



**FEB 06 2001**

LRN-01-0049

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

Gentlemen:

**USE OF THE WESTINGHOUSE  
DYNAMIC ROD WORTH MEASUREMENT CALCULATIONS  
SALEM GENERATING STATIONS  
FACILITY OPERATING LICENSES DPR-70 AND DPR-75  
DOCKET NOS. 50-272 AND 50-311**

In accordance with the notification requirements of WCAP 13360-P-A, Revision 1, "Westinghouse Dynamic Rod Worth Measurement Technique," dated October 1998, PSEG Nuclear LLC Company is notifying the NRC of our intention to perform future low power physics testing (LPPT) at Salem Generating Station, Units 1 and 2 using the Westinghouse developed Dynamic Rod Worth Measurement (DRWM) technique. PSEG Nuclear will perform the supporting analytical computations for this technique. The results of the Westinghouse application of DRWM at Salem Units 1 and 2 are presented in Attachment 1.

Westinghouse performed the initial applications of DRWM as part of the LLPT for Cycle 11 of Salem 2 on May 26, 1999 and Cycle 14 of Salem Unit 1 on October 24, 1999. The first application of PSEG Nuclear analytical computations to support DRWM in LPPT will occur with the startup of Salem Unit 1 Cycle 15 on or about May 3, 2001.

Should you have any questions regarding this request, please contact Mr. Howard Berrick at 856-339-1862.

Respectfully,

  
G. Salamon  
Manager – Licensing

Attachment

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**Attachment 1**

Westinghouse performed the initial applications of Dynamic Rod Worth Measurement (DRWM) as part of the Low Power Physics Testing (LPPT) for Cycle 11 of Salem Unit 2 on 5/26/99 and Cycle 14 of Salem Unit 1 on 10/24/99. PSEG Nuclear intends to perform the analytical computations necessary to support DRWM beginning with the startup of Salem 1 Cycle 15 in May 2001.

Westinghouse WCAP-13360-P-A, Revision 1 contains NRC approved criteria that needs to be met in order for PSEG Nuclear to perform computations to support DRWM. Successfully meeting these criteria constitutes inherent NRC approval to use DRWM in LPPT. The criteria are 1) Eligibility of Codes for DRWM computations, 2) Application of procedures to DRWM computations, 3) Training and qualification of utility personnel, 4) Comparison calculations for the DRWM technique and 5) Quality assurance and change control. PSEG Nuclear Fuel Section Report NFS-0188 documents that these criteria have been met.

The comparison calculations are required to be within acceptable deviations as identified in WCAP-13360-P-A, Revision 1 and shown below in Table 1. Tables 2 through 5 provide results of comparison calculations that are within the acceptable deviations. Specifically, Table 2 compares the DRWM predicted rod worth's based on Westinghouse and PSEG Nuclear calculations for Salem Unit 1 Cycle 14. Table 3 compares the DRWM predicted rod worth's based on Westinghouse and PSEG Nuclear calculations for Salem Unit 2 Cycle 11. Table 4 compares the DRWM measured rod worth's based on Westinghouse and PSEG Nuclear data for Salem Unit 1 Cycle 14. Table 5 compares the DRWM measured rod worth's based on Westinghouse and PSEG Nuclear data for Salem Unit 2 Cycle 11.

**Table 1 ACCEPTABLE DEVIATIONS FOR COMPARISON CALCULATIONS**

PARAMETER	ACCEPTABLE DEVIATION
Calculated Bank Worth	$\pm 2\%$ or $\pm 25$ pcm
Calculated Total Worth of All Banks	$\pm 2\%$
Measured Bank Worth Obtained for First Application	$\pm 2\%$ or $\pm 25$ pcm
Measured Total Worth Obtained for First Application	$\pm 2\%$

Comparing Westinghouse and PSEG Nuclear predicted results, it can be seen from Table 2 that the maximum difference in the predicted worth of any bank for Salem 1 Cycle 14 is -14.1 pcm, for Control Bank A. From Table 3, the maximum difference in the predicted worth of any bank for Salem 2 Cycle 11 is 23.2 pcm for Control Bank B. The difference in total predicted rod worth is 0.1% or 5.1 pcm for Salem Unit 1 Cycle 14 and 1.3% or 63.7 pcm for Salem Unit 2 Cycle 11. Thus, the acceptable deviations of

**Attachment 1**

±25 pcm for an individual bank worth and ±2% for the sum of all bank worth's are satisfied.

Comparing measured results based on Westinghouse and PSEG Nuclear generated data, it can be seen from Table 4 that the maximum difference in the measured worth of any bank for Salem 1 Cycle 14 is -9.3 pcm for Control Bank A. From Table 5, the maximum difference in the measured worth of any bank for Salem 2 Cycle 11 is -10.4 pcm for Shutdown Bank B. The difference in total measured rod worth is -0.7% or -35.9 pcm for Salem Unit 1 Cycle 14 and -0.5% or -26.6 pcm for Salem Unit 2 Cycle 11.

As demonstrated above and documented in NFS-0188, PSEG Nuclear satisfies the criteria in WCAP-13360-P-A, Revision 1, for a utility to perform DRWM calculations in-house. Therefore, PSEG Nuclear will perform analytical computations to support DRWM in future LPPT. The first application of PSEG Nuclears analytical computations for DRWM will be during the LPPT for the startup of Salem Unit 1 Cycle 15, which is scheduled to occur on or about May 3, 2001.

**REFERENCES**

1. WCAP-13360-P-A, Revision 1, "Westinghouse Dynamic Rod Worth Measurement Technique", October 1998.
2. NFS-0188, Revision 0, "Nuclear Physics Benchmark of Dynamic Rod Worth Measurement Data for Salem Nuclear Plants", December 2000.

## Attachment 1

**Table 2**      **COMPARISON OF PREDICTED ROD WORTHS FOR SALEM UNIT 1  
CYCLE 14, BASED ON WESTINGHOUSE AND PSEG NUCLEAR DATA**

BANK	WORTH (pcm)		DIFFERENCE	
	Westinghouse Predicted	PSEG Nuclear Predicted	% (W-P/P)	pcm
Control A	782.9	797.0	-1.8	-14.1
Control B	538.4	536.4	0.4	2.0
Control C	545.4	532.0	2.5	13.4
Control D	735.2	737.7	-0.3	-2.5
Shutdown A	1009.8	1005.7	0.4	4.1
Shutdown B	843.8	850.6	-0.8	-6.8
Shutdown C	279.9	282.5	-0.9	-2.6
Shutdown D	430.1	418.5	2.8	11.6
<b>TOTAL</b>	5165.5	5160.4	0.1	5.1

**Table 3**      **COMPARISON OF PREDICTED ROD WORTHS FOR SALEM UNIT 2  
CYCLE 11, BASED ON WESTINGHOUSE AND PSEG NUCLEAR DATA**

BANK	WORTH (pcm)		DIFFERENCE	
	Westinghouse Predicted	PSEG Nuclear Predicted	% (W-P/P)	pcm
Control A	485.3	471.9	2.8	13.4
Control B	916.9	893.7	2.5	23.2
Control C	924.3	913.8	1.1	10.5
Control D	731.1	724.4	0.9	6.7
Shutdown A	227.5	225.5	0.9	2.0
Shutdown B	874.0	860.7	1.5	13.3
Shutdown C	399.6	401.5	-0.5	-1.9
Shutdown D	405.8	409.3	-0.9	-3.5
<b>TOTAL</b>	4964.5	4900.8	1.3	63.7

## Attachment 1

**Table 4**      **COMPARISON OF MEASURED ROD WORTHS FOR SALEM UNIT 1  
CYCLE 14, BASED ON WESTINGHOUSE AND PSEG NUCLEAR DATA**

BANK	WORTH (pcm)		DIFFERENCE	
	Westinghouse Measured	PSEG Nuclear Measured	% (W-P/P)	pcm
Control A	845.7	855.0	-1.1	-9.3
Control B	539.0	542.7	-0.7	-3.7
Control C	536.6	537.7	-0.2	-1.1
Control D	736.4	741.4	-0.7	-5.0
Shutdown A	1045.2	1051.0	-0.6	-5.8
Shutdown B	852.4	861.5	-1.1	-9.1
Shutdown C	280.5	281.8	-0.5	-1.3
Shutdown D	425.8	426.4	-0.1	-0.6
<b>TOTAL</b>	5261.6	5297.5	-0.7	-35.9

**Table 5**      **COMPARISON OF MEASURED ROD WORTHS FOR SALEM UNIT 2  
CYCLE 11, BASED ON WESTINGHOUSE AND PSEG NUCLEAR DATA**

BANK	WORTH (pcm)		DIFFERENCE	
	Westinghouse Measured	PSEG Nuclear Measured	% (W-P/P)	pcm
Control A	472.2	474.5	-0.5	-2.3
Control B	930.7	940.0	-1.0	-9.3
Control C	938.1	938.3	0.0	-0.2
Control D	726.4	732.2	-0.8	-5.8
Shutdown A	218.9	218.1	0.4	0.8
Shutdown B	866.2	876.6	-1.2	-10.4
Shutdown C	394.3	395.1	-0.2	-0.8
Shutdown D	407.7	406.3	0.3	1.4
<b>TOTAL</b>	4954.5	4981.1	-0.5	-26.6