Public Service
Electric and Gas
Company

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LR-N980450

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

Gentlemen:

REQUEST FOR ADDITIONAL INFORMATION
REGARDING AUXILIARY BUILDING VENTILATION
SALEM NUCLEAR GENERATING STATION UNIT NOS 1 AND 2
FACILITY OPERATING LICENSE NOS. DPR-70, DPR-75
DOCKET NOS. 50-272, AND 50-311

By letter dated August 3, 1998, the Nuclear regulatory Commission (NRC) requested Public Service Electric and Gas Company (PSE&G) to provide additional information relative to the PSE&G proposed amendment to modify Technical Specification 3/4 7.7 "Auxiliary Building Exhaust Air Filtration System." (TAC Nos. M99875 and M99876).

In attachment 1 to this letter, PSE&G provides its response to your request for additional information. The request for information is stated in boldface type as written in the NRC's request for additional information, and each request is followed by the PSE&G response in regular (non-boldface) type. PSE&G will revise the proposed license amendment with the changes described herein, following resolution of this request for additional information.

Should there be any additional questions or comments on this transmittal, please do not hesitate to contact us.

Sincerely,

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Affidavits
Attachment (1)

C Mr. H. J. Miller, Administrator - Region I
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REF: LR-N980450
LCR S95-44

STATE OF NEW JERSEY)
) SS.
COUNTY OF SALEM)

L. F. Storz, being duly sworn according to law deposes and says:
I am Senior Vice President - Nuclear Operations of Public Service Electric and Gas Company, and as such, I find the matters set forth in the above referenced letter, concerning Salem Generating Station, Units 1 and 2, are true to the best of my knowledge, information and belief.

Subscribed and Sworn to before me
this 21st day of Sept., 1998

Notary Public of New Jersey

DELORIS D. HADDEN
Notary Public of New Jersey
My Commission Expires
03-29-2000

My Commission expires on _____

ATTACHMENT 1
LR-N980450
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
AUXILIARY BUILDING VENTILLATION SYSTEMS
SALEM NUCLEAR GENERATING STATION
UNITS 1 AND 2

1. **On page 3 of the license change request (LCR) dated October 24, 1997, the licensee states:**

"On a safety injection (SI) signal the non-operating exhaust fan will automatically start to maximize flow. Alteration of this default configuration to optimize system performance requires manual intervention. In addition, dampers that normally direct effluent from the emergency vent duct through the HEPA filters are manually shifted during accident conditions to include air flow through the Carbon adsorber unit."

With regard to the execution of manual actions under accident conditions as noted above are such actions executed from the Control Room or in areas that result in radiological exposure of plant personnel? How have these manual actions been accounted for in accident dose analysis?

Manual actions to direct the airflow through different filtration units can only be initiated from the Control room (remote manual actions from within the control room). These remote manual actions, which are initiated from the Control Room, are not accounted for in the accident dose analysis.

2. **On page 9.4-10 of the SGS-UFSAR, it states: "The Auxiliary Building Ventilation System continuously maintains the building at a slight negative pressure with respect to outdoors." In Insert B(e) for the proposed TS LCO, the licensee states in part: "With Auxiliary Building pressure at or above zero inches water column (0.00" wg) with respect to atmospheric pressure....."**

In accordance with Westinghouse Standard TS (WOG-STS), the Auxiliary Building Ventilation System (ABVS) should maintain the building at a specific negative pressure (e.g., -0.125 (1/8) inches water gauge with respect to atmospheric pressure). (For example, see WOG-STS 3.7.12 and 3.7.13.) The system should also maintain a negative pressure with respect to building adjacent areas. The proposed TS should be revised to specify negative pressure with respect to adjacent areas. If not, explain.

The proposed license amendment will bring consistency between the Salem Technical Specifications and the Salem UFSAR and other engineering design documents. These documents state the ABV system continuously maintains the building at a slight negative pressure with respect to outdoors. Insert B(e) in the proposed Technical Specification, states in part," with the Auxiliary Building pressure maintained at or above zero inches of water column (0.00" wg) with respect to atmospheric pressure." Although the system is designed to maintain a negative pressure with respect to the outdoors, the system does not (and cannot) continuously maintain a specific negative

pressure during normal operations. This is due to the high volume of traffic in and out of the building, as well as normal maintenance activities that take place within the building. Consequently, providing a specific negative pressure number in the Technical Specifications would result in unnecessary entries into the action statements whenever the pressure is greater than the specific number, but still negative with respect to the outside atmosphere.

3. ABVS alignment appears to indicate that part of effluent flow out the plant vent is not being filtered by the charcoal filter during emergency operations. How does the licensee ensure that contaminated air inside the ECCS areas does not flow out the plant vent unfiltered? (See page 9.4-8 of SGS-UFSAR and Insert J for proposed TS bases.)

The ABV system is designed to maintain the building at a slight negative pressure to control the release of particulate and gaseous contamination from the building in accordance with 10CFR20 limits. The ABV system exhaust fans are designed to exhaust more air than the supply fans supply to the building, and thus maintain the building at design negative pressure, which ensures that air exhausted from Emergency Core Cooling System (ECCS) and Normal areas will be routed through the filtration units.

As described in the Justification section of this proposed license amendment, the current limiting condition for operation does not provide the sufficient controls for the system configuration to ensure the system performs as described in the UFSAR.

The following actions are being taken in accordance with procedures to preclude the system from being configured differently than described in the UFSAR:

1. Disable the automatic start of one ABV supply fan on an Safeguards Equipment Cabinet (SEC) signal.
2. Fail open the outside air inlet damper.
3. Fail open the inlet vortex dampers by isolating control air to the actuator.

This provides a flowpath with minimal resistance to the building regardless of supply fan operation, thus ensuring that contaminated air inside the ECCS areas does not flow out the plant vent unfiltered. In addition, the procedure requires both supply fans and all three-exhaust fans to be available (although the automatic start feature of one supply fan will be disabled). Analyses have been performed to demonstrate that a minimum of

two-hours is available for operators to restart the disabled fan (assuming the other fan fails to start) before unacceptable building temperatures are reached.

4. **Temperature and relative humidity should be specified for laboratory analysis of a representative carbon sample to demonstrate the removal efficiency of iodine. The proposed TS should be revised to specify the standard used in obtaining laboratory samples.**

   ASTM D3803-1989 only specifies the testing of laboratory samples for organic methyl iodine, not elemental iodine as specified in the proposed TS. Methyl iodine had been used in the Salem TS before the proposed TS revision. Because the exact composition of the source term can vary depending on the accident scenario, the staff believes that organic methyl iodine, as specified in ASTM D3803-1989, should be used because the removal efficiency for methyl iodine will bound that for elemental iodine.

The TS section will be revised to state the temperature and relative humidity as requested. The wording of the TS section will also be revised to state the carbon sample is being tested to demonstrate the removal efficiency for methyl iodide, in lieu of elemental iodine.

(The above applies to Inserts C(b)(5) and D(c) for the proposed TS.)

5. **In Insert C(b)(6) for the proposed TS surveillance requirements (SRs), the licensee states:**

   "Verifying that flow rate through the carbon adsorber does not exceed 23,540 cfm (21,400 cfm + 10%) when either HEPA plus carbon adsorber combination is aligned to the ECCS areas."

   The flow rate through the carbon adsorber should be specified as "21,400 cfm plus or minus 10 percent" rather than the maximum flow rate (21,400 cfm + 10%) only. Flow rate plus or minus 10 percent has been used elsewhere in the proposed TS SRs. Otherwise, explain the basis for the difference.

The maximum airflow rate stated in this section of the TS demonstrates the worst case scenario for the filtration system. The system airflow rates can vary based on the outside air temperature. Normally, the nominal air flow rate is stated throughout the TS

because the flow can vary from the nominal value but still be within the tolerance values for the system. The flowrate specified for the surveillance test corresponds to the maximum design flow rate for the charcoal adsorbers. This is the limiting condition for system performance under accident conditions. Testing at this flow rate assures that the charcoal adsorber removal efficiency, and the system bypass leakage are within the design values used in the accident analysis.

6. In Insert D(e) for the proposed TS SRs, the licensee states:

"After any structural maintenance on the HEPA or carbon adsorber unit mounting frames or housing, perform tests as required by surveillance 4.7.7.1 (b)(3) and 4.7.7.1 (b)(4)."

Should this SR [D(e)] specify the SRs as provided by Inserts C(b)(1) through C(b)(4) for the proposed TS?

Yes. After any structural maintenance on the filter mounting frames or housing, testing should be performed IAW SRs Inserts C (b) (1) through C (b) (4). The TS section [D (e)] will be revised accordingly.

7. Inserts C(b)(1) and C(b)(2) should specify the standards to which the verifying tests are performed (e.g., ANSI/ASME N510, etc.). Otherwise, explain.

This section of the TS will be revised to reference the standard for the performance of the surveillance tests as ANSI/ASME N510-1975. The Bases (Insert J/Attachment 3, last page) specify the standards for surveillance testing "ANSI N510-1975, ANSI D3803-1989, and Generic Letter 83-13 are to be used to develop criteria for Surveillance Testing."

8. On page 5 of the LCR, the licensee states:

"For conditions where two or three exhaust fans are inoperable, uncontrolled releases of particulate and gaseous contamination from the Auxiliary Building could occur under post LOCA conditions due to the inability to maintain negative Auxiliary Building pressure. However, PSG&E believes that the 24 hour allowed outage time is appropriately conservative due to....."

For the case where all (2) supply fans are inoperable, the proposed action statement would require that the unit be placed in Hot Standby within 6 hours

since post-accident design-basis temperatures can not be assured in the Auxiliary Building.

Explain further the rationale for usage of the 24 hour allowed outage time (AOT) for the case where all (3) exhaust fans are inoperable.

The exhaust fans maintain the Auxiliary Building slightly negative with respect to the outside atmospheric pressure. The exhaust fans control the release of particulate and gaseous contamination via the Auxiliary Building in the event of post-LOCA conditions. PSE&G believes the 24 hour allowed outage time is appropriately conservative based on: a) the low probability of events resulting in core damage due to the loss of exhaust fans, and b) the proposed 24 hour action time is consistent with the loss of carbon adsorber unit, which also limits the release of radioactive material under post-LOCA conditions. The loss of all exhaust fans is not the most limiting case; when all three exhaust fans are off (not operating), the supply fans are also turned off to prevent over-pressurization of the building.

The loss of the supply fans is most limiting due to its potential effect on equipment qualification. Without the supply fans the vital components in the auxiliary building may reach temperatures in excess of post-accident design basis temperatures, thus potentially affecting their ability to perform their safety function. Therefore, the proposed action statement is more restrictive in the amount of time required to reach a safe shutdown condition than currently in use in the Salem Technical Specifications.

9. On page 6 of the LCR, the licensee states:

"For the changes contained in the proposed Surveillance Requirements 4.7.7. 1 (b)(1) and 4.7.7.1 (b)(2), PSE&G altered the manner in which the 18 month test is performed. Specifically, PSE&G would like to replace DOP with halogenated hydrocarbon refrigerant as the challenge agent when determining total system bypass."

**(The above applies to Inserts C(b)(5) and D(c) for the proposed TS.)
Explain further the basis for requesting changes in the 18 month SR test (e.g., a comparison of DOP versus halogenated hydrogen carbon as the challenge agent for total system bypass). Also, clarify the purpose for the proposed SR test and how this test compares with past practices (e.g., the invasive practice of removing and reinstalling HEPA filters to ensure that they do not bias the test results).**

Both DOP (dioctyl phthalate) and Halide (refrigerant) are used for filter testing

purposes. The DOP is used to perform in-place tests on HEPA filters, while the refrigerant gas is used for in-place tests of carbon adsorbers.

Either DOP or refrigerants can be used for testing purposes. This section of the Technical Specifications deals with testing for any bypass leakage for a section of duct in the system. In the past, an entire bank of HEPA filters had to be removed to perform this test, because the HEPA filters would remove the DOP from the air stream in the duct section if they remained in the system during the test, as they're designed to do. This proposed license amendment requests that refrigerant be used for the test of the duct section because the HEPA filters can remain installed in the system during the test (HEPA filters will not stop refrigerant).

Recent verbal discussion with filter testing experts (NUCON) reveal the refrigerant test of a duct section is a more reliable and verifiable test than using DOP for this purpose. In addition, the proposed test would save considerable man-hours to remove and replace HEPA filters, and to perform additional tests once the HEPA filters were re-installed

10. On page 8 of the LCR, the licensee states:

> **For the changes contained in the proposed Surveillance Requirement 4.7.7. 1 (Q and .7.7. 1 (g), PSE&G is providing requirements to ensure proper testing of the carbon adsorber unit after flow from the normal areas of the Auxiliary Building or the containment purge has been directed through the carbon adsorber. The airflows from these areas exceed the capacity of the carbon filter and therefore verification of the carbon adsorber operability is required."**
>
> **Explain how airflow from the normal areas (Auxiliary Building or containment purge) exceeds the capacity of the carbon filter which requires verification of carbon adsorber integrity and operability.**

The airflow rate from normal areas of the Auxiliary Building is ~32,130 CFM and the flow rate from the Containment Purge is ~35,000 CFM. The carbon adsorber unit is limited to a flow rate of 23,540 cfm (21,400 cfm + 10%).

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11. After reviewing your submittal as well as information from the Salem Individual Plant Examination (IPE) and other documents to evaluate the risk impact of the proposed changes, the following information is required:

a) According to the Salem IPE, the ABVS supports the operation of the Safety Injection pumps, RHR pumps, AFW pumps, CCW pumps, Charging pumps, and Containment Spray pumps. The IPE assumes that these pumps do not require ABVS during the mission time of 24 hours. Justify this assumption by summarizing your technical bases.

b) Is your current PRA the same as the IPE? If no, is the assumption still the same in your current PRA? Explain.

c) Explain, quantitatively or qualitatively, what the risk impact of the proposed, changes in ABVS would approximately be small in terms of both core damage frequency and large early release frequency. Provide the result of the sensitivity or uncertainty analyses, if any, associated with the ABVS.

PSE&G RESPONSE TO PARTS a AND b.

The Probabilistic model of the Auxiliary Building Ventilation (ABV) System used to support the Technical Specification Change Request differs from the model used in the Individual Plant Examination (IPE) analysis.

For historical perspective, the IPE model of portions of the ABV System is described in Section 3.2.1.17, "Room Cooler System (VAS)". The IPE did not take credit for the Supply Air System or Exhaust Air System portions of the ABV System but solely relied on the availability of room coolers for the success of individual systems. Systems modeled with dependencies on room coolers included the Residual Heat Removal (RHR) System, the Safety Injection System (SJS), the Centrifugal Charging (High Head) Pumps, the Auxiliary Feedwater System (AFS), and the Component Cooling Water (CCW) System. The Containment Spray System (CSS) was assumed not to be dependent on room cooling as described in Section 3.2.1.6 of the IPE, based on information available at the time of the IPE analysis. Again, the IPE did not take any credit for any room cooling provided by the ABV Supply and Exhaust Fan portions.

In contrast, an enhanced model was created during the extended Salem shutdown, during which updated information became available as part of system review efforts. Dependence on room coolers was maintained for all systems previously assumed to be

dependent plus the CSS. Furthermore, the enhanced models additionally took credit for ABV Supply and Exhaust system portions in the case of room cooler failures for the SJS pumps and CCW pumps.

PSE&G RESPONSE TO PART c

For short duration events, it is generally considered to assess risk in terms of conditional core damage probability and Large Early Release Probability rather than cdf or Large Early Release Frequency (LERF). This approach is consistent with Draft Regulatory Guide, DG-1065, "An Approach for Plant-Specific, Risk-Informed Decision-Making: Technical Specifications," dated June 1997. Typically, PSE&G considers an increased Conditional Core Damage Probability (CCDP) of 5.0E-7 (unitless) or less not to be a significant increase. Based on the Level 1 PSA analysis (core damage model), the most limiting supply or exhaust fan outage resulted in a CCDP of 1.2E-7 (less than 5.0E-7) for a 30 day period. Therefore, it was concluded that the requested Allowed Outage Time (AOT) would not result in a significant increase to the CCDP.

A detailed quantitative analysis of the effect of this request on the Large Early Release Frequency (LERF) was not completed. However, the following qualitative assessment is used to consider the effect on the Large Early Release Frequency/Probability to be small.

First, because the Salem Level 2 PSA does not credit the ABV system for reducing the magnitude or frequency of releases (through the Auxiliary Building), the only potential impact on Large Early Releases would have to be related to the probability of containment failure. However, the Supply and Exhaust Fan portions are only credited to support the CCW and SJS systems. The ABV Supply and Exhaust Fan portions are not credited for the support of containment atmosphere control systems such as the Containment Fan Cooler Units or the Containment Spray System. Therefore, the only impact that the ABV Supply and Exhaust Fan portions can have on Large Early Releases is equal to their impact on core damage multiplied by the unaffected probability of containment failure phenomena.

Draft Regulatory Guidance, DG-1065, indicates that a small increase in the Large Early Release Probability is equal to 5E-8, one-tenth of a small increase in the CCDP of 5E-7. Since the Salem LERF is equal to ten percent of the CDF, the impact on the LERP must be one-tenth of the impact of CCDP. Based on these considerations, this request

is considered to have a small impact on both the LERF and LERP.

No further sensitivity or uncertainty analyses were done in support of this Technical Specification Change Request.