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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
CAROLINA POWER & LIGHT COMPANY	)	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' MOTION FOR SUMMARY DISPOSITION OF EDDLEMAN CONTENTION 29/30 (Appendix I Compliance)

SHAW, PITTMAN, POTTS & TROWBRIDGE
Thomas A. Baxter, P.C.
John H. O'Neill, Jr.
Jeffrey J.A. Gibbs

CAROLINA POWER & LIGHT COMPANY
Richard E. Jones
Samantha Francis Flynn

Counsel for Applicants

8310110150 831005
PDR ADOCK 05000400
G PDR

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OF EDDLEMAN CONTENTION 29/30 (Appendix I Compliance)

Pursuant to 10 C.F.R. § 2.749, Carolina Power & Light Company and North Carolina Eastern Municipal Power Agency ("Applicants") move the Atomic Safety and Licensing Board for Summary Disposition of Intervenor Wells Eddleman's Contention 29/30. Summary Disposition of this Motion is appropriate in that there is no genuine issue of fact to be heard with respect to Contention 29/30 and Applicants are therefore entitled to a decision in their favor as a matter of law.

This Motion is supported by:

(1) "Applicants' Statement of Material Facts on Eddleman Contention 29/30 as to Which There Is No Genuine Issue To Be Heard (Appendix I Compliance)";

(2) "Affidavit of John J. Mauro and Guy Martin, Jr in Support of Applicants' Motion for Summary Disposition of Eddleman Contention 29/30" ("Joint Affidavit");

(3) "Affidavit of Thomas J. Grant in Support of Applicants' Motion for Summary Disposition of Eddleman Contention 29/30" ("Grant Affidavit");

(4, "Affidavit of Ronald L. Shearin in Support of Applicants' Motion for Summary Disposition of Eddleman Contention 29/30" ("Shearin Affidavit");

(5) All pleadings and other papers previously filed by the parties in this proceeding and other documents referenced herein.

I. INTRODUCTION AND PROCEDURAL BACKGROUND

Eddleman Contention 29/30, as admitted, states:

> Applicants have underestimated radioiodine releases during normal operations and have not demonstrated that normal radioiodine releases will not exceed Appendix I limitations.

"Applicants' Motion for Codification of Admitted Contentions," Appendix A at 16 (December 17, 1982). This form of Eddleman Contention 29/30 was adopted by the Board in its "Memorandum and Order (Addressing Applicants' Motion for Codification)" at 1-2 (January 17, 1983) ("Memorandum and Order on Codification"). Neither Intervenor Eddleman nor the NRC Staff objected

to Applicants' proposed codification. "Wells Eddleman's Response to Applicants' 'Motion for Codification of Admitted Contentions'" (January 3, 1983); "NRC Staff Response to Applicants' Motion for Codification of Admitted Contentions" (January 6, 1983).

The codified form of Contention 29/30 originated from the Board's acceptance of limited segments of Contentions 29 and 30 as originally proposed by Mr. Eddleman. See "Memorandum and Order (Reflecting Decisions Made Following Prehearing Conference)" at 46-47 (September 22, 1982) ("Memorandum and Order on Admissibility"). Applicants simply abstracted the Board's statement on the contention from the Memorandum and Order on Admissibility, and in their Motion for Codification requested Board clarification as to which specific aspects of these two contentions had been accepted for litigation by the Board.1/ Motion for Codification at 2-3, 8. The Board accepted Applicants' codification as proposed without elaboration. Memorandum and Order on Codification at 1-2.

Applicants, the Staff and Mr. Eddleman conducted discovery by way of interrogatories; the final day for the filing of responses to the second and last round of interrogatories on Eddleman Contention 29-30 was August 19, 1983.2/ Applicants

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1/ Proposed Contentions 29 and 30 were consolidated in the admitted Contention 29/30. Memorandum and Order on Admissibility at 46-47; Memorandum and Order on Codification at 1.

2/ Discovery has included Wells Eddleman's Interrogatories to Applicants, Second Set dated April 22, 1983 and Fourth Set

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have been served Intervenor Eddleman's "Motion to Compel Discovery and Certificate of Negotiations Re Interrogatories on Eddleman 29/37B (2d Round)" (September 8, 1983) to which Applicants filed their Answer on September 23, 1983. Intervenor Eddleman's Motion to Compel constitutes the sole unresolved discovery issue pending on Contention 29/30.

The existence of this unresolved dispute does not preclude the Board's grant of summary disposition on this contention. Discovery on Contention 29/30 has been permissible since its admission in September of 1982. See Memorandum and Order on Admissibility at 1, 46-47. Mr. Eddleman delayed presenting his first round discovery request on this contention until April 22, 1983 and his second round of discovery request on July 20, 1983. Mr. Eddleman's unilateral delay in issuing his first round discovery request until exactly seven months after Contention 29/30 was admitted by the Board exhibits little urgency

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(Continued)

dated July 20, 1983, Applicants' Interrogatories to Wells Eddleman, Second Set, dated March 9, 1983 and Fifth Set dated July 20, 1983, Wells Eddleman's Interrogatories to the NRC Staff dated May 6, 1983, NRC Staff Interrogatories to Wells Eddleman, dated March 18, 1983 and responses thereto. Applicants have filed two Supplements to their responses to Intervenor's first round of interrogatories on August 24, 1983 and September 26, 1983. Intervenor's Motion to Compel Discovery regarding Applicants' responses to Intervenors' second round of interrogatories is pending before the Board.

on his part. Contention 29/30 could have been the subject of a summary disposition motion at any time after the date for conclusion of discovery. Mr. Eddleman has been aware since approximately January 6, 1983 of the date for the conclusion of discovery on Contention 29/30 and he has failed diligently to pursue discovery at his own risk. See Letter of Thomas A. Baxter to the Board (January 14, 1983) (discussing summary disposition schedules). September 30, 1983 was established as the last day for the filing of a summary disposition motion on Contention 29/30. "Memorandum and Order (Ruling on Spent Fuel Transportation Contentions and Miscellaneous Motions)" at 17-18 (August 24, 1983) ("Memorandum and Order on Miscellaneous Motions"). This Board should not reward Intervenor's lack of diligence in discovery by allowing a further delay in the resolution of Applicants' Motion for Summary Disposition on Contention 29/30.3/

3/ Two of the interrogatories discussed in Intervenor's Motion to Compel are subject to this Board's prior determination on Intervenor's first Motion to Compel, a third interrogatory is manifestly irrelevant as determined by this Board's prior Order, and only one interrogatory is genuinely at issue. See "Applicants' Answer to Intervenor Eddleman's Motion to Compel Discovery re Interrogatories on Eddleman 29/37B (Second Round)," dated September 23, 1983.

II. GOVERNING LEGAL STANDARDS

A. Summary Disposition

"Applicants' Memorandum of Law in Support of Motions For Summary Disposition on Intervenor Wells Eddleman's Contentions 64(f), 75, 80 and 83/84," filed September 7, 1983, is fully applicable to this Motion and is incorporated by reference herein.

B. 10 C.F.R. Part 50, Appendix I

Appendix I to 10 C.F.R. Part 50 ("Appendix I") provides numerical guides for design objectives and limiting conditions of operation to assist Applicants for an operating license for a light-water-cooled nuclear power reactor in meeting the requirement that radioactive material in effluents to unrestricted areas be kept as low as is reasonably achievable. Compliance with Appendix I involves a demonstration that the plant design provides reasonable assurance that the liquid and gaseous effluents released will be below levels resulting in offsite exposures in excess of the Appendix I design objectives. Appendix I provides that such demonstration shall be made "by calculational procedures based upon models and data such that the actual exposure of an individual through appropriate pathways is unlikely to be substantially underestimated, all uncertainities being considered together." 10 C.F.R. Part 50, Appendix I, § III.A.1.

In adopting the numerical guides contained in Appendix I, the Commission acknowledged that the "use of calculational procedures based at least partially upon hypotheses is unavoidable" in demonstrating Appendix I compliance. Rulemaking Hearing; Numerical Guides For Design Objectives In Limiting Conditions For Operations To Meet The Criterion "As Low As Practicable" For Radioactive Material In Light-Water-Cooled Nuclear Power Reactor Effluents, CLI-75-5, 1 N.R.C. 277, 334 (1975) ("RM-50-2"). The Commission also determined that the calculational procedures and underlying hypotheses need not be unnecessarily conservative, but rather the Commission strongly favored that the "calculational methods be realistic, which in turn has influenced our adoption of particular numerical guideline values for dose objectives." Id. at 336. In practical terms, the Commission embraced the concept of using "as realistic a model for characterizing natural phenomena, including plant performance," as an applicant considered useful in demonstrating Appendix I compliance. Id. at 337. The Commission encouraged this approach because it had adopted conservative Appendix I guidelines against which the estimates would be compared to establish compliance. Furthermore, the Commission was aware that "[m]easured levels of environmental radioactivity are generally small in comparison with values calculated from known or presumed release rates." Id. at 326.

The calculational methodology by which demonstration of compliance is performed has been standardized and is set forth in a series of NRC Regulatory Guides.4/ In addition, the NRC has an ongoing data collection and assessment program to determine whether changes to the standardized methods are warranted. Joint Affidavit at ¶ 5.

Applicants' mathematical modeling need be no more complex than necessary to demonstrate that SHNPP complies with Appendix I. "There is no regulatory necessity for performing the most realistic dose estimates that are technologically achievable if a less complex and less expensive analysis can be made to demonstrate compliance with licensing requirements." RM-50-2 at 339.

Applicants are therefore only required to demonstrate compliance with Appendix I through computational models, utilizing data representing the physical characteristics of the plant and environment, which predict a realistic dose estimate. It is

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4/ Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 C.F.R. Part 50, Appendix I"; Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors"; Regulatory Guide 1.112, "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Power Reactors"; Regulatory Guide 1.113, "Estimating Aquatic Dispersion of Effluents From Accidental And Routine Reactor Releases For The Purpose of Implementing Appendix I."

this demonstration of compliance with radioiodine release aspects of Appendix I that Contention 29/30 challenges.

III. ARGUMENT

A. Introduction

Both Applicants and the NRC Staff performed Appendix I calculations using the same methodology as set forth in applicable Regulatory Guides. The methodology is based on historical nuclear plant operating experience and takes into account the full range of normal operating experiences, including anticipated operational occurrences. The first step of the methodology is to calculate the Source Term, or the radionuclides, including radioiodines, estimated released in liquid and gaseous effluents during normal operations. The second step is to calculate the atmospheric dispersion and aquatic dilution of the released radionuclides. The third step is to calculate the radiation doses to the general public attributable to the radionuclides dispersed in the environment. This, in turn, involves calculation of concentrations of radionuclides in environmental pathways and the radiological doses to receptors. Joint Affidavit at ¶ 8.

The results of Applicants' calculations are set forth in the Harris Environmental Report ("ER") at § 5.2. The Staff's independent calculations are reported in the Draft

Environmental Impact Statement ("DES") at § 5.9.3.2 and Appendix D. Specifically focusing on release of radioiodines, Applicants calculated the annual atmospheric release of I-131 would be 0.09 curies/year (ER, Table 5.2.5-2) and the Staff calculated a value of 0.16 curies/year (DES, Appendix D, Table D-8). The RM-50-2 design objective, as set forth in the Annex to Appendix I, is 2 curies/year. Both Applicants and the Staff calculate the I-131 releases to be more than an order of magnitude less than the design objective. Thus any differences between the two calculations are without significance.5/ Furthermore, it is uncontroverted that predicted releases are on the average many times greater than actual operating experience. Joint Affidavit at ¶ 8, Attachments 3 and 4; see RM-50-2 at 326.

Contention 29/30, as admitted, by its own terms is limited to "radioiodine releases." The first part of the contention alleges that "Applicants have underestimated radioiodine

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5/ Mr. Eddleman attempts to attach significance to the difference between Applicants' and the Staff's estimate. At the time of the preparation of the DES, the Staff's review was based on incomplete information and only partial credit was allowed for removal of radioiodines by one of the radioactive waste handling systems. The NRC Staff has since completed its review of that system and has revised its Source Term calculation. This revised estimate will be published in the Final Environmental Statement and is expected to be virtually identical to Applicants' estimate. Joint Affidavit at ¶ 25.

releases during normal operations." The second part of the contention contends that Applicants "have not demonstrated that normal radioiodine releases will not exceed Appendix I limitations."6/ Yet, during the course of discovery Mr. Eddleman attempted to expand the scope of Contention 29/30 to include atmospheric dispersion modeling (already the subject of Eddleman Contention 80), aquatic dilution of radioiodines after release, dose calculations (included, in part, in Joint Intervenors Contention II and Eddleman Contention 37B on health effects), and in-plant and environmental monitoring of radioiodine releases. Many, if not a majority of the allegations go beyond what Applicants would submit is a fair reading of the scope of Contention 29/30.7/

Applicants have divided Mr. Eddleman's many allegations into five functional areas:

1. The Source Term Calculation
2. The Filtration System

6/ In admitting certain aspects of originally proposed Contentions 29 and 30, the Board stated: "The Contentions, however, also allege that releases will exceed Appendix I releases; if proved, this would present a serious safety concern; accordingly, this part of the Contention is accepted." Memorandum and Order on Admissibility at 46.

7/ The Board specifically rejected those aspects of originally proposed Contentions 29 and 30 that addressed health effects and radiological monitoring. Id.

3. The Dispersion Calculation

4. The Dose Calculation

5. The Monitoring Systems

Applicants submit that only those allegations included in the first two functional areas are fairly included within the scope of Contention 29/30: (1) the source term calculation (which estimates radioiodine releases) and (2) the filtration system (the efficiency of which is taken into account in calculating radioiodine releases). Allegations regarding the dispersion calculation go to what happens to the radioiodine after release. Allegations regarding the dose calculation go to the potential impact of radioiodine releases. Allegations with respect to the Monitoring Systems go to Applicants' ability to determine what was released. Therefore, Applicants propose that the Board rule on the demonstration made in the first two sections of this argument regarding the Source Term and filtration system and find that the allegations set forth in the remaining three sections are outside the scope of Contention 29/30. If the Board does not agree with Applicants that every allegation discussed in the last three sections of this argument is outside the scope of Contention 29/30, Applicants plead, in the alternative, that the Board find that any such allegation is without merit and that there is no genuine issue of material fact.

Each allegation made by Mr. Eddleman in the context of Contention 29/30 during the discovery process is without merit. In most cases Mr. Eddleman provides no basis for his allegations. The allegations themselves are fraught with technical inaccuracies which indicate Mr. Eddleman's fundamental misunderstanding of this issue. Where Mr. Eddleman attempts to support his allegations, he either misuses referenced material or relies on materials that have been thoroughly discredited within the scientific community. Applicants demonstrate in this Motion that Mr. Eddleman's allegations are without merit and that there is no genuine issue of material fact regarding each such allegation.

While Mr. Eddleman has taken a scatter-shot approach to Contention 29/30, he never actually alleges that Applicants' Appendix I calculations of releases of radioiodines from the Harris Plant will actually exceed Appendix I guidelines. See Eddleman Response to Applicants' Interrogatory No. 18. Rather, Mr. Eddleman for various reasons alleges that Applicants' calculations underestimate the actual exposure of an individual from radioiodine releases "when all exposure pathways are considered and all uncertainties are considered together." Id. He never attempts to quantify the alleged underestimation of radioiodine releases and the resultant exposure.8/ Mr.

8/ "I have not calculated the extent to which Applicants have underestimated radioiodine releases during normal operations." Eddleman Response to Applicants' Interrogatory 29-19(a).

Eddleman never comes to grips with the fact that Applicants and the NRC Staff have independently performed the calculations which demonstrate Appendix I compliance, utilizing standardized methodology approved by the NRC Staff, which historically have significantly overestimated actual releases of radionuclides. This calculation, of course, includes releases of radioiodines. These uncontroverted facts, as will be demonstrated herein -- that the releases have been calculated by both Applicants and NRC Staff to be significantly below Appendix I guides, that the methodology used has universal acceptance within the nuclear industry and has been endorsed by the NRC, and that historical empirical data clearly demonstrate that the estimated releases utilizing the standardized methodology consistently overpredict radioiodine releases when compared with actual measured releases -- in and of themselves are sufficient to compel summary disposition of Contention 29/30.

In responding to Mr. Eddleman's allegations and in demonstrating the Applicants' compliance with Appendix I, Applicants rely on the sworn statements of John J. Mauro, Director, and Guy Martin, Jr., Manager, of the Radiological Assessment and Health Physics Department of Envirosphere Company, a division of Ebasco Services, Inc. Dr. Mauro and Mr. Martin supervised Applicants' Appendix I calculations and, as demonstrated by their resumes (Joint Affidavit at Attachments 1 and

2), they have extensive experience in this area. Applicants also rely on the sworn affidavits of Dr. Thomas J. Grant, and Ronald L. Shearin. Dr. Grant is Supervising Radiation Protection Engineer for the Harris Project, employed by Ebasco Services, Inc., the architect-engineer for the Harris Plant. He is responsible for the design and procurement of the radiation monitoring system. Mr. Shearin is employed by Carolina Power & Light Company and is responsible for development and establishment of the environmental monitoring system.

B. The Source Term Calculation

Demonstration of Appendix I compliance initially requires calculation of the Source Term. The Source Term calculation consists of a quantitative evaluation of radionuclide releases, including radioiodines, which are produced by the plant and released into the environment. The Source Term considers all radionuclides which are potentially available for release to the environment during the full range of normal plant operations, including "anticipated operational occurrences." Anticipated operational occurrences would include leakages and malfunctions which, based on industry experience, can be expected in the course of normal operations. Joint Affidavit at ¶ 8.

Historical empirical data form the basis for the standardized Source Term equation embodied in a computer program known

as the Gaseous and Liquid Effluent Code ("GALE Code"). See NUREG-0017, "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents From Pressurized Water Reactors," at § 1.1. The GALE Code Source Term takes into account plant specific design features, resulting in an individualized estimate of radionuclide releases. Joint Affidavit at ¶ 7. Applicants' calculation of the Source Term was made utilizing the methodology contained in NUREG-0017 and Regulatory Guide 1.112. Id. at ¶ 6.

Use of the Gale Code to calculate the Source Term is widely accepted; it is used almost exclusively throughout the nuclear industry to demonstrate compliance with Appendix I. Id. at ¶ 7. While the intent of the Source Term calculation is to provide a realistic estimate of radionuclide releases, empirical studies have shown that predicted releases are on the average many times greater than actual operating experience. Id. at ¶ 8, Attachments 3 and 4.

Intervenor Eddleman, by various statements in discovery, has alleged the following with regard to Applicants' Source Term calculations:

(1) Nuclear power plants generally exceed allowable releases. Eddleman Response to Applicants' General Interrogatory 1 at 2;

(2) Applicants' Source Term calculation ignores the contribution of leaks to releases. Eddleman Response to Applicants' Interrogatory 29-22;

(3) Applicants' Source Term calculation, derived from the NUREG-0017 equation, does not account for individual plant variations in radioiodine releases. Eddleman Responses to Applicants' Interrogatories 29-5 and 29-31;

(4) The factors used to modify the standardized Source Term equation in NUREG-0017 are too lenient in light of the problems experienced at Carolina Power & Light Company's other plants with regard to failed fuel percentages. Eddleman Response to NRC Staff Interrogatory No. 15; and

(5) Applicants' Source Term calculation ignores the effects of decaying radioiodines such as Xenon which produce additional radioiodines. Eddleman Responses to Applicants' Interrogatories 29-17, 29-20(f), 29-31, 29-35, 29-56 and NRC Staff Interrogatory 19.

We address each of these allegations, seriatim, below.

(1) Mr. Eddleman's position that nuclear power plants generally exceed allowable releases is categorically refuted by the extensive surveillance programs undertaken by the NRC and by the operational experience upon which the standardized Source Term model in NUREG-0017 is founded. Joint Affidavit ¶ 8, Attachments 3 and 4. Furthermore, such an allegation can be viewed as an attempt to attack the implementation guidance contained in § III of Appendix I. Constituting such an attack, it must be rejected as impermissible. See 10 C.F.R. § 2.758.

(2) & (3) Contrary to Mr. Eddleman's unsupported allegations, the data upon which the NUREG-0017 Gale Code program is

based reflects actual historical release data gathered from operating nuclear power plants, including equipment leakages. NUREG-0017 at § 1. Plant specific design features are taken into account. Joint Affidavit at ¶ 7.

(4) The assumptions regarding the failed fuel percentage for the Source Term calculation are based upon standard primary coolant concentration values recommended by the NRC. Joint Affidavit at ¶ 14; NUREG-0017 at Table 2-3. These recommendations reflect operational experience over a three and a half year period from 1970 to 1973 at 18 different operating PWR's. Id. Any particular plant may be above or below the average utilized; however, the NRC's ongoing program to track fuel performance trends has indicated that the average percent of failed fuel is declining due to improvements in fuel fabrication, management methods and water chemistry control. Therefore, although the factor utilized to calculate the Shearon Harris Source Term was an average failed fuel factor based on operational experience, this recent operational data indicates that even this average factor is somewhat conservative. Joint Affidavit at ¶ 15. Because of differences in fuel design, between the older Robinson Plant, the Brunswick BWR Plant and Harris, and because of improvements in fuel fabrication and management methods and water chemistry control, the failed fuel history of Robinson and Brunswick bears no relevance to calculation of the Harris Source Term.9/

9/ This Board has already determined that, because of design differences between the Robinson and the Harris Plants, infor-

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(5) Mr. Eddleman also believes that Applicants' Source Term calculation is defective because it excludes the effect of the radioactive decay of higher isotopes into radioiodine. Mr. Eddleman specifically refers to the decay of xenon gas isotopes into radioiodine. Eddleman Responses to Applicants Interrogatories 29-17 and 27-31(a). Xenon, a noble gas, does not decay into radioiodine; rather iodines decay to xenon.10/ Joint Affidavit at ¶ 16.

In fact, the radioiodine Source Term takes into account radioiodine resulting both from direct fissioning of uranium in the core and from the decay of tellurium, a radionuclide produced in the fissioning process. Joint Affidavit at ¶ 19, Attachment 5. Furthermore, regardless of the source of radioiodines, their release is estimated based on historical operational data, and consequently all radioiodines are accounted for. Intervenor Eddleman is in error when he asserts that Applicants' dose calculation does not consider the daughter products of decaying radionuclides. In fact, most

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mation regarding Robinson's fuel failure limitations is irrelevant to Contention 29/30. See Memorandum and Order on Miscellaneous Motions at 10.

10/ Such a fundamental scientific error on Intervenor's part exhibits his lack of basis in a stark and conclusive manner.

radioiodines do result from decay of primary fission products. Id.

The only other theoretical contribution to radioiodine in the environment would arise from the decay of tellurium subsequent to release. The releases of tellurium are so small, and its half-life so short, that its decay subsequent to release does not contribute meaningfully to the radioiodine Source Term. Its contribution to dose would be even less. Joint Affidavit at ¶¶ 20, 21.

C. The Filtration System

The Harris air filtration system is described in considerable detail in the Joint Affidavit at ¶ 24 and Attachment 6. The air filtration system consists of filter casings, prefilters, High Efficiency Particulate Air ("HEPA") filters, charcoal adsorbers, fans and instrumentation. The system is designed and fabricated in excess of minimum requirements of industry standards and guidelines to ensure the highest possible filtration efficiency. Id.

Applicants' Source Term for radioiodine in gaseous effluents includes only an assumed 90% reduction factor, due to the effects of the SHNPP filtration system. Joint Affidavit at ¶ 22. This filtration factor was conservatively derived from the historical data contained in NUREG-0017 and underestimates the actual operational efficiencies of such filtration systems, which exceed 99%. Joint Affidavit at Attachment 6 (page 9).

Intervenor Eddleman has alleged that:

(1) The Shearon Harris filters may not be as efficient as estimated by Applicants in their Appendix I compliance calculations. Eddleman Responses to Applicants' General Interrogatory No. 1 and Interrogatory 29-3.

(2) Gasket and fitting failures will allow radioiodines to leak past Applicants filtration systems. Eddleman Responses to Applicants' General Interrogatory 1 and Interrogatories 29-3, 29-19, 29-24, 29-25, 29-26, 29-27 and 29-30;

(1) When asked in a second round of interrogatories if he maintained that the radioiodine filtering capability of the Harris Plant is overstated, Mr. Eddleman was unable to provide any basis. Eddleman Response to Applicants' Interrogatory 29-23(a). Since Mr. Eddleman is not sure that he maintains his allegation and provides no basis for it, it is difficult to respond. In response to his concerns regarding usage time of filters, actual in-place usage time of the HEPA Air filters will be much less than their life expectancy under normal environmental operating conditions. A quality assurance program will be adopted to ensure filters are changed on schedule and are not subjected to premature wear. Joint Affidavit at ¶ 23 and Attachment 6 (pages 10,11). As noted above, actual operational efficiencies of filtration systems exceed 99%.

(2) Intervenor Eddleman has also alleged that gasket and seal failures, due to distortion, embrittlement and cracking resulting from radiation exposures, will allow radioiodine to leak past Applicants' filtration system. The only filter unit gaskets and seals, which could be subject to deterioration due to thermal, radiation or humidity conditions, are at the Prefilters and HEPA filters where the particulate matter is trapped. The charcoal adsorber section where the gaseous radioiodines are trapped is of all-welded, gasketless construction. The access doors have gaskets which are not directly located in the air stream and which have an estimated life of more than 40 years. These gaskets, nonetheless, will be inspected for deterioration and wear every time the filters are inspected or replaced. Beyond that, the filter unit housings are maintained under negative pressure during operations and no leakage of contaminated air to the outside is possible even if a leak exists in the door gasket. Joint Affidavit at Attachment 6 (pages 10-11). Thus even with a deterioration of seals or gaskets, radioiodines could not escape.

Mr. Eddleman bases his allegations regarding seal degradation on three reports which allegedly document such effects in materials which he maintains to be similar to those used by Applicants in filtration system seals.11/ The studies which Mr.

11/ Mr. Eddleman cites to NUREG/CR-2157, 2763 and 2877 and articles by Clough and Gillen. Eddleman Response to Applicants' Interrogatories 29-25, 29-26.

Eddleman cites are inappropriate for comparison to Applicants' filtration system seals because (1) they are based on materials which are dissimilar to those utilized by Applicants, (2) the materials break-down is the result of radiation exposures which result in integrated doses far in excess of those which will be experienced by Applicants' filtration systems, and (3) the studies simply do not reach the conclusions asserted by Mr. Eddleman. Joint Affidavit at ¶¶ 26, 27, 28; Grant Affidavit at ¶ 9. The filtration system utilizes welding and steel components to minimize the number and extent of gasket materials utilized. Joint Affidavit at Attachment 6. Applicants' gasket material is composed of neoprene, Cohrlastic R-1048 and Grade Medium Silicone Rubber. Id. at Attachment 6 (pages 1 and 2). None of these materials is similar to those upon which the three studies are based. Grant Affidavit at ¶ 9. The smallest integrated radiation dosage experienced by the tested material in the reports cited by Mr. Eddleman exceeds the lifetime doses that will be experienced by SHNPP filter gasket material by a factor of more than one thousand. Id. at ¶ 27.

Mr. Eddleman also ignores the inspection program to which Applicants are committed by FSAR § 1.8, as required by Regulatory Guide 1.140. This inspection program will ensure that routine inspections undertaken at the time of filter bed replacement will discover any embrittlement cracking or

distortion which would constitute a threat to the pneumatic integrity of the filtration systems. Id.; Grant Affidavit at ¶ 9.

Mr. Eddleman maintains that he has "no evidence that Applicants will carry out inspections per Reg. Guide 1.140 or that these inspections will detect degradation of sealers prior to leakage." Eddleman Response to Applicants' Interrogatory 29-27(e). As noted above, Applicants have committed to the inspections mandated by Regulatory Guide 1.140 in FSAR § 1.8. Mr. Eddleman cannot establish a genuine issue of material fact relying upon the mere speculation. Gulf States Utility Co. (River Bend Station, Units 1 and 2), LBP-75-10, 1 N.R.C. 246, 248 (1975). He must produce acceptable evidence concerning a fact material to Applicants' demonstration of Appendix I compliance, and that evidence must be sufficient to create a genuine issue of material fact. 10 C.F.R. § 2.749(d).12/

12/ Mr. Eddleman also speculates that if degradation is detected in seals and gaskets, Applicants will not replace those degraded seals and gaskets. Eddleman Response to Applicants' Interrogatory 29-27(e). Mr. Eddleman's conclusion, based on shear speculation, is contradicted by his concession that he possesses no evidence of, and has not asserted that, CP&L will act intentionally to operate the Harris facility in violation of Appendix I. Eddleman Response to NRC Staff Interrogatory No. 15.

D. The Dispersion Calculation

Applicants' Appendix I compliance estimate assumes that the radioiodines in the Source Term are released to the environment. Once released, the exact pathways and concentrations that the radioiodines follow are determined by the dispersion aspects of these releases. Applicants' dispersion calculations are governed by Regulatory Guide 1.111 for the atmospheric medium and Regulatory Guide 1.113 for the aquatic environment. As discussed previously, Applicants submit that allegations regarding dispersion calculations are outside the scope of Contention 29/30.

1. The Atmospheric Dispersion. Applicants have elsewhere described in detail the atmospheric dispersion model used for both routine and accidental release assessment of radionuclides. In doing so, Applicants have responded to the alleged inadequacies of their dispersion model that were raised by Mr. Eddleman and have demonstrated that there is no genuine issue as to any fact material to the validity of the dispersion model.13/

13/ See "Applicants' Motion for Summary Disposition of Intervenor Wells Eddleman's Contention 80 (Atmospheric Dispersion Model)," dated September 1, 1983, supported by (1) "Applicants' Statement of Material Facts as to Which There Is No Genuine Issue To Be Heard on Eddleman Contention 80," (2) "Affidavit of Brian D. McFeaters in Support of Applicants' Motion for Summary Disposition of Intervenor Wells Eddleman's Contention 80" (hereinafter "First McFeaters Affidavit"), (3) "Affidavit of

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Eddleman Contention 80 alleges that the mixing and dispersion models for radiological releases from the Shearon Harris Nuclear Power Plant assume more complete dispersion than actually takes place because they do not take into account various meteorological conditions that could affect such dispersion. Mr. Eddleman's allegations in support of his Contention 29/30 regarding Applicants' atmospheric dispersion models are a subset of the allegations in the more broadly worded Contention 80. Here the issue is limited to radioiodine releases during

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(Continued)

Wayne Lei in Support of Applicants' Motion for Summary Disposition of Intervenor Wells Eddleman's Contention 80"; "Applicants' Reply to Wells Eddleman's Motion for Partial Summary Disposition on Eddleman Contention 80," dated September 27, 1983, supported by (1) "Statement of Applicants' Position with Respect to Mr. Eddleman's 'Statement of Material Facts as to Which There Is No Genuine Issue To Be Heard,'" (2) "Affidavit of Brian D. McFeaters in Support of Applicants Reply to Wells Eddleman's Motion for Partial Summary Disposition on Eddleman Contention 80" (hereinafter "Second McFeaters Affidavit"), (3) "Affidavit of Maynard E. Smith in Support of Applicants' Reply to Wells Eddleman's Motion for Partial Summary Disposition on Eddleman Contention 80" (hereinafter "Smith Affidavit"). The NRC Staff supported Applicants' position regarding the validity of their atmospheric dispersion model. See "NRC Staff Response in Support of Applicants' Motion for Summary Disposition of Eddleman Contention 80, And in Opposition to Wells Eddleman's Motion for Partial Summary Disposition of Eddleman Contention 80," filed September 26, 1983, supported by (1) "Affidavit of Irwin Spickler in Support of Summary Disposition of Eddleman Contention 80" (hereinafter "Spickler Affidavit"), (2) "Affidavit of Edward F. Branagan, Jr. in Support of Summary Disposition of Eddleman Contention 80," (3) "Affidavit of Kenneth C. Dempsey in Support of Summary Disposition of Eddleman Contention 80."

normal operations. Therefore, Applicants rely on their previous submittals in their Motion for Summary Disposition of Contention 80 and their Reply to Mr. Eddleman's Motion for Partial Summary Disposition and the Supporting Response and Affidavits of the Staff in support thereof, which demonstrate that there is no genuine issue of material fact regarding the validity of Applicants' dispersion model.

Intervenor Eddleman has attacked Applicants' atmospheric dispersion model by alleging that:

(1) The meteorological data gathered is insufficient to adequately represent the area's meteorological variations. Eddleman Responses to Applicants Interrogatories 29-6, 29-41, 29-42, 29-67;

(2) The atmospheric estimate does not adequately account for the effects of precipitation ("washout"). Eddleman Responses to Applicants' Interrogatories 29-48 and 29-45;

(3) Applicants have failed to account for plume concentration effects as a result of building "wakes" and other phenomena. Eddleman Responses to Applicants' Interrogatories No. 29-5, 27-33, 29-43, 29-44 and 29-48.

(1) Applicants' atmospheric dispersion estimates for routine releases from the Harris Plant are determined by using a Gaussian plume model based on Regulatory Guide 1.111. The appropriateness of and conservatisms built into Applicants' atmospheric dispersion model are without question. First McFeaters Affidavit, Exhibit B; Smith Affidavit at ¶ 9;

Spickler Affidavit at ¶¶ 8,9. Applicants' atmospheric dispersion model utilized site specific meteorological data obtained at the Harris site meteorological monitoring station during the period from January 1976 through December 1978. Second McFeaters Affidavit, Exhibit B at 1. This particular duration of atmospheric data collection is specified in Regulatory Guide 1.70. The three years of meteorological data (which integrate the sensor signals for each 15 minute interval) were compared with historical records from various reporting services, including the data from the Raleigh-Durham airport and Cooperative Weather Observer Network, and with data collected at the on-site monitoring system at the Harris Plant site from January 1979 to date. All of the information reviewed confirms the representativeness of the three years of data used in the atmospheric dispersion model. Second McFeaters Affidavit, Exhibit B at 1-2. There is no genuine issue of material fact regarding the sufficiency of the data used by Applicants in the atmospheric dispersion model.

(2) Mr. Eddleman's allegations regarding the effects of "washout" or "rainout" on atmospheric dispersion and deposition of radionuclides out of a plume have been treated extensively in "Applicants' Reply to Wells Eddleman's Motion for Partial Summary Disposition on Eddleman Contention 80" and by the Staff's Response thereto. Wet deposition of radionuclides out

of a plume by either "rainout" (due to precipitation in clouds) or "washout" (due to precipitation below clouds) is appropriate to take into account at a site with "a distinct rainy season which corresponds to the grazing season." Second McFeaters Affidavit, Exhibit B at 4; Spickler Affidavit at ¶ 8. The Harris site does not have a distinct rainy season during the grazing season; in such cases wet deposition has been found to be of little significance in considering dispersion and deposition of routine emissions over the period of a year because of their infrequent and random occurrence. Id.; Smith Affidavit at ¶¶ 7,9; Spickler Affidavit at ¶ 9.

(3) Contrary to Mr. Eddleman's allegations, Applicants do take into account the building wake effect in their atmospheric dispersion model. The building wake effect results in a prediction of greater dispersion and lower concentrations in a radioactive plume. Applicants' model contains a building wake factor that uses the smallest cross-sectional area of the reactor building, thus substantially lessening the importance of predicted wake effect. As a result, actual concentrations that might occur are significantly overpredicted, contributing to the conservatism of Applicants' model. First McFeaters Affidavit, Exhibit B at 12-13, 24-25.

2. Aquatic Dispersion. Applicants have determined the aquatic dispersion of released radioiodines in the Shearon Harris Reservoir according to equation 43 of Regulatory Guide 1.113. Joint Affidavit at ¶ 29. Equation 43 assumes that radioiodine is removed from the reservoir only by radiological decay and by discharge to an outlet, in this case the Cape Fear River. Id. Equation 43 also assumes steady-state dispersion of the released radioiodines throughout the reservoir and complete mixing of the released effluents. Id. at ¶ 34. Sedimentation and chemical interaction of radioiodines with other materials has not been incorporated in Applicants' estimate since chemical interaction of radioiodines with other materials would result in an increase in sedimentation, or the settling out of the radioiodine compounds into the underlying sediment. This effect would decrease Applicants' estimate of radioiodine concentrations in the reservoir.14/ Joint Affidavit at

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14/ Sedimentation effects are taken into account, however, when determining doses from exposure to shoreline deposits and sedimentation as discussed in the dose calculation, at Section II.E., infra, according to Regulatory Guide 1.109, equation A-5. See Joint Affidavit at ¶ 31, n.7. An additional conservatism is therefore provided by Applicants, ignoring the effect of sedimentation in calculating radioiodine concentrations in the Harris reservoir but considering the effects of such sedimentation in determining dose exposure at the reservoir site. Applicants would be completely justified in taking into account sedimentation in calculating radioiodine concentrations since sedimentation effects are among those natural phenomena specifically recognized by the Commission as appropriate for modifying Appendix I calculations. RM-50-2 at 337 (Item (1)(d)).

¶¶ 31-33.

As stated in Regulatory Guide 1.113, the steady-state completely mixed model is most suitable for long lived radionuclides. Joint Affidavit at ¶ 34. Short-lived radionuclides such as I-131 do not lend themselves to accurate prediction and modeling of the distribution of their activity due to their rapid decay; however, equation 43 of Regulatory Guide 1.113 does predict the total amount of activity due to such short-lived radionuclides in the Harris reservoir. Id. The range of concentrations expected in the Harris reservoir and the concentration of radionuclides in the cooling tower discharge are contained in Table 5.2.2-3 of the ER. From this Table, Applicants have utilized the average radioiodine concentration expected in the Harris reservoir in order to determine radioiodine concentrations in fish.15/ Joint Affidavit at ¶ 35.

15/ The radioiodine concentrations in fish are needed to calculate the doses attributable to the ingestion pathway through the consumption of fish from the Harris Reservoir. Regulatory Guide 1.109 Appendix A.2.b. at Table A-1. By utilizing the average concentration in the Harris Reservoir to determine the concentration of radioiodines in fish, Applicants have assumed that the fish would spend as much time in water containing less than average concentrations as in water containing more than average concentrations. Joint Affidavit at ¶ 35. In view of the small area of the aquatic "plume" relative to the size of the Harris reservoir, such an assumption is a reasonable and conservative approach to estimating the radioiodine concentrations in fish resulting from radioiodine releases to the reservoir itself. Joint Affidavit at ¶ 36.

Intervenor Eddleman has alleged that Applicants' aquatic dispersion calculations underestimate the amount of radioiodine concentrations in the Harris reservoir and that "no model in that Regulatory Guide for impoundments appears to be appropriate for Harris's (sic) reservoir." Eddleman Response to Applicants' Interrogatory 29-10(a). Intervenor Eddleman attributes the inappropriateness of the Regulatory Guide models to:

(1) Failure to consider the effects of chemical interaction by radioiodines. Eddleman Responses to Applicants' Interrogatories 29-10 and 29-56;

(2) Neglect of stratification within the reservoir and their assumption of uniform concentrations. Eddleman Responses to Applicants' Interrogatories 29-10 and 29-57;

(3) The treatment accorded short half-life radioiodines, such as I-131. Eddleman Response to Applicants' Interrogatory 29-10; and

(4) Neglect of "bioconcentration" of the radioiodines. Eddleman Responses to Applicants' Interrogatories 29-55, 29-56 and 29-57.

(1) Intervenor Eddleman's allegations with regard to the effects of chemical interaction of radioiodines and stratification within the Harris Reservoir is self defeating. As discussed above, the chemical interaction of the radioiodines with other materials would simply decrease the radioiodine

concentration level within the Harris Reservoir due to the settling out, or sedimentation, of radioiodines chemically combined with other materials in the water. Joint Affidavit at ¶ 31. There are no effects of chemical interaction of radioiodines within the Harris Reservoir which would lead to underestimation of radioiodine concentrations in the Harris Reservoir as alleged by Intervenor Eddleman. Id.

(2) In a similar fashion, stratification, if it occurred within the reservoir, would simply have no effect on calculated concentrations. The effluent discharge point into the Harris Reservoir is a subterranean pipe below the surface of the reservoir. See ER § 5.2.1.2.1. Stratification, if it occurred, would result in thermal barriers separating the Harris Reservoir into different horizontal layers of water distinguished by their temperatures. Joint Affidvit at ¶ 32. The effect of a subsurface warm water discharge point into a stratified reservoir would result in disrupting the integrity of the temperature layers and an increase in localized mixing activity. This would reduce the localized concentrations of radioiodines and have no effect on the average concentration in the reservoir. Id.

Consequently, the effects of chemical reactions between released radioiodines and other compounds in the Harris Reservoir would reduce the radioiodine concentrations for the

aquatic medium and render Applicants aquatic dispersion calculations less conservative than they are at the present time.16/ Joint Affidavit at ¶ 3.

(3) As discussed above, short-lived radionuclides do not lend themselves to an accurate prediction and modeling of the distribution of their activity due to their rapid decay. The total amount of activity due to short-lived isotopes is modeled. Joint Affidavit at ¶ 34. When asked to provide the analytical basis for his position and to state how he would change the dispersion model to take into account his concerns regarding short-lived isotopes, Mr. Eddleman simply responded: "I have not determined this, but the ability to handle short-halflife substances like I-131 is a preprerequisite (sic) to the adequacy of any such model for radioiodine levels." In fact, the total amount of activity is modeled. Because of the short-lived nature of such isotopes, modeling their distribution would not be consequential to radioiodine concentrations in the Reservoir, even if such a model were developed. Mr. Eddleman has not provided any basis for a challenge to that model.

16/ An evaluation of the limited data presently available to Applicants from their Harris Reservoir monitoring program indicates that no stratification occurs within the Harris lake; however, should such stratification occur, it would only lead to greater localized dispersion. Joint Affidavit at ¶ 31, n.8.

(4) Mr. Eddleman's concerns with "bioconcentration" are addressed in Section E. infra regarding the dose calculations.

E. The Dose Calculation

Applicants' calculation of the dose to the public from releases of radioiodine from the Harris Plant is in strict conformance with the methodology contained in Regulatory Guide 1.109. Joint Affidavit at ¶ 37. Applicants' analysis of the dose estimate is contained in § 5.2.2 of the ER. Applicants dose calculation utilizes the dose factors contained in Regulatory Guide 1.109. Id. The calculated doses at critical locations are contained in ER Table 5.2.5-2 as required by the Annex to Appendix I. Applicants' dose estimates include exposure resulting from direct radiation, ingestion including meat, poultry, and fish from the Harris Reservoir, recreational activities, ingestion of local and home-grown vegetables, and anticipated uses of water drawn from the Harris Reservoir. See ER § 5.2. Applicants' dose calculation does not include doses resulting from exposure to the lungs through inhalation of radioioidines because the thyroid is the critical organ and such lung exposure has been determined to be negligible. Joint Affidavit at ¶ 40.17/

17/ This determination was verified by the study conducted by the International Commission on Radiological Protection ("ICRP"), which determined that the critical human organ continues to be the thyroid, and dosage due to inhalation would be

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Regulatory Guide 1.109 requires that 90% of the exposure be accounted for. Joint Affidavit at ¶ 10. This rule creates a presumption that if 90% of exposure is accounted for, the dose analysis may be considered adequate and complete. Id. This conclusion in the Regulatory Guide is reasonable because numerous conservative factors are built into the various model parameters utilized to determine the dose calculation. Joint Affidavit at ¶¶ 11, 41, 45. Such conservatism more than compensates for the negligible amounts of dose exposure thereby ignored from numerous inconsequential pathways.18/

Intervenor Eddleman contends that Applicants dose calculation:

(1) Ignores the effects of wet deposition. Responses to Applicants' Interrogatories 29-12, and 29-17;

(2) Ignores evidence presented by the Heidelberg study, NRC Translation 520, which indicates that the transfer factors for radioiodines from the aquatic and atmospheric environment to materials ingested and inhaled by humans, have been significantly understated. Eddleman Response to Applicants' Interrogatory 29-12;

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significantly greater to the thyroid than to the lung. Joint Affidavit at ¶ 40.

18/ See also "Affidavit of G. Hoyt Whipple in Support of Applicants' Motion for Summary Disposition of Joint Contention II" at ¶¶ 7, 8.

(3) Has utilitzed models which use scientifically defective methodology as reported by a Washington Post article of November 11, 1979. Eddleman Responses to Applicants' General Interrogatory 1 and Interrogatory 29-12;

(4) Has not accounted for all pathways which can contribute doses to human beings at the critical locations. Eddleman Responses to Applicants' General Interrogatory 1 and Interrogatories 29-12 and 29-17;

(5) Has underestimated the doses due to consumption of leafy green vegetables, such as collard greens. Eddleman Response to Applicants' Interrogatory 29-20; and

(6) Has used NRC guidance to calculate dose which underestimates the actual dose. Eddleman Response to Applicants' Interrogatory 29-20.

Applicants contend that each allegation is clearly outside the scope of Contention 29/30.

(1) As discussed in connection with Applicants' atmospheric dispersion estimates, wet deposition of radionuclides contributes an insignificant amount to total concentration of radioactivity on the ground over the course of a year. See Section III.D.1, infra. Any effect on Applicants' dose calculation due to wet deposition would be negligible as shown by the calculations contained in the Second McFeaters Affidavit, Exhibit B at 4. Since the contribution of wet deposition, to radioiodine concentrations is negligible, Applicants' dose calculations do not and need not specifically account for wet

deposition, consistent with the general rule established by Regulatory Guide 1.109, which requires that 90% of the exposure be accounted for. Joint Affidavit at ¶ 10.

(2) & (3) Intervenor Eddleman, relying on the so called "Heidelberg Report," or NRC Translation 520, also alleges that Applicants' transfer factors for radioiodine pathways resulting in human exposure are grossly understated. The transfer factors utilized by Applicants were also alleged by Mr. Eddleman to be based on defective experiments as reported in a Washington Post article of November 11, 1979. As that article actually relies upon the information contained in the Heidelberg Report, both of Mr. Eddleman's allegations ultimately rely on that report.

The constant of proportionality ("uptake factor" or "transfer factor") used by Applicants is found in Regulatory Guide 1.109 and is based on extensive scientific surveys and studies. Joint Affidavit at ¶¶ 11, 37, 38. Contrary to Mr. Eddleman's Washington Post article and the Heidelberg Report, the measurements made of the concentration of radionuclides and stable elements in plants and soils to derive the transfer factors were taken from soils from natural settings (agricultural soils, meadows, forests and gardens -- not sterilized soils as alleged by Intervenor) and plants collected from the natural environment (not from transplanted plants given

insufficient time to accumulate radionuclides as alleged by Intervenor). Id. at ¶ 38.

Any reliance on the Heidelberg Report is misplaced. The Heidelberg Report has been the recipient of wide-spread and universal scientific criticism by highly respectable international governmental and private agencies because of its many inaccuracies, misleading treatment of available data and other methodological flaws, to the extent that it has been thoroughly discredited in the scientific community.19/ Joint Affidavit at ¶ 39; see also Metropolitan Edison Company (Three Mile Island Nuclear Station, Unit No. 1), LBP-81-59, 14 N.R.C. 1211, 1496-97 (1981) (rejecting analysis based on the Heidelberg Report).

19/ See Attachment 7 to the Joint Affidavit for a summary of the criticisms and exposed shortcomings of the Heidelberg study by both American and German institutions, including a recantation of the report's conclusions by one of its joint authors in a German administrative court. The authors of the Report were university students who represented themselves as being sponsored by Heidelberg University, contrary to fact and against the direct instructions of the President of the University. The Report has been soundly discredited and severely criticized by the Ministerium Fur Arbeit Gesundheit Und Sozialordung Baden (the German Government Nuclear Power Plant Licensing Agency), Dr. E.K.F. Brutz, Dean of the Faculty of Biology of the University of Heidelberg, the National Radiological Protection Board of England, and the NRC Staff, which published a review of the Heidelberg study, NUREG-0668, "Staff Review of Radioecological Assessment of the Wyhl Nuclear Power Plant: Analysis of the Report Prepared by the University of Heidelberg, West Germany (Draft Summary Report)."

Among other defective shortcomings, the Heidelberg Report utilized a Source Term greatly in excess of any experienced by U.S. operating plants, utilized soil to plant concentration factors (uptake factors) not supported by the literature cited for them and utilized dose conversion factors far in excess of those supportable by experimental data. Joint Affidavit at ¶ 39 and Attachment 7. The report also selectively combined atmospheric dispersion data in an irrational manner compounding the effects of meteorological phenomena to create atmospheric dispersion factors in error by a multiple of ten or more. Id. at Attachment 7.

(4) Mr. Eddleman faults Applicants for not taking into account all pathways which can contribute any increment, however insignificant or negligible, to Applicants' dose calculation. When asked what was his basis for this assertion, Mr. Eddleman responded: "Appendix I is basis, you need to because wherever radionuclides can go and be uptaken, they will be. Appendix I requires an estimate including all possible pathways, not just most of them." Eddleman Response to Applicants' Interrogatory 29-68(a)(vii). Of course, this is simply not true. As discussed above, unless a pathway has the potential to contribute significantly to the exposures, they need not be included in dose calculations. Joint Affidavit at ¶ 10; RM-50-2 at 339. Applicants and the NRC Staff have considered

all significant pathways. Mr. Eddleman has not suggested a pathway of significance that was omitted.

(5) Mr. Eddleman challenges Applicants' estimates with regard to the human ingestion of green leafy vegetables, specifically collard greens. Mr. Eddleman misconstrues Applicants' estimate as based upon a limited period of sixty days for consumption. Mr. Eddleman's allegation is based upon a fundamental misconception regarding this sixty day period. Applicants have constructed their estimate of exposure due to human ingestion of green leafy vegetables, including collard greens, based upon a growing season of sixty days, not a consumption season of sixty days. Joint Affidavit at ¶ 44. This sixty day growing period is conservative in nature (because it overestimates the time vegetables will actually be growing above the soil in a garden) and adequately accounts for all deposition which would occur on all green leafy vegetables which would be consumed by humans.20/ Id.

20/ The assumptions in the vegetable consumption dose calculation attest to the conservatisms inherent in the methodology. For an adult, the assumption is made that he consumes 64 kg/year of leafy vegetables, all of which are assumed to be obtained from the backyard garden. It is assumed that no radioiodines are removed in the course of food preparation and cooking. Joint Affidavit at ¶ 43. As a further conservatism, the maximum individual exposures from airborne releases is a summation of all dose pathways. Notwithstanding the fact that the maximum location for meat and milk pathway is different than the maximum location for crop pathway, the dose calculation makes the impossible assumption that the maximum individual lives in both maximum exposure locations at once. Id. at ¶ 45.

(6) Finally, Mr. Eddleman alleges that "no NRC guidance which I know does not contribute to the underestimate of radioiodine releases," without support or evidence for his conclusion. Eddleman Response to Applicants' Interrogatory 29-20(e). Applicants have utilized NRC guidance which is contained in Regulatory Guide 1.109. Joint Affidavit at ¶ 37. This guidance and the models contained within it, have been subjected to exceptional and intensive scientific scrutiny resulting in favorable conclusions regarding the adequacy of that guidance. Id. at ¶ 11.

Empirical studies have demonstrated the calculational methodology to be conservative. Id. at ¶ 11, 46, 47, Attachments 3 and 4.

F. The Monitoring System

The Harris Plant contains two separate monitoring systems, one in-plant for effluent monitoring and one external to the site for monitoring the environment. The in-plant fixed Radiation Monitoring System includes monitors designed to assess radioiodine releases from the Plant. Grant Affidavit at ¶ 3. The system and individual monitors are described in detail in the Harris FSAR, §§ 11.5 and 12.3.4. All gaseous effluent release points are monitored either directly or indirectly. The radioiodine monitoring system is also equipped with the capability to obtain grab samples from each effluent point to

assess offsite releases when the monitoring system is not operational. The system and monitors are designed to ensure that an accurate assessment of offsite releases can be made. Grant Affidavit at ¶ 19.

Applicants' environmental monitoring system is composed of both atmospheric and aquatic samplers. These samplers are described in the Shearin Affidavit at ¶¶ 2, 8, 9. The environmental monitoring system is designed to provide data on measurable levels of radioactive materials in the environment to enable Applicants to estimate dose equivalents from radioiodine releases at the Harris Plant. Id. at 13.

Critical locations for environmental samplers are initially determined according to the guidelines contained in NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants." Annual land use surveys will be conducted to ensure a continuing ability to determine critical locations, notwithstanding changes in use of unrestricted areas surrounding the Plant. Id. at 11.

These programs for effluent monitoring and environmental monitoring are designed to meet the requirements of Appendix I, § IV. B.

With respect to Applicants' monitoring systems, Mr. Eddleman has alleged:

(1) Monitoring systems will not monitor all radioiodines either in-plant or in the

environment because of fitting and gasket failures. Eddleman Responses to Applicants' General Interrogatory 1 and Interrogatory 29-3;

(2) Applicants' monitoring system cannot function with humidity present at the SHNPP site. Eddleman Responses to NRC Staff Interrogatories 16 and 19, Applicants' Interrogatory 29-34; and

(3) Applicants' monitoring system will fail to accurately measure released radioiodines due to the fact that all potential release points are not monitored, regardless of the quantities which are potentially releasable from those points. Eddleman Responses to Applicants' General Interrogatory No. 1, Interrogatories 29-3, 29-17, 29-24 (as supplemented by 29-28), 29-28, and NRC Staff Interrogatory 19.

Again, Applicants submit that these allegations raise issues outside the scope of Contention 29/30.

(1) Intervenor Eddleman maintains that Applicants' monitoring system will suffer from the same leaks from seals and gaskets that threaten Applicants' filtration system. See Section III.C(2) supra. The choice of materials used in, and design and testing of, monitors are aimed at preventing filter bypass or any other leakage prior to detection. Grant Affidavit at ¶ 5. Applicants' monitoring system contains "O" rings seals composed of "Buna-N" rubber and neoprene. These materials have been tested to determine their resistance to radiation damage. Id. at ¶ 6. These "O" rings in normal operation will be subjected to an integrated dose of

radioactivity consisting of one one-thousandth of that required to produce any degradation. Id.

Again, Intervenor's reliance on certain reports of material degradations are misplaced as the cited reports refer to different materials and a much harsher environment. See Section III.C.(2) supra. The "O" ring seals will be visually inspected at each filter change and will be replaced if signs of wear and damage are noted. Grant Affidavit at ¶¶ 7, 9. As an additional safeguard, any leakage which would occur in certain neoprene seals in the monitoring systems would be detected by a vacuum differential pressure switch and displayed on the Radiation Monitoring Systems Display Console. Id. at ¶ 7; FSAR § 11.5.2.3.1.

(2) Mr. Eddleman has also alleged that Applicants' monitoring system cannot accurately or adequately function due to the high humidity naturally occurring at the Harris site. Mr. Eddleman maintains that the natural humidity at the Shearon Harris site is "quite high on average" and will be further aggravated by the presence of Jordan Lake. Eddleman Response to Interrogatory 29-34(b).

The monitoring system is designed to operate in a 95% humidity environment. The humidity which could interfere with radioiodine monitoring systems is not naturally occurring humidity, but condensed water vapor in the effluent streams to be

monitored. Grant Affidavit at ¶¶ 12, 13. Sample lines to all gaseous effluent monitors are heat traced to preclude any possibility of condensing liquid. Id. at ¶ 12. For moisture laden or steam exhaust streams, gross activity is monitored and concentration of iodines and particulates are calculated based on known ratios. Sampling provides verification of the calculations. Id. at ¶ 13.

(3) Mr. Eddleman has also alleged that Applicants have not demonstrated an ability to operate the Harris Plant within the guidelines of Appendix I because all potential release points for radioiodines at the Shearon Harris Plant are not monitored.

All significant gaseous effluent release points are monitored in compliance with NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," § 11.5, Table 1. Grant Affidavit at ¶ 16. Releases from insignificant gaseous effluent release points are accounted for by indirect measurement techniques and routine sampling. Id. at ¶¶ 16, 17; see also FSAR §§ 9.3.2.2.2 and 16.2; Technical Specifications 3.7.1.4, 4.7.1.4 and Table 4.7-1. Every gaseous effluent stream is equipped with a manual sampling capability allowing for periodic evaluation and analysis of radioiodine activity, should the monitoring system be shutdown for an extended time period. Grant Affidavit at

¶ 18. Therefore, all gaseous effluent release points are monitored either directly or indirectly and an accurate assessment of offsite releases can be made. Id. at ¶ 19.

IV. CONCLUSION

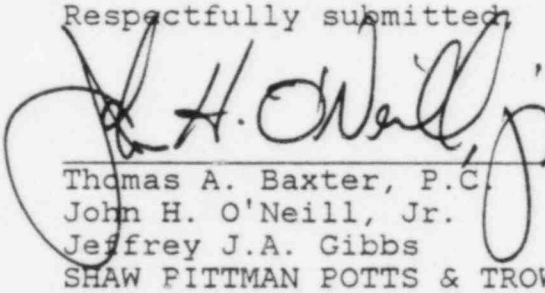
Applicants respectfully submit that there is no material issue of fact with regard to any aspect of Eddleman Contention 29/30. The methodology used by both Applicants and the NRC Staff is set forth in NRC Regulatory Guides and other NRC promulgated guidance, which have been subjected to thorough scientific scrutiny and have been universally accepted in the nuclear scientific community. Dr. Mauro and Mr. Martin, who supervised the Appendix I calculations performed for the Harris Plant, have responded, in their affidavit, to the unsupported attacks on the Appendix I methodology advanced by Mr. Eddleman. Based on the Joint Affidavit and the affidavits of Dr. Grant and Mr. Shearin, it is clear that Mr. Eddleman's allegations are without merit. Furthermore, Mr. Eddleman's allegations regarding the dispersion models, dose calculations and monitoring systems are manifestly outside the scope of Contention 29/30.

But, even if Mr. Eddleman were correct in faulting some aspect of Applicants' calculations, on a theoretical basis, it

is an uncontroverted fact that the methodology results in a conservative estimate of radioiodine releases. Empirical data conclusively supports the calculations. Both Applicants and the NRC Staff have calculated that I-131 releases from the Harris Plant will be an order of magnitude less than the Appendix I guide. Based on historical data, the actual releases are likely to be even less.

For all of the above reasons, summary disposition of Contentin 29/30 is appropriate at this time.

Respectfully submitted,



Thomas A. Baxter, P.C.
John H. O'Neill, Jr.
Jeffrey J.A. Gibbs
SHAW PITTMAN POTTS & TROWBRIDGE
1800 M Street, N.W.
Washington, D.C. 20036
(202) 822-100

Richard E. Jones
Samantha Francis Flynn
CAROLINA POWER & LIGHT COMPANY
P.O. Box 1551
Raleigh, North Carolina 26602
(919) 836-7707

Counsel for Applicants

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