROGATORY NO. G2(d). Please state the subject matter, separately for each contention as to which each such person is expected to testify, which each such person is expected to testify to.

ANSWER: See Answer G2(a).

INTERROGATORY NO. G2(e). Please identify all documents or parts thereof upon which each such witness is expected to, plans to, or will rely, in testifying or in preparing testimony.

ANSWER: See Answer G2(a).

INTERROGATORY NO. G3(a). [P]lease identify any other source(s) of information which Applicants have used to respond to any interrogatory identified under G1 above, stating for each such source the interrogatory to which it relates, and what information it provides, and identifying where in such source that information is to be found.

ANSWER: Applicants have identified all other such sources of information, if any, within the answers to the specific interrogatories set forth herein.

INTERROGATORY NO. G3(b). [P]lease identify any other source(s) of information not previously identified upon which any witness identified under G2 above, or other witness, has used in preparing testimony or exhibits, or expects to use in testimony or exhibits, identifying for each such source the witness who is expected to use it, and the part or part(s) or such source (if applicable) which are expected to be used, and, if not previously stated, the fact(s) or subject matter (or both) to which such source relates.

ANSWER: See Answer G2(a).

INTERROGATORY NO. G4(a). [P]lease identify all documents, and which pages or sections thereof Applicants intend or expect to use in cross-examination of any witness I call in this hearing. For each such witness, please provide on a timely basis (ASAP near or during hearings) a list of all such documents, the subject matter Applicants believe they relate to, and make the document(s) available for inspection and copying as soon as possible after Applicants decide or form intent to use such document in cross-examination.

ANSWER: Applicants have not at this time identified which documents, if any, they intend to use in cross-examination of Mr. Eddleman's witnesses.

INTERROGATORY NO. G4(b). [P]lease identify any undocumented information Applicants intend to use in cross-examination of each such witness for me.

ANSWER: See Answer G4(a).

INTERROGATORY NO. G5(a). [F]or each contention Applicants state or admit is an admitted Eddleman contention under G1(a) above, or an admitted joint intervenor contention, please state whether applicants have available to them experts, and information, on the subject matter of the contention.

ANSWER: Applicants have available to them experts and information on the subject matter of Contentions 9, 11, 41, 45, 116 and 132C(II).

INTERROGATORY NO. G5(b). If the answer to (a) above is other than affirmative, state whether Applicants expect to be able to obtain expertise in the subject matter, and information on it, and if not, why not.

ANSWER: Not applicable.

INTERROGATORY NO. G6(a). [F]or each document identified in response to any interrogatory herein, or referenced in response to any interrogatory herein, please supply all the following information which has not already been supplied:

(i) date of the document

(ii) title or identification of document

(iii) all authors of the document, or the author

(iv) all qualifications (professional, technical) of each author of the document

(v) the specific parts, sections or pages, of the document, if any, upon which Applicants rely

(vi) the specific information each part, section or page identified in response to (v) above contains.

(vii) identify all documents used in preparing the document, to the extent known (and also to the extent not identified in the document itself)

(viii) state whether Applicants possess a copy of the document

(ix) state all expert opinions contained in the document, upon which Applicants rely, or identify each such opinion.

(x) identify the contention(s) with respect to which Applicants rely upon (a) the expert opinions (b) the facts identified in the document

(xi) state whether Applicants now employ any author(s) of the document, identifying each person for each document.

(xii) state whether Applicants have ever employed any author(s) of the document, identifying each such person for each document.

(xiii) identify all sources of data used in the document. Answers to all the above may be tabulated or grouped for efficiency.

ANSWER: All such information available to the Applicants with regard to each document identified in response to an interrogatory herein is contained in the particular document which is being made available to Mr. Eddleman. It would be particularly burdensome for Applicants to research all historical employment records to determine whether the authors of each document identified herein have ever been employed by Applicants. However, Applicants will supplement this response in a timely manner if and when Mr. Eddleman identifies any such

author regarding whom they are particularly interested in determining this information.

INTERROGATORY NO. G7(a). Please identify all documents which Applicants plan, expect or intend to offer as exhibits (other than for cross-examination) with respect to each Eddleman contention admitted in this proceeding which (i) is included in your current response to G1(a), or (ii) is the subject of interrogatories in this set; please state for which contention or contentions each exhibit will be or is expected to be offered.

ANSWER: Applicants have not yet identified those documents they intend to offer as exhibits relating to Contentions 9, 11, 45, 116 or 132C(II). As to Contention 41, see Applicants' May 12, 1983 answer to Interrogatory G7.

INTERROGATORY NO. G7(b). Please identify all documents which Applicants plan, expect or intend to use in cross-examination of any other parties' witnesses or joint intervenor witness in this proceeding, with respect to (i) Eddleman contentions identified under G7(a)(i) (or G1(a)) above, or any other Eddleman contention which is the subject of interrogatories in this set; (ii) each Joint contention now admitted in this proceeding; (iii) per our agreement of 4-8-83, each contention of each other party to this proceeding which is currently admitted. Please identify for each such document the witnesses, or witness, and all contentions with respect to whom (or which) that document is planned, expected, or intended to be offered or used.

ANSWER: Applicants have not yet identified those documents they intend to use for cross-examination of any witness.

INTERROGATORY NO. G7(c). Please identify which of the documents identified in response to (b) above (i) will be offered into evidence by Applicants, and (ii) which of the same documents Applicants expect to offer into evidence or intend to offer as evidence or exhibits in this proceeding.

ANSWER: See Answer G7(b).

INTERROGATORY NO. G10(a). Where the above general interrogatories, and/or specific interrogatories below, or any of them, call for identification of documents, (i) and no documents are identified, is that the same as Applicants stating that there are no documents responsive to this general interrogatory, in each case where no documents are identified? (ii) and documents are identified, is that the same as Applicants stating that the identified documents are the only ones presently known which are responsive to the interrogatories? (iii) If your answer to G10(a)(ii) is other than affirmative, please state all reasons for your answer. (iv) If your answer to G10(a)(i) above is other than affirmative, please state all reasons for your answer.

ANSWER: (i) Yes.

(ii) Yes.

(iii) Not applicable.

(iv) Not applicable.

INTERROGATORY NO. G10(b). Where any interrogatory, general or specific, herein, calls for factual information (i) and an opinion is stated in response, is that the expert opinion of any person(s) identified as having contributed information to that response? (ii) and facts are given or identified (or a fact is) in response, but no documents are identified, does that mean Applicants have no documents containing such fact(s)? (iii) If your answer to (i) above is affirmative, please state for each such response all qualifications of each expert upon whom Applicants rely for each such answer. The qualifications need be stated only once for each such person if they are clearly referenced in other answers. (iv) if your answer to (i) above is other than affirmative, please state which opinions, if any, given in response to interrogatories (general or specific) herein is the opinion of an expert, identify each expert whose opinion you used in response to each interrogatory, and state in full the qualifications of each such expert. (v) If your answer to (i) above is other than affirmative, please identify all opinions of non-experts used in your responses, and identify each non-expert whose opinion is included in each answer herein. (vi) If your response to (ii) above is other than affirmative, please identify each document which contains a fact not previously documented in your response(s), stating what the fact is, and at what page, place, chapter or other specific part the document contains such fact.

ANSWER: (i) Yes.

(ii) See Answers G1(e), (f) and (g) and G10(a)(i) above.

(iii) See Attachments (A)-(O) attached hereto.

(iv) Not applicable.

(v) Not applicable.

(vi) Not applicable.

INTERROGATORY NO. G11. For each answer to each interrogatory herein (or any subpart or part thereof), please identify each item of information in possession of Applicants (including facts, opinions of experts, and documents) which (a) contradicts the answer you made, (i) in whole (ii) in part (please identify each such part for each item of information identified); (b) casts doubt on your answer (i) in whole (ii) in part (please identify each such part for each item of information identified); (c) Please identify all documents not already identified in response to parts (a) and (b) above (and their subparts) which contains any item of information asked for in (a) or (b) above. Please identify for each such document what information item(s) it contains and what answer(s) each such item is related to.

ANSWER: G11(a)-(c): Applicants have no such information.

ANSWERS TO INTERROGATORIES ON EDDLEMAN 9

INTERROGATORY NO. 9-1. Please provide a copy of the current 10 CFR 50.49. If you believe it is different from that cited in my responses, please state whether it is being further amended or changed in any way to your present knowledge, or if such changes have been proposed, so state.

ANSWER: 10 C.F.R. § 50.49 was published as a final rule of the Commission on January 21, 1983 at 48 Fed. Reg. 2729. The current version of 10 C.F.R. § 50.49 is available in the Local Public Document Room ("LPDR").

INTERROGATORY NO. 9-2(a). Please identify each and every item of electrical equipment at Harris that you believe (a) is fully environmentally qualified under 10 CFR 50 Appendix A General Design Criterion 1 and/or GDC 4 and/or 10 CFR 50.49 and/or NUREG-0588, stating under which you believe it is fully qualified (you may say "all" if you so believe);

ANSWER: The Environmental Qualification Master List ("Master List") for the Shearon Harris Nuclear Power Plant ("SHNPP") identifies electrical equipment at SHNPP required to be environmentally qualified under 10 C.F.R. § 50.49. All electrical equipment on the Master List will be fully qualified prior to fuel load in accordance with applicable NRC regulations and guidance. As of April 13, 1984, more than 80% of the Environmental Qualification Reports submitted to Applicants by equipment vendors have been determined to be acceptable. The Master List and a sample of the Environmental Qualification Packages containing Environmental Qualification Reports, review documentation and other information will be produced for inspection and copying in accordance with Applicants' Response to Wells Eddleman's Request for Production of Documents.

INTERROGATORY NO. 9-2(b). [I]s required to be environmentally qualified for accident conditions by NRC rule, regulation or regulatory position (specify which), but has not been fully qualified.

ANSWER: See Answer 9-2(a).

INTERROGATORY NO. 9-2(c). For each item identified under either (a) or (b) above, please state exactly what accident conditions are postulated for that item, and all reasons why those conditions and not any more severe ones are postulated, and

ANSWER: The design basis post-accident condition consequences to which electrical equipment identified in the answer to Interrogatory 9-2(a) must be qualified are described in the following sections of the Final Safety Analysis Report for the Shearon Harris Nuclear Power Plant ("FSAR"):

Post-Accident Condition Consequences	FSAR
Compartment Pressurization and Flooding	§§ 3.6, 3.6A
Chemical Environment	§§ 3.11.5, 6.5.2
Temperatures and Integrated Radiation Doses	§ 3.11B
Analysis of Pressure Response of Containment	§ 6.2.1

INTERROGATORY NO. 9-2(d). [S]tate what exact tests were done on (i) that item (ii) a similar item (iii) anything, which tests' results were used to establish, in your view, that the item is environmentally qualified. Include all test conditions in your response, or reference them precisely.

ANSWER: Applicants have received to date over 100 test reports from equipment vendors. All such test reports are reviewed by Applicants for correctness and applicability to SHNPP. A sample of The Environmental Qualification Packages containing test reports will be produced for inspection and copying as stated in Answer 9-2(a).

INTERROGATORY NO. 9-2(e). [I]dentify all documents containing the results of any tests identified in response to (d) above. Please note all tests which any item (or any item similar to an item used at Harris) failed.

ANSWER: See Answers 9-2(d) and (f).

INTERROGATORY NO. 9-2(f). Have there been any failures, in tests you know of, of (i) items to be used at Harris (ii) items similar to those to be used at Harris, in or under environmental conditions (aa) as severe (bb) more severe (cc) less

severe (dd) different, than the conditions you believe the item (or similar item) to be used at Harris must be environmentally qualified under? Please identify all documents relating to each such failure not already identified above. Please also (ee) state for each such failure any rationale, reasoning or argument or information which you believe means such failure would not be a to environmentally disqualify the item or similar item at Harris, based on the failure of each such item or similar item in the test(s).

ANSWER: All test failures must be documented by the vendor. The vendor also must provide an evaluation of the failures. The following criteria are used by Applicants in reviewing the adequacy of vendor documentation:

1) Record failure date and time.

2) Identify and understand cause of problem or failure which includes determining with reasonable assurance if test monitoring instrumentation and/or test devices were the cause of the abnormality.

3) Determine with reasonable assurance whether the acceptance criteria were appropriate.

4) Review the failure to determine if it is common-mode or random.

5) Determine whether all failed items have been repaired or whether disposition has been determined.

6) Determine whether the corrective actions have been made in existing identical items to which these actions are pertinent.

7) If the problem or failure has been corrected by design change, determine whether the change has been incorporated and tested to prove its effectiveness.

8) Determine whether the problem and failure report close-out has been reviewed by cognizant technical and management personnel to ensure adequacy of corrective and close-out action.

All documentation related to test failures is included in the Equipment Qualification Packages, a sample of which will be produced for inspection and copying as stated in Answer 9-2(a).

INTERROGATORY NO. 9-3(a) State (or state where it is stated) all actions Applicants have taken to comply with the criteria of 10 CFR 50.49 for each item of electrical equipment located in a harsh environment at Harris.

ANSWER: Applicants' program for environmental qualification of electrical equipment is designed in accordance with 10 C.F.R. § 50.49 and NUREG-0588, Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment, (Rev. 1, July 1981), which is endorsed by 10 C.F.R. § 50.49(k). The principal elements of Applicants' program to meet section 50.49 include:

1) Identify on the Master List all electrical equipment required to be environmentally qualified.

2) Identify environmental parameters at equipment locations, e.g., radiation, temperature, humidity.

3) Specify equipment for the appropriate environmental parameters in accordance with applicable NRC regulations and guidance and industry standards.

4) Evaluate vendor proposals for meeting the specifications and evaluate vendor test plans prior to testing.

5) Review vendor Equipment Qualification Reports.

6) Assemble Equipment Qualification Packages containing all required documentation.

7) Prepare documentation for NRC Staff ("Staff") audit, including:

a) Equipment Qualification Program Report;

b) Master List;

c) Component Evaluation Sheets;

d) Equipment Qualification Packages

8) Respond to any Staff audit findings and requests for additional information.

9) Qualify all equipment prior to fuel load.

10) Monitor NRC and other studies, reports and Information Notices, IE Bulletins, vendor information and other industry experience for applicability to SHNPP.

INTERROGATORY NO. 9-3(b). [D]efine the term "harsh environment" as you use it in your interrogatory 9.5(a). State whether this is the same definition used (i) in 10 CFR 50.49 as presently promulgated (ii) in NUREG-0588 (iii) in 10 CFR 50 Appendix A.

ANSWER: Applicants' definition of "harsh environment" is as follows:

> The harsh environment is an environment with a significant change (increase in pertinent environmental stress factors) due to a Design Basis Event, such as, Loss of Coolant Accident, Main Steam Line Break or High Energy Line Break, including a significant increase in radiation due to recirculation of containment sump fluid.

Neither 10 C.F.R. 50, Appendix A, 10 C.F.R. § 50.49, or

NUREG-0588 defines harsh environment. However, 10 C.F.R. §50.49(c) defines mild environment. Applicants believe their definition of harsh environment to be consistent with the intent of NRC regulations and guidance.

INTERROGATORY NO. 9-3(c). State which equipment at Harris has been qualified under NUREG-0588 in your opinion, and to the extent not already set forth above (in other responses to the above), state for each item all reasons why you think it is qualified under NUREG-0588 and identify all documents concerning its qualification and/or testing.

ANSWER: See Answers 9-2(a) and (d), and 9-3(a).

INTERROGATORY NO. 9-4(a). State when, if ever, CP&L plans to complete environmental qualification for the Harris 1 plant.

ANSWER: Environmental qualification of electrical equipment will initially be achieved prior to fuel load. However, environmental qualification of electrical equipment is an ongoing program at SHNPP for the life of the plant. Replacement parts, spare parts and new equipment will be environmentally qualified. In addition, Applicants will monitor NRC and other studies, reports and Information Notices, IE Bulletins, vendor information and other industry experience for applicability to SHNPP.

INTERROGATORY NO. 9-4(b). What work needs to be done between now and your completion date (or November 30, 1985 if you think this date applies regardless of your completion date) to qualify all the electrical equipment at Harris that must be qualified. Please identify all documents, including work schedules, test programs and/or schedules, critical path studies or diagrams, and/or plans, which relate to the completion of the environmental qualification of electrical equipment at Harris. If a schedule only applies to some equipment, identify all equipment for which that schedule applies.

ANSWER: The current schedule for completion of the preoperational phase of Applicants' program for environmental qualification of electrical equipment is as follows. On July 1, 1984 Applicants will submit to the Staff their Equipment Qualification Program Report, the Master List, the Component Evaluation Sheets and other information requested by the Staff in § 3.11.3 of NUREG-1038, Safety Evaluation Report Related to the Operation of Shearon Harris Nuclear Power Plant, Units 1 and 2 (November 1983) ("SER"). The Staff will conduct an audit of Applicants' program in October and will issue an SER supplement based on the results of the audit. All equipment will be fully qualified by fuel load, which is scheduled for June 1985.

INTERROGATORY NO. 9-5(a). Please provide a copy of FSAR Amendment 4.

ANSWER: FSAR Amendment 4 will be produced for inspection and copying.

INTERROGATORY NO. 9-5(b). Please state why you believe compliance with the format requirements of 10 CFR 50.49 (if any -- see your interrogatory 9-7(a)) would be relevant to this contention.

ANSWER: 10 C.F.R. § 50.49 contains requirements for identification of electrical equipment and for documentation of component evaluation data. The formats of FSAR Figure 3.11.1-1, the Master List, and Figure 3.11.1-2, the Component Evaluation Sheets, are designed to address the regulatory requirements by calling for certain categories of information which, along with other information, will be reviewed by the

Staff. Any deficiencies or omissions which Intervenor believes to exist in Figures 3.11.1-1 and 3.11.1-2 would thus be potentially relevant to Contention 9.

INTERROGATORY NO. 9-5(c). Please state why you believe compliance with the format requirements of 10 CFR 50.49 (if any -- see your interrogatory 9-8(a)) would be relevant to this contention.

ANSWER: See Answer 9-5(b).

INTERROGATORY NO. 9-5(d). [P]lease explain why I should tell you what changes you need to make in a figure (3.11.1-2) in your FSAR, in order to comply with 10 CFR 50.49. Please also state whether you believe that figure and the information in it does comply (or demonstrate compliance with) 10 CFR 50.49, and if so, why (state all reasons) and please also state whether NRC staff agrees with your view. (Cf. your interrogatory 9-8(c))

ANSWER: Applicants believe the Interrogatory is relevant for the reasons stated in Answer 9-5(b). Applicants believe that the format of Figure 3.11.1-2 is adequate because it calls for all of the categories of information required by 10 C.F.R. § 50.49 and recommended by NUREG-0588. Applicants believe that the Staff agrees with the format of Figure 3.11.1-2. Figure 3.11.1-2 is consistent with a figure included by the Staff in IE Bulletin 79-01B as an example of an acceptable format for providing the types of information required for environmental qualification of electrical equipment. Applicants are aware of no subsequent Staff issuance repudiating or preempting the sample format provided in IE Bulletin 79-01B.

INTERROGATORY NO. 9-6(a). State what criteria of NUREG-0588 you believe you have (i) completely (ii) partially complied with. Give all basis for each answer. Identify all documents you believe support your answer to the above parts, and all documents you believe support your answers to (b) through (d) of 9-5 above.

ANSWER: Applicants believe that their program for environmental qualification of electrical equipment complies with all the criteria of NUREG-0588. For the bases of Applicants' compliance, see Answer 9-3(a).

INTERROGATORY NO. 9-7(a). Do you believe there are inadequacies in SER section 3.11?

ANSWER: Applicants do not believe there are any inadequacies in SER § 3.11.

INTERROGATORY NO. 9-7(b). If so, please detail each such inadequacy. Identify all documents and/or expert opinions supporting your opinion that each is an inadequacy in fact.

ANSWER: Not applicable.

INTERROGATORY NO. 9-8(a). What information requested in SER pp 3-49 through 3-51 has CP&L (i) already provided to NRC Staff (ii) committed to provide to NRC Staff (iii) refused or otherwise declined to provide to NRC Staff (iv) not yet provided to NRC Staff? Please identify all items of equipment for which you have not yet provided information requested by the Staff, either information requested as detailed in the SER pp 3-49 through 3-51, or any other information requested (specify).

ANSWER: Applicants have committed to provide all of the information requested in SER § 3.11.3. The information will be provided according to the schedule outlined in Answer 9-4(b). Applicants have met with the Staff in order to present a general program description. The materials included in the presentation will be produced for inspection and copying.

INTERROGATORY NO. 9-9. (a) Is there any equipment in your (i) Brunswick (ii) Robinson 2 nuclear plants which is not environmentally qualified and which should be or must be environmentally qualified under 10 CFR 50.49, NUREG-0588, or other applicable NRC rule, requirement or regulation (please specify)? If so, when do you plan to qualify each such item of equipment (list all -- if no date, say "no date to qualify")? (b) Do you believe that operating either plant with such equipment (i) has (ii) will (iii) might compromise safety of that plant? Please give all reasons for your answer and identify all documents you believe support your answer, including any documents submitted to NRC to justify continued operation of either Robinson 2 or either or both Brunswick units with unqualified electrical equipment.

ANSWER: Applicants object to the Interrogatory as irrelevant and beyond the scope of Contention 9.

INTERROGATORY NO. 9-10(a). What flooding analysis have you done for equipment inside that Harris containment? Please identify all documents containing such analysis.

ANSWER. The flooding analysis for equipment inside containment at SHNPP is described in FSAR §§ 3.6 and 3.6A.

INTERROGATORY NO. 9-10(b). Do you have any Anaconda flexible conduit in use anywhere at Harris? If so, is it in a place or use that you believe should require it to be environmentally qualified under 10 CFR 50.49, NUREG-0588 or other applicable regulation, rule or position of NRC (please specify)? Please identify all such uses and/or locations of Anaconda flexible conduit.

ANSWER: Anaconda flexible conduit is used in several different applications at various locations at SHNPP. None of the conduit is required to be environmentally qualified, either because:

1) The equipment to which the conduit is connected is qualified to operate independent of the conduit materials.

2) The cables enclosed in the conduit are qualified for use unprotected by conduit.

3) The conduit is used to enhance moisture protection for outdoor equipment such as terminal boxes.

4) The conduit is used as a vibration reducer on high vibration equipment, an application which is not impaired by failure of the outside jacket material of the conduit.

INTERROGATORY NO. 9-10(c). Are any of the items mentioned in Union of Concerned Scientists' February 7, 1984 petition to NRC re environmental qualification of electrical equipment, in use or planned to be used or installed at Harris?

ANSWER: Mr. Eddleman did not supply Applicants with a copy of the February 7, 1984 Union of Concerned Scientists' Supplemental Petition for Emergency and Remedial Action; and Applicants were unable to obtain a copy of the petition in sufficient time to answer the Interrogatory.

INTERROGATORY NO. 9-10(d). What equipment in use at Harris, if any, can perform its required functions while submerged? What equipment at Harris has submergence included in its environmental qualification requirements (i.e. has a qualification environment that includes being submerged)?

ANSWER: All electrical equipment at SHNPP for which submergence is included in its qualification environment will be qualified to perform its required safety function(s) while submerged. Such equipment will be qualified for submergence in the radiation field postulated for the equipment's location. Any electrical equipment located below the maximum flooding level of 228.3 ft. could be submerged during an accident. The

elevation level for each item of electrical equipment is indicated on the Master List.

INTERROGATORY NO. 9-10(e). Please list all equipment at Harris which you think (i) is electrical equipment that could be submerged during an accident, e.g. at TMI-type accident or small-break LOCA where coolant overflows or flows out into containment, but cannot be removed from containment either (aa) because it is too radioactive, or (bb) because containment is isolated; (ii) is electrical equipment that has to be environmentally qualified for being submerged in (aa) water (bb) highly contaminated water, e.g. a high radiation field with water. Please identify all bases for your answers and all documents concerning these matters.

ANSWER: See Answer 9-10(d).

INTERROGATORY NO. 9-10(f). Have you analyzed the effects of plateout of radioiodines etc. on the radiation fields to which electrical equipment at Harris may be exposed during an accident? Please identify all documents concerning such analysis by you or by anyone else. Identify also any documents analyzing this question in general (plateout effects on radiation fields in nuclear plant accidents as this affects electrical equipment or may affect it) or for other nuclear plants or for military nuclear systems, which you know of.

ANSWER: Applicants have analyzed the effects of plateout of radioiodines on the radiation fields to which electrical equipment at SHNPP may be exposed during an accident. A zero removal rate coefficient is used for all types of halogens in Applicants' plateout model. This assumption of zero removal is more conservative than the removal rates recommended in NUREG-0588.

INTERROGATORY NO. 9-11(a). What maintenance procedures for Harris assure that environmentally qualified electrical equipment at Harris is always kept in the same condition or state of repair and/or readiness it was qualified under? Please identify all documents concerning such maintenance, or maintenance programs for environmentally qualified electrical equipment at Harris.

ANSWER: Maintenance procedures for SHNPP are currently under development. Maintenance procedures will be based on the following information. Environmental Qualification Reports submitted by vendors are reviewed for information regarding maintenance by engineering personnel trained in equipment qualification. The engineering reviews also identify equipment qualified to less than the 40-year life of the plant, and document maintenance to be performed on such equipment to assure continued qualification. Spare parts and replacement intervals necessary to assure a 40-year life also are identified. The information generated by the engineering reviews is then transmitted to the Operations Department to be included in the SHNPP surveillance and maintenance program. Operations personnel also review Technical Manuals for inclusion in the program. NRC and other studies, reports and Information Notices, IE Bulletins, vendor information and other industry experience will be taken into account in writing and revising maintenance procedures as appropriate.

INTERROGATORY NO. 9-11(b). Are there any items that must be environmentally qualified for several conditions (e.g. radiation, steam spray and impact) which were not tested under all those conditions at once? Please identify each such item or describe which items were not so tested.

ANSWER: Generally, the electrical equipment at SHNPP which must be qualified to accident conditions is not tested under all postulated conditions simultaneously. Paragraph 2.3 of NUREG-0588 permits sequential testing, and such testing is

standard industry practice. However, most equipment is tested under several conditions simultaneously. The test methods for particular items of electrical equipment are included in the Equipment Qualification Packages, a sample of which will be produced for inspection and copying as stated in Answer 9-2(a).

INTERROGATORY NO. 9-11(c). Have radiation fields in the auxiliary building at Harris under (i) MSLB (ii) high energy line break outside containment (iii) EFW failure (iv) AFW failure (v) break in steam line to steam - driven pump (vi) fire in the auxiliary building, been analyzed for determining conditions under which electrical equipment in the Harris auxiliary building must be environmentally qualified? Please identify all documents concerning (aa) such analysis (bb) any reasons for not doing such an analysis for any or all of the situations inquired about above.

ANSWER: Except for (vi), which is not analyzed under the environmental qualification program but is analyzed under the fire protection program, each of the above postulated events has been analyzed to assure that the calculated radiaticn environment for electrical equipment in the SHNPP Reactor Auxiliary Building, both for normal plant operation and the most severe design basis accident to which the equipment is required to be qualified, is conservative.

INTERROGATORY NO. 9-12(a). Please provide copies of (i) actual test data (ii) analysis, used or submitted by CP&L to show electrical equipment at Harris is or will be environmentally qualified, for all items of electrical equipment at Harris which (aa) you believe must be environmentally qualified (bb) such tests or analysis have been done and you have a copy of the test results or analysis. Please provide copies of all procedures used in each such test and all documents giving data or basis used in each such analysis.

ANSWER: See Answer 9-2(d).

ANSWERS TO INTERROGATORIES ON EDDLEMAN 11

Applicants have determined that there are no polyethylene-insulated electrical cables in cable raceways at SHNPP which will be exposed to radiation. See Letter from M. A. McDuffie to Harold R. Denton (April 26, 1983), and attachments, a copy of which was transmitted to Mr. Eddleman. While Applicants believe Contention 11 is now moot, Applicants are providing answers to the interrogatories, pending an opportunity to discuss the contention with Mr. Eddleman, in order to facilitate the proceeding.

INTERROGATORY NO. 11-1(a). What information do you possess concerning the effects on (i) polyethylene (ii) polyethylene copolymer (iii) neoprene (iv) any other insulation used on (aa) cable (bb) wiring (cc) other equipment, at Harris, of (cc) radiation delivered at a dose rate of (cc-a) under 1 rad per hour (cc-b) 1 rad per hour to 5 rads/hour (cc-c) 5 rads/hour to 20 rads/hour (cc-f) 500 rads/hour to 2000 rads/hour (cc-g) 2000 rads/hour to 10,000 rads/hour (cc-h) 10,000 rads/hour to 50,000 rads/hour (cc-i) 50,000 rads/hour to 200,000 rads/hour (cc-j) 200,000 rads/hour to 1 megarad per hour (cc-k) 1 megarad/hour to 5 megarads/hour (cc-1 over 5 megarads per hour? Please identify all documents containing such information which you know of.

ANSWER: Applicants have not performed an analysis of the kind requested by the Interrogatory. Such an analysis would require substantial time and effort. Applicants' Architect/Engineer, EBASCO, has an extensive library of documents concerning radiation effects on insulation material at different dose rates and under different environmental conditions. These documents are located at EBASCO's offices in New York City.

INTERROGATORY NO. 11-1(b). Do any of the documents identified in response to the above interrogatory also discuss the effects of (i) heat (ii) pressure (iii) steam (iv) oxygen (v) surface area (vi) nitrogen (vii) particulates (e.g. soot from fires, radioactive particulates) (viii) conduit (ix) cable configuration (x) insulator position or configuration (xi) other materials used in conjunction with insulation (xii) insulation stripped from conductors (xiii) mechanical stress (xiv) fire (xv) submergence (xvi) impact of objects (e.g. shrapnel from exploding pump, line break, etc.) (xvii) pipe whip (xviii) vibration (xix) seismic forces (xx) explosions (xxi) hydrogen burns or rapid deflagrations (xxii) other factors, in combination with radiation, on the (aa) insulating ability (bb) integrity (cc) properties (specify) (dd) resistivity (ee) strength (ff) tensile strength (gg) volume (hh) elasticity (jj) bulk modulus (kk) other characteristics (please specify) of the insulation or of polyethylene, polyethylene copolymer (PE co-P), neoprene, or other insulating material used or to be used at Harris for cable or wiring or other electrical equipment insulation? Please identify what of the above is discussed in each document, and identify all documents not identified in response to the above which discuss any of the above factors or properties under conditions of radiation exposure combined with any of items (i) thru (xxii) above.

ANSWER: See Answer 11-1(a).

INTERROGATORY NO. 11-1(c). Please identify any documents or other information which you believe indicates that insulation in a conduit (specify what the conduit is made of) is shielded from, or (ii) not subject to, degradation effects such as those alleged in Eddleman contention 11.

ANSWER: Insulation in a conduit is assumed to be affected by all gamma radiation existing outside the conduit (i.e., no gamma shielding credit is taken for the conduit).

INTERROGATORY NO. 11-1(d). Please state the lowest (i) gamma (ii) total, radiation dose rate at which you believe the effects alleged in Eddleman contention 11 (i.e. accelerated degradation of insulation) (aa) cannot occur (bb) will not occur (cc) probably will not occur (dd) might not occur. Please give all bases for each of your answers and identify any and all documents containing information you believe supports your answer.

ANSWER: The investigation of cable insulation deterioration in the containment building of the Savannah River Nuclear Reactor, as documented in K. T. Gillen and R. L. Clough, Investigation of Cable Deterioration in the Containment Building of the Savannah River Nuclear Reactor, NUREG/CR-2877 (August 1982), showed that there were alternating areas of flexible and brittle cable insulation corresponding to differences in the radiation fields experienced by the cable at those points. The brittle portions of the cable were exposed to approximately 25 rads/hr., while the relatively undamaged portions were exposed to approximately 13 rads/hr. This strongly suggests that there is a minimum threshold dose rate below which dose-rate effects are not significant. That dose rate appears to be somewhere between 13 and 25 rads/hr.

INTERROGATORY NO. 11-1(e). Please state the highest (i) gamma (ii) total, radiation dose rate at which you believe the accelerated degradation of insulation described (e.g.) in Eddleman 11, NUREG/CR 2763, NUREG/CR 2877, etc. (aa) cannot (bb) does not (cc) probably will not (dd) might not, occur. Please give all basis for your answer, including identification of all documents containing information you believe supports your answer.

ANSWER: Gillen and Clough in their tests used dose rates ranging from 1.4 x 10E3 rads/hr. to 1.2 x 10E6 rads/hr. See K. T. Gillen and R. L. Clough, Occurrences and Implications of Radiation Dose-Rate Effects for Material Aging Studies, NUREG/CR-2157 (June 1981); R. L. Clough and K. T. Gillen, Radiation-Thermal Degradation of PE and PVC: Mechanism of Synergism and Dose-Rate Effects, NUREG/CR-2156 (June 1981).

Conclusions concerning dose-rate effects for dose rates higher than 1.2 x 10E6 rads/hr. cannot be drawn from the Gillen and Clough studies.

INTERROGATORY NO. 11-1(f). Please state if there is any radiation dose rate or total integrated radiation dose (specify which, and what dose or dose rate) above which insulation (e.g. polyethylene, neoprene) cannot be degraded or is not degraded in such a way that its function or the safety function of energy or signals insulated by it will not be impaired. Please state all such doses or dose rates and all bases for your conclusion that they exist and/or are at the level(s) stated, stating which type(s) of insulation (e.g. polyethylene, PE-co-P, neoprene) each such dose rate applies to, and identifying all documents containing information you believe supports each such total dose or dose rate or answer you have made.

ANSWER: Applicants are not aware of any radiation dose rate or total integrated dose above which insulation does not degrade.

INTERROGATORY NO. 11-1(g). [S]tate which, if any, total integrated (i) gamma (ii) total, radiation dose rate exists below which degradation of the type alleged in Eddleman 11 and/or described in NUREG/CR 2156, 2157, 2763 and 2877 (specify which one(s)) (aa) does not occur (bb) cannot occur. Please state all basis for each of your answers, including identification of all documents containing any information you believe supports your answer(s) or any of them (specify which).

ANSWER: Applicants do not know what the Interrogatory means by a "total integrated . . . radiation dose rate." The degradation curves shown in Figures 1 through 4 of NUREG/CR-2157 indicate that, until the materials tested received a total integrated dose of approximately 2 x 10E7 rads, no significant degradation occurred; and no significant differences in degradation were observed regardless of the dose rates used to reach that total dose.

INTERROGATORY NO. 11-1(h). Please identify all radiation dose rate levels which you believe (i) exist in normal operation of Harris, or would exist in normal operation of Harris, in any zone or area through which insulated cables or wiring or other insulated equipment insulated with polyethylene or PE co-P, pass (ii) exist or would exist during normal shutdowns at Harris in any such area (iii) exist or would exist during refueling or other prolonged outages at Harris in any such area (iv) exist or could exist during any accident (specify the accident) in any such area. Please also provide (v) maps, drawings or diagrams showing the areas of given radiation dose levels for Harris (vi) all assumptions and calculations, including computer runs and programs and assumptions and input data for each such run (and a listing of the source code for each program so used), used to figure those radiation dose levels, specifying for which zone(s) or area(s) each was used. Please provide this information for the auxiliary building and all other areas in which cables or wiring insulated with polyethylene, PE co-P or neoprene, or other equipment so insulated, could be exposed to radiation.

ANSWER: Radiation dose maps for all radiation zones at SHNPP are contained in FSAR Appendix 3.11B. The radiation doses given are based on 100% reactor output. Radiation dose rates under normal, full-power operating conditions can be calculated by dividing the 40-year total integrated dose by the number of hours in 40 years. Radiation dose rates during design basis accident conditions are similar to the dose rates normally employed during equipment qualification tests. Because the qualification tests sufficiently simulate accident conditions, accident dose rates are irrelevant to the question of low dose-rate effects.

INTERROGATORY NO. 11-1(j). Have you, or anyone else, performed any analysis of the ability of (i) all (ii) (specify) wiring, cable or other electrical equipment insulated with (aa) polyethylene, (bb) PE co-P (cc) neoprene (dd) other insulation, to perform its safety-related functions and/or to avoid suprious signals or short circuits, under the degradation effects described in (ee) Eddleman contention 11 (ff) NUREG/CR-2156 (gg) NUREG/CR-2157 (hh) NUREG/CR 2763 (jj) NUREG/CR

2877 (kk) other studies of radiation effects or synergistic effects of conditions including radiation, on such insulation? Please identify all such studies you (11) possess (mm) know of.

ANSWER: In the Gillen and Clough tests, the properties measured to detect polymer degradation were mechanical properties - namely, tensile strength and elongation. Other engineering properties of interest, particularly electrical properties like insulation resistance and dielectric strength, were not measured. Cable qualification tests have demonstrated that a cable with substantial degradation in mechanical properties of the insulation will still perform its electrical function.

A more recent Sandia study by Minor and Furgal has indicated that degradation of the mechanical properties of cable insulation does not prevent the cable from performing its required electrical function. See E. E. Minor and D. T. Furgal, Equipment Qualification Research Test of Electrical Cable with Factory Splices and Insulation Rework No. 2, NUREG/CR-2932 (2 vols.) (September 1982). In the study, cross-linked polyolefin insulated electrical cable was exposed to a relatively low dose rate (6.2 x 10E4 rads/hr.). Despite degradation of mechanical properties, the cable was able to perform its electrical function at all times. This series of tests was conducted according to industry standards (IEEE Standards 323-1974 and 383-1974) and NRC guidelines (NUREG-0588). Minor and Furgal concluded that the methodology employed by the nuclear industry to qualify electrical equipment, despite the dose-rate effect on mechanical properties found by Gillen and Clough, is adequate.

INTERROGATORY NO. 11-1(k). Are you able to analyze all instances in which (i) cable (ii) wiring (iii) other electrical equipment at Harris, might fail under the influence of degradation effects such as are discussed in any of the documents or contention 11 listed in (j) (ee) through (j) (kk) above? If so present and identify any such analysis you have done for equipment at Harris which is insulated with (aa) polyethylene (bb) PE co-P (cc) neoprene (dd) other insulating material.

ANSWER: See Answer 11-1(j).

INTERROGATORY NO. 11-1(l). Please state all features, procedures, or requirements of your Harris (aa) inspection (bb) maintenance (cc) test program(s) which provides or provide for (i) inspection (ii) testing (iii) replacement, of cable or wiring insulation which may have become degraded. Please specify (dd) how you plan to inspect insulation inside conduit (ee) how you plan to inspect insulation inside bundled wiring or cables (ff) how you plan to inspect multiconductor cables or wires (gg) how you plan to test the insulation on wiring or cable inside conduit (hh) how you plan to test insulation inside bundled wiring or cables (jj) how you plan to test insulation inside multiconductor cables or wires. Please identify all documents relating to each of the above subparts or the matters or items inquired about in each.

ANSWER: Applicants are in the process of developing their surveillance and maintenance program for SHNPP. In any event, there are no polyethylene-insulated electrical cables in cable raceways at SHNPP which will be exposed to radiation. See Letter from M.A. McDuffie to Harold R. Denton (April 26, 1983), and attachments.

INTERROGATORY NO. 11-1(m). Identify each specific property or property you believe is (i) always (ii) usually (iii) sometimes necessary for wiring or cable insulation to perform its safety function. Define the safety function of (iv) wiring (v) cable (vi) other electrical, insulation at Harris. Specify the level or range of each property identified in response to (i), (ii) or (iii) above which is necessary in your opinion for the insulation to perform its safety function. State all basis for each of your answers and identify all documents containing information used in your answers or which you believe supports any of your answers (specify which you believe it supports).

ANSWER: The safety function of electrical cable insulation is to enable electrical cable continuously to carry current and hold a voltage. The properties of electrical cable insulation necessary for the insulation to perform its safety function include both electrical and mechanical properties. However, as stated in Answer 11-1(j), cable qualification tests as well as a recent Sandia study have demonstrated that a cable with substantial degradation in mechanical properties will still perform its electrical function.

INTERROGATORY NO. 11-1(n). Are there any performance-based acceptance criteria for insulation at Harris to perform its safety function? If so, specify each such criterion for each application (e.g. ECCS power supply wiring) for which insulation is used at Harris. Identify all documents giving descriptions of or basis for or information relating to such acceptance criteria.

ANSWER: See Answer 11-1(l).

INTERROGATORY NO. 11-1(o). Are there any other acceptance criteria for insulation to be used in areas at Harris where it can or will be exposed to radiation? Please identify each such criterion and give all basis for it and state to what insulation or what areas or what items it applies. Identify all documents listing or describing the areas or items where each such acceptance criterion applies, and also identify any documents listing or describing areas or items for which each acceptance criterion identified in response to any part of (l)(m) or (n) above applies or why it applies to that area or item.

ANSWER: See Answer 11-1(l).

INTERROGATORY NO. 11-1(p). If not already stated, give the radiation levels in each radiation zone (and a description or drawings locating each such zone) at Harris in full-power "normal" operation (as you define "normal"), including (i) gamma dose (ii) neutron dose (iii) total radiation dose including alpha, beta, gamma, neutrons, etc.

ANSWER: See Answer 11-1(h).

INTERROGATORY NO. 11-1(q). Can neutrons or other radiation at Harris create activation products (radioactive atoms) in (i) insulation (ii) conductors (iii) other components of wiring or cables (iv) electrical equipment (v) electrical equipment holders, boxes or cabinets (vi) conduit (vii) air (viii) water (ix) steam, at Harris? Have radiation doses or dose rates to insulation on (aa) cable (bb) wiring (cc) other electrical equipment due to such activation products, been analysed for (x) Harris (xi) any other nuclear plant you know of? Identify all documents you know of containing such analysis. Please give all reasons for not doing such analysis if you haven't done it or it hasn't been done.

ANSWER: Gamma energies during normal full-power operating conditions are too low to create activation products.

INTERROGATORY NO. 11-1(r). [S]tate the number of hours per year of "normal operation" (an average or typical year will do) in which the level of radiation in each radiation zone at Harris is greater than or equal to (i) 0.001 R/hr (ii) 0.10 R/hr (iii) 0.01 R/hr (iv) 1.0 R/hr (v) 5 R/hr (vi) 10 R/hr (vii) 20 R/hr (viii) 50 R/hr (ix) 100 R/hr (x) 200 R/hr (xi) 500 R/hr (xii) 1000 R/hr (xiii) 2000 R/hr (xiv) 5000 R/hr (xv) 10,000 R/hr (xvi) 20,000 R/hr (xvii) 50,000 R/hr (xix) 100,000 R/hr (xx) 200,000 R/hr (xxi) 500,000 R/hr (xxii) 1 megarad/hr (xxiii) 2 MR/hr (xxiv) 5 MR/hr (xxv) 10 MR/hr (xxvi) 100 MR/hr.

Please also state or give radiation level profile of each radiation zone at Harris showing typical radiation levels, location of all wiring or cables in that zone, stating what cables or wiring are inconduit (and what the conduit is made of and how thick it is and all its dimensions), the hours per year at each radiation level, and the total integrated radiation dose received by each wire, cable or electrical insulator in the zone for which you have thus far (or ever) computed a total integrated radiation dose. Also give the radiation dose rate at each wire, cable or other electrical insulator for which you have computed a radiation dose rate. If this dose rate varies, specify how it varies and what levels you expect it to be at for what fractions of the time, hours per year, etc.

ANSWER: See Answer 11-1(h).

INTERROGATORY NO. 11-1(s). [S]pecify all "unacceptance criteria" by which degraded cables or wiring at Harris will be removed from service and/or replaced when they meet the "unacceptance criteria" or any of them.

ANSWER: See Answer 11-1(l).

INTERROGATORY NO. 11-1(t). [E]xplain how you will replace wiring or cable with degraded insulation at Harris. Please discuss in detail the relevance, if any, to this of the cable pulling problems identified by Paul Bemis NRC Region II to the ACRS subcommittee on Harris, Jan. 3 and 4, 1984 at Apex NC. Please give all details including replacement procedures, acceptance criteria, splicing or connection criteria and/or procedures, and identify all documents containing information discussed or asked about in each part of this subsection (s).

Please also identify all documents in your possession concerning cable pulling problems at Harris thus far. Please explain how cable pulling would differ when the plant is "hot" (radioactive) or under operating conditions, compared to conditions under which CP&L has so far tried cable pulling at Harris. Please state all reasons why CP&L has stopped cable pulling at Harris each time you stopped, and state which reasons would apply in the event of cable or wiring replacement at Harris.

ANSWER: See Answer 11-1(l).

INTERROGATORY NO. 11-1(u). Please identify all studies or documentation or information which you have re wiring, cable or electrical insulation at Harris which accounts for radiation dose-rate effects (cf. your interrogatory 11-12(a)) (i) Please identify all NRC staff "evaluations" of Applicants' program for environmental qualification of electrical equipment with respect to radiation dose rate effects on insulation. (cf. your interrogatory 11-12(b)). (ii) Please identify any other studies of radiation dose-rate effects on insulation you know of that have not been identified in response to above interrogatories.

ANSWER: See Answers 11-1(a) and 9-4(a).

INTERROGATORY NO. 11-2. Please identify all cables or wiring at Harris which you believe (i) is environmentally qualified (ii) must be environmentally qualified, with respect to radiation dose-rate effects on insulation. Please state what radiation zone each is in. Please also state which such cables, wiring, etc. have been accepted specifically by NRC staff

as environmentally qualified for Harris. Please identify all documents related to each such qualification, testing, analysis, or acceptance, as regards radiation dose-rate effects.

ANSWER: Electrical cables required to be environmentally qualified are identified on the Master List. See Answer 9-2(a). The locations of such cables are shown on project-related drawings which will be made available for inspection and copying.

INTERROGATORY NO. 11-3. Please identify all electrical equipment at Harris that is exposed to radiation and which is insulated with polyethylene or polyethylene copolymer (specify which). State which is exposed to low dose rates of radiation. State which is exposed to any radiation dose rate or total dose (specify) at which you believe dose-rate-related degradation effects can occur. State and identify all documents in which you make or report all analysis of radiation dose-rate rx effects on the insulation of each such item of electrical equipment. If you consider this irrelevant to Eddleman 11 please answer it as an interrogatory re Eddleman 9.

ANSWER: Except for electrical cables (see April 26, 1983 Letter from M. A. McDuffie to Harold R. Denton, and attachments), Applicants do not have a list of electrical equipment at SHNPP which identifies the materials contained in electrical equipment components. Although Applicants have some such information, identification of electrical equipment component materials is not required as part of Applicants' equipment qualification program. The ability of electrical equipment to perform its safety function under normal and accident conditions is based on test data. The requested information is in the possession of the component manufacturers.

ANSWERS TO INTERROGATORIES ON EDDLEMAN 41

INTERROGATORY NO. 41-20. Please answer the interrogatories numbered 184 through 195 (copy attached) which were posed to NRC staff re Eddleman 41. Please consider that "you" means CP&L or Applicants in formulating your answers. Where an interrogatory asks re NRC/NRC staff only, please answer as if the question read "NRC, NRC Staff, or CP&L or Applicants" instead of "NRC Staff" or "NRC".

INTERROGATORY NO. 41-20(184). Has CP&L completed its 100% reinspection of pipe hangers at Harris? If not, when does CP&L tell you they expect to complete it?

ANSWER: The 100% reinspection of seismic pipe hangers was completed prior to the submittal of Applicants' June 11, 1981 Final Report.

INTERROGATORY NO. 41-20(185). Have you inspected any more pipe hangers at Harris since you last answered interrogatories? If so, which ones, with what results?

ANSWER: Yes. See answer to Interrogatory 41-21.

INTERROGATORY NO. 41-20(186). Please identify all documents pertaining to the matters and inspections inquired about in interrogatories 184 and 185 above.

ANSWER: See answers to Interrogatories 41-20(184), 41-20(185) and 41-21.

INTERROGATORY NO. 41-20(187). Has any (i) welder (ii) welding inspector, ever been fired or discharged or asked to resign from Harris because of (aa) making (bb) approving, defective welds or defective pipe hangers? If so, please identify each such person.

ANSWER: See Applicants' answers to Interrogatories 41-1(s) and (t) dated May 12, 1983 and January 13, 1984.

INTERROGATORY NO. 41-20(188). Has any (i) welder (ii) welding inspector (iii) other person, ever been (aa) disciplined (bb) laid off (cc) sent for retraining (dd) required to be retrained or to take further training, because of (A) making

(B) approving, defective (iv) welds (v) pipe hangers, at Harris? If so, please identify each such person.

ANSWER: Applicants have been unable to prepare a response to this interrogatory in the required time, but will submit a supplemental response in the near future.

INTERROGATORY NO. 41-20(189). Have you identified any defective pipe hangers at Harris which have not yet been repaired? If so, which ones?

ANSWER: Yes. At any given time there are hangers with welds that have been rejected upon initial inspection and are in the process of being repaired. These are inprocess hangers and are not specifically tracked.

INTERROGATORY NO. 41-20(190). Have you written any evaluation or recommendations for improvement (or has anyone working for NRC Staff or CP&L done so) for CP&L Harris QA or QC concerning their inspection of pipe hangers (a) ever (b) since 9/1/1980? If so, please identify each document containing each such evaluation and/or recommendation.

ANSWER: See answer to Interrogatory 41-22.

INTERROGATORY NO. 41-20(191). Have you contacted any of the welders identified to Wells Eddleman by CP&L in response to his interrogatories served in 1983? If so, please describe the nature of each such contact and the information (a) you gave to (b) you received from, each such welder. Please identify or state any statements, questions, or other things you have communicated orally or in writing to each such welder, and all response(s) you have received to each.

ANSWER: Daniel has sent a letter to its employees identified in Applicants' March 14, 1984 response to Interrogatories 41-1(l) and 41-1(m). An identical letter was sent to each employee identified in exhibit B of that response. An identical letter, different from the above, was sent to each other

employee identified in Exhibit A. A copy of the two letters will be produced in accordance with Applicants' Response to Wells Eddleman's Request for Production of Documents.

INTERROGATORY NO. 41-20(192). Please identify all documents concerning reinspection of pipe hangers at Harris which have occurred since June 1, 1983.

ANSWER: See answer to Interrogatory 41-21 below.

INTERROGATORY NO. 41-20(193). Please identify all documents concerning defects in pipe hangers at Harris found since 1 June, 1983, which (a) you possess (b) you know someone else possesses (please identify who possesses it, if you know).

ANSWER: See answer to Interrogatory 41-21 below.

INTERROGATORY NO. 41-20(194). Has (a) CP&L (b) Daniel International (c) anyone else including employees of CP&L or Daniel, who worked at the Harris site, ever (i) made any false statement to NRC concerning pipe hangers at Harris (ii) made any statement to NRC concerning pipe hangers at Harris, which was later shown to be false (iii) made any statement to NRC concerning the pipe hangers or any pipe hanger at Harris, which was later shown to be inaccurate, misleading or incorrect? Please give all details and identify all documents concerning each such statement.

ANSWER: To the best of Applicants' knowledge, no such statements have been made to the NRC Staff.

INTERROGATORY NO. 41-20(195). How serious do you believe "OK" tagging of defective pipe hangers is (a) as a breach of faith with NRC (b) as a violation of NRC regulations (c) as a threat to safety of the Harris plant? Please give all reasons for each of your answers.

ANSWER: Not applicable. Applicants do not perform "OK" status tagging of pipe hangers.

INTERROGATORY NO. 41-21. Please provide access to all weld inspection reports completed since May 1, 1983, for Harris.

ANSWER: The specific dates of weld inspections are recorded in the seismic weld data reports (SWDR), although they are not tracked in a format that makes this information easily retrievable. To give a totally accurate answer would be burdensome since it would involve reviewing approximately 18,000 hanger packages. Approximately 2100 weld inspections performed since 5/1/83 can be readily identified however, and a 10% sample of these will be produced.

INTERROGATORY NO. 41-22. Please identify each change or improvement to Applicants' QA/QC program at Harris which has been made (i) wholly (ii) partly in response to problems with pipe hanger inspection. Please identify all documents requesting or approving or describing each such change.

ANSWER: Since the initial problem of pipe hanger weld inspections was identified on September 3, 1980, there have been many changes to the pipe hanger inspection program. Documents filed with the NRC for Interim Report Number 2 for our October 3, 1983 submittal on items 96 and 72, Interim Report No. 3 for our March 21, 1984 submittal on items 95 and 72, and the June 11, 1981 Final Report all identify improvements made. Also, work procedure WP-110 and WP-139 describe the present construction program. QC instruction QCI-19.3 describes the present weld inspection documentation program. Additional background information on changes to these programs are contained in CP&L memoranda dated September 23, 1983 and December 15, 1983.

The above-referenced documents will be produced in accordance with Applicants' Response to Wells Eddleman's Request for Production of Documents, with the exception of the 1981 Final Report, which was previously provided to Mr. Eddleman.

INTERROGATORY NO. 41-23. Please state all reasons for each other change in Applicants' QA/QC program at Harris as it relates to pipe hangers.

ANSWER: See documents referenced in the answer to Interrogatory 41-22.

INTERROGATORY NO. 41-24. Please identify all persons who are involved in the 100% reinspection of pipe hangers at Harris. State the qualifications of each to (a) reinspect pipe hangers (b) perform any other work she or he performs in this reinspection.

ANSWER: Persons who have inspected Seismic Category I pipe hanger welds are identified in Exhibit 1 to Applicants' May 12, 1983 Responses to Interrogatories on Contention 41 and in Exhibit 1 hereto.

INTERROGATORY NO. 41-25. How many defects in pipe hangers have been identified so far at Harris? Of these, how many remain unrepaired? When do you anticipate that the last pipe hanger needing repair to make it fully acceptable, will be repaired?

ANSWER: Weld discontinuities are identified and repaired in process, and are not catalogued as a unique item. See also Applicants' May 12, 1983 response to Interrogatory 41-1(y). All hangers required for safe operation and shutdown will be complete, including repair of any weld discontinuities, prior to fuel load.

INTERROGATORY NO. 41-26. Provide copies of all Field Change Requests, Permanent Waivers, or other changes in pipe hanger acceptance criteria, used or made since 6/1/83. Provide also copies of all analyses or approval documents related to each such FCR, PW, etc.

ANSWER: Documents which address pipe hanger weld acceptance criteria are Ebasco Drawing 2165-A-003, Field Change Request No. AS-4294 and Field Change Request No. H-979. Copies of these documents and the related justification documents will be produced pursuant to Applicants' Response to Wells Eddleman's Request for Production of Documents.

INTERROGATORY NO. 41-27. When do Applicants anticipate finishing reinspecting all pipe hangers at Harris?

ANSWER: All pipe hangers required for safe operation and shutdown will be complete, including inspection of weld repairs, prior to fuel load.

INTERROGATORY NO. 41-28. Will NRC Staff be inspecting pipe hangers at Harris after Applicants finish your 100% reinspection? If so, do you expect them to find any defective hangers?

ANSWER: Applicants do not know.

INTERROGATORY NO. 41-29. How many pipe hangers remain to be (i) welded (ii) installed at Harris? When will these be completed? When will the last of these be completed?

ANSWER: Of approximately 18,000 seismic pipe hangers, approximately 10,000 have received some level of weld inspection. The remaining hangers are either (1) not installed, (2) tacked up only, or (3) welded to some extent but not inspected.

INTERROGATORY NO. 41-29[2]. Are any pipe hangers being welded or installed at Harris now? If so, are the welds repairs/replacement only?

ANSWER: Yes. Pipe hangers are currently being welded and installed; this welding is not solely for repair or replacement purposes.

INTERROGATORY NO. 41-30. Is pipe hanger welding going on at Harris at the present time or the recent past? If so, is it repair/replacement welding, or are new hangers being welded?

ANSWER: See answer to Interrogatory 41-29[2]. Both repair/replacement welding and new hanger welding is ongoing.

INTERROGATORY NO. 41-31. Has any additional training been required or set forth for pipe hanger welders at Harris since the retraining Applicants (or their contractor(s)) did prior to 1983? If so, what training (identify all documents including texts and handouts concerning it) and who is required to take it?

ANSWER: An ongoing training program is conducted at the Harris Plant for all welders and their craft supervision (foremen, general foremen and superintendents). Topic outlines for training conducted during 1983 were included as Exhibits 3.1, 4.1, 5.1, 6.1 and 7.1 to Applicants' March 14, 1984 Supplemental Responses to Interrogatories 41-1(l), (m). Exhibit 2 hereto is an outline of additional training conducted in January 1984. No handouts were used during this period.

INTERROGATORY NO. 41-32. Have welding inspectors at Harris received any additional training since 9/3/1980? If so, which training was related to problems inspecting pipe hangers at Harris? Please state the names of persons (i) required (ii) invited to take such training, identify all documents concerning it including course outlines or syllabus, text(s), handouts, or materials used in teaching it. Please state the grade(s) or result(s) for each person taking such additional training.

ANSWER: Welding inspectors at the Harris Plant have received continuing training in (1) weld symbol identification, (2) weld inspection techniques and criteria, and (3) procedure requirements. Documents detailing this ongoing training will be produced in accordance with Applicants' Response to Wells Eddleman's Request for Production of Documents. Written tests of inspection personnel were not given after completion of these training classes.

INTERROGATORY NO. 41-33. Are there any text(s), handouts or information which was not verbal and was supplied to (a) welders (b) inspectors at Harris who were taking any retraining since 9/3/80, which has not been identified in response to above interrogatories or previous interrogatories on this contention? If so, please identify all such text(s), handouts or information, telling to whom it was provided and when.

ANSWER: See Applicants' responses to Interrogatory 41-7, dated May 12, 1983 and November 11, 1983 and documents produced pursuant to those requests. Exhibit 3 hereto is an additional handout provided to welders and their craft supervision which was utilized in Welder Craft Training classes. Handouts provided to weld inspectors in conjunction with a weld acceptance criteria class held on January 17, 1984 will be produced in accordance with Applicants' Response to Wells Eddleman's Request for Production of Documents.

INTERROGATORY NO. 41-34. Please provide copies of any analyses of the clarity of blueprints and specifications of welds on pipe hangers at Harris, which you possess.

ANSWER: Applicants do not possess any analysis of the clarity of blueprints and specification.

INTERROGATORY NO. 41-35. Please provide any studies of the blueprint reading ability of (i) engineers working with pipe hanger blueprints (ii) welders welding pipe hangers (iii) welding inspectors inspecting pipe hangers, at Harris. Please identify each person whose blueprint-reading ability (a) was studied (b) has been checked, at Harris, and the results of each such check or study for that person.

ANSWER: The blueprint reading ability of engineers, welders and weld inspectors has not been formally studied. However, as discussed in responses to Interrogatories 41-7, 41-31 and 41-32, training classes for welders and weld inspectors have been conducted on the proper interpretation of weld symbols. It should be recognized that a basic part of an engineer's education includes training in engineering drawing (graphics) and therefore any degreed engineer is well versed in blueprint reading.

INTERROGATORY NO. 41-36. Please state how many pipe hangers have been OK'd (a) once (b) twice (c) three times (d) more than three times, and then been found to be defective, at Harris. Please identify all welding inspectors who inspected each such hanger, and all welders who welded each such hanger.

ANSWER: This information is not specifically tracked although it is available by reviewing the SWDR's in the hanger packages. Applicants object to answering this question literally since it would be burdensome to review approximately 18,000 seismic hanger packages to determine this information.

ANSWERS TO INTERROGATORIES ON EDDLEMAN 45

INTERROGATORY NO. 45-19(196). Please identify all water hammer incidents in PWRs since 1-1-83 that (a) caused damage (b) caused a safety problem (c) were reported by NRC to Congress as significant events (d) were required to be reported to Congress by the NRC. Please state the relevance of each such incident to Harris and all information supporting your answer.

ANSWER: It is Applicants' understanding that NRC has reported to Congress two PWR water hammer events since January 1, 1983; one which occurred at Maine Yankee on January 25, 1983, and one at Palisades identified to NRC on March 13, 1984. The Maine Yankee water hammer event caused a crack in the feedwater line near Steam Generator No. 2 and several feedwater line hangers exhibited deformation or other distress. The reactor had been tripped prior to the event, therefore no safety problems were associated with the event. The relevance of this event to SHNPP is discussed in the Applicants' response to Interrogatory 45-20.

The Palisades event was reported to the NRC on March 13, 1984, and, while still under investigation, appears to involve water hammer. Damage to the auxiliary feedwater sparger piping supports located within Steam Generator "B" was discovered during the current plant outage.

The damage is internal to the steam generator and no breach of the reactor coolant pressure boundary occurred, therefore no safety problems were associated with this event. It should be noted that it is being speculated that this damage is due to a water hammer event during the previous power cycle. The Palisades plant utilizes a top feedring steam generator design as does Maine Yankee (see Applicants' response to Interrogatory 45-20).

As stated in the Applicants' response to Interrogatory 45-20, SHNPP uses a bottom feed or preheat steam generator

where the feedwater flows into the steam generator through injection nozzles. It should also be noted that Applicants have modified the feedwater system by diverting a portion of the main feedwater flow to the steam generator auxiliary nozzle (approximately 22%). This modification further minimizes the potential for bubble collapse water hammer.

INTERROGATORY NO. 45-19(197). Have you evaluated the complete start-up test program for Harris 1 as it involves water hammer in the systems mentioned in Eddleman 45? If not, why not? If so, please identify all documents which (a) are drafts of your evaluation (b) contain your evaluation (c) contain information which would contradict or cast doubt on your evaluation. If CP&L has not submitted a complete start-up test program for Harris concerning water hammer in the systems mentioned in Eddleman 45, when will they do so?

ANSWER: CP&L is presently developing a startup program for Harris in accordance with the guidelines set forth in the Harris startup manual.

The preoperational test procedures referenced within FSAR Section 14.2.12.1 will be performed prior to fuel load. These procedures should be available for review by required CP&L personnel and NRC 60 days prior to use.

The approved initial startup procedures referenced in FSAR Section 14.2.12.2 are planned to be available for review by required personnel at least 60 days prior to fuel loading. The preoperational tests and startup tests for the feedwater, main steam and emergency core cooling system will be performed in accordance with Regulatory Guide 1.88 as described in FSAR Section 14.2. The SHNPP startup program will not be specifically

designed for water hammer; however, the program will include provisions for the proper draining, filling and venting of piping and equipment. The program will also include provisions for equipment (pump and valve) operation based on the manufacturer's recommendations. It should be noted that the design of the SHNPP is such that the potential for a water hammer event occurring is minimal. The split feedwater modification will provide continuous flow through the main feedwater line. Additionally, check valves are installed upstream of the auxiliary feedwater nozzles and horizontal lengths of feedwater piping are minimized between the steam generator and the vertical portion of piping. An additional precaution will be taken, against a possible check valve leak, by installing surface mounted thermocouples on each auxiliary feedwater discharge line to detect and alarm any significant backleakage through the check valves.

INTERROGATORY NO. 45-19(198). Identify all open items re Harris that relate to (a) water hammer (b) effects of water hammers (c) detection of water hammers (d) detection of situations in which water hammers could occur or are likely to occur (e.g. formation of voids, leaking pipes, etc). Please identify all documents relating to each such open item.

ANSWER: Water hammer is not included in the summary/table of outstanding items contained in the Shearon Harris SER, NUREG-1038, Section 1.7.

INTERROGATORY NO. 45-19(199). If there are any (a) confirmatory items (b) concerns expressed or held by any member of NRC Staff, re water hammer or its effects (e.g. as inquired about in items (a) thru (d) in 198 above) at Harris, please state each and identify all documents concerning each. Please

state if the person(s) who hold the concerns stated will appear as witnesses if Eddleman 45 goes to hearing.

ANSWER: (a) Water hammer is not referenced as a confirmatory issue for Shearon Harris in the Harris SER.

(b) Appendix C to the Harris SER includes a reference to Unresolved Safety Issue A-1. As stated in Section C.4 of Appendix C, the NRC staff, based upon its evaluations, had concluded that the Harris Plant could be operated without undue risk to the public health and safety before final resolution of this unresolved safety issue. The SER, of course, predates the issuance of NUREG-0927 which contains the NRC's resolution of Unresolved Safety Issue A-1.

INTERROGATORY NO. 45-20. Explain all reasons why you believe the Maine Yankee water hammer event of 1983 would not have any relevance to Harris. Document your answer where you rely on information that is documented.

ANSWER: The Maine Yankee Nuclear Power Plant uses a top feedring design in which feedwater is injected into the downcomer between the baffle and the outer shell. The water hammer event at Maine Yankee occurred when the outlet nozzle at the bottom of the feedring became submerged in the rising steam generator water level and the steam in contact with the cold feedwater within the ring suddenly collapsed. The Shearon Harris Nuclear Power Plant does not utilize the top feedring steam generator design. Instead, Shearon Harris uses a bottom feed or preheat steam generator in which feedwater flows into the steam generator through injection nozzles. Since Shearon

Harris does not have a top feedring steam generator, the water hammer event, which occurred at Maine Yankee in January, 1983, is not applicable to Shearon Harris.

ANSWERS TO INTERROGATORIES ON EDDLEMAN 116

INTERROGATORY NO. 116-1(a). Please list all the updates to the FSAR and all other responses to NRC which relate to fire protection, which CP&L has made since 5-14-82. (b) Please state which items re fire protection at Harris the NRC considers open items, to your knowledge. (c) please identify all NRC regulatory guides, regulations, publications, standards, staff positions, or other standards (including fire protection standards) you believe Harris must comply with concerning fire protection. (d) Do you believe that Harris should be able to fight fires during nuclear accidents? If so, do you believe this ability should be present even when containment is isolated? Please give all bases for your answers in detail.

ANSWER: (a)

Amendment No. 3 6/30/82

Amendment No. 5 4/13/83

Amendment No. 10 9/13/83

Amendment No. 11 1/17/84

NRC Safety Review Question Responses	280.2,3,4,5,6,7, 8,9,10,12,19,20, 25,26,27,28,29,32	8/02/82
NRC Acceptance Review Question Responses	280.1,2,25,26,27, 28,29	7/11/83
NRC Safety Review Question Response	280.24	7/15/83
Safe Shutdown Analysis		7/22/83
NRC Safety Review Question Responses	280.1,11,30	8/12/83
NRC Acceptance Review Question Responses	280.24,18,30,9,3	8/12/83
NRC Safety Review Question Responses	280.16,21,31	8/31/83

Safe Shutdown Analysis Revision 1 and NRC Safety Review Question Response	280.1 (Rev 1)	10/14/83
Safe Shutdown Analysis Revision 2 and NRC Safety Review Question Responses	280.1 (Rev 2)	2/24/84
NRC Safety Review Question Responses	280.13,14,15,17, 18,22,23	7/11/83

(b) Refer to the NRC's SER related to the operation of the Harris Plant NUREG-1038, Section 9.5.1, for the identification of open items regarding fire protection.

(c) The applicable fire protection codes, standards and guidelines are identified in FSAR Section 9.5.1.2.1 and Applicants' response to NRC Safety Review Question 280.1.

(d) SNHPP follows NRC regulatory requirements, i.e, BTP CHEB 9.5.1 "Guidelines for Fire Protection for Nuclear Power Plants", with certain differences which are outlined in the responses to the 280.1 Safety Review Question.

INTERROGATORY NO. 116-2(a). Under what conditions can (i) control (ii) power, fail to any (aa) firefighting (bb) safety (cc) fire suppression, equipment at Harris? Please give all reasons for your answer(s) in detail and identify all documents relating to such failures or their possibility, probability, improbability, etc. at Harris.

(b). What is the last FSAR amendment that affected section 9.5.1.1.?

(c). What other amendments have changed section 9.5.1.1.1?

(d). What analysis, test or other information is used to support the ratings of each fire barrier at Harris? Please provide copies of all such analysis, test(s) or information that is not in the FSAR at present. Please state where in the FSAR such information is found. Please

provide copies of the actual test results, and copies of the test procedures, for each fire barrier tested for Harris.

(e). Please provide copies of all actual test results re "fire resistant" or "fire resistive" materials used at Harris. Please also provide copies of all test procedures actually used in each such test. Please identify each material and the test(s) applied to it.

(f). If any analysis of fire resistance of any material used at Harris was made, provide all workpapers and documents underlying each such analysis, stating what material the analysis is for and where in the Harris plant such material is used.

(g). (cf your interrogatory 116-5(f)) Please identify and make available all information underlying or supporting each belief CP&L has that in any fire area(s) at Harris, it is "not feasible to use such fire barriers or other means of separation of safety related cable."

(h). Please identify all tests of flame spread (i) in (ii) between cables of the type(s) used in any of the areas referred to in your interrogatory 116-5(f), and all other tests involving fires in such cables, that have been done to your knowledge. Please identify all documents referring to such tests or giving the methods or result(s) of any such test(s).

ANSWER: (a) The SHNPP fire protection system as discussed in FSAR §§ 9.5.1 and 9.5A and the safe shutdown analysis is designed such that in case of a fire in any area of the plant, the plant can be safely shut down. The fire protection system itself, with the exception of containment boundary penetrations, is a nonsafety system as designated by the NRC. Containment penetrations comply with all applicable regulations delineated in FSAR Sections 3.8 and 6.2.

(b) The last FSAR amendment that affected Section 9.5.1.1.1 is Amendment No. 2 which made changes to table 9.5.1-1.

(c) No other FSAR amendments have affected Section 9.5.1.1.1.

(d) The analysis and or test which is used to support the ratings of each fire barrier at Harris are based on standard fire tests made in accordance with "Standard Methods of Fire Tests of Building Construction and Material" ASTM E-119, and NFPA 251, and IEEE-634 as modified by Appendix A-14 of the Nuclear Mutual Limited Guidelines (NML). Copies of ASTM E-119, NFPA 251, IEEE-634 and the NML Guidelines will be available at CP&L's offices for your review along with copies of any actual test results regarding fire barriers which CP&L currently has in its possession.

(e) The Manufacturer supplies the appropriate fire resistant material and guarantees its rating according to tests which he has performed in accordance with procedures either written by him or in accordance with national standards such as NFPA or ASTM. CP&L does not perform these tests or write the procedures.

(f) See response to (e) above.

(g) CP&L's justification for its belief in the Safe Shutdown Analysis that it is not feasible to use such fire barriers or other means of separation is described in its Safe Shutdown Analysis and exemption request submitted in Table 9.5B-3 dated 10/14/83 and 2/24/84.

(h) All Class IE cables at SHNPP have been qualified in accordance with IEEE Standard 383-1974. It should be noted

that CP&L provides specifications for Class IE cables to the manufacturer/supplier. Based on these specifications the manufacturer/supplier provides an acceptable cable. SNHPP's specifications for all Class IE cables are as follows:

CAR-SH-E14A,B,C, and D

CAR-SH-E15A,B and C.

INTERROGATORY NO. 116-2(a)[2]. define "maximum credible fire" as you use the term (i) in your Harris fire analyses (ii) in your interrogatory 116-7.

(b). explain exactly how the "maximum credible fire" for each fire area at Harris was "postulated".

(c). what consideration of combustible materials was made in postulating each such "maximum credible fire".

(d). what consideration have you made of simultaneous fires at Harris and/or your ability to fight them. Please identify all documents concerning simultaneous fires at Harris, stating on what page(s) or in which section(s) they deal with simultaneous fires.

ANSWER: (a) Maximum credible fire as used by CP&L defines the postulated fire in a particular fire area. The fire is postulated for various fire areas of the plant as described in FSAR Section 9.5.1.3.

(b) The postulated fire for each fire area is described in the Fire Hazard Analysis (FSAR Section 9.5A) and is based on identified in-situ combustibles plus transient combustibles.

(c) See response to (b) above. The maximum credible fire was based on the project design and operational considerations. Conservative estimates were used to assure the Fire Hazard

Analysis is always bounded. Note that the Fire Hazard Analysis is a "living document" (i.e., one which is regularly reviewed and/or updated) to assure its continued validity.

(d) SHNPP follows BTP CHEB 9.5.1 "Guidelines for Fire Protection for Nuclear Power Plants", which does not require the consideration of simultaneous fires.

INTERROGATORY NO. 116-3(a). Do you believe Harris 1 is required to (i) have (ii) maintain safe shutdown capability in the event of a fire? (b) is this requirement waived in any way by any NRC rule or regulation during a nuclear accident? Please provide all bases for your answers.

ANSWER: (a) Yes, as stated in SRP 9.5.1, BTP CHEM 9.5.1 and the Safe Shutdown Analysis.

(b) Yes, as stated in the Safe Shutdown Analysis.

INTERROGATORY NO. 116-4(a). When do you expect to finish providing NRC Staff with the additional information it has requested concerning fire hazard analyses? (b) When do you expect to be able to test the fire control system at Harris? (c) Please identify all startup test procedures for fire control and/or fire detection at Harris. Please identify all documents containing such procedures and/or schedules for each or any or all of them.

ANSWER: (a) At this time there remain three fire protection issues as to which the NRC Staff has requested additional information from CP&L: (1) fire door qualification; (2) safe shutdown analysis; and (3) alternate shutdown analysis. CP&L currently plans to provide the information to NRC within three weeks on fire door qualification and by August 15, 1983 on the remaining two items. The Fire Hazard Analysis will be updated continuously since it will reflect the "as built" conditions of SHNPP.

(b) System testing began 1 year ago and will continue with full integrated testing to be performed prior to fuel load at Harris.

(c) Methodology, instruction, guidance and procedural information related to fire control and fire detection at Harris is contained within the SHNPP startup manual which is locaed at the Harris site. The SHNPP initial test program is based on the requirements of 10 CFR 50.34, Section XI of 10 CFR 50, Appendix B, and the NRC Reg. Guide 1.68 specific information is contained within the Applicant's FSAR Section 14.2.

ANSWERS TO INTERROGATORIES ON EDDLEMAN 132(C)(II)

INTERROGATORY NO. 132-c-2-20(a). What analysis, if any, have you made of the number of operators who can or should be present in the Harris control room during nuclear accidents, and what task(s) each will have to perform? (b) What information must be identified from each panel numbered 1 thru 15 in each accident sequence you have analyzed for human factors and adequate procedures at Harris. (c) Please identify all documents in which information inquired about in (a) or (b) above can be found. Please state where it is in each such document, for which information, if you know.

ANSWER: CP&L has provided information related to this interrogatory on at least two previous occasions:

(1) M. A. McDuffie to H. R. Denton letter dated September 27, 1983 SER: LAP-83-426 (a copy of which has been provided to Mr. Eddleman)

(2) ACRS Presentations in January, 1984

As stated in Attachments 2 and 3 to the above letter (in part):

A Task Analysis has been performed on the High-Pressure (HP) Basic version of the Westinghouse Owners' Group (WOG) Emergency Response Guidelines (ERGs) by a working group under the purview of the WOG Procedure Subcommittee.

The generic Task Analysis utilized a top-down approach that identifies the guidelines (i.e., event sequences), plant systems utilized in responding to event sequences, operator functions and operator tasks performed in responding to event sequences, and detailed elements that comprise the operator tasks.

As a minimum, CP&L intends to identify the deviations from the generic ERGs for the SHNPP-Unit 1 EOPs, task analyze those differences and generate plant specific lists of instruments and Controls necessary to perform the EOPs in the SHNPP-Unit 1 control room.

Additionally, CP&L will review the generic Task Analysis along with the ERGs deviations analysis, thus insuring review of each step of the SHNPP-Unit 1 EOPs. We believe that no major discrepancies will be identified because of our extensive functional analysis performed during the SHNPP-Unit 1 MCB redesign process and because of the task analysis performed on the event-based procedures during the Control Room Design Review

The basic version of the WOG ERGs have undergone one week of simulator verification and validation testing.

Carolina Power & Light Company has been deeply involved in the development of the ERGs since their inception through participation in both the full Owners' Group and the Procedures Subcommittee.

The above information was summarized again during the ACRS presentation, with the additional statement that ". . . modified H. B. Robinson EOPs have been walked through on [the] new

[Shearon Harris] control board arrangement." ACRS Subcommittee Meeting, January 3, 1984, at 172.

INTERROGATORY NO. 132-c-2-21(a). Please provide actual locations of all dials, readouts, indicators or lights on each panel numbered 1,2,3,...through 15 in the Harris control room, stating what information or thing each indicates. (Cf your interrogatory 6(b) on this contention).

ANSWER: Front view drawings are identified in the document list attached to Applicants' Response to Wells Eddleman's Request for Production of Documents and will be made available for review by Mr. Eddleman pursuant to the Response.

INTERROGATORY No. 132-c-2-22(a). What signal density analyses have been made for Harris other than those "reported" in the DCRDR. (b) What studies or experience with lighting in nuclear plant control rooms under emergency conditions are you aware of? (d) what studies of depth perception of Harris plant operators (i) have been made (ii) will be required? (c) What are the acceptance criteria for (i) near vision (ii) far vision (iii) depth perception (iv) field discrimination, for Harris operators?

ANSWER: (a). None.

(b). NUREG-0700 addresses lighting levels. The Illumination Engineering Society Handbook provided guidance during the Essex Corporation evaluation. CP&L has used experience gained at the Robinson and North Anna Plants, and the Skaales Energy Control Center in conjunction with interfaces with K. B. Stephens, Co. and CFB Associates (lighting manufacturers representatives) to upgrade our 1972 design to a state-of-the-art Lithonia anti-glare system in March 1983.

(c)-(d). Applicants' criteria for acceptance for vision is based upon the doctors' recommendation for work

acceptability. The physical examination which must be given to every prospective operator requires documentation by the examining physician of any physical restriction for work. A decision is then made by Applicants as to the prospective employee's ability to perform in the position for which he or she is being considered. That decision is made based upon discussions with the physician and supervision as to the prospective operator's ability to perform the required duties.

INTERROGATORY NO. 132-c-2-23(a). What is your understanding of how GDC 1 applies to the Harris control room? Specifically, also state what role GDC 1 played in your Harris DCRDR. (b) What is your understanding of how GDC 19 applies to the Harris control room? (c) What role did GDC 19 play in your Harris DCRDR? (d) Did you misidentify interrogatory 132-c-II-6 in your interrogatory no. 14 on 132-c-2, or are there two 132-c-II-6's.

ANSWER: (a)-(c). Applicants' commitment to GDC 1 (Quality Standards & Records) and GDC 19 (Control Room) is listed in FSAR § 3.1. It should be noted that the previous control board/control room arrangement was not contrary to the GDC or good engineering practices. At the time it was developed, it was based on several years of previous CP&L, Westinghouse, Ebasco, and industry human factors experience to date. As with any technical field, experience is gained and enhancements are made. CP&L considers the new control board/control room layout an operator and man-machine interface enhancement. It preceded the requirements of NUREG 0700 and 0737, but meets the intent of both. The previous arrangement, however, had served the Company well and was not considered inadequate.

(d). In Wells Eddleman's Response to Applicant's Interrogatories Concerning Contentions 9, 11 and 132C(2), dated March 7, 1984, on page 19, in response to Interrogatory 132(C)(II), you state "When I am able, I will dig out what I have on this . . . ." Interrogatory 132(II)-14 asks for the dates as to when you will do this. There has been no misidentification of interrogatories.

INTERROGATORY NO. 132-c-2-24[223]. Do you possess readable documents or drawings which show what instrumentation is on the front of control room panels 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and/or 15 at Harris? If so, will you provide copies of same?

ANSWER: See Answer 132-C-2-21.

INTERROGATORY NO. 132-c-2-25[224]. Has the Staff completed its DCRDR for Harris 1? If not, when do you expect to complete it? Please identify all documents and work papers you have so far generated in this review.

ANSWER: The Staff's DCRDR was conducted on August 15-19, 1983. CP&L provided follow-up information in a letter (LAP-83-426) from M. A. McDuffie to H. Denton, dated 9/27/83. Mr. Eddleman was on the distribution list and should have received a copy of this letter. As of this date, no Technical Evaluation Report (TER) has been received from the NRC or Lawrence Livermore National Labs (LLNL), consultants to NRC.

INTERROGATORY NO. 132-c-2-26[225]. Has the Staff analyzed the uses that must be made during any (or all) credible Harris accidents, of the information appearing on any panel listed in Eddleman contention 132(c)(2)? If so, which accidents, and which information on which panels? Please identify all documents concerning each such analysis.

ANSWER: See Answer to 132-C-2-20.

INTERROGATORY NO. 132-c-2-27[226]. Has the Staff any opinion concerning the qualifications of the people who did the DCRDR for CP&L (the "human factors experts")? Does your opinion of the adequacy of these persons' qualifications incorporate the views of the Licensing Board in Byron (1984)? Please state your view of the adequacy of these persons' qualifications if you have one.

ANSWER: Essex Corporation has done considerable human factors work for industry and has been previously under contract to the NRC. The Byron situation involved only procedural fixes, not hardware modifications as at the Harris Plant. Qualifications of personnel involved on the Harris project were included in the Essex report and were resubmitted as the result of a specific question at the ACRS subcommittee meeting in January 1984.

INTERROGATORY NO. 132-c-2-28[227]. What HEDs and HERSs for Harris has the Staff reviewed? Please identify all documents giving the results of your review of each.

ANSWER: The staff reviewed all uncorrected HEDs (Human Engineering Discrepancies). They sampled the corrected HEDs. HER (Human Engineering Requirements Specifications) were not reviewed by the NRC, nor were they intended to be. They are only for internal CP&L use as controls for future design and construction.

INTERROGATORY NO. 132-c-2-29[228]. What information needed by operators in accidents at Harris, which appears on any of the panels contention 132(c)(2) says cannot be se from each other (or by persons standing near each, whose view may be blocked by other panels), can be seen from a distance of (a) 5 feet (b) 10 feet (c) more than 10 feet (d) more than 2 feet, with sufficient reliability for accurate interpretation and reading under high stress conditions such as would prevail in an accident, in your opinion?

ANSWER: See Answer 132-C-2-20.

INTERROGATORY NO. 132-c-2-30[229]. Has the Staff made any review of the visual blockages possible in the Harris control room layout? If so, what documents contain the results or your review? Please identify all work papers used in your review.

ANSWER: The Essex study, referred to above, addressed the information requested.

INTERROGATORY NO. 132-c-2-31[230]. Does the Staff believe CP&L was (a) right (b) responsible, when it set into concrete in the Harris 1 control room floor the positions of the cabinets recommended by its DCRDR consultants, prior to Staff completing its control room design review for Harris 1? Please give all reasons for your answer and identify all documents information from which was used to make or support your answer.

ANSWER: CP&L acted very responsibly during the Essex study. Construction concrete work in the floor was stopped until the study was complete. Design drawings were revised and recommended changes were implemented. This entire process preceded the issuance of NUREG 0700 and 0737 which provided formal

guidance. CP&L initiated this work on its own. The NRC Staff has never given any indications to the contrary.

Respectfully submitted,

Michael A. Swiger

Thomas A. Baxter, P.C.
Michael A. Swiger
SHAW, PITTMAN, POTTS & TROWBRIDGE
1800 M Street, N.W.
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Richard E. Jones
Samantha Francis Flynn
H. Hill Carrow
CAROLINA POWER & LIGHT COMPANY
Post Office Box 1551
Raleigh, North Carolina 27602
(919) 836-7707

Counsel for Applicants

Dated: April 17, 1984

PETER MAURICE YANDOW

Senior Engineer

BIRTH DATE: December 7, 1951

1. EDUCATION

A. Bellows Free Academy, Fairfax, Vermont - 1969

B. B.S.E.E., Northeastern University, Boston, MA - 1974

11. EXPERIENCE

A. June 1974 to December 1974

1. Stone and Webster Engineering Corporation, Boston, MA.

a. Employed as a Career Development Engineer

B. January 1975 to April 1978

1. Combustion Engineering, Incorporated, Boston, MA.

a. Employed as a Cognizant Engineer for Protection System for five operation nuclear power plants. Duties included maintenance of operating systems, detection and solution of design problems and the procurement of spare and replacement items.

C. April 1978 to May 1983

1. Yankee Atomic Electric Company, Framingham, MA.

a. Employed as a Senior Engineer. Duties include follow-up work on all major instrumentation systems at three operating nuclear plants and one presently being built.

D. May 9, 1983

1. Carolina Power and Light Company

a. Employed as a Senior Engineer in the Electrical Unit, Harris Plant Engineering Section, Nuclear Plant Engineering Department, located at New Hill, NC.

RICHARD M. BUCCI

N· clear Services Section Leader
Corporate and Consulting Electrical Engineering
Equipment Qualification Program Manager

EXPERIENCE SUMMARY

Registered Professional Engineer with over ten years experience in electrical and related power engineering for fossil and nuclear power plants, including five years experience in Technical Supervision of engineering and design teams for nuclear power plants. Responsible for managing nuclear consulting services (electrical), development of corporate programs, guidance and positions on nuclear plant electrical systems, equipment qualification and computer aided design (CAD) programs.

Technical responsibilities have included developing, implementing and consulting on system and physical design criteria; preparation and review of electrical one-line diagrams, physical drawings and specifications; review/analysis of equipment qualification; economic and technical equipment evaluations; monitoring vendor information, specification conformance and delivery; engineering support of plant construction, start-up and operations; preparation of electricl and equipment qualification sections of PSAR, FSAR and responses to NRC. Developed and applied computer-aided methods for electrical auxiliary system studies, cable and raceway system design monitoring system start-up packages, analyses of plant design for conformance with safety requirements, preparation/ maintenance of equipment qualification documentation and electrical design/graphics.

Administrative responsibilities included planning and implementing corporate engineering programs, project implementation of QA and Equipment Qualification Programs, development of schedule and budget, manpower forecasts and performance evaluations, job control by monitoring/reporting on accomplishments, schedule and workdays, training and development of design engineers, and management of multidiscipline corporate equipment qualification program efforts and electrical consulting projects.

REPRESENTATIVE EXPERIENCE

Client	Project/Station	Type	Position
Ebasco Corporate and Consulting Engineering Dept.	Nuclear Services, Development/Consulting Electrical	Nuclear	Section Leader
Ebasco Corporate and Consulting Engineering Dept.	Corporate Equipment Qualification Program	Nuclear	Program Manager

Ebasco Corporate and Consulting Engineering Dept.	CAD Development Program		Electrical Section Leader
Carolina Power & Light Co.	Shearon Harris Units 1 & 2	Nuclear	Lead Electrical Engineer
Florida Power & Light Co.	St. Lucie Units 1 & 2	Nuclear	Electrical Consultant
New York Power Authority	Indian Point Unit 3	Nuclear	Electrical Consultant
Houston Lighting & Power Co.	Allens Creek Units 1 & 2	Nuclear	Electrical Engineer
Houston Lighting & Power Co.	Cedar Bayou Fuel Oil Conversion	Oil	Electrical Engineer
Houston Lighting & Power Co.	PH Robinson Fuel Oil	Oil	Electrical Engineer

EMPLOYMENT HISTORY

Ebasco Services Incorporated, New York, N.Y.: 1974-Present

- Principal Engineer, 1982-Present
- Senior Engineer, 1980-1982
- Engineer, 1978-1979
- Associate Engineer, 1976-1977
- Assistant Engineer, 1974-1975

University of Illinois, School of Engineering, Urbana, Illinois, 1972-1974

- Research Assistant, Computer Applications

Litcom Division, Litton Industries, Melville, N.Y. 1972

- Junior Test Engineer, 1972

EDUCATION

Pratt Institute - BEE - 1972
University of Illinois-Graduate Study in Electrical Engineering, 1972-1973

REGISTRATIONS

Professional Engineer - New York

PROFESSIONAL AFFILIATIONS

IEE - Member: Power Engineering Society, Computer Society

American Nuclear Society - Member: Power Division, Nuclear Reactor Safety Division

Tau Beta Pi Engineering Honor Society

Eta Kappa Nu Electrical Engineering Honor Society

PUBLICATIONS

Author, "Developing and Maintaining Equipment Qualification Programs: A Computer-Aided Approach", TRANSACTIONS of the 1983 ANS Winter Meeting.

Alexander G. Fuller

Principal Engineer - Mechanical

I. Date of Birth - October 14, 1951

II. Education

A. BS Degree in Civil Engineering from N. C. State University, 1973.

III. Experience

A. Summer, 1970

1. Carolina Builders

a. Salesman.

B. Summers, 1971 and 1972

1. N. C. State Highway Commission

a. Engineering Assistant.

C. May 28, 1973, to Present

1. Carolina Power & Light Company

a. May 28, 1973 - Employed as Junior Engineer in the Construction Section of the Power Plant Engineering & Construction Department. Located at the Harris site, New Hill, N. C.

b. September 1, 1973 - Transferred from Power Plant Engineering & Construction Department to Power Plant Construction Department, Nuclear Construction Section. Located at the Harris site, New Hill, N. C.

c. August 17, 1974 - Transferred from the Nuclear Construction Section to the Fossil Construction Section. Assigned to Cape Fear Plant working out of General Office.

d. January 18, 1975 - Promoted to Civil Engineer in the Fossil Construction Section of the Power Plant Construction Department. Assigned to Cape Fear Plant working out of General Office.

e. September 27, 1975 - Transferred from Fossil Construction Section to Nuclear Construction Section. Located at the Harris site, New Hill, N. C.

f. September 27, 1975 - Reclassified as Engineer II in the Nuclear Construction Section of the Power Plant Construction Department. Located at the Harris site, New Hill, N. C.

g. August 16, 1976 - Transferred from Harris site to Cape Fear Plant as Engineer in the Nuclear Construction Section of the Power Plant Construction Department. Assigned to supervise contractor accomplishment of drainge modifications at the Cape Fear Plant.

h. April 2, 1977 - Transferred from Cape Fear Plant to Harris site as Engineer in the Nuclear Construction Section of the Power Plant Construction Department. Resumed duties as civil engineer in the Resident Engineer subunit.

i. March 25, 1978 - Promoted to Senior Engineer in the Nuclear Construction Section of the Power Plant Construction Department. Located at the Harris site, New Hill, N. C.

j. July 1, 1978 - Transferred to the Miscellaneous Projects Unit in the Nuclear Construction Section of the Power Plant Construction Department. Located at the Harris site, New Hill, N. C.

k. November 15, 1980 - Promoted to Project Engineer - Civil in the Miscellaneous Projects Unit, Nuclear Construction Section, Power Plant Construction Department. Located at the Harris site, New Hill, N. C.

l. January 31, 1981 - Transferred to the Outlying Structures Unit in the Harris Site Management Section of the Nuclear Plant Construction Department. Located at the Harris site, New Hill, N. C.

m. June 27, 1981 - Reclassified as Project Engineer-Mechanical in the Harris Site Management Section of the Nuclear Plant Construction Department. Located at the Harris site, New Hill, N. C.

n. October 30, 1982 - Promoted to Principal Engineer-Mechanical in the Harris Site Management Section of the Nuclear Plant Construction Department. Located at the Harris site, New Hill, N. C.

IV. Professional Societies:

A. Professional Engineer Registered in North Carolina - July 7, 1978

Revised 9/16/82

Roland M. Parsons

Project General Manager

I. Date of Birth: March 13, 1936

II. Education:

A. BS Degree in Civil Engineering from Fresno State College, 1959

III. Experience:

A. August, 1964 to November, 1966

1. U. S. Forest Service, Nevada City, California

a. Forest service representative on hydroelectric developments built on forest service land by others.

B. November, 1966 to September, 1973

1. Ebasco Services, Inc., Hartsville, South Carolina; and Jensen Beach, Florida

a. November, 1966 - Field Engineer on construction of H. B. Robinson Unit No. 2 (700 MW Westinghouse PWR nuclear power plant).

b. November, 1967 - Resident Engineer responsible for site engineering and quality control for construction of H. B. Robinson Unit 2.

c. April, 1971 - Senior Resident Engineer responsible for all site engineering for construction of St. Lucie Unit No. 1 (810 MW combustion engineering PWR nuclear power plant).

C. September, 1973 to May, 1974

1. Daniel Construction, Jenkinsville, South Carolina

a. Site Manager of Engineering responsible for all site engineering for construction of V. C. Summer Nuclear Power Plant.

D. June, 1974 to September, 1976

1. Ebasco Services, Elma, Washington

a. Senior Resident Engineer responsible for all site engineering on 1300 MW PWR nuclear power plant.

E. September 20, 1976 to Present

1. Carolina Power & Light Company

a. September 20, 1976 - Employed as Site Manager in the Nuclear Construction Section of the Power Plant Construction Department. Located at the Harris site, New Hill, N. C.

b. April 27, 1979 - Reclassified as Site Manager (Harris) in the Harris Site Management Section of the Power Plant Construction Department. Located at the Harris site, New Hill, N. C.

c. May 3, 1980 - Reclassified as Site Manager - Harris Plant Construction in the Harris Site Management Section of the Power Plant Construction Department. Located at the Harris site, New Hill, N. C.

d. January 31, 1981 - Reorganization - Site Manager - Harris Plant in the Harris Site Management Section of the Nuclear Plant Construction Department. Located at the Harris site, New Hill, N. C.

e. March 22, 1982 - Title changed to Project General Manager.

f. September 3, 1983 - Reorganization - Project General Manager - Nuclear Generation Group, Harris Nuclear Project Department, Harris Plant Construction Section. Located at the Harris site, New Hill, N. C.

IV. Societies, Memberships and Publications:

A. American Society of Civil Engineers

B. Registered Professional Engineer in North Carolina - No. 7634

C. Registered Professional Engineer in South Carolina - No. 3422

D. Registered Professional Engineer in California - No. 16379

E. Registered Professional Engineer in Washington - No. 15111

F. Registered Professional Engineer in Florida - No. 16700

G. Publication: System For Control of Construction Quality; Proceedings of The American Society of Civil Engineers, Journal of The Construction Division, March, 1972.

H. Publication: System for Material Movement to Work Areas; Journal of The Construction Division, March, 1980.

I. Publication: Is Total CPM Really the Answer for Super Projects; Civil Engineering Magazine, November, 1983.

Victor M. Safarian
Project QA/QC Specialist

I. Date of Birth

July 9, 1946

II. Education and Training

A. High school graduate, Page High School, Greensboro, North Carolina, 1964

B. U. S. Air Force Medical Technician School, 12 months

C. Other Training Courses:

1. Eastman Kodak Company's School of Industrial Radiography, Rochester, New York
2. Magnaflux Corporation School for Magnetic Particle, Fluorescent Penetrant and Visual Penetrant Inspections, Chicago, Illinois

III. Experience

A. U. S. Air Force

1. 1964 - 1968

a. Medical Technician/Operating Room Specialist

B. Bexar County Ambulance Service, San Antonio, Texas

1. April 1968 - February 1969

a. Driver and Attendant

C. Alladin Company, Ltd., Greensboro, North Carolina

1. February 1969 - July 1969

a. Salesman

D. Pittsburgh Testing Laboratory, Greensboro, North Carolina

1. July 1969 - November 1975

a. NDE Inspector

E. Daniel International

1. November 1975 - March 1976 (Fabrication Services Corporation, Albany, Georgia)

a. NDE Piping Inspector

2. March 1976 - April 1978 (Callaway Nuclear Plant, Fulton, Missouri)

   a. Project Level II NDE Inspector

F. Carolina Power & Light Company

1. April 1978 employed as a QA Specialist in the Engineering & Construction QA Section of the Technical Services Department. Located at the Harris site, New Hill, North Carolina.

   a. April 1980 promoted as a Senior QA Specialist in the Engineering & Construction QA Section of the Technical Services Department. Located at the Harris site, New Hill, North Carolina.

   b. March 1981 transferred and reclassified as a Senior QA/QC Specialist in the Engineering & Construction QA/QC Section of the Corporate Quality Assurance Department. Located at the Harris site, New Hill, North Carolina.

   c. March 1981 promoted and transferred as a Project QA/QC Specialist in the Engineering & Construction QA/QC Section of the Corporate Quality Assurance Department. Located at the Mayo Plant, Roxboro, North Carolina.

   d. October 1982 transferred as a Project QA/QC Specialist in the Engineering & Construction QA/QC Section of the Corporate Quality Assurance Department. Located at the Harris site, New Hill, North Carolina.

   e. February 1983 - SECTION TITLE CHANGE - Project QA/QC Specialist in the QA/QC Harris Plant Unit of the QA/QC Harris Plant Section of the Corporate Quality Assurance Department. Located at the Harris site, New Hill, North Carolina.

IV. Professional Societies

None

David R. Timberlake

Senior Engineer

I. Date of Birth - June 26, 1950

II. Education

A. BS Degree in Engineering Operations from N. C. State University, 1972

III. Experience

A. June, 1972 to September, 1974

1. Newport News Shipbuilding

a. Welding engineer.

B. February, 1975 to November, 1977

1. National Welders, Charlotte, N. C.

a. District manager - managed retail welding supply distributorship.

C. December, 1977 to May, 1978

1. Victor Equipment Company, Denton, Texas

a. Contractor specialist.

D. May, 1978 to March, 1979

1. Brown & Root, Glen Rose, Texas

a. Pipe welder.

E. April, 1979 to February, 1980

1. Brown & Root, Roxboro, N. C.

a. Welding engineer.

F. March 3, 1980, to Present

1. Carolina Power & Light Company

a. March 3, 1980 - Employed as Construction Specialist in the Harris Site Management Section of the Power Plant Construction Department. Located at the Harris site, New Hill, N. C.

b. November 15, 1980 - Reclassified to Engineer in the Harris Site Management Section of the Power Plant Construction Department. Located at the Harris site, New Hill, N. C.

c. January 31, 1981 - Reorganization - Department renamed to Nuclear Plant Construction.

d. March 5, 1983 - Promoted to Senior Engineer in the Harris Site Management Section of the Nuclear Plant Construction Department. Located at the Harris site, New Hill, N. C.

IV. Professional Societies:

A. American Welding Society

Rev. 2/14/83

GEORGE ORMAND WHITE, II

Project Engineer

BIRTH DATE: January 12, 1944

I. EDUCATION

A. Bachelor of Science Degree, Mechanical Engineering, North Carolina State University - 1965

B. Masters Degree, Materials Engineering, North Carolina State University - 1976

C. Teaching Assistant in Graduate School - North Carolina State University

II. EXPERIENCE

A. August 1967 to December 1968

1. Ford Motor Company, Dearborn, Michigan

a. Employed as a design engineer in vehicle component design. This work included stress analysis, fatigue life prediction, etc.

B. January 1969 to July 1971

1. Baldwin-Lima Hamilton, Wrightsville Beach, N. C.

a. Worked as a test engineer, supervising the operation and maintenance of a desalting plant at a government test facility.

C. September 1971 to 1973

1. North Carolina State University, Raleigh, N. C.

a. Entered Graduate School at North Carolina State University full time.

D. October 1973 to May 1975

1. Hercules, Inc., Wilmington, N. C.

a. Worked as a Project Engineer, carrying out numerous plant modifications from design through estimating and construction.

E. June 1975 to October 1975

1. Warren O. Stiles and Associates, Wrightsville Beach, N. C.

a. Worked as a consulting Project Engineer on a variety of engineering problems.

F. November 1975 to March 1976

1. Institute of Marine Research, Wilmington, N. C.

a. Worked temporarily as a research associate to Dr. Brauer during preparation of a research proposal for a deep ocean aquarium system.

G. July 19, 1976 to Present

1. Carolina Power & Light Company

a. Employed as a Quality Assurance Engineer in the Engineering Quality Assurance Section of the Power Plant Engineering Department. Responsibilities involve review of engineering documents to ensure inclusion of applicable quality assurance requirements. Activities also included QA surveys of engineering programs of the engineering groups at CP&L Power Plant Engineering Department, the architect/engineer, and steam supplier firms.

b. November 1976 - Transferred to the Technical Services Department, QA Engineer, Engineering & Construction QA Section.

c. April 1977 - Transferred to the Power Plant Engineering Department, Engineering Pool Section, Materials/Codes Unit.

d. June 1978 - Promoted to Senior Engineer in the Materials/Codes Unit, Engineering Pool Section. Responsibilities include new power plant design activities involving materials (metallic and nonmetallic), design specification, fabrication processes (welding, forming, heat treating, inspection, tests, etc.). Responsibilities also include ensuring that applicable codes, standards and regulations are invoked in design specifications. In addition, performs failure analyses as related to materials design and fabrication on special assignments and assists the Operating Plant Engineering Support Section on request.

e. December 1, 1979 - Transferred as Senior Engineer to the Harris Plant Engineering Section of the Nuclear Power Plant Engineering Department.

f. December 27, 1980 - Promoted to Project Engineer - Mechanical in the Harris Plant Engineering Section of the Nuclear Power Plant Engineering Department. Located at the Harris Site, New Hill, NC.

III. PROFESSIONAL SOCIETIES

A. Licensed Professional Engineer - North Carolina - 1972

B. ASME Society

JOHN FERGUSON

Education

B.S., General Engineering, United States Military Academy, 1972

University of Kentucky, Ft. Knox extension, undergraduate and post-graduate coursework in psychology.

Experience

June 1972 - July 1977: U.S. Army. Positions included Platoon Leader, Executive Officer, Squad Personnel Office, Brigade Assistant Personnel Officer and Troop Commander.

September 1977 - Present: Carolina Power & Light Company. During this period, held various Personnel positions with CP&L. In May 1983, named Director - Personnel, Harris Plant, with responsibility for evaluating the qualifications of potential employees, performing unescorted access screening, and interpreting and evaluating personnel policies in light of employee concerns.

Attachment I

David Bidwell Waters
Principal Engineer - Operations
April 8, 1940

Education & Training

B. S. Degree in Engineering Physics - Ohio State University - 1963.

M. S. Degree in Nuclear Engineering - Carnegie Institute of Technology - 1967.

Professional Societies

American Nuclear Society
Professional Engineer - North Carolina - 1975
Society of Fire Protection Engineers

Experience

A. April, 1963, to April, 1972, Senior Engineer, Westinghouse Electric Corporation, Pittsburgh, PA

B. May, 1972, employed as a Senior Engineer in the Nuclear Generation Section of the Bulk Power Supply Department. Located in the General Office.

June, 1973, employed as a Project Engineer in the Nuclear Generation Section of the Bulk Power Supply Department. Located in the General Office.

July, 1974, employed as a Principal Engineer - Operating Nuclear Plants in the Nuclear Generation Section of the Bulk Power Supply Department. Located in the General Office.

January, 1977, employed as a Director - Startup and Technical in the Generation Services Section of the Generation Department. Located in the General Office.

September, 1978, employed as a Principal Engineer - Nuclear Generation in the Nuclear Generation Section of the Generation Department. Located in the General Office.

May, 1979, employed as a Principal Specialist - Regulatory Compliance in the Generation Services Section of the Generation Department. Located in the General Office.

November, 1979, employed as a Principal Specialist - Special Projects in the Nuclear Operations Administration Section of the Nuclear Operations Department. Located in the General Office.

February, 1981, employed as a Principal Specialist - Special Projects in the Nuclear Operations Administration Section of the Technical Services Department. Located in the General Office.

February, 1982, employed as Principal Engineer - Operations, at the Shearon Harris Nuclear Power Plant, located in New Hill, North Carolina.

ROBERT WAYNE PRUNTY, JR.

Principal Engineer

BIRTH DATE: August 3, 1948

I. EDUCATION:

A. B.S. Degree in Electrical Engineering from University of South Carolina, Columbia, South Carolina - 1971

II. EXPERIENCE:

A. August 1971 to June 1979

1. U.S. Navy

a. Student in Nuclear Power School - August 1971 to September 1972

b. Nuclear Submarine Officer - October 1972 to September 1974

c. Student in Submarine Officer's Advanced Course - October 1974 to April 1975

d. Nuclear Submarine Officer - May 1975 to May 1977

e. Staff Instructor, Naval Nuclear Power School - June 1977 to june 1979

B. July 1979 to Present

1. Carolina Power & Light Company

a. Employed as Senior Engineer in the Engineering Pool Section of the Power Plant Engineering Department

b. December 1, 1979 - Transferred as Senior Engineer to the Harris Plant Engineering Section of the Nuclear Power Plant Engineering Department

c. April 5, 1980 - Promoted to Project Engineer - Harris Plant Engineering Section Nuclear Power Plant Engineering Department-located at New Hill, N.C.

d. August 8, 1981 - Promoted to Principal Engineer-Electrical in the Harris Plant Engineering Section, Nuclear Plant Engineering Department, New Hill, N.C.

Attachment K

KEVIN W. SHAW
HARRIS PLANT ENGINEERING SECTION

BIRTH DATE: April 6, 1960

EDUCATION AND TRAINING

A. Bachelor of Science Degree in Mechanical Engineering - Purdue University, December 1982

B. Nuclear Orientation and Introduction to Power Plants - Bechtel Power Corporation, Los Angeles Power Division, June 1981

C. Quality Assurance Codes and Standards Course - Carolina Power & Light Company, February 1984

PROFESSIONAL SOCIETIES

American Society of Mechanical Engineers

EXPERIENCE

June 1979	HVAC installation/service - Klawinski Heating & Air Conditioning, Inc., Hammond, Indiana
January 1980	Co-op student engineer - Mechanical Section, Bechtel Power Corporation, Norwalk, California
June 1981	Co-op student engineer - Mechanical Section, Bechtel Power Corporation, Norwalk, California
June 1982	Co-op student engineer - Mechanical Section, Bechtel Power Corporation, Norwalk, California
January 1983	Engineer - Mechanical Section, Bechtel Power Corporation, Norwalk, California
October 1983	Associate Engineer - Harris Plant Engineering Section, Mechanical Unit, Carolina Power & Light Company, Shearon Harris Nuclear Power Plant, New Hill, North Carolina

MICHAEL G GAGLIARDI
Mechanical Supervising Engineer

EXPERIENCE SUMMARY

Responsible for providing technical and administrative direction to a team of mechanical engineers and designers. Maintain current knowledge of technical industry developments, conditions, problems and state of the art methods as related to the team area of responsibility. Coordinate own activities with those of team and other groups within the department and other disciplines in areas of mutual concern. Provide interpretation of engineering design criteria. Responsibility also includes training and development of employees under my direction requirements to enhance their potential for advancement to more responsible positions. Prepare employee performance evaluations and provide guidance and counseling for future assignments and job growth. Coordinated team activities with specified project goals and schedules and most recently integrated the start-up and testing schedules of the project into the overall plant construction activities. Familiar with CPM, PERT and MBO scheduling techniques.

Responsibilities have included establishment, review and interpretation of balance of plant and NSSS system design criteria from the project contract, heat balances, departmental guides, codes, standards and NSSS System designs. Develop flow diagrams and piping layouts for balance of plant and NSSS Systems. Prepare system design descriptions and component design specifications. Responsible for the preparation of bid documents, negotiations and evaluation of commercial and technical aspects of approximately one hundred (100) mechanical contracts. Review instrumentation and control logic diagrams as they relate to system function and operation. Prepare and maintain all calculations associated with system design and component selection. Familiar with pipe stress and support & restraint design elements for nuclear power plants. Worked with dynamic and static methods for calculating and evaluating pipe stress analysis and support & restraint information. Working knowledge of the ASME B&PV Code, and B31.1 Power Piping Code.

Prepared System Interaction Study for the Power Authority of the State of New York for the Indiam Point 3 Nuclear Power Plant. Responsibilities included coordinating an interdisciplinary team of engineers and designers in developing methodology and criteria and field walkdown activities. Participated in the presentation of the study to the NRC and ACRS and provided expertise in responding to questions and comments. Reviewed and commented on PRA study performed for IP-3.

Responsible for the technical and administrative coordination of a group of pipe rupture analysis engineers and designers. The prime responsibility of the team was implementation of the Nuclear Regulatory Commission's Standard Review Plans 3.6.1 and 3.6.2. In addition, regulatory guides and standards were continuously reviewed and their impact evaluated. Analysis requirements included the application of a detailed dynamic study of the thermo-dynamic and fluid-dynamic properties of high energy and moderate energy piping systems. Analytical tools used in the development of data include RELAP 3 & 4.

Coordinated a corporate task force responsible for developing procedures and guidelines for pipe rupture analysis. Activities included pipe whip, jet impingement, environmental and flooding procedures. Assisted in the development of structural guides for pipe rupture restraint design and load calculation methods. Provided review of industry technique state of the art methods for evaluation of the effects of pipe ruptures.

MICHAEL G GAGLIARDI (Cont'd)

REPRESENTATIVE EXPERIENCE

Client	Project	Size	Fuel	Support
Carolina Power and Light Company	Shearon Harris Nuclear Power Plant	1 Unit 950 MW	Nuclear	Supervising Mechanical Engineer
Carolina Power and Light Company	H B Robinson	1 Unit 700 MW	Nuclear	Project Engineer
Power Authority of the State of New York	Indian Point Unit 3	1000MW	Nuclear	Project Engineer

EMPLOYMENT HISTORY

Ebasco Services Incorporated, New York, NY; 1973 - Present

- Principal Engineer, 1980 - Present
- Senior Engineer, 1978 - 1980
- Engineer, 1977 - 1978
- Associate Engineer, 1975 - 1977
- Assistant Engineer, 1973 - 1975

Port Authority of New York and New Jersey; 1971 - 1973

- Junior Mechanical Engineer (Coorperative work-study program)

EDUCATION

Pratt Institute - BSME - 1973

PROFESSIONAL AFFILIATIONS

ASME - Member
ANS - Member

DEAN SHAH
LEAD SYSTEMS ENGINEER

EXPERIENCE SUMMARY

Eleven years experience as a Mechanical Engineer, Lead Systems Engineer, Lead Pipe Rupture Engineer and Piping Stress Analysis Engineer for power plants.

Currently serves as Lead Systems Engineer in Mechanical Engineering Department. Duties include supervision and administration of systems group preparing schedules, work assignments, and providing technical assistance and directions of other engineers in the group. Responsible for engineering and design of balance of plant systems and developing and reviewing flow diagrams for balance of plant systems. Prepare systems design descriptions, design specifications, perform design calculations for sizing pipes, pumps and other mechanical components of fluid systems, selection and sizing the valves, safety related calculations to guarantee systems operations, review other disciplines work for system functions such as Instrumentation and Control logic diagrams, specify components, interface with other disciplines and vendors. Also responsible for some of the mechanical equipment procurements.

Assisted with interpretation and implementation of NRC IE Bulletins, SRP, Regulatory Guides and other criteria. Have written and reviewed FSAR sections and have prepared reply to NRC questions. Have prepared or reviewed safe shutdown analysis. Also worked to evaluate Appendix R requirements.

Worked as a Project Engineer for Seismic Qualification of the Auxiliary Feedwater Systems as required by NRC Generic Letter 81-14.

Worked as Lead Pipe Rupture Engineer. Duties included coordinating and responding to all matters relating to pipe rupture, pipe whip and jet impingement analysis and evaluation of other consequences such as flooding due to pipe rupture. Lead a special task force set up to resolve complete jet impingement interaction analysis. This task force approach has proven to be the most efficient and systematic way to complete the jet impingement effort. Also coordinated a task group that helped to develop a technical directive from the department.

Worked as a Senior Engineer in Applied Mechanics Department. Duties included performing and checking stress analysis of power plant pipelines as per ASME B&PV Code Section III, B31.1 Power Piping Code and FSAR requirements, locating anchors, restraints and snubbers on piping systems. Have performed and checked thermal expansion, static and dynamic seismic analysis and buried piping analysis. Have checked valve operability and equipment nozzle loads, hangers and restraints detail designs. Have also developed load combinations for seismic restrants. Have prepared reply to NRC questions related to piping analysis and seismic requirements. Written sections of FSAR.

Site experience involves three months at a nuclear power plant performing an onsite audit of piping systems for seismic requirements

DEAN SHAH (Cont'd)

REPRESENTATIVE EXPERIENCE

Client	Project	Size	Fuel	Position
Carolina Power & Light Company	Shearon Harris Units Nos. 1 - 4	960MW Each	Nuclear (PWR)	Lead
Japan Atomic Power Company	Tokai No. Unit 2	1100MW	Nuclear (BWR)	Support
Public Service Company of Colorado	Fort St. Vrain	330MW	Nuclear (HTRG)	Support
Virginia Electric Power Company	Surry Unit No. 2	934MW	Nuclear (PWR)	Support
Toyko Electric Power Company	Fukushima Unit 6	1100MW	Nuclear (BWR)	Support
Power Authority of The State of New York	Indian Point Unit 3	1000MW	Nuclear (PWR)	Lead

EMPLOYMENT HISTORY

Ebasco Services Incorporated, New York, NY; 1974 - Present

- Senior Engineer, 1978 - Present
- Engineer, 1975 - 1978
- Associated Engineer, 1974 - 1975

Stone & Webster Engineering Corp, Boston, MA; 1973 - 1974

- Stress Analyst

Warner & Swasey, Co; Worcester, MA; 1972 - 1973

- Designer

EDUCATION

Worcester Polytechnic Institute, MSME - 1973

REGISTRATIONS

Professional Engineer - New York.

PROFESSIONAL AFFILIATIONS

ASME - Member
Have participated in Special Working Group - Dynamic Analysis ASME (Section III).

Attachment N

JOHN STEVEN HARDY
ENGINEERING TECHNICIAN

BIRTH DATE: December 23, 1958

I. EDUCATION

A. A.A.S. Degree in Mechanical Design from Forsyth Technical Institute, Winston-Salem, North Carolina - 1979

II. EXPERIENCE

A. May 1979 to Present

1. Carolina Power & Light Company

a. From May 1979 to January 1980, coordinated the review of the FSAR and ER.

b. From January 1980 to the present, directly involved with the review of all fire protection-related items, such as specifications, revisions, drawing changes, licensing commitments, safe shutdown analysis, etc.

MARGARETA A. SERBANESCU

Principal Engineer

EXPERIENCE SUMMARY

Graduate Mechanical Engineer with 18 years diversified experience in engineering and design of fire protection, plumbing, HVAC and waste treatment/water pollution control systems of fossil and nuclear fueled electric generating stations and industrial projects including administrative and/or technical supervision of fire protection engineers, mechanical and/or buildings engineering designers. Responsibilities included developing, fire protection, plumbing and other mechanical water system designs and basic design criteria, preparing system flow diagrams, calculations, input criteria for physical design drawings, economic analysis of equipment options, procurement specifications, purchase requisitions, bid evaluations, selection of equipment, recommendations for purchase, supervision of installation, coordination with other engineering disciplines, clients and authorities having jurisdiction. In addition, for nuclear fueled electric generating stations, prepared preliminary, final and special safety analysis reports. As senior engineer was assigned Lead Fire Protection Engineer and was responsible for the entire fire protection system/program of the project as described above, including licensing support, manpower planning and coordination with project needs.

As Principal Engineer continued the activities of Lead Fire Protection Engineer continuing to be resposible for the entire project fire protection systems and program, as described above, and prepared Company fire protection standards. In January of 1981 was assigned to supervise the Fire Protection Engineering group and was responsible for technical and administrative fire protection engineering operations in New York and Lyndhurst offices. Supervised the engineering, design and other activities on fire protection of all projects nuclear and fossil assigned to these offices, responsible for the development of company fire protection technical standards and standard specifications, and ensured these activities were performed in an efficient and timely manner, in accordance with company procedures/guides to provide a high quality product.

REPRESENTATIVE EXPERIENCE

Client	Project	Size	Fuel
Louisiana Power & Light Company	Waterford SES Unit No. 3 Combustion Engineering Pressurized Water Reactor Unit	1165 MW	Nuclear

MARGARETA A. SERBANESCU

REPRESENTATIVE EXPERIENCE (Cont'd)

Client	Project	Size	Fuel
Washington Public Power Supply System	WPPSS Unit No. 3 Combustion Engineering Pressurized Water Reactor	1300 MW	Nuclear
Taiwan Power Company	Chin-Shan Unit Nos. 1 & 2 GE Boiling Water Reactor Units	600 MW ea	Nuclear
Carolina Power & Light Co.	Shearon Harris Nuclear Power Plant Units 1 & 2 Westinghouse Pressurized Water Reactor Units	900 MW ea	Nuclear
Iowa Public Service Co.	G Neal Unit No. 4	576 MW	Coal
Houston Lighting & Power Company	Allens Creek Nuclear Generating No. 1 General Electric Boiling Water Reactor Unit	1200 MW	Nuclear
	Limestone Electric Generating Station Unit Nos. 1 & 2	750 MW ea	Lignite
Orange and Rockland Utilities Inc.	Lovett Station Coal Conversion Unit Nos. 4 & 5	200 MW ea	Coal
Florida Power & & Light Co.	St Lucie Power Plant Unit No. 1	890 MW	Nuclear
	and St Lucie Power Plant Unit No. 2 Combustion Engineering Pressurized Water Reactors	890 MW	Nuclear

MARGARETA A SERBANESCU

REPRESENTATIVE EXPERIENCE (Cont'd)

Client	Project	Size	Fuel
Comision Federal de Electricidad de Mexico	Laguna Verde Power Plant Unit Nos. 1 & 2 General Electric Boiling Water Reactor Reactor	675 MW ea	Nuclear
Consolidated Edison Company of New York	Arthur Kill Unit Nos. 2 & 3	200 MW/ 300 MW Respectively	Oil to Coal Re-conversion
Knolls Atomic Power Laboratory	Knolls Facilities Modification Program	-	Nuclear
Clark Oil and Refining Corp.	Feasibility Study of Producing Gasoline from Coal	-	Synthetic
Arkansas Power & Light Co.	Coal to Medium Btu Gas	-	Synthetic
HNG Synfuels Company, Texas Inc.	The River Plant Coal to Methanol	-	Synthetic
Virginia Electric and Power Co.	Surry Unit Nos. 3 & 4 Babcock & Wilcox Pressurized Water Reactor Units	930 MW ea	Nuclear
Power Authority of the State of New York	Astoria Unit No. 6	830 MW	Oil
	Greene County Nuclear Power Plant Babcock & Wilcox Pressurized Water Reactor Unit	1300 MW	Nuclear
Electra de Viesgo, SA Spain	Santillan Nuclear Power Plant	1100 MW	Nuclear

MARGARETA A. SERBANESCU

REPRESENTATIVE EXPERIENCE (Cont'd)

Client	Project	Size	Fuel
People's Republic of China	Shiheng Power Plant	300 MW	Coal
	Huai-Nan Power Plant	600 MW	Coal
Ebasco	Nuclear Standardization Programs GE Boiling Water Reactor Unit, Combustion Engineering Pressurized Water Reactor Unit, Westinghouse Pressurized Water Reactor Unit	1200 MW	Nuclear
Ebasco	Coal-Fired Reference Plants	400 MW 600 MW 800 MW	Coal Coal Coal

EMPLOYMENT HISTORY

Ebasco Services Incorporated, New York, NY; 1978-Present

- o Principal Engineer - Supervisory Function, 1/81-Present
  - Lead Engineer 7/80-1/81
- o Senior Engineer - Lead Engineer 1/79-7/80
  - Support Engineer 7/78-12/78

Stone and Webster Engineering Corporation, New York, NY; 1973-1978

- o Engineer in Power

Hydrotechnic Corporation, New York, NY; 1969-1973

- o Mechanical Design Engineer

Spotnails, Incorporated, New York, NY; 1966-1969

- o Mechanical Draftsman - Designer

Interzoo, Caserta, Italy; 1965-1966

MARGARETA A. SERBANESCU

EDUCATION

Polytechnic Institute of Bucharest, Master of Mechanical Engineering - 1965

Trane Educational Divis on, Trane Air Conditioning Clinic - Completed Course

PROFESSIONAL AFFILIATIONS

National Fire Protection Association - Member

EXHIBIT 1

INSPECTOR	DATE HIRED	QUALIFICATIONS WHEN HIRED	TESTING DATE AND RESULTS
M.D. Griffith	6/13/83	Weld Inspector - 5 years	7/15/83 Passed
C.W. Whatley	8/16/83	Mechanical Insp. - 1 year, 2 months	10/12/83 Passed
S. Rahe	9/26/83	Welder, Inspector - 152 weeks	10/28/83 Passed
S. Russell	9/2/83	NDE, VT, RT, UT - 2 years 3 months	9/22/83 Passed
M. Stephens	6/21/82	Weld Inspector - 1 year, 1 month	8/29/83 Passed
J.D. Storey	3/29/82	Welder - 2 years, 2 months	9/23/83 Passed
R. Cooper	8/16/83	Level II Welding Inspector - 3 years, 3 months	8/31/83 Passed
J. Zysk	2/13/84	Visual Weld Inspector - 2 years, 2 months	2/22/84 Passed

Exhibit 6 Topic Outline

Welding Procedure Training

January 1984

1. Permanent Marking of Site Material and Components

2. General Welding Procedure for Carbon and Alloy Steel Pipe Weldments

HAND OUT

WELDER CRAFT TRAINING
August 1981

EXHIBIT 3

HIGHLIGHTS OF MP-06 and MP-07

General Welding Procedure for Carbon Steel and Stainless Steel

1. After thermal cutting, at least 1/16" shall be removed by grinding or machining.

2. All internal and external surfaces 2" on each side of weld joint shall be cleaned prior to welding.

3. Tools used on carbon steel shall not be used on stainless steel.

4. No welding is permitted if it is wet, damp or raining.

5. No peening is allowed on root pass or on final pass unless the weld gets post weld heat treatment.

6. Marking of socket welds:

   (1) Scribe a 1/2" mark on socket fitting face.
   (2) Bottom the pipe into the fitting and mark 1" on the pipe from the face of the fitting.
   (3) Back the pipe out 1/16" minimum (3/16" maximum).

7. All stainless steel butt welds get purge.

HIGHLIGHTS OF MP-05
(Stamping of Weldments)

1. Marking of carbon steel and stainless steel 0.120" and less is done by banding or electrochemical etching.

2. Marking of carbon steel and stainless steel greater than 0.120" and less than 0.250" is done by:
   (a) Banding
   (b) Vibraetching
   (c) Electrochemical etching

3. Marking of carbon steel and stainless steel greater than .250" can be done by any of the following:
   (a) Banding
   (b) Electrochemical etching
   (c) Vibraetching
   (d) Impression Stamping
   (e) Interrupted dot die

Each welder is required to put his stencil adjacent to the weld but not closer than 1" after completion of the weld or at the end of the shift. This stencil shall be put at 3 ft. intervals or less.

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 MUNICIPAL POWER AGENCY	)	Docket Nos. 50-400 OL 50-401 OL
(Shearon Harris Nuclear Power Plant, Units 1 and 2)	)	

AFFIDAVIT OF ROLAND M. PARSONS

County of Wake)
) ss:
State of North Carolina)

Roland M. Parsons, being duly sworn according to law, deposes and says that he is Project General Manager - Shearon Harris Nuclear Power Plant of Carolina Power & Light Company, that the answers to interrogatories on Eddleman Contention 41 contained in "Applicants' Responses to Wells Eddleman's General Interrogatories and Interrogatories on Contentions 9, 11, 41, 45, 116 and 132C(II) to Applicants Carolina Power & Light Company, et al. (Eighth Set)" are true and correct to the best of his information, knowledge and belief, and that the sources of his information are officers, employees, agents and contractors of Carolina Power & Light Company.

Roland M. Parsons
Roland M. Parsons

Subscribed and sworn to before me
this 12th day of April, 1984

Debra P. Hales
Notary Public

My Commission expires My Commission Expires 7-20-87

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

AFFIDAVIT OF LEONARD I. LOFLIN

County of Wake	)
	)
State of North Carolina	)

Leonard I. Loflin, being duly sworn according to law, deposes and says that he is Manager - Engineering, Harris Plant of Carolina Power & Light Company; that the answers to Interrogatories on Contentions 9, 11, 45, 116 and 132c(II) contained in "Applicants' Answers to Wells Eddleman's General Interrogatories and Interrogatories on Contentions 9, 11, 41, 45, 116 and 132c(II) to Applicants Carolina Power & Light Company, et al. (Eighth Set)" are true and correct to the best of his information, knowledge and belief; and that the sources of his information are officers, employees, agents and contractors of Carolina Power & Light Company.

Leonard I. Loflin

Sworn to and subscribed before me,
this the 17th day of April, 1984.

Notary Public

My commission expires:

1-25-87