



**INDIANA  
MICHIGAN  
POWER**

*A unit of American Electric Power*

**Indiana Michigan Power**  
Cook Nuclear Plant  
One Cook Place  
Bridgman, MI 49106  
AEP.com

June 3, 2005

AEP:NRC:5055-06  
10 CFR 50.55a

Docket No: 50-315

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Mail Stop O-P1-17  
Washington, DC 20555-0001

**Donald C. Cook Nuclear Plant Unit 1  
PRESSURIZER SAFETY NOZZLE STAINLESS STEEL SAFE END  
WELD CIRCUMFERENTIAL FLAW EVALUATION**

This letter is being submitted for Nuclear Regulatory Commission (NRC) review and approval in accordance with the requirements of the American Society of Mechanical Engineers (ASME) Code, Section XI, 1989 Edition, Paragraph IWB-3640.

During the Unit 1 Cycle 20 Refueling Outage, Indiana Michigan Power Company (I&M) personnel performed non-destructive examinations (NDE) of the Unit 1 pressurizer Alloy 82/182 welds. During the examinations, I&M identified the need to perform a repair on weld 1-PRZ-23, and a weld overlay was applied for the repair. The subsequent NDE of the repair found the weld overlay to be acceptable in addressing weld 1-PRZ-23. However, the NDE identified the presence of a flaw in the pressurizer safety nozzle stainless steel safe end weld (1-RC-9-01F). The flaw did not meet the acceptance criteria of the ASME Code, Section XI, 1989 Edition, Table IWB-3514-2 and an evaluation in accordance with ASME Code, Section XI, 1989 Edition, Paragraph IWB-3640 was performed for both an axially oriented flaw and a circumferentially oriented flaw by Westinghouse Electric Company (Westinghouse) personnel. As the consequences of circumferential flaw growth are more significant than the consequences of axial flaw growth, the summary of the circumferentially oriented flaw evaluation is provided as Attachment 1 to this letter.

The Westinghouse evaluation summary report has undergone two editorial revisions. Revision 1 incorporated owner review comments to the Westinghouse evaluation, and Revision 2 revised the proprietary classification of the evaluation to allow public disclosure. Revision 2 of the summary is being provided for NRC review and approval.

Attachment 2 to this letter provides the design loads that were provided to Westinghouse personnel for use in the flaw evaluation using the ASME Code, Section XI, 1989 Edition, Appendix C guidelines. The Westinghouse evaluation determined that the flaw was acceptable and would experience negligible growth over the life of the plant (60 years). Based on the evaluation,

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Westinghouse personnel concluded that the circumferential flaw met the ASME Code, Section XI, 1989 Edition, Paragraph IWB-3640 flaw acceptance criteria and was acceptable for the duration of the plant life and did not require repair.

Based on the above information and the evaluation summarized in Attachment 1, subject to NRC review and approval, I&M concludes that the pressurizer nozzle weld 1-RC-9-01F is acceptable for service, and system operability is maintained.

This letter contains no new commitments. Should you have any questions, please contact Mr. John A. Zwolinski, Safety Assurance Director, at (269) 466-2428.

Sincerely,



Daniel P. Fadel  
Engineering Vice President

RGV/rdw

- Attachments: 1. Pressurizer Safety Nozzle (SST Safe End Weld) Circumferential Flaw Evaluation  
2. AEP Design Information Transmittal DIT-B-02976-00

- c: R. Aben – Department of Labor and Economic Growth, w/o attachments  
J. L. Caldwell – NRC Region III  
K. D. Curry – AEP Ft. Wayne, w/o attachments  
J. T. King – MPSC, w/o attachments  
C. F. Lyon – NRC Washington, DC  
MDEQ – WHMD/HWRPS, w/o attachments  
NRC Resident Inspector

Attachment 1 to AEP:NRC:5055-06

**Pressurizer Safety Nozzle (SST Safe End Weld)  
Circumferential Flaw Evaluation**

Westinghouse Non-Proprietary Class 3



Westinghouse Electric Company  
Nuclear Services  
P.O. Box 355  
Pittsburgh, Pennsylvania 15230-0355  
USA

Mr. Paul Donavin  
American Electric Power  
Donald C. Cook Nuclear Plant  
One Cook Place  
Bridgman, MI 49106

Direct tel: 412-374-4378  
Direct fax: 412-374-3451  
e-mail: harschk@westinghouse.com  
Purchase Order: C-7693 Release 05-007  
Sales order: 33762  
Our ref: AEP-05-50 Revision 2

May 24, 2005

**American Electric Power  
Donald C. Cook Unit 1  
Pressurizer Safety Nozzle (SST Safe End Weld) Circumferential Flaw Evaluation**

**References**

1. AEP Design Information Transmittal (DIT) No. DIT-S-01505 dated 5/18/2005, Subject: Provide Ultrasonic Data from Weld 1-RC-9-01F Examination for IWB 3600 Analysis.
2. ASME Code Section XI, "Rules of In-service Inspection of Nuclear Power Plant Components," 1989 Edition (no addenda).
3. Westinghouse Letter AEP-05-45, "Pressurizer Safety Nozzle (SST Safe End Weld) Axial Flaw Evaluation," dated 05/4/2005.

Dear Mr. Donavin:

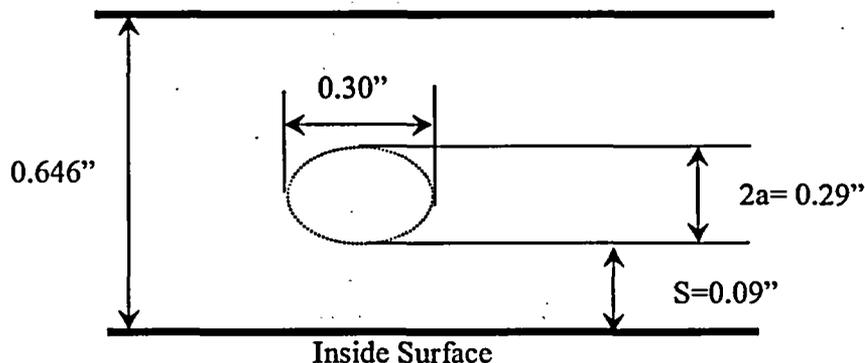
During the inspection of the pressurizer butt welds at D. C. Cook Unit 1, a circumferential indication was detected in the stainless steel safe end weld on one of the three pressurizer safety valve nozzles.

Per the request of American Electric Power (AEP), Westinghouse has performed an evaluation of the circumferential indication discovered in the pressurizer safety nozzle stainless steel (SST) safe end weld. The purpose of the evaluation is to demonstrate that the detected circumferential flaw is acceptable for the duration of the plant life (60 years) without repair. The following provides a brief summary of the evaluation and the associated results:

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Westinghouse Electric Company LLC  
P.O. Box 355  
Pittsburgh, PA 15230-0355

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**As-Found Circumferential Flaw Configuration [1]****Flaw Evaluation**

To remain as a sub-surface flaw, the criteria  $S > 0.4a$  must be met [2], therefore maximum allowable sub-surface flaw ( $2a$ ) = 0.45" based on  $S = 0.09$ ".

The maximum allowable circumferential flaw is determined to be 75% of the wall thickness using the flaw evaluation procedures in Section XI Appendix C [2] as the guidelines.

Using the fatigue crack growth reference curve for austenitic steel in air from Section XI Appendix C [2], the fatigue crack growth for the as-found sub-surface flaw for 10, 20, 30 and 40 years is negligible and is shown below:

Initial crack depth (a)	Crack depth after			
	10 years	20 years	30 years	40 years
0.145"	0.145"	0.145"	0.145"	0.145"

The design transient cycles used in the fatigue crack growth calculation is based on a plant life of 40 years. Since the design transient cycles for a plant life of 40 years are the same as that for 60 years. Fatigue crack growth for 60 years is also expected to be negligible.

**Conclusion**

The as-found circumferential flaw in the pressurizer safety nozzle stainless steel weld has been shown to meet the Section XI IWB-3640 flaw acceptance criteria using the flaw evaluation procedures in Section XI Appendix C as the guidelines. The flaw is acceptable for the duration of the plant life (60 years) and no repair is necessary.

This letter supersedes Westinghouse Letter AEP-05-45, entitled "Pressurizer Safety Nozzle (SST Safe End Weld) Axial Flaw Evaluation" [3] and Westinghouse Letter AEP-05-50, entitled "Pressurizer Safety Nozzle (SST Safe End Weld) Circumferential Flaw Evaluation" (Revision 0 dated 05/18/2005 and Revision 1 dated 05/19/2005). Reference 2 has been changed to reflect ASME Code Section XI, 1989 Edition (no addenda), which is currently the Code of record at D.C. Cook. This document is considered Westinghouse Non-Proprietary Class 3.

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Our ref: AEP-05-50 Revision 2

May 24, 2005

If you have any specific questions regarding the information in this letter, please contact Mr. Chris Ng of Westinghouse *Piping Analysis and Fracture Mechanics* (724) 722-6030 or me at (412) 374-4378.

Very truly yours,

WESTINGHOUSE ELECTRIC COMPANY

A handwritten signature in black ink that reads "Kyle Harsche". The signature is written in a cursive style with a large, stylized "K" and "H".

Kyle Harsche  
Customer Projects Manager

Attachment 2 to AEP:NRC:5055-06

AEP Design Information Transmittal DIT-B-02976-00

# AEP DESIGN INFORMATION TRANSMITTAL (DIT)

DIT Form, Part 1

<input checked="" type="checkbox"/> SAFETY-RELATED <input type="checkbox"/> NON-SAFETY-RELATED	<b>Originating Organization</b> <input checked="" type="checkbox"/> AEP <input type="checkbox"/> Other (specify)	DIT No <u>DIT-B-02976-00</u>	
D.C. Cook Unit : <u>1</u> System Designation <u>RCS, Reactor Coolant System</u>		Page <u>1</u> of <u>2</u> To <u>Mr. Di Tang, Westinghouse</u>	
Subject: Provide design inputs for design of the weld overlay on weld 1-PRZ-23 of pressurizer safety valve line nozzle.			
Paul R. Donavin	Principal Engineer	<i>Paul R. Donavin</i>	4/21/05
Preparer	Position	Preparer's Signature	Date
T. Satyan-Sharma	Principal Engineer	<i>T. Satyan-Sharma</i>	4/21/05
Reviewer	Position	Reviewer's Signature	Date
<i>WCMammone</i>	<i>ICM Supervisor</i>	<i>WCMammone</i>	4/25/05
Approver	Position	Approver's Signature	Date
Status of Information: <input checked="" type="checkbox"/> Approved for Use <input type="checkbox"/> Unverified			
Method and Schedule of Verification for Unverified DITs		N/A	
Holds Associated with Unverified DITs: <u>None</u>			CR# <u>None</u>
<b>Description of Information:</b> The information contains operating pressures and temperature, piping loads, and design Codes. The operating pressure is 2085 psig, Operating Temperature is 631°F, (Ref.3) and the piping loads are attached from Reference 1.			
<b>Purpose of Issuance (Including any Precautions or Limitations):</b> Provide operating parameters for weld overlay design on 1-PRZ-23.			
<b>Source of Information:</b> Engineering Judgement Used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
Controlled Reference / Document No.: <u>1. Teledyne Engineering Services, TR-5364-3, Rev.0 (Archived)</u>			
Uncontrolled Reference / Document No.: <u>2. ASME B&amp;PV Nuclear Code Case N-504-2</u> <u>3. R*TIME Record for 2/15/05 at 00:00</u>			
Distribution: Copy to Requestor <u>Di Tang, Westinghouse</u> Copy to DIT Administrator File Original to NDM (Transmitted by DIT Administrator)			

This form is derived from the information in 12-EHP-5040-DES-001, Control of Design Input.

# AEP DESIGN INFORMATION TRANSMITTAL (DIT)

DIT Form, Part 2

AEP Design Information Transmittal	DIT No. DIT-B-02976-00  Page <u>2</u> of <u>2</u>
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Technical Report  
 TR-5364-3  
 Revision 0

6-91

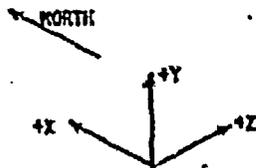
**TELEDYNE  
 ENGINEERING SERVICES**

NOZZLE LOAD SUMMARY SHEET

DONALD C. COOK  
 UNIT #1  
 PROJECT 5364

BY: CMA DATE: 7-12-83  
 CHECKED BY: AMB DATE: 7/12/83

GLOBAL COORDINATE SYSTEM



NODE NUMBER 244

	DESIGN LOADINGS								
	DISPLACEMENTS			FORCES			MOMENTS		
	$\Delta X$	$\Delta Y$	$\Delta Z$	FX	FY	FZ	MX	MY	MZ
DEADWEIGHT-1	-	-	-	20	-1040	60	18380	-950	-11150
THERMAL-1	-	-	-	-140	-2069	-690	-28480	26920	-64700
THERMAL-2	-	-	-	-260	-1180	-120	-19920	10200	-39240
THERMAL-3	-	-	-	-293	-448	+241	-11881	+194	17805
SEISMIC-OBE	-	-	-	±611	±921	±501	±10864	±10969	±20444
SEISMIC-DBE	-	-	-	±1031	±1523	±852	±18491	±18177	±33944
BLOWDOWN-SV	-	-	-	±2230	±3985	±1460	±44943	±31261	±48886
BLOWDOWN-PORV	-	-	-	±94	±105	±130	±3725	±1966	±3188

UNITS: DISPLACEMENTS : INCHES  
 FORCES : POUNDS  
 MOMENTS : INCH-POUNDS

CONTENT QUALITY IS  
 EQUAL TO THE ORIGINAL