UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW, SUITE 23T85
ATLANTA, GEORGIA 30303-8931

March 2, 2005

EA-05-036

Tennessee Valley Authority
ATTN: Mr. K. W. Singer
Chief Nuclear Officer and
Executive Vice President
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: NRC INSPECTION REPORT NO. 05000390/2005007; PRELIMINARY WHITE FINDING; WATTS BAR NUCLEAR POWER PLANT

Dear Mr. Singer:

This letter and the enclosed supporting documentation discuss a finding that appears to have low-to-moderate safety significance. As described in Section 4OA2.3 of NRC Inspection Report 05000390, 391/2004005, issued on January 28, 2005, a finding was identified which concerned inadequate corrective actions to identify and correct silt blockage of Essential Raw Cooling Water (ERCW) piping at Watts Bar. On November 22, 2004, while performing a manual valve exercising procedure, your staff identified that the 1A-A Centrifugal Charging Pump (CCP) backup cooling line from the ERCW system was completely blocked with silt. Approximately 2.5 gallons of muddy paste passed through the one-inch drain valve before the valve became fully blocked, and the line had to be cleared mechanically. The capability to provide ERCW cooling via this line is significant in that the 1A-A CCP is the only high head pump provided with a backup source of raw cooling water. The line was cleared and Problem Evaluation Report (PER) 72620 was initiated. This PER was assigned the lowest significance level (D) and closed based on corrective actions which cleared the line and planned corrective actions to verify that it remained clear again in six months.

In early 2004, Watts Bar began to experience significant debris and silt buildup in ERCW lines. Several of these had repeat instances of blockage identified. In each case, the blockages were determined not to affect operability because the lines were only partially blocked or the blockage cleared when flow was initiated through the line. Your corrective actions for the previous instances of silt buildup included clearing the blockage and determining operability of affected components, performing effectiveness reviews of programs and processes for controlling macrofouling (clams), and increasing the monitoring frequency to every three months. These incidents were all treated separately, and a PER for the increasing trend in the accumulation of silt was not generated. Several of the individual PERs referenced PER 33308 for additional corrective actions. PER 33308 was a level (A) PER (highest) generated to address macrofouling (clam) issues.

This PER did not include any corrective actions to address the significant silt accumulations other than increasing the frequency of TI-67.003 and 67.004, Component Flow Blockage Testing Utilizing Ultrasonics Essential Raw Cooling Water - (Train A and B). The Watts Bar staff maintained the frequency of monitoring the ERCW line to the 1A-A CCP at once every 18 months.

The NRC has determined that TVA's actions in response to the previous silt blockage problems did not constitute adequate corrective action to preclude silt blockage of the ERCW line to the 1A-A CCP. This performance deficiency constitutes an apparent violation of 10 CFR 50, Appendix B, Criterion XVI, in that, TVA failed to identify and correct a significant condition adverse to quality, which resulted in silt blockage of the ERCW line to the 1A-A CCP. Accordingly, this apparent violation is identified as AV 05000390/20050007-01, Inadequate Corrective Action to Identify and Correct Silt Blockage of ERCW Piping. The finding is being considered for escalated enforcement action in accordance with the "General Statement of Policy and Procedures for NRC Enforcement Actions" (Enforcement Policy), NUREG-1600. The current Enforcement Policy is included on the NRC's Web site at www.nrc.gov; select **What We Do, Enforcement**, then **Enforcement Policy**.

This finding was assessed using the applicable Significance Determination Process (SDP) and was preliminarily determined to be a White finding (i.e., a finding with some increased importance to safety, which may require additional NRC inspection). The finding has a low-to-moderate safety significance primarily because the 1A-A CCP is the only high head pump provided with a backup source of cooling water (ERCW). The Phase 3 SDP is attached .

The initial risk reviews performed by your staff indicated that the finding was Green (i.e., a finding of low to very low safety significance.) The primary cause of the difference between the NRC's risk assessment and your staff's initial assessment was the assumed initiating event (IE) frequency for a total loss of the Component Cooling System. The NRC used an IE value based on current pump failure and common cause failure data, that is about thirty times greater than that used in your staff's model. This difference in assumed IE frequency led to the order of magnitude difference in the core damage probability. This finding does not represent a current safety concern because your staff subsequently cleared the silt blockage of the ERCW line and increased the frequency of monitoring for blockage.

Before we make a final decision on this matter, we are providing you an opportunity to: (1) present to the NRC your perspectives on the apparent violation and the facts and assumptions used by the NRC to arrive at the finding and its significance at a Regulatory Conference or (2) submit your position on the finding to the NRC in writing. If you request a Regulatory Conference, it should be held within 30 days of your receipt of this letter and we encourage you to submit supporting documentation at least one week prior to the conference in an effort to make the conference more efficient and effective. If a Regulatory Conference is held, it will be open for public observation. The NRC will also issue a press release to announce the conference. If you decide to submit only a written response, such submittal should be sent to the NRC within 30 days of the receipt of this letter.

Please contact Steve Cahill at (404) 562-4520 within 10 business days of the date of your receipt of this letter to notify the NRC of your intentions. If we have not heard from you within 10 days, we will continue with our significance determination decision and you will be advised by separate correspondence of the results of our deliberations on this matter.

Since the NRC has not made a final determination in this matter, no Notice of Violation is being issued for these inspection findings at this time. In addition, please be advised that the number and characterization of the apparent violation described in the enclosed inspection report may change as a result of further NRC review.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Victor McCree, Director
Division of Reactor Projects

Docket No.: 50-390
License No.: NPF-90

Enclosure: SDP Phase III Summary

cc w/encl: (See page 4)

cc w/encl:
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NAME	SCahill	JBartley	CEvans	RBernhard			
DATE	02/28/2005	02/28/2005	02/28/2005	02/28/2005	02/ /05	March 7, 2005	March 7, 2005
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
PUBLIC DOCUMENT	YES NO						

OFFICIAL RECORD COPY DOCUMENT NAME: E:\Filenet\ML050620219.wpd

SRA Analysis Number: WBAR0401
Analysis Type: SDP Phase III
Inspection Report # (if issued):2004-05
Plant Name: Watts Bar
Unit Number: 1
Enforcement Action # (if applicable): 05-036

I. Background - On November 22, 2004, while performing TI-50.030, Manual Valve Exercising (System 67), the licensee identified that the 1A-A CCP backup cooling line was completely blocked with silt. Approximately 2.5 gallons of muddy paste passed through the one-inch drain valve before the valve became blocked. The line had to be cleared mechanically. This line is significant in that the 1A-A CCP is the only high head pump provided with a backup source of cooling water. The licensee cleared the line the day of discovery, and had been last tested about July 10, 2003

Performance Deficiency -The inspectors identified an apparent violation of 10 CFR 50, Appendix B, Criterion XVI, having a potential safety significance greater than very low safety significance. The licensee's corrective actions for occurrences of silt blockage in essential raw cooling water (ERCW) lines were inadequate and resulted in not promptly identifying and correcting a complete blockage in the backup cooling water line to a high head injection pump. In addition, the inspectors identified that the licensee's corrective actions for the blockage of the backup cooling water line were inadequate.

Exposure Time - T/2 time is used since the date of the blockage is not known. The last known good performance of the test was about July 10, 2003. The date of the completion of the immediate corrective action was November 22, 2004. This is a period of about 501 days. Use a T/2 of 251 days.

Date of Occurrence - November 22, 2004

II. Safety Impact: WHITE

III. Risk Analysis/Considerations

Assumptions

1. Common cause failure rates are based on the values the NRC uses in the SPAR models as of 12/2004.

2. Seal failure rates on loss of cooling are based on those used in the SPAR model (WOG-2000 (NRC modified version) Model)

PRA Model used for basis of the risk analysis: Modified SPAR. The SPAR model is modified to use a fault tree as the initiator for the loss of CCW (CCS at Watts Bar).

IV. Calculations

The initiating event frequency in the licensee's model for total loss of CCW is 1E-6. Examination of the inputs to the calculation of this IE indicate that the Multiple Greek Letter coefficients that are used by the licensee to calculate the common cause fail to run of the CCW pumps were significantly lower than would be used by the NRC based on our review of industry failure data. The existing SPAR model for Watts bar does not have the total loss of CCW as an initiator. For this finding, one must be added. INEL developed a modified Watts Bar SPAR model in which the IE is modeled as a fault tree. The IE frequency derived from the fault tree is 3.4E-5/year.

See attached SPAR model run using modified Watts Bar files that include a fault tree initiator for total LOCCW. Dominant sequences are common cause failure of CCW pumps to run and common cause failures of CCW heat exchangers with a failure of the RCP seals once cooling is lost. These results are consistent with the SRAs earlier rough hand calculations for the finding (IE frequency times .2 for seal failure equals the delta). No recovery was allowed for these common cause failures. The annual delta CDP is 7.7E-6.

DELTA CDP FOR EXPOSURE TIME
For the 251 day exposure: 7.7E-6 *251/365days/year = 5.3E-6 for the T/2 period

EXTERNAL EVENTS CONSIDERATIONS
The risk from the finding is based on ERCW being available to provide the backup to CCW. Any external event would have to damage CCW, but not impact ERCW. Tornados are much more likely to impact ERCW, due to its location in a separate outside building. Fragility of equipment is not available, since Watts Bar used seismic margins as the basis for meeting its IPEEE review. A potential common cause seismic failure vulnerability could be the CCW head tank, but unless the ERCW system is much more robust than the CCW system, for this finding there would be minimal impact.

All five CCW pumps are located in fire area 8. The 1A-A, C-S, and the 2A-A are located near each other, and are separated from the 1B-B and the 2B-B by a one hour fire barrier. The pumps have detection and pre-action sprinklers. The 1B-B pump can be lined up to the A Train heat exchanger for fire response only. Area 8 is a large corridor, with the pumps in a small portion of it . Its total fire IE frequency is 7.63E-3/year for all fires. The IPEEE uses this area as an example of how the fire calculations are performed, and uses factors of .05 failure rate for automatic suppression, and .1 for manual suppression failure rate. The NRC would allow .01 for manual suppression in one hour. The probability of an extensive fire that would breach the one hour wall is less than 6.9E-6. The fraction of the total fire area 8 that is included in the area occupied by the pumps and the extra order of magnitude credit the NRC would allow for manual suppression would get the frequency to a value low enough, that when multiplied by the RCP seal failure rate, would be low enough not to increase the delta CDP to the yellow threshold.

LARGE EARLY RELEASE FREQUENCY IMPACT.
The loss of the RCP seals will not result in an increase in the likelihood of containment bypass sequences, so the CDP evaluation will dominate risk.

V. Conclusions/Recommendations - Risk increase over the base case was greater than 1E-6, but less than E-5. The finding is WHITE

RECONCILIATION BETWEEN PHASE 3 AND PLANT NOTEBOOK/ PHASE 2 RESULTS
Only one sequence resulted from the Phase two sheets:

LCCSA - CS - SINJ , where:

Ensure Seal Injection (SINJ)	Connect ERCW to CCP lube oil cooling [4] (operator action = 1)
Loss of Other Train of CCS (CS) [2, 3]	Continued operation of normally running C-S pump (1 train)

The resulting color was yellow, with loss of the A train (LCCSA) equal to 3, and CS equal to 2. This sequence is significantly the same as the dominant sequence identified in the Phase 3. It represents the total loss of CCW. The Phase 2 sheets do not credit the 80% success rate of the RCP seals on loss of cooling that the Phase 3 does, which results in the one color change. The plant notebook could more correctly model the sequence as a total loss of CCW.

VI. References

Phase I Screening Sheets
SPAR run (attached)

Analyst: R. Bernhard Date: February 2, 2005 Reviewed By: W. Rogers Date: February 2, 2005

C O N D I T I O N A S S E S S M E N T

Code Version: 7:22 Model Version : 2004/12/22
Project : WBAR_3 Duration (hrs) : 8.8E+003
User Name : IDAHO NATIONAL LABORATORY Total CCDP : 9.8E-005
Event ID : ERCWXT Total CDP : 9.0E-005
Importance : 7.7E-006
Description : ERCW SUPPLY TO CHARGING PUMPS IS UNAVAILABLE

BASIC EVENT CHANGES

Event Name	Description	Base Prob	Curr Prob	Type
CVS-XHE-XM-CPP1AA	OPERATOR FAILS TO ALIGN ERCW	1.5E-001	1.0E+000	TRUE

SEQUENCE PROBABILITIES

Truncation : Cummulative : 100.0% Individual : 1.0%

Event Tree Name	Sequence Name	CCDP	CDP	Importance
LOCCW	2-02-06	6.7E-006	1.0E-006	5.7E-006
TRANS	02-02-06	2.0E-006	7.3E-007	1.2E-006
LOCCW	2-03-06	3.4E-007	5.1E-008	2.9E-007
LODCB	02-02-06	1.2E-007	2.3E-008	1.0E-007

NEGATIVE SEQUENCE PROBABILITIES

Truncation : Cummulative : 100.0% Individual : 1.0%

Event Tree Name	Sequence Name	CCDP	CDP	Importance

NOTE: Percent contribution to total Importance.

SEQUENCE LOGIC

Event Tree	Sequence Name	Logic	
LOCCW	2-02-06	/RPS	/AFW
		LOSC	/RCPT
		/RSD	/BP1
		BP2	HPI
TRANS	02-02-06	/RPS	/AFW
		/PORV	LOSC
		/RCPT	/RSD
		/BP1	BP2
		HPI	
LOCCW	2-03-06	/RPS	/AFW
		LOSC	/RCPT
		/RSD	BP1
		/BP2	HPI
LODCB	02-02-06	/RPS	/AFW
		/PORV	LOSC
		/RCPT	/RSD
		/BP1	BP2
		HPI	

Fault Tree Name	Description
AFW	AUXILIARY FEEDWATER
BP1	RCP SEAL STAGE 1 INTEGRITY (BINDING/POPPING)
BP2	RCP SEAL STAGE 2 INTEGRITY (BINDING/POPPING)
HPI	HIGH PRESSURE INJECTION

LOSC	RCP SEAL COOLING MAINTAINED
PORV	PORVs ARE CLOSED
RCPT	REACTOR COOLANT PUMPS TRIPPED
RPS	REACTOR PROTECTION SYSTEM
RSD	RAPID SECONDARY DEPRESSURIZATION (<1710 PSI IN 2 HR)

SEQUENCE CUT SETS

Truncation: Cummulative: 100.0% Individual: 1.0%

Event Tree: LOCCW CCDF: 6.7E-006
Sequence: 2-02-06

CCDF	% Cut Set	Cut Set Events
6.7E-006	100.00	/RCS-MDP-LK-BP1 RCS-MDP-LK-BP2

Event Tree: TRANS CCDF: 2.0E-006
Sequence: 02-02-06

CCDF	% Cut Set	Cut Set Events
1.4E-006	71.59	CCW-HTX-CF-HXAC /RCS-MDP-LK-BP1 RCS-MDP-LK-BP2
5.1E-007	26.02	SWS-STR-CF-ALL /RCS-MDP-LK-BP1 RCS-MDP-LK-BP2
3.0E-008	1.53	CCW-CKV-CF-PMPS /RCS-MDP-LK-BP1 RCS-MDP-LK-BP2

Event Tree: LOCCW CCDF: 3.4E-007
Sequence: 2-03-06

CCDF	% Cut Set	Cut Set Events
3.4E-007	100.00	RCS-MDP-LK-BP1 /RCS-MDP-LK-BP2

Event Tree: LODCB CCDF: 1.2E-007
Sequence: 02-02-06

CCDF	% Cut Set	Cut Set Events
4.7E-008	38.34	CCW-MDP-FR-1AA /RCS-MDP-LK-BP1 RCS-MDP-LK-BP2
3.6E-008	28.76	SWS-STR-PG-A2AA /RCS-MDP-LK-BP1 RCS-MDP-LK-BP2
3.0E-008	23.97	CCW-HTX-PG-HXA /RCS-MDP-LK-BP1 RCS-MDP-LK-BP2
5.0E-009	4.05	CCW-HTX-CF-HXAC /RCS-MDP-LK-BP1 RCS-MDP-LK-BP2
2.4E-009	1.92	ACP-BAC-LP-1A /RCS-MDP-LK-BP1 RCS-MDP-LK-BP2
1.8E-009	1.47	SWS-STR-CF-ALL /RCS-MDP-LK-BP1 RCS-MDP-LK-BP2

BASIC EVENTS (Cut Sets Only)

Event Name	Description	Curr Prob
ACP-BAC-LP-1A	DIVISION 1A AC POWER 6.9KV BUS FAILS	4.8E-006
CCW-CKV-CF-PMPS	CCF OF CCW DISCHARGE CHECK VALVES	2.2E-007
CCW-HTX-CF-HXAC	CCF OF CCW HEAT EXCHANGERS HX-A & C	1.0E-005
CCW-HTX-PG-HXA	CCW HEAT EXCHANGER HXA PLUGS	6.0E-005
CCW-MDP-FR-1AA	CCW PUMP 1A-A FAILS TO RUN	9.6E-005
RCS-MDP-LK-BP1	RCP SEAL STAGE 1 INTEGRITY (BINDING/POPPING O	1.3E-002
RCS-MDP-LK-BP2	RCP SEAL STAGE 2 INTEGRITY (BINDING/POPPING O	2.0E-001
SWS-STR-CF-ALL	CCF OF SERVICE WATER STRAINERS	3.7E-006
SWS-STR-PG-A2AA	SWS TRAIN 2A DISCH STRAINER A2AA FAILS	7.2E-005

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