

April 11, 2002

Mr. Harold W. Keiser
Chief Nuclear Officer & President
PSEG Nuclear LLC - X04
Post Office Box 236
Hancocks Bridge, NJ 08038

SUBJECT: SALEM NUCLEAR GENERATING STATION, UNIT NO. 2, ISSUANCE OF
AMENDMENT RE: CONTAINMENT LEAKAGE RATE TESTING PROGRAM
(TAC NO. MB3838)

Dear Mr. Keiser:

The Commission has issued the enclosed Amendment No. 232 to Facility Operating License No. DPR-75 for the Salem Nuclear Generating Station (Salem), Unit No. 2. This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated January 17, 2002, as supplemented on March 8 and 22, 2002.

This amendment provides for an alternate method for complying with the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.54(o), and 10 CFR Part 50, Appendix J, Option B for Salem, Unit No. 2. Specifically, the amendment allows a one-time interval increase for the Salem, Unit No. 2, Type A, Integrated Leakage Rate Test from a maximum of a 10-year interval to a maximum 15-year interval .

A copy of our safety evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

/RA/

Robert J. Fretz, Project Manager, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-311

Enclosures: 1. Amendment No. 232 to
License No. DPR-75
2. Safety Evaluation

cc w/encls: See next page

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** See previous concurrence

Accession No. ML020720154

* SE input provided. No major changes made.

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OFFICIAL RECORD COPY

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Unit No. 2

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PSEG NUCLEAR LLC

EXELON GENERATION COMPANY, LLC

DOCKET NO. 50-311

SALEM NUCLEAR GENERATING STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 232
License No. DPR-75

1. The Nuclear Regulatory Commission (the Commission or the NRC) has found that:
 - A. The application for amendment filed by the PSEG Nuclear LLC, Exelon Generation Company, LLC, and (the licensees) dated January 17, 2002, as supplemented on March 8 and 22, 2002, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance: (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-75 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 232, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. The license amendment is effective as of its date of issuance and shall be implemented within 30 days.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

James W. Clifford, Chief, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications

Date of Issuance: April 11, 2002

ATTACHMENT TO LICENSE AMENDMENT NO. 232

FACILITY OPERATING LICENSE NO. DPR-75

DOCKET NO. 50-311

Replace the following page of the Appendix A Technical Specifications with the attached revised page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

Remove Page

6-19

Insert Page

6-19

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 232 TO FACILITY OPERATING LICENSE NO. DPR-75
PSEG NUCLEAR LLC
EXELON GENERATION COMPANY, LLC
SALEM NUCLEAR GENERATING STATION, UNIT NO. 2
DOCKET NO. 50-311

1.0 INTRODUCTION

By letter dated January 17, 2002, as supplemented on March 8 and 22, 2002, the PSEG Nuclear LLC (PSEG or the licensee) submitted a request for changes to the Salem Nuclear Generating Station, Unit No. 2 (Salem), Technical Specifications (TSs). The requested changes would provide for an alternate method for complying with the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.54(o), and 10 CFR Part 50, Appendix J, Option B. Specifically, the amendment allows a one-time interval increase for the Salem Type A, Integrated Leakage Rate Test (ILRT) from a maximum of a 10-year interval to a maximum 15-year interval. The March 8 and 22, 2002, letters provided clarifying information that did not change the initial proposed no significant hazards consideration determination.

2.0 REGULATORY EVALUATION

Appendix J, Option B of 10 CFR Part 50 requires a Type A test be conducted at a periodic interval based on the historical performance of the overall containment system. Salem TS 6.8.4.f, "Primary Containment Leakage Rate Testing Program," requires the ILRT to be performed at a frequency in accordance with 10 CFR Part 50, Appendix J, Option B, as modified by approved exemptions, and in accordance with the guidelines contained in Regulatory Guide (RG) 1.163, "Performance-Based Containment Leak-Test Program," dated September 1995, as modified by approved exceptions. This RG endorses, with certain exceptions, Nuclear Energy Institute (NEI) 94-01, Revision 0, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," dated July 26, 1995.

A Type A test is an overall ILRT of the containment structure. NEI 94-01 specifies an initial test interval of 48 months, but allows an extended interval of 10 years, based upon two consecutive successful tests. There is also a provision for extending the test interval an additional 15 months beyond the 10-year interval in certain circumstances. The most recent Type A tests at Salem have been successful, so the current Type A leakage rate test interval is 10 years.

The licensee requested a change to TS 6.8.4.f which would allow an exception from the Type A test interval guidelines stated in RG 1.163. Specifically, the proposed addition to TS 6.8.4.f,

which would allow an exception to the Type A testing frequency specified in NEI 94-01, paragraph 9.2.3, reads as follows:

- a. NEI 94-01-1995, Section 9.2.3: The first Type A test performed after March 24, 1992, shall be performed no later than March 24, 2007.

Thus, the proposed TS changes would allow Salem a one-time extension of the current 10-year Type A test (ILRT) interval to a 15-year interval from the last successful test performed on March 24, 1992.

3.0 TECHNICAL EVALUATION

3.1 Probabilistic Risk Assessment Evaluation

In its application dated January 17, 2002 (ADAMS Accession No. ML020450531), PSEG provided a copy of the risk impact assessment that was performed to justify extending the Type A test interval to 15 years. The licensee also provided additional analysis and information in letters dated March 8 and 22, 2002. In performing the risk assessment, PSEG considered the guidelines of NEI 94-01, the methodology used in EPRI TR-104285, "Risk Impact Assessment of Revised Containment Leak Rate Testing," guidance provided by NEI in letters dated November 13 and 30, 2001, and Regulatory Guide (RG) 1.174, "An Approach For Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis."

NEI 94-01, Revision 0, Section 11.0 provides the basis for the current 10-year test interval to meet the performance-based Option B to Appendix J. Section 11.0 of NEI 94-01 states that NUREG-1493, "Performance-Based Containment Leak-Test Program," dated September 1995, provided the technical basis to support rulemaking to revise leakage rate testing requirements contained in Option B to Appendix J. The technical basis consisted of qualitative and quantitative assessments of the risk impact (in terms of increased public dose) associated with a range of extended leakage rate test intervals. To supplement the NRC's rulemaking basis, NEI undertook a similar study. EPRI Research Project Report TR-104285 documents the results of that study.

In NUREG-1493, the staff estimated that a reduction in the frequency of tests from the original three tests in a 10-year period to the current one test in a 10-year period results in a 0.07% risk increase from the baseline dose of 31.0 person-rem/year for the Surry Nuclear Station (Surry). This estimate used a 10% increase in the probability of leakage as a multiplier to be used in the risk impact dose calculation. NEI guidance uses a similar multiplier representing the change in probability of leakage. Specifically, NEI determined that relaxing the interval from three tests in 10 years to one test in 10 years increases the average time that a leak, that could only be detected by an ILRT, would go undetected from 18 months ($3 \text{ years} \times 12 \text{ months/year} \div 2$) to 60 months ($10 \text{ years} \times 12 \text{ months/year} \div 2$). This change would, therefore, result in a factor of 3.33 ($60 \div 18 = 3.33$). Using a factor of 3.33 for the Surry example would yield a 10-year dose of 0.06 person-rem/year ($3.33 \times 0.018 \text{ person-rem/year}$). This number represents 0.19% of the total dose of 31.0 person-rem/year, and is a 0.13% increase in risk from the baseline contribution of 0.06% ($0.018 \text{ person-rem/year} \div 31.0 \text{ person-rem/year}$). Similarly, a factor of 5.0 for the 15-year test interval ($90 \div 18 = 5.0$) would yield an additional 0.10% increase in risk over the 10-year test interval dose ($(0.09 - 0.06) \div 31.0 \text{ person-rem/year}$).

PSEG used the NEI guidance to assess the change in the predicted person-rem/year frequency, and as previously stated, this guidance incorporates a multiplier representing the change in probability of leakage. The licensee quantified the risk from sequences that have the potential to result in large releases if a pre-existing leak were present. Since the time Option B to Appendix J was adopted, the staff has issued RG 1.174 to provide guidance on the use of probabilistic risk assessment (PRA) techniques in risk-informed changes to a plant's licensing basis. RG 1.174 provides a means to assess the acceptability, consistent with NEI guidance, of extending the Type A test interval beyond that established during the Option B rulemaking. RG 1.174 defines very small changes in the risk-acceptance guidelines as increases in core damage frequency (CDF) less than 10^{-6} per reactor year, and increases in large early release frequency (LERF) less than 10^{-7} per reactor year. Since the Type A test does not impact CDF the relevant criterion from RG 1.174 is the change in LERF. RG 1.174 further discusses defense-in-depth and encourages the use of risk analysis techniques to help ensure and show that key principles, such as the defense-in-depth philosophy, are met.

The staff reviewed the licensee's proposed change against the risk metrics and acceptance criteria of RG 1.174 as follows:

Total Integrated Plant Risk

An increase in risk is predicted when compared to that estimated from current requirements. Therefore, according to the NEI guidance, PSEG estimated (1) the increase in the total integrated plant risk change from a 10-year test interval to a 15-year test interval, (2) the increase in the total integrated plant risk, given the change from a three in 10-year test interval to a 15-year test interval, and (3) the increase in total integrated plant risk, given the change from a three in 10-year test interval to the current one in 10-year test interval:

| Change in Type A Test (ILRT) | Percent Increase in Total Integrated Plant Risk (person-rem/year) |
|--|--|
| One in 10-year test interval (current) to one in 15-year test interval (proposed) | 0.12% |
| Three in 10-year test interval (original) to one in 15-year test interval (proposed) | 0.28% |
| Three in 10-year test interval (original) to one in 10-year test interval (current) | 0.16% |

The staff compared the licensee's results to the baseline analysis generated for Surry. The staff determined that the percent increase of 0.16% for Salem is comparable to the increase in risk of 0.13% estimated for the three in 10 year to the current one in 10-year test interval for Surry as previously discussed. Similarly, the increase in risk of 0.12% for the one in 10 year test interval to one in 15-year test interval is comparable to the 0.10% increase found for Surry. The staff considers the increase in the total integrated plant risk for the proposed change to be small. Therefore, the staff concluded that the proposed change meets RG 1.174, and that the total integrated plant risk is acceptable.

Large Early Release Frequency

RG 1.174 provides guidance for determining the risk impact of plant-specific changes to the licensing basis. RG 1.174 defines very small changes in the risk-acceptance guidelines as increases in CDF less than 10^{-6} per reactor year and increases in LERF less than 10^{-7} per reactor year. Since the Type A test does not impact CDF, the relevant criterion is LERF. The increase in LERF resulting from a change in the Type A test interval from 1 in 10 years to 1 in 15 years is estimated to be 3.6×10^{-8} /year. The increase in LERF resulting from a change in the Type A test interval from the original three in 10 years to one in 15 years is estimated to be 8.6×10^{-8} /year. Increasing the Type A interval to 15 years is considered to be a very small change in LERF when using the guidelines of RG 1.174. The above increases in LERF assume that the visual examination conducted under ASME Code, Section XI, Subsection IWE is 100% effective at detecting a large flaw in the accessible region of the containment liner and 0% effective in the inaccessible region. The licensee, in its March 8, 2002, letter, stated the total inaccessible area is about 34% of the containment liner. In addition, PSEG stated that an examination of the containment liner conducted in accordance with ASME Code, Section XI, Subsection IWE will be performed in the fall of 2003. Therefore, since the changes in LERF are within the guidelines of RG 1.174, the staff finds this acceptable.

Defense-in-Depth Philosophy

RG 1.174 further encourages the use of risk analysis techniques to demonstrate that the proposed change is consistent with the defense-in-depth philosophy. According to RG 1.174, consistency with the defense-in-depth philosophy is maintained if a reasonable balance is preserved among prevention of core damage, prevention of containment failure, and consequence mitigation. The NEI guidance uses the conditional containment failure probability (CCFP) as a means to determine consistency with defense-in-depth principles. CCFP is defined as the probability of containment failure given the occurrence of an accident. Since an accident is assumed to have occurred, CCFP considers the prevention of containment failure aspect of defense-in-depth. PSEG estimated the change in the CCFP to increase by 0.0017 for the proposed change and 0.0040 for the cumulative change of increasing the test interval of three in 10 years to one test in 15 years. The staff finds that the defense-in-depth philosophy is maintained based on the very small change in CCFP for the proposed amendment.

The NRC staff also recognizes the limitations of the CCFP approach. For plants, such as Salem, with core damage frequency estimates well below 10^{-4} , the ability of the containment to withstand events of even lower probability becomes less clear. Therefore, it is important to consider other risk metrics in conjunction with the conditional containment failure probability, such as total LERF. Based on the information provided in PSEG's January 17, 2002, submittal, and letters dated March 8 and 22, 2002, the licensee has sufficiently demonstrated for the purpose of this evaluation that the total LERF for internal events is less than the criteria of 10^{-5} stated in RG 1.174. Therefore, the staff finds this acceptable.

Probabilistic Risk Assessment Conclusion

Based on its review of the risk information provided by PSEG, the staff finds that the increase in predicted risk due to the proposed change is within the acceptance guidelines of RG 1.174, as well as maintains the RG's defense-in-depth philosophy. Therefore, the staff finds the proposed change to be acceptable.

3.2 Mechanical and Structural Integrity Evaluation

Salem is a Westinghouse 4-loop, pressurized water reactor (PWR) design. The primary reactor containment is a large, reinforced-concrete, vertical right cylinder with a flat base and a hemispherical dome. The containment pressure boundary consists of the steel liner, which consists of a 0.25-inch thick steel plate attached to the inside face of the concrete shell, containment access penetrations, and process piping and electrical penetrations. The integrity of the penetrations is verified through Type B and Type C local leak rate tests (LLRT) as required by 10 CFR Part 50, Appendix J, and the overall integrity of the containment structure is verified through an ILRT. These tests are performed to verify that the containment structure at the design-basis accident (DBA) pressure remains essentially leak-tight. As stated in PSEG's application, Salem has performed three ILRTs which were completed on May 23, 1983; November 27, 1986; and March 24, 1992. Based on these successful Type A tests at Salem and the requirements of 10 CFR Part 50, Appendix J, Option B, the current interval requirement is 10 years.

PSEG proposed to extend the interval for its next scheduled verification of Salem's overall containment leak-tight integrity through an ILRT to March 24, 2007. Because the leak rate testing requirements (ILRT and LLRTs) of 10 CFR Part 50, Appendix J, Option B and the containment inservice inspection (ISI) requirements mandated by 10 CFR 50.55a complement each other in ensuring the leak-tightness of the pressure boundary and the structural integrity of the containment, PSEG provided information in its original January 17, 2002, application related to the ISI of the containment and potential areas of weakness in the containment that may not be apparent in the risk assessment. In response to questions raised during a telephone conference on March 6, 2002, PSEG provided information in a letter dated March 8, 2002, to explicitly address the licensee's ability to continue to meet the requirements of General Design Criterion (GDC) 16, and 10 CFR 50.54(o). GDC 16 requires that the containment and its associated systems shall provide an essentially leak-tight barrier against the uncontrolled release of radioactivity to the environment, and 10 CFR 50.54(o) states that the primary containment shall meet leakage test requirements set forth in 10 CFR Part 50, Appendix J.

In its March 8, 2002, letter, PSEG stated that inspections of the containment liner at Salem are conducted in accordance with the Salem ISI Program Long Term Plan that was developed to meet the requirements of the 1998 Edition of the ASME Code, Section XI, Subsection IWE. The licensee indicated that the areas and items subject to examination, including areas of augmented inspections, include all accessible containment surface areas (including structural attachments and penetrations, seals, gaskets, moisture barriers, pressure retaining bolting and Class MC supports). The staff notes that Salem was authorized to use the 1998 Edition of the ASME Code, Section XI, Subsection IWE (in lieu of the 1992 Edition with 1992 Addenda) for containment ISI based on a safety evaluation (SE) supporting Relief Requests RR-E1 and RR-L1, dated June 6, 2000, (ADAMS Accession No. ML003720636). The SE concluded that the proposed alternative to use the 1998 Edition provided an acceptable level of quality and safety for ensuring the pressure boundary integrity of the Salem containment. According to PSEG's March 8, 2002, letter, the containment ISI performed under Subsection IWE will not be affected by the requested extension of the ILRT time interval (15 years), and will be performed as originally scheduled. The staff considers that the examination of the accessible containment liner surfaces under Salem's ISI program will provide the added assurance that the licensee will continue to meet the GDC 16 requirement of providing an essentially leak-tight barrier during the proposed extended interval. Therefore, the staff finds this acceptable.

PSEG further stated in its March 8, 2002, letter that, under the 10 CFR Part 50, Appendix J program, all Type B penetrations that utilize resilient seals and gaskets are tested to ensure that the results are within the Option B of Appendix J guidelines and Regulatory Guide 1.163. Most of the mechanical penetrations that are to be opened each refueling outage are tested (Type B test) every 30 months. The gaskets or other sealing material are inspected prior to closing and are left as-tested. Other penetrations (mechanical and electrical) are tested once every 120 months. Any penetration found to not meet administrative limits established by the licensee under its Type B and C (LLRT) program is placed on a 30-month test frequency and tested each refueling outage. Because the proposed amendment will not affect the frequency for testing penetrations, and the Type B testing frequency for all penetrations meets the guidelines of NEI 94-01 and RG 1.163, the staff finds that this element of the licensee's containment ISI program will provide reasonable assurance that the integrity of the containment pressure boundary will be maintained during the period of the ILRT extension.

In a telephone conference call on March 6, 2002, the NRC staff requested that PSEG address the issue of the susceptibility of stainless steel bellows to trans-granular stress corrosion cracking. The staff's concern is that leakage through a cracked stainless steel bellows is not readily detectable by Type B testing (see NRC Information Notice (IN) 92-20, "Inadequate Local Leak Rate Testing," dated March 3, 1992). PSEG stated in its March 8, 2002, letter that the bellows assemblies at Salem, by design, do not comprise a part of the containment leakage-limiting boundary. Therefore, IN 92-20 is not applicable. The licensee also stated that the bellows assemblies that are associated with containment piping penetrations are only located outside the containment and are not exposed to containment pressure. The staff verified that this concern does not apply to Salem, therefore, the staff finds that this concern is resolved for the proposed ILRT extension.

The NRC staff requested that PSEG address the concern that inspections of some reinforced and steel containments have indicated degradation from the uninspectable (embedded) side of the steel liner. This type of degradation cannot be easily found by VT-3 or VT-1 examinations unless the defect is visible through the thickness of the liner or 100% of the uninspectable surfaces, or are periodically examined by volumetric examination methods. Because the steel liner will be in tension when the containment vessel is pressurized during an ILRT and would help to identify areas of through-wall degradation, the staff questioned whether potential leakages due to age-related degradation were considered in the risk assessment of the extended ILRT. In response to this question, PSEG provided additional information in letters dated March 8 and 22, 2002. In the March 22, 2002, letter, PSEG included a copy of its risk assessment performed in Calculation S-C-ZZ-MEE-1613, Revision 1. In the calculation, the licensee stated that EPRI Containment Failure Class 3 sequences included containment failures that are due to leaks such as liner breaches which would be detected by performing a Type A ILRT. In addition, EPRI Containment Failure Class 1 (the intact containment case included in NEI guidance and licensee's calculation), contains a leakage term that is, by definition, independent of the source of the leak. Therefore, based on its review of the additional information provided in PSEG's March 22, 2002, letter, the staff determined that the potential for containment leakage due to a containment shell failure was explicitly included in the licensee's risk assessment. Furthermore, in its letter dated March 8, 2002, PSEG provided an assessment of dose consequences for EPRI Class 7, severe accidents (early and late releases). The assessment showed that even with the increased potential to have an undetected containment flaw or leak path, the increase in risk resulting from a change in the ILRT test frequency from the current once every 10 years to once every 15 years is very small.

The licensee estimated the total person-rem for Class 7 releases in the most severe case would increase by 0.12% by increasing the ILRT test frequency from once every 3 years to once every 15 years. PSEG also concluded that the increase of total person-rem due to the extension of the ILRT schedule from 10 to 15 years is trivial. The NRC staff verified that potential leakages due to age-related degradation were considered in PSEG's risk assessment and that the increase in risk is very small. Therefore, the staff finds that PSEG has adequately addressed the issue of degradation from the uninspectable side of the steel liner.

Mechanical and Structural Integrity Conclusion

Based on the licensee's justification provided in its TS change request and its responses to the questions raised by the staff, the staff finds that: (1) the structural integrity of the containment vessel is verified through the periodic inservice inspections conducted as required by Subsections IWE and IWL of the ASME Code, Section XI; (2) the integrity of the penetrations and containment isolation valves are periodically verified through Type B and Type C tests as required by 10 CFR Part 50, Appendix J and the SGS-2 TS, and (3) the potential for large leakage from the areas that cannot be examined by ISI has been explicitly modeled in performing the risk assessment. In addition, the system pressure tests for the containment pressure boundary (i.e., Appendix J tests, as applicable) are required to be performed following repair and replacement activities in accordance with Article IWE-5000 of the ASME Code, Section XI. Serious degradation of the primary containment pressure boundary is required to be reported under 10 CFR 50.72 and 10 CFR 50.73. Therefore, the staff finds this acceptable.

3.3 Staff's Conclusion

Based on its review, the staff finds that the interval to the next Type A test at Salem may be extended to 15 years, and that the proposed change to TS 6.8.4.f is acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the New Jersey State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes surveillance requirements. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (67 FR 10450). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: M. Snodderly
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Date: April 11, 2002