Public Service
Electric and Gas
Company

Stanley LaBruna

Vice President - Nuclear Engineering

Public Service Electric and Gas Company P.O. Box 236, Hancocks Bridge, NJ 08038 609-339-1700

JUN 10 1993

NLR-N93084

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Gentlemen:

RESPONSE TO NRC BULLETIN 93-02
DEBRIS PLUGGING OF EMERGENCY CORE COOLING SUCTION STRAINERS
SALEM AND HOPE CREEK GENERATING STATIONS
DOCKET NOS. 50-272, 50-311, AND 50-354

This letter is to provide Public Service Electric and Gas's (PSE&G) response to the subject bulletin concerning the potential for clogging the suction strainers of Emergency Core Cooling Systems (ECCS) with fibrous material.

Attachment 1 to this letter details the response to the requested actions for Salem Units 1 & 2. Attachment 2 to this letter is the response for the Hope Creek Generating Station. As detailed in these attachments, all requested actions of this bulletin have been completed for Salem and Hope Creek.

If you have any questions on this response, please do not hesitate to call.

Sincerely,

J. LaBruna

Attachments (2)
Affidavit

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PDR ADOCK 05000272
Q PDR

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C Mr. T. T. Martin, Administrator - Region I
U. S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Mr. J. C. Stone, Licensing Project Manager
U. S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

Mr. S. Dembek, Licensing Project Manager
U. S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

Mr. T. P. Johnson (S09)
USNRC Senior Resident Inspector

Mr. K. Tosch, Manager, IV
NJ Department of Environmental Protection
Division of Environmental Quality
Bureau of Nuclear Engineering
CN 415
Trenton, NJ 08625

JUN 1 0 1993

REF: NLR-N93084

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

S. LaBruna, being duly sworn according to law deposes and says:

I am Vice President - Nuclear Engineering of Public Service Electric and Gas Company, and as such, I find the matters set forth in the above referenced letter, concerning the Salem Unit Nos. 1 and 2 and Hope Creek Generating Stations, are true to the best of my knowledge, information and belief.

S. LaBruna

Subscribed and Sworn to before me
this 10th day of June, 1993

Kimberly Jo Brown
Notary Public of New Jersey

KIMBERLY JO BROWN
NOTARY PUBLIC OF NEW JERSEY
My Commission Expires April 21, 1998

My Commission expires on _____

NLR-N93084

ATTACHMENT 1
RESPONSE TO NRC BULLETIN 93-02
SALEM UNITS 1 AND 2

BACKGROUND:

The bulletin notified licensees of the potential for ECCS pumps to lose net positive suction head (NPSH) due to fibrous materials clogging the intake strainers. The initiating event for this bulletin occurred at the Perry Nuclear Power Plant where air filters used in the drywell return ducts had dropped into the suppression pool and over a period of time collected on the suction strainer of the RHR pumps, and thus prohibited the pumps from drawing adequate suction.

DISCUSSION:

The impact of the bulletin on the Salem plants would be the potential for clogging of the containment sump intake. A diagram of the containment sump is provided in Figure 1. The containment sump is comprised of two subsections, the pocket sump which houses the containment sump pumps and the ECCS Section which supplies suction to the RHR pumps. A cage with an internal mesh screen and external metal bars covers the entire containment sump and is used to keep debris from entering the sump.

During the Cold Leg recirculation phase of post-LOCA recovery, the RHR pump suction is swapped over to the containment sump with RHR pump discharge aligned to the suction of the safety injection and charging pumps. The bulletin identifies the potential for flow restriction to the RHR pumps and subsequent reduction of ECCS flow to the core should the outer sump cage be covered with debris such as fibrous material.

REQUESTED ACTIONS:

Bulletin 93-02 requested the identification of fibrous air filters or other temporary sources of fibrous material, not designed to withstand a LOCA, which are installed or stored in primary containment. Immediate compensatory measures which may be required to assure the functional capability of the ECCS were to be taken along with prompt action to remove any such material. The removal of this material must be done at the next shutdown, or within 120 days, whichever comes first. If the plant was shutdown when the bulletin was issued, then removal of identified material had to be completed prior to restart.

When NRC Bulletin 93-02 was issued, Salem Unit 1 was operating in Mode 1 (Power Operations) and Salem Unit 2 was in Mode 5 (Cold Shutdown) returning from its seventh refueling outage.

RESPONSE:

In order to ensure that the concerns raised by the bulletin will not occur at Salem, the following actions were taken as requested:

1) A design review was performed of all permanently installed fibrous filter material in the Salem Unit 1 & 2 containments. This review has determined that two systems contain filter media; the Containment Fan Coil Units and the Containment Iodine Removal Units. Each of these units is discussed below.

A) Containment Fan Coil Units (CFCU's) - There are five units for each plant located on elevation 130' inside containment. They each contain a fibrous roughing filter covering an area of 190 sq. ft. and a thickness of two inches.

The CFCU's have two flow paths, one for normal operation and another for accident operation. The normal flow path is through what is known as the roughing filter damper, then the roughing filter itself, through a set of two cooling coils, fan, and then out to containment via supply duct work. The roughing filter is provided to maintain the cooling coils free from the dust and debris during normal operation which could reduce CFCU efficiency when needed during post accident conditions. In the event of an accident, the roughing filter dampers will automatically close isolating this flow path.

The fibrous material of the roughing filters will not impact the containment sump cage and ECCS capabilities due to the design of the filter and of the cooling system itself.

The backing of the roughing filter is made of a specially woven synthetic material which is designed to confine any streaming of fiberglass filaments. The entire roughing filter media is then secured in place and prevented from entering the CFCU by ¼" wire mesh screen. Air velocity through the roughing filter during normal operation is 600 ft/min.

The accident flow path is through the HEPA filter damper, demister, HEPA filter, then the cooling coils, fan, and out to containment through the same supply ductwork. In the event cooling air is supplied to containment through this flow path, the air passes along the back facing of the roughing filter with a velocity of 295 ft/min. Failure of the roughing filter inlet dampers to close would result in an even lower air velocity at the back face of the roughing filter. Since the air velocity through the filter is highest during normal operation, any separation of fibrous material would be more likely to occur during normal

operation and be evident when changing filters during outage inspections. Salem has not experienced any such degradation.

Although unlikely, should the fibrous filaments get through the roughing filter barriers, there is a very high probability that these fibers would be trapped by the fins of the cooling coils and not make it through the fan and out into containment. Should condensation draining from the coils after a LOCA event carry these filaments to the drain system and subsequently to the containment pocket sump, the ECCS suction would remain unaffected since an inner screen separates the two sump sections (see Figure 1 to this Attachment). ECCS suction through the cage would not be impaired.

The HEPA filter is a Flander's Filter Co. waterproof glass material built to various MIL Specifications and qualified for post-accident operation. The HEPA filter is comprised of a bank of forty 24"x 24"x 12" filter cells. The velocity through the HEPA filters during accident operation is 295 ft/min. Should these filters fail (i.e., blow out) for any reason, they too, like the roughing filter, would be stopped by the CFCU cooling coils.

The potential for pipe breaks to dislodge the roughing filters has been evaluated. It is concluded that the roughing filters will not become dislodged due to the CFCU location within containment. There are no Reactor Coolant System high energy lines in the vicinity of the filter units. Therefore, there is no credible potential for the filters to become dislodged from the units during a LOCA.

B) Containment Iodine Removal Units (CIRU's) - Each Salem plant has two CIRU's located on elevation 100' inside containment. These units contain a fibrous roughing filter comprised of one bank of eight 24" x 24" x 5 7/8" filter cells.

The flow path is through the inlet isolation damper, roughing filter, HEPA filter, charcoal filter, outlet isolation damper, then through the fan and out to containment ambient. These units are automatically stopped and isolated in the event of an accident. Should both the inlet and outlet isolation dampers fail to close and a filter blowout is postulated, the filter media would be confined within the CIRU casing on the front of the in series filter banks (HEPA followed by charcoal). Therefore, the roughing filter would not have the potential of migrating to the containment sump.

It can be concluded based on the above that although Salem Units 1 & 2 have some permanent fibrous filters inside containment, there is an exceedingly remote potential for them to enter and clog the containment sump and result in loss of NPSH to the RHR pumps. Therefore, PSE&G has concluded that this material is not required to be removed.

2) A recent walkdown of Unit 2 containment was performed to identify any permanent fibrous filter material other than that installed at the CFCU's and the CIRU's, and to identify any temporary fibrous material that would require removal prior to startup. This walkdown revealed no additional filter material requiring removal or analyses. Neither Salem Units 1 nor 2 store any temporary fibrous material in containment during power operation.

Since neither Salem Units store temporary filters inside the containment by policy; which is verified by procedure prior to restart following all refueling outages, a similar concern for Unit 1 does not exist. The pertinent design features described for Unit 2 are applicable for Salem Unit 1.

3) Salem Technical Specifications require one train of ECCS to be operable in Mode 4 (Hot Shutdown) and two trains in Modes 1, 2 and 3 (Power Operation, Startup, and Hot Standby). It is required that two surveillances be met as part of demonstrating ECCS subsystem operability. These are:

a) LCO 4.5.2.c - By a visual inspection which verifies that no loose debris (rags, trash, clothing, etc.) is present in the containment which could be transported to the containment sump and cause restriction of the pump suctions during LOCA conditions. This visual inspection shall be performed:

   1. For all accessible areas of the containment prior to establishing CONTAINMENT INTEGRITY, and

   2. Of the areas affected within containment at the completion of each containment entry when CONTAINMENT INTEGRITY is established.

b) LCO 4.5.2.d - At least once per 18 months by:

   1. A visual inspection of the containment sump and verifying that the subsystem suction inlets are not restricted by debris and that the sump components (trash racks, screens, etc.) show no evidence of structural distress or corrosion.

To meet the requirements of "3a" above, procedure S1(2).OP-ST.SJ-0010(Q) is performed prior to entry into Mode 4. This procedure was performed satisfactorily on 5/16/93 for Salem Unit 2 and on 07/29/92 for Salem Unit 1 (the last time Unit 1 was in Mode 5). Procedure SC.RP-TI.ZZ-1102, "Containment Entries at Power and Initial Entry After Shutdown" is used to document any loose debris once containment integrity is established.

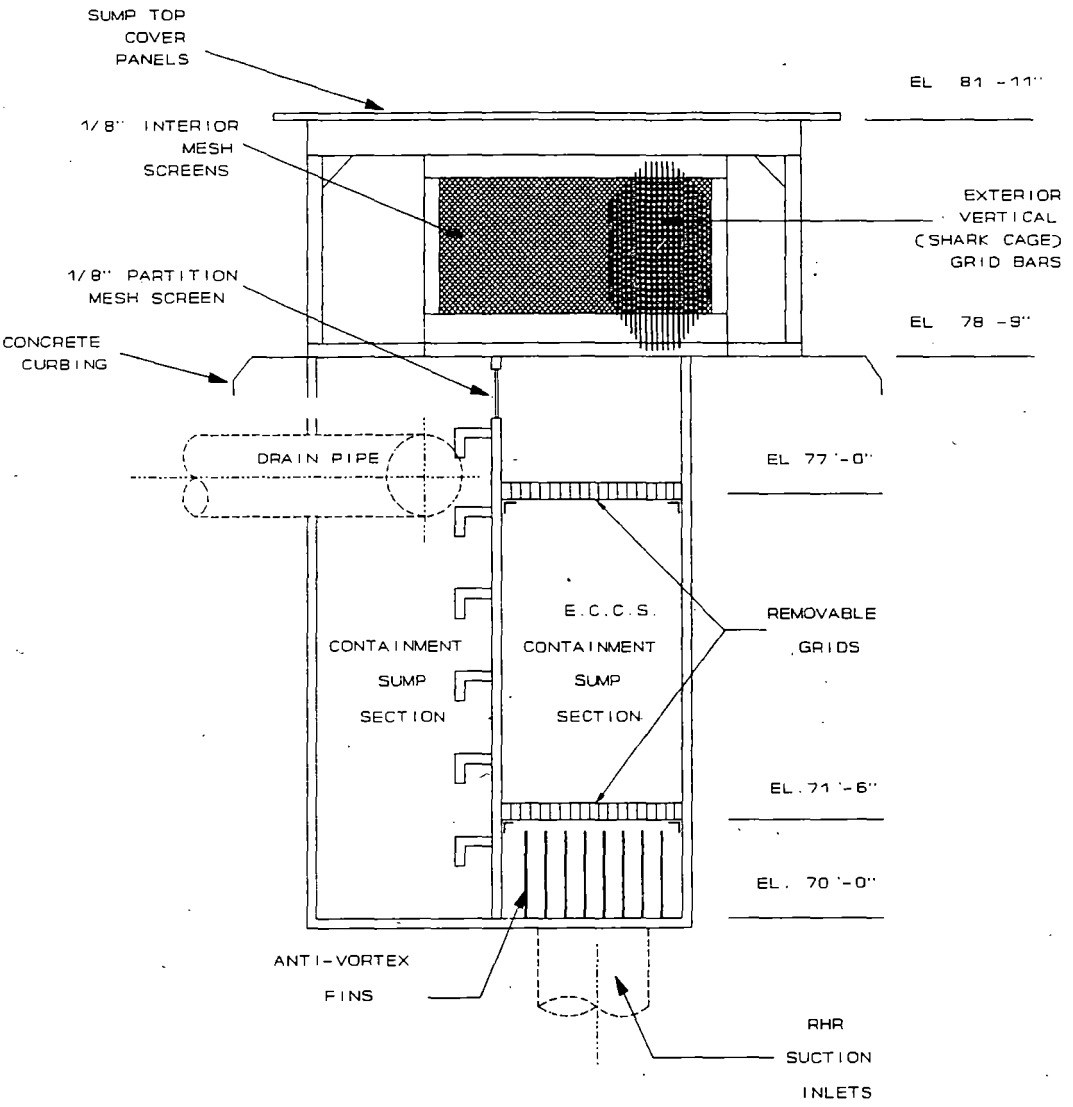
To satisfy the requirements of "3b" above, procedure S1(S2).OP-ST.SJ-0011(Q) is also performed prior to entry into Mode 4. This procedure was performed satisfactorily on 5/12/93 for Salem Unit 2 and on 7/9/92 for Salem Unit 1 (the last time Unit 1 was in a refueling outage).

With the completion of these surveillances, it is assured that transient material does not exist inside containment that could potentially restrict flow to the containment sump during Modes 1-4 when sump operability is required.

CONCLUSION:

It can be concluded based on these measures discussed above that the likelihood of Salem experiencing a loss of NPSH due to installed or stored fibrous filter material becoming lodged on the containment sump enclosure is extremely minimal. By virtue of this response, all required actions of Bulletin 93-02 have been complied with and no additional actions are necessary.

FIGURE - 1
CONTAINMENT SUMP



NLR-N93084

ATTACHMENT 2
RESPONSE TO NRC BULLETIN 93-02
HOPE CREEK

BACKGROUND:

The bulletin notified licensees of the potential for ECCS pumps to lose net positive suction head (NPSH) due to fibrous materials clogging the intake lines or strainers. The initiating event for this bulletin occurred at the Perry Nuclear Power Plant where air filters used in the drywell cooling air return ducts had dropped into the suppression pool and over a period of time collected on the suction strainer of the RHR pumps. The fibrous material acted like a filter media, collecting corrosion products of the pool, and thus prohibited the pumps from drawing adequate suction.

DISCUSSION:

The impact of the bulletin on the Hope Creek Generating Station would be the potential for clogging of ECCS suction strainers from the suppression pool within the containment drywell. During post-LOCA recovery, the Core Spray, Low Pressure Core Injection, and High Pressure Core Injection Systems take suction from the suppression pool. The bulletin identifies the potential for flow restriction to the ECCS pumps and subsequent reduction of flow to the core should the strainers located inside the suppression pool be covered with debris such as fibrous filter media.

REQUESTED ACTIONS:

Bulletin 93-02 requested the identification of fibrous air filters or other temporary sources of fibrous material, not designed to withstand a LOCA, which are installed or stored in primary containment. Immediate compensatory measures which may be required to assure the functional capability of the ECCS were to be taken along with prompt action to remove any such material. The removal of this material must be done at the next shutdown, or within 120 days, whichever comes first. If the plant was shutdown when the bulletin was issued, then removal of identified material had to be done prior to restart.

When NRC Bulletin 93-02 was issued, Hope Creek was operating in Operational Condition 1 (Power Operations). On 5/15/93, however, the Unit came off line and entered a five day forced outage. The Unit returned to power operation on 5/20/93.

RESPONSE:

In order to ensure that the concerns raised by the bulletin will not occur at Hope Creek, the following actions were taken as requested:

1) A design review was performed for equipment containing air filter fibrous material not designed to withstand a LOCA in the Hope Creek primary containment. As a result of this review, it is concluded that there is no air handling equipment, (i.e., Drywell Unit Coolers), that contains fibrous air filter media within the Hope Creek primary containment.

2) Two containment walkdowns were performed to identify any debris or fibrous material. The first walkdown was performed on 5/17/93 and was conducted within the containment drywell area. This walkdown did not reveal any fibrous filter material that required removal or further analyses.

The second walkdown was performed on 5/18/93 in accordance with Primary Containment Closeout Procedure HC.OP-GP.ZZ-0002(Q). This procedure is performed prior to power operations and verifies that there is no debris, trash, or temporary equipment in the drywell. This procedure was performed with specific emphasis on identification of temporary fibrous material and was completed satisfactorily.

Unlike Perry's past practices, Hope Creek does not and never did store any temporary filters inside primary containment.

3) It is very difficult for any substantial amount of debris to enter the suppression pool. During any outages that require access to the suppression chamber, the number of personnel afforded access is restricted and administrative controls for tool and material accountability are implemented. By the very design of the suppression chamber, there is a limited amount of equipment needing maintenance in the area. Small amounts of debris will either pass through the system and have a negligible effect or become filtered out via the Torus Water Cleanup System.

A visual inspection of the suppression pool was completed last refueling outage for any debris floating on the surface. This inspection revealed no surface debris. Also a limited inspection was performed below the waterline by a submersible surveillance and retrieval apparatus. This operation did not show any material that could potentially block the ECCS suction strainers in the suppression pool. Prior to work starting in the Drywell during the refueling outage, the openings of the Drywell to Torus downcomers were covered. In addition, the downcomer region was inspected after completion of Drywell work and any debris was removed.

Based upon the inspections performed during the last refueling outage, the limited personnel accessibility of the suppression chamber, administrative controls that were implemented, and the minimal amount of work performed inside the suppression chamber, it can be concluded with a high degree of confidence that no fibrous debris currently exists in the torus.

CONCLUSION:

It can be concluded based on these measures discussed above that the likelihood of Hope Creek experiencing a loss of NPSH due to fibrous filter material becoming lodged on the ECCS pump suction strainers following a LOCA is extremely minimal. By virtue of this response, all required actions of Bulletin 93-02 have been complied with and no additional actions are necessary.