## WESTINGHOUSE NON-PROPRIETARY CLASS 3

# **BASES FOR MILLSTONE UNIT 3**

# ECCS CURRENT AND FUTURE TECHNICAL SPECIFICATIONS

August 1997

G. G. Konopka

WESTINGHOUSE ELECTRIC CORPORATION Nuclear Services Division P.O. Box 355 Pittsburgh, Pennsylvania 15230

© 1997 Westinghouse Electric Corporation All Rights Reserved

9710090111 971001 PDR ADDCK 05000423 PDR PDR

## Bases ... Millstone Unit 3 ECCS Current and Future Technical Specifications

#### References

1.	1	] <sup>a, c</sup> . This PO is for engineering and design
	of orifices to be fabricated under	[] <sup>a, c</sup> . This PO is
	based on Westinghouse propos	al letter [ ] a, c,
2.	Calculation [	] a, c "Millstone Unit 3 CCP/SIP/RSS PEGISYS Model
	Development" [	a, c,
3.	Calculation [	] <sup>a, c</sup> "Millstone Unit 3 ECCS Evaluation - Future Tech.
	Spec. Change Basis" [	) a, c,
4.	Calculation [	] <sup>a, c</sup> "Millstone Unit 3 SIP Rethrottling to Address
	Pump Runout During Recircula ] <sup>a, c</sup> ,	tion Considering Revised Tech Specs" [
5.	Westinghouse Internal Letter [	] <sup>a, c</sup> "Millstone 3 FSAR Input Data"
	[ ] a, c,	[24] [1976] 유럽에서 10 (1986) 유럽이 있습니다.
6.	Calculation [	] <sup>a, c</sup> "Safeguards Pump NPSH with Open RWST
	Line", [ ] a, c,	
7.	Letter [	] <sup>a, c</sup> , "Technical Specification Sections", to R. W.
	Ackley, Stone and Webster Eng	ineering Corp., [ ] <sup>a, c</sup> ,
8.	Letter [ ] a, c, Emerge	ency Core Cooling System Pump Runout Limit Issues,
	[ ] â, ¢,	

#### Background

Millstone Unit 3 requested Westinghouse to perform an evaluation of the Emergency Core Cooling System (ECCS) branchline throttle valves. This evaluation was to address the potential throttle valve erosion concern described in Westinghouse notification letter [ ]<sup>a, c</sup>. Briefly, this task determined the maximum pressure drop across the presently installed branchline throttle valves and splits that pressure drop between an orifice and the presently installed throttle valve. In the scoping evaluations, it was determined that the head boost provided by the Recirculation Spray Pumps was not previously evaluated, and it was necessary to evaluate and address runout of the High Head Safety Injection (HHSI) pumps and Centrifugal Charging Pumps (CCP) prior to designing the branchline orifices. Westinghouse performed CCP and HHSI pump runout calculations (References 2, 3 and 4) to establish the system performance requirements for the HHSI and Charging/Safety Injection (CHG/SI) systems. While performing these suction-boost/runout calculations it was determined to be beneficial to revise the Technical Specifications' surveillance and flow balancing requirements. These changes will re-establish pump performance degradation margin, which was used for system rethrotteling to prevent suction boost runout without a Technical Specification change.

#### Purpose

Sec. 9. 18.

This letter only addresses the Technical Specification data associated with minimum safeguards flow data that is input to the Updated Final Safety Analysis Report (UFSAR) accident analyses. The maximum safeguards UFSAR input data was not affected by this effort nor is maximum safeguards data provided in the Technical Specifications. The intent of this letter is to provide the revised Technical Specification limits and to document the bases for the present and revised Technical Specification limits.

# **Bases for the Present Technical Specification**

The Millstone Unit 3 present Technical Specification limits and the associated Westinghouse ECCS calculations/references are as follows:

Surveillance Requirements

T/S Section	Pump	Current value	Reference	
4.5.2.f.1	CCP A, B & C	≥ 2411 psid	[	] a, c
4.5.2.f.2	SIP A & B	≥ 1348 psid		] a, c
4.5.2.h.1.a	CCP A, B & C	≥ 339.0 gpm	t	] a, c
4.5.2.h.1.b	CCP A, B & C	≤ 560 gpm	t	] a, c
4.5.2.h.2.a 4.5.2.h.2.b	SIP A&B SIP A SIP B	≥ 442.5 gpm ≤ 670 gpm ≤ 650 gpm	[ * Refere * Refere	] a, c ence 7 ence 7

 Reference 7 indicates that Stone and Webster established these values. NEU to verify with Stone and Webster.

A brief discussion of referenced calculations as it applies to the current Technical Specification values follows:

I a, c "Performance of Modified 4 Loop ECCS" [

This calculation evaluated the four loop ECCS. The mini-flow surveillance criteria of  $\geq$  2411 psid at 50 gpm (for the "standard 4-loop plant") was a limiting value based on an ECCS review of 4-loop plants.

1 a, c

] <sup>a, c</sup> "Millstone Unit 3 Minimum Safeguards Reanalysis" ] <sup>a, c</sup>. This calculation evaluated the HHSI minimum safeguards. This calculation replaced the HHSI results in calculation [ ]<sup>a, c</sup>, [

 $]^{a,c}$ . The Technical Specification results of this calculation are a mini-flow surveillance criteria (4.5.2.f.2) of  $\geq$  1348 psid at 50 gpm, and a corresponding analysis flow value (4.5.2.h.1.b) of  $\geq$  423.4 gpm. The results of this calculation are in reference 5 letter. Note: The present Technical Specification value of

 $\geq$  442.5 gpm, from [ ] <sup>a, c</sup>, is a higher flow limit based on analysis system resistances and a nominal minimum vendor (B) HHSI pump curve and thus is a conservative flow value.

]<sup>a, c</sup> "Millstone TAC 01 and ECCS Analysis" [ ]<sup>a, c</sup>

This calculation documented changes to the TAC 01 procedure and generated new minimum ECCS flow rates. The B CHG/SI pump field test data fell directly on the minimum acceptance TAC curve at higher flows and no margin was available. [

]<sup>a, c</sup>. The results of

this calculation are a mini-flow surveillance criteria of  $\geq 2338$  psid at 50 gpm, and a corresponding analysis value (4.5.2.h.1.a) of  $\geq 339.0$  gpm.

] <sup>a, c</sup> "Millstone Unit 3 ECCS Reanalysis" [ ] <sup>a, c</sup>

This calculation documented CHG/SI, HHSI and Residual Heat Removal System (RHRS) changes to the TAC 01 procedure and generated minimum ECCS flow rates. The CHG/SI and HHSI minimum and maximum branchline resistances were evaluated to provide the limiting ECCS flowrates. [

] <sup>a, c</sup>. The results of this calculation are a CCP mini-flow surveillance criteria of  $\geq$  2298 psid at 50 gpm which is an analysis value based on a corresponding 4.5.2.h.1.a flow of  $\geq$  310.5 gpm. The HHSI flows from this calculation were revised in Calculation [ ] <sup>a, c</sup> summarized above.

#### **Bases for the Revised Technical Specification limits**

The Millstone Unit 3 ECCS Technical Specification limits have been revised based on Westinghouse ECCS calculations References 3 and 4 as follows:

Surveillance Requirements

8 . 8 . 3

T/S Section	n Current value	Revised value	Reference
4.5.2.f.1	≥ 2411 psid	5676 ft. (2464 psid)	Reference 3

Page 3 of 5

4.5.2.f.2	≥ 1348 psid	3240 ft. (1406 psid)	Reference 4	
4 5.2.h.1.a	≥ 339.0 gpm	≥ 310.5 gpm	[ ] <sup>a, c</sup>	
4.5.2.h.1.b	≤ 560 gpm	* No Change	* Reference 6	
4.5.2.h.2.a	≥ 442.5 gpm	≥ 423.4 gpm	[ ]a, c	
4.5.2.h.2.b	≤ 670 gpm	≤ 675 gpm	* Reference 6	
	≤ 650 gpm	≤ 675 gpm	* Reference 6	

Note that Reference 6 evaluated the Safeguards Pumps' NPSH considering revised CCP and HHSI pump runout limits (note the CCP limit did not change), an open test line in the RHR/low head SI system and pumping from the refueling water storage tank. The CCPs are limited to [ ]<sup>a, c</sup> gpm from the Refueling Water Storage Tank (RWST) if both RHR pumps are operating along with both CCPs and HHSI pumps. References 3 and 4 show that the rethrottled CHG/SI system flow is less than [ ]<sup>a, c</sup> gpm from the RWST with one CCP operating therefore adequate NPSH is provided to the CCPs. It should be noted that the Reference 6 evaluation is based on revised pump runout limits provided in Reference 8.

[ ]<sup>a, c</sup> "Millstone Unit 3 SIP Rethrottling to Address Pump Runout During Recirculation Considering Revised Tech Specs" [ ]<sup>a, c</sup>

This calculation evaluated the HHSI system performance in meeting the proposed Technical Specification revision and pump boost/runout issue. [

 $]^{a, c}$ . The Technical Specification results of this calculation are a mini-flow surveillance criteria of  $\geq 3240$  ft (1406 psid) at 50 gpm based on TAC pump curve data and a corresponding analysis flow value (4.5.2.h.2.a) of  $\geq 423.4$  gpm. The results of this calculation are consistent with the data in Reference 5 letter.

[ ] <sup>a, c</sup> "Millstone Unit 3 ECCS Evaluation - Future Tech. Spec. Change Basis" [ ] <sup>a, c</sup>

This calculation evaluated the CHG/SI system performance in meeting the proposed Technical Specification revision and pump boost/runout issue. [

 $]^{a, c}$ . The Technical Specification results of this calculation are a mini-flow surveillance criteria of  $\geq$ 5676 ft (2464 psid) at 50 gpm based on TAC/analysis pump curve data and a corresponding analysis flow value (4.5.2.h.1.a) of  $\geq$  310.5 gpm. The results of this calculation are consistent with the data in Reference 5 letter.

] a, c "Millstone 3 FSAR Input Data" Evaluation

Westinghouse Internal Letter [ ]<sup>a, c</sup> "Millstone 3 FSAR Input Data", Reference 5, transmitted the revised safety analysis ECCS flow data used for the current accident analysis. References 3 and 4 evaluated the rethrottled system relative to Reference 5 data. Except for the all lines injecting 'ase for the CHG pumps, which has been evaluated by the appropriate safety analysis group through the Technical Specification change review process, there were no adverse flow deviations.

٠

1