PSEG Nuclear LLC
P.O. Box 236, Hancocks Bridge, New Jersey 08038-0236

MAR 0 8 2002

LR-N02-0080
LCR-S02-01

PSEG
Nuclear LLC

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Gentlemen:

REQUEST FOR CHANGE TO TECHNICAL SPECIFICATIONS REQUIREMENTS
SUPPLEMENTAL REQUEST
ONE-TIME EXTENSION TO INCREASE THE INTERVAL OF THE INTEGRATED LEAK RATE TEST FROM TEN TO FIFTEEN YEARS
SALEM GENERATING STATION, UNIT 2
FACILITY OPERATING LICENSE DPR-75
DOCKET NO. 50-311

On January 17, 2002, PSEG Nuclear LLC submitted a one-time request for a revision to the Technical Specifications (TS) to increase the interval of the integrated leak rate test from ten to fifteen years for Salem Unit 2. The information contained in this letter documents our response to an information request by the Nuclear Regulatory Commission's Salem Project Manager, Mr. Robert Fretz, during a telephone conference on March 6, 2002. In accordance with 10CFR50.91(b)(1), a copy of this submittal has been sent to the State of New Jersey.

Should you have any questions regarding this request, please contact Mr. Michael Mosier at 856-339-5434.

Sincerely,

Gabor Salamon
Nuclear Safety and Licensing Manager

Attachment

A-047

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 3/8/02

Gabor Salamon
Nuclear Safety and Licensing Manager

C: Mr. H. Miller, Administrator – Region I
U. S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Mr. R. Fretz, Project Manager - Salem
U. S. Nuclear Regulatory Commission
Mail Stop 8B2
Washington, DC 20555

USNRC Senior Resident Inspector (X24)

Mr. K. Tosch, Manager IV
Bureau of Nuclear Engineering
PO Box 415
Trenton, New Jersey 08625

ONE-TIME EXTENSION TO INCREASE THE INTERVAL OF THE INTEGRATED LEAK RATE TEST FROM TEN TO FIFTEEN YEARS SALEM GENERATING STATION, UNIT 2 FACILITY OPERATING LICENSE DPR-75 DOCKET NO. 50-311

REVISIONS TO THE TECHNICAL SPECIFICATIONS (TS)

The following questions were discussed in this telephone conference:

NRC Question 1:

Please provide a description of the ISI that provides assurance that in the absence of an ILRT for 15 years, the containment structural and leak-tight integrity will be maintained. Please provide the specific year of the Edition and Addenda of the ASME Code used for containment ISI and the start date of the first 120-month containment ISI interval (and subsequent containment ISI intervals).

Response:

Inspections of the containment liner are conducted in accordance with the Salem Unit 2 ISI Program Long Term Plan having been prepared to meet ASME Section XI 1998 Edition Category IWE. The areas and items subject to examination include the accessible containment surface areas, including structural attachments and penetrations, seals, gaskets, moisture barriers, pressure retaining bolting and class MC supports.

The start date for the program was fall, 2000, which coincided with the last outage of the second period of the Second Inspection Interval for the Class 1, 2 and 3 Component Inspection Program. Salem Unit 2 is on an 18-month fuel cycle and upon completion of fall 2000 outage entered our 3rd inspection period, which will be comprised of refueling outages in the spring 2002, and fall 2003. The inspection plan currently calls for 100 percent exams to be performed again in the fall 2003 outage that will close out the Second Inspection Interval. The program will then be upgraded in accordance with 10CFR50.55a for the next 120-month inspection interval (Third Inspection Interval).

NRC Question 2:

Subarticle IWE-1240 of Subsection IWE of Section M of the ASME Boiler and Pressure Vessel Code requires you to identify the surface areas requiring augmented examinations. Please provide the locations of the containment liner surfaces which

PSEG has identified as requiring augmented examination, and a summary of findings of the examinations performed.

Response:

There are no areas of the Salem Unit 2 containment liner that require augmented examinations per Subarticle IWE-1240 of Subsection IWE of ASME Section XI.

NRC Question 3:

Provide your examination schedule for the examination and testing of seals, gaskets, and bolts associated with the containment pressure boundary.

Response:

There is no requirement to examine seals and gaskets under the ASME Section XI 1998 Code other than those used as part of the moisture barrier to prevent intrusion of water against non-accessible areas of the pressure containing metal containment shell or liner at concrete-to-metal and metal-to-metal interfaces which are not seal welded.

Under the 10CFR50 Appendix J, Option B program those Type B penetrations that utilize resilient seals, gaskets, etc. are tested within the guidelines provided by Option B and Regulatory Guide 1.163. Most of our mechanical penetrations are not on an extended test frequency since they are opened each refueling outage. They remain on a once every 30-month Type B test frequency (actually as-found tested each refueling outage, prior to opening). The gasket or other sealing material is inspected prior to closing and then they are as left tested. The exceptions to this are the flanges on the compartments for the containment sump isolation valves that do not comprise part of the primary containment. These are tested once each inspection period (approximately every other refueling outage) to satisfy ASME Section XI requirements for IWC components. They are also opened at approximately the same intervals to perform IST valve surveillances. The other mechanical Type B penetration that is tested on an extended test frequency is a spare electrical penetration that was converted to a mechanical penetration. This penetration has been set to a 120-month test frequency based on more than 3 consecutive as-found tests below the components administrative acceptance limit. This component is also as-found, inspected and as-left tested if opened on a frequency less than the 120-month established Option B frequency. The only other Type B components penetrating the containment are the electrical penetrations. These are also on a 120-month test frequency based on 3 or more consecutive as-found tests below the components administrative limit. The program is established such that a sampling of electrical penetrations is performed each refueling outage such that at the completion of the 120-month cycle all penetrations will have been tested at least once. Any penetration found to not meet the administrative limit is

placed on a 30-month test frequency and tested approximately each refueling outage. In addition, the electrical penetration canisters are left pre-charged with Nitrogen to approximately 15-20 psig and are inspected once every 92 days to ensure they are maintaining their pre-charge.

NRC Question 4:

Stainless steel bellows have been found to be susceptible to trans-granular stress corrosion cracking, and the leakages through them are not readily detectable by Type B testing (see Nuclear Regulatory Commission Information Notice 92-20, "Inadequate Local Leak Rate Testing," March 3, 1992). If applicable, please provide information regarding inspection and testing of the bellows for Salem Unit 2, and how the potential bellows degradation has been factored into PSEG's risk assessment.

Response:

The bellows assemblies at Salem by design do not comprise part of the containment leakage-limiting boundary and therefore NRC Information Notice 92-20 is not applicable. The containment piping penetrations are seal welded to the containment liner inside containment and are tested as part of the Integrated Leak Rate Test as well as inspected under the ASME Section XI, IWE program. The bellows assemblies are only located outside containment and are therefore not exposed to containment pressure.

NRC Question 5:

Inspections of some reinforced and steel containments have indicated degradation from the uninspectable (embedded) side of the steel liner of primary containments. These degradations cannot be found by VT-3 or VT- I examinations unless they are through the thickness of the liner or 100% of the uninspectable surfaces are periodically examined by volumetric examination methods. Please describe how the potential leakages due to age-related degradation mechanisms described above are factored into the risk-informed assessment related to the extension of the ILRT.

Response:

The reactor containment structure is a reinforced concrete vertical right cylinder with a flat base and a hemispherical dome. A welded steel liner with a minimum thickness of 1/4 inch is attached to the inside face of the concrete shell to ensure a high degree of leak tightness. The liner is anchored to the concrete shell by means of anchors so that it forms an integral part of the entire composite structure under all loadings.

The current person-rem used in the calculation for class 7 release is 9.66E+5. The person-rem per year was estimated to be 29.4. Since the frequency of class 7 release is not influenced by the interval of Type A test, this value remained unchanged for ILRT intervals of 3-year, 10-year and 15 year. The total person-rems for all classes for 3-year, 10-year and 15-year ILRT intervals were estimated to be 37.54, 37.71 and 37.82 respectively.

Postulated pre-existing faults from the outside of the containment, based on a study for Susquehanna and other similar studies, show that the LERF value is not sensitive to these postulated faults. The postulated existing faults do not change our LERF value. However, the person-rem value could be different if the fault existed. In particular, the person-rem assumed in class 7 releases could be under estimated.

The original class 7 releases included a total of six (6) release categories from the Salem 2 IPE. The following table shows the timing of vessel breach and containment failures for these six release categories.

Release Category ID	Description	Vessel Failure Time (sec)	Containment Failure Time (sec)
LGLTDI	Large, late containment failure with direct release	11281	63186
LGLTSS	Large, late containment failure with subsoil release	11281	63186
SMLATE	Small, controlled late containment failure	13131	68076
LGERDI	Large, early containment failure with direct release	11280	11284
LGERSS	Large, early containment failure with subsoil release	11280	11284
SMERLY	Small, controlled early containment failure	12772	12777

It can be seen from the above table that vessel and containment failures occur almost simultaneously for the bottom three release categories. Pre-existing faults in the containment will not affect accident progression paths (in terms of release) of these release categories. The additional release from the pre-existing faults will be confined to the top three release categories. The total frequency of these release categories is 2.75E-5/year. The bottom three can be regarded as class 2 (large containment isolation

failure) since the net effect is that the containment is irrelevant for the case. The total frequency for class 2 is increased to 4.88E-6[1].

The resulting person-rem for class 7 releases becomes 7.79E+5. Based on discussions with the NRC staff, for additional conservatism, this number should be increased by a factor of 10 to 7.79E+6[2]. The resulting person-rem per year for class 7 releases is 215.

Using this greatly increased person-rem, the total person-rem per year for 3-year, 10-year and 15-year ILRT interval is 233.06, 233.23 and 233.34 respectively. This is less than the 10CFR100 limit of 300 rem. It can be seen that the total person-rem per year is increased for all ILRT intervals. But, the percentage increase from 3-year to 10-year and 15-year is trivial.

Percentage increase from 3-year to 10-year intervals is 0.07%;
Percentage increase from 3-year to 15-year intervals is 0.12%.

In conclusion, extending the ILRT to 15-year interval poses negligible additional risks.

NRC Question 6:

Provide justification for the reduction factor of 2 credited for IWE inspection.

Response:

The following PRA Methodology was used to arrive at the factor of 0.5

1. A 100% IWE examination of the containment liner was performed in fall, 2000.

2. A 100% IWE examination of the containment liner will be performed in fall, 2003.

---

[1] An alternative approach is to create two class 7 releases (class 7a and class 7b). One (class 7a) is impacted by pre-existing faults and the other (class 7b) is not. The results will show even a smaller person-rem per year result since the class 7b will have a smaller person-rem (2.64E+6) than the class 2 person-rem (3.46E+6).

[2] The person-rem value of 7.79E+5 is already more than 200 times the class 1 value. It would be more than 2000 times the class 1 value by increasing the value to 7.79E+6. To be consistent with other utilities' approach (1000 times the class 1 value of 3.34E+3), we should increase this by a factor of 5 to 3.90E+6 (more than 1000 times the class 1 value). Using the 3.90E+6 value will result in the total person-rem of about 126 (125.81, 125.97 and 126.09 for 3-year, 10-year and 15-year ILRT intervals).
Even if we do not split the class 7 release into two parts, by using the 3.90E+6 value (1000 times class 1 value), the person-rem per year for 3-year, 10-year and 15-year ILRT intervals are 155.04, 155.20, and 155.32 respectively.

3. If the 10-year ILRT interval can be extended to 15 years, the next ILRT will be conducted in fall 2006.

4. The multiplication factors of 3.33 and 5 in the submittal were introduced to account for the additional mean time to detect potential large liner failures. If we reverted back to the original 3-year ILRT period, the multiplication factor will be one.

If the IWE is performed on a three-year cycle, and it is as effective as the ILRT, and covers 100% of the containment, the multiplication factors discussed in 4 above would be one since the IWE would be equivalent to the original 3 year ILRT.

Assuming that the IWE is not 100% effective and covers less than 100% of the containment liner, we need to quantify the multiplication factors. Based on plant specific information, the total inaccessible area is about 34% (24% below ground and 10% above ground) of the containment liner

For the 15-year ILRT interval we first divide the containment liner into two regions: IWE accessible and IWE inaccessible. Using the above assumption and the fact that a 100% IWE was performed in 2000, a 100% IWE will be performed in 2003 and the ILRT will be performed in 2006, the multiplication factors discussed in 4 above should be reduced to one for IWE accessible regions; and the multiplication factors discussed in 4 above should be unchanged for IWE inaccessible regions (since for calculation simplification the IWE is 0% effective in inaccessible regions).

The aggregated multiplication factor can be derived from the following equation for ILRT of 15-year intervals:

> 5 x [1-((1 x % region IWE as effective as ILRT) + (0 x % region IWE 0% effective))]
> = 5 x [1-((1 x .66) + (0 x .34))] = 5 x (1 - 0.66) = 5 x 0.34

This 0.34 is less than the 0.5 that was used in the original calculation.

The aggregated multiplication factor can be derived from the following equation for ILRT of 10-year intervals:

> 3.33 x [1-((1 x % region IWE as effective as ILRT) + (0 x % region IWE 0% effective))]
> = 3.33 x [1-((1 x .66) + (0 x .34))] = 5 x (1 - 0.66) = 3.33 x 0.34

The factor 1/2 is used to account for the fact that a 100% IWE was completed in 2000, 1.5 years (not 3 years) before the scheduled 10-year ILRT. To be consistent for 10-year and 15-year intervals, the 0.5 number is used for the 10-year interval too.

Sensitivity Analysis:

If the IWE in accessible areas is 90% as effective as the ILRT and in the inaccessible areas is 0% effective, the multiplication factor is increased to:

> 5 x [1-((1 x % region IWE as effective as ILRT) + (0 x % region IWE 0% effective))]
> = 5 x [1-((0.9 x .66) + (0 x .34))] = 5 x 0.41

The number is less the 0.5 used in our original submittal.

If the IWE in accessible areas is 80% as effective as the ILRT and in the inaccessible areas is 0% effective, the multiplication factor is increased to:

> 5 x [1-((1 x % region IWE as effective as ILRT) + (0 x % region IWE 0%effective))]
> = 5 x [1-((0.8 x .66) + (0 x .34))] = 5 x 0.47

The reduction factor IWE is still less than the 0.5 factor used in our submittal. As a matter of fact, if the IWE in accessible area is 75% as effective as the ILRT and the inaccessible area is 0% effective, the multiplication factor is increased to 5 x 0.5 which is the number used in the submittal.

A number of conservatisms are used in this analysis. The first one is the assumption that the IWE is 0% effective in inaccessible areas. This is used to simplify the calculation. However, the barrier that protects against moisture intrusion into an inaccessible area behind the insulation is examined for integrity. Indication of potential degradation would be possible discoloration around the anchor bolts holding the insulation to the liner or at the bottom of the insulation. Also, a break in the moisture barrier, or damage to the insulation would indicate a potential degradation. In addition, the barrier that prevents moisture intrusion to the below grade portion of the liner is inspected. The inspectors are trained to look for this degradation. The second conservative assumption is that a leak in an inaccessible area leads to a LERF (not all leaks lead to a LERF).

NRC Question 7:

Provide the total square feet of containment liner and the size hole that would cause leakage equivalent to L_a.

Response:

The total liner area (sq. ft.) is 110,176. A hole equal to 0.092 in. in diameter would cause leakage equivalent to L_a.