

ACCELERATED DOCUMENT DISTRIBUTION SYSTEM

REGULATOR INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 9406300260 DOC. DATE: 94/06/17 NOTARIZED: NO DOCKET #
 FACIL: 50-387 Susquehanna Steam Electric Station, Unit 1, Pennsylv 05000387
 50-388 Susquehanna Steam Electric Station, Unit 2, Pennsylv 05000388
 AUTH. NAME AUTHOR AFFILIATION
 JONES, G.T. Pennsylvania Power & Light Co.
 RECIPIENT NAME RECIPIENT AFFILIATION
 MILLER, C.L. Project Directorate I-2

SUBJECT: Forwards Rev 0 to EC-059-1006, "Results of Hydraulic Tests
 on ECCS Strainer Blockage & Matl Transport in BWR
 Suppression Pool."

see Rpts

DISTRIBUTION CODE: A001D COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 4+400
 TITLE: OR Submittal: General Distribution

NOTES:

	RECIPIENT ID CODE/NAME	COPIES LTTR	ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	ENCL
	PD1-2 LA	1	1	PD1-2 PD	1	1
	POSLUSNY, C	2	2			
INTERNAL:	ACRS	6	6	NRR/DE/EELB	1	1
	NRR/DORS/ONDD	1	1	NRR/DRCH/HICB	1	1
	NRR/DRPW	1	1	NRR/DSSA/SPLB	1	1
	NRR/DSSA/SPSB	1	0	NRR/DSSA/SRXB	1	1
	NUDOCS-ABSTRACT	1	1	OC/LFDCB	1	0
	OGC/HDS2	1	0	<u>REG FILE</u> 01	1	1
EXTERNAL:	NRC PDR	1	1	NSIC	1	1

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK,
 ROOM P1-37 (EXT. 504-2065) TO ELIMINATE YOUR NAME FROM DISTRIBUTION
 LISTS FOR DOCUMENTS YOU DON'T NEED!

TOTAL NUMBER OF COPIES REQUIRED: LTR 23 ENCL 20



Pennsylvania Power & Light Company

Two North Ninth Street • Allentown, PA 18101-1179 • 215/774-5151

George T. Jones
Vice President-Nuclear Engineering
610/774-7602

JUN 17 1994

Director of Nuclear Reactor Regulation
Attention: Mr. C.L. Miller, Project Director
Project Directorate I-2
Division of Reactor Projects
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

**SUSQUEHANNA STEAM ELECTRIC STATION
TRANSMITTAL OF ECCS SUCTION STRAINER
TESTING DOCUMENTATION
PLA-4161** **FILES A17-4/R41-2**

Docket Nos. 50-387
and 50-388

Dear Mr. Miller:

As you are aware, PP&L has been actively involved in efforts to resolve questions regarding the potential for LOCA-induced plugging of ECCS suction strainers. Testing to aid in characterizing this problem for the Susquehanna units was begun in late 1993, and PP&L has recently completed documentation of the results. The purpose of this letter is to transmit the subject documentation to you in response to staff requests aimed at gathering relevant data for the ongoing NRC evaluation of this problem.

Background

Based upon extensive engineering evaluations of the potential for strainer plugging, PP&L issued a voluntary LER to the NRC in July, 1993. This report documented the substantial uncertainties associated with the assumptions necessary to support our evaluations. In order to resolve these concerns, PP&L took two parallel paths:

1. **Design of modifications** to replace the fibrous insulation in the drywell with metallic insulation (assuming the debris generation zones provided in Regulatory Guide 1.82, Rev. 1) was begun in order to minimize risk. PP&L strongly believes that metallic insulation is much less likely to plug the strainers than fibrous insulation. These modifications were installed in the fall 1993 Unit 1 refueling outage, and the spring 1994 Unit 2 refueling outage.

9406300260 940617
PDR ADOCK 05000387
P PDR



ADD 1

1991 10 11

2. Testing to better characterize the judgments used in our engineering evaluations of the problem. The tests described in the attachment were performed in order to better understand transport of various materials in the Susquehanna Mark II containment, and the impact of fibrous debris alone and in combination with simulated suppression pool "sludge" on head loss across the strainer. Limited testing was also performed to review the effectiveness of potential backflushing methods.

Key Insights

The primary purpose of PP&L's test program was to evaluate the effectiveness of various aspects of the design solution chosen for this problem, as well as other potential actions such as backflushing. As discussed in the attached documentation, the testing provided insights to several important potential conclusions for Susquehanna's specific design.

Transport Tests

The testing indicated the potential for various forms of debris to settle or remain suspended after the initial dynamic post-LOCA mixing phase in the pool. Heavier debris, such as metallic insulation and fibrous insulation in clump form, was shown to be difficult to transport with the expected velocities. Fibrous insulation in a less dense form was readily entrained.

Head Loss Tests

The purpose of these tests was to provide head loss versus debris accumulation data. Key among the insights from these tests was that when fibrous insulation and suppression pool sludge (mainly iron oxide in particulate form) were combined, strainer head loss could occur with much less material than if only fibrous insulation was present. The affect on head loss from the specific simulated sludge tested was more significant than other potential debris types tested, such as paint flakes.

Determination of time to strainer blockage was not an objective of the testing. Although PP&L believes that in general the time to strainer blockage will decrease under this combined debris condition, the times reported as a consequence of the data taken are conservative for several reasons (more detail is provided in the documentation):

- The head loss testing assumed that the tested amounts of insulation debris would be transported to the wetwell; actual transported amounts are not well known.

- Settling of debris to the bottom of the suppression pool, which would affect the amount of debris available to contribute to plugging, was not explicitly modeled during the testing.
- The concentration of insulation material in the test tank was kept constant in order to reduce test variability. In an actual event, the concentration would decrease with time, thereby increasing the time before plugging would occur.
- The suppression pool "sludge" utilized for combined debris testing was simulated material based on discussions with suppression pool inspection firms. Although we currently believe it to be credible, preliminary information from other industry sources indicates that the particulate may be significantly smaller. If this is true, it is likely that more will pass through the fiber bed prior to plugging, and time to plugging will increase. It is PP&L's understanding that the BWROG is pursuing this question.

The head loss tests were intended to provide a relationship between debris accumulation and head loss for use in evaluating actual Susquehanna operating scenarios. These evaluations are ongoing in coordination with the BWROG program plan for resolving this issue; they are expected to provide more meaningful insights regarding this problem.

Backflushing Tests

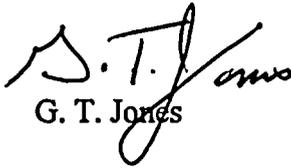
This testing was limited to backflushing with air. Testing performed at 50-60 psig was effective for fibrous insulation alone, but for SSES, higher pressures would be needed for complete backflushing when sludge accompanies the insulation on the strainer. At this time, however, based on the replacement of the fibrous insulation, PP&L does not plan to implement backflushing measures at SSES.

Future Work

PP&L does not have plans for any further testing at this time. PP&L is currently preparing a report documenting how the test data was applied to evaluate the potential for strainer plugging under various operating scenarios for the Susquehanna units. This work is being performed in conjunction with the BWROG generic resolution program for this issue; PP&L will keep the NRC informed of any significant information resulting from our work as it develops.

The attached documentation has been provided to the members of the BWROG and the International Working Group on ECCS Suction Strainers in parallel with this submittal for their information and use. Any questions on this material should be directed to Mr. R.R. Sgarro at (610) 774-7914.

Very truly yours,



G. T. Jones

Attachments

cc: NRC Document Control Desk (original)
NRC Region I
Mr. G. S. Barber, Sr. Resident Inspector - SSES
Mr. C. Poslusny, Sr. Project Manager - Rockville
Mr. A. W. Serkiz, RES/EIB - Rockville
Mr. M. L. Marshall Jr., RES/EIB - Rockville
Mr. R. J. Barrett, NRR/SCSB - Rockville
Mr. R. M. Lobel, NRR/SCSB - Rockville
Mr. R. B. Elliott, NRR/SCSB - Rockville
Mr. R. Pinelli, BWROG Chairman - GPU Nuclear