

October 31, 1996

Ms. Irene Johnson, Acting Manager  
Nuclear Regulatory Services  
Commonwealth Edison Company  
Executive Towers West III  
1400 Opus Place, Suite 500  
Downers Grove, IL 60515

SUBJECT: REVIEW OF ZION, UNIT 2, OPERABILITY ASSESSMENT #96-01283, STRUCTURAL  
INTEGRITY OF COMBUSTION ENGINEERING STEAM GENERATOR WELDED SLEEVES  
(TAC NOS. M95183 AND M95184)

Dear Ms. Johnson:

In a letter dated March 25, 1996, Commonwealth Edison Company (ComEd) submitted its initial and final operability assessments and a technical report, "Verification of the Structural Integrity of the ABB CENO Steam Generator Welded Sleeve," Combustion Engineering, Inc., CEN-628-P, Revision 00-P, March 1996. These documents dealt with the weld zone indications that have been detected in Combustion Engineering's steam generator welded sleeves. The results of the staff's review of the operability assessments and technical report are enclosed.

Sincerely,

ORIGINAL SIGNED BY:

Clyde Y. Shiraki, Project Manager  
Project Directorate III-2  
Division of Reactor Projects - III/IV  
Office of Nuclear Reactor Regulation

9611040273 961031  
PDR ADOCK 05000304  
P PDR

Docket No. 50-304

Enclosure: As stated

cc w/encl: see next page

**NRC FILE CENTER COPY**

Distribution:

Docket File

J. Roe, JWR

C. Moore

ACRS, T2E26

PUBLIC

E. Adensam, EGA1

C. Shiraki

M. Dapas, RIII

PDIII-2 r/f

R. Capra

OGC, 015B18

E. Sullivan, 07D4

DEFOI/1

DOCUMENT NAME: ZI95183.LTR

\*Input provided by memo dated 10/23/96; no major changes

To receive a copy of this document, indicate in the box: "C" = Copy without enclosures "E" = Copy with enclosures "N" = No copy

OFFICE	PM:PDIII-2	LA:PDIII-2	EMCB	D:PDIII-2
NAME	CSHIRAKI	CMOORE	ESULLIVAN*	RCAPRA
DATE	10/31/96	10/31/96	10/23/96	10/31/96

OFFICIAL RECORD COPY

040075



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

October 31, 1996

Ms. Irene Johnson, Acting Manager  
Nuclear Regulatory Services  
Commonwealth Edison Company  
Executive Towers West III  
1400 Opus Place, Suite 500  
Downers Grove, IL 60515

SUBJECT: REVIEW OF ZION, UNIT 2, OPERABILITY ASSESSMENT #96-01283, STRUCTURAL  
INTEGRITY OF COMBUSTION ENGINEERING STEAM GENERATOR WELDED SLEEVES  
(TAC NOS. M95183 AND M95184)

Dear Ms. Johnson:

In a letter dated March 25, 1996, Commonwealth Edison Company (ComEd) submitted its initial and final operability assessments and a technical report, "Verification of the Structural Integrity of the ABB CENO Steam Generator Welded Sleeve," Combustion Engineering, Inc., CEN-628-P, Revision 00-P, March 1996. These documents dealt with the weld zone indications that have been detected in Combustion Engineering's steam generator welded sleeves. The results of the staff's review of the operability assessments and technical report are enclosed.

Sincerely,

Clyde Y. Shiraki, Project Manager  
Project Directorate III-2  
Division of Reactor Projects - III/IV  
Office of Nuclear Reactor Regulation

Docket No. 50-304

Enclosure: As stated

cc w/encl: see next page

I. Johnson  
Commonwealth Edison Company

Zion Nuclear Power Station  
Unit Nos. 1 and 2

cc:

Michael I. Miller, Esquire  
Sidley and Austin  
One First National Plaza  
Chicago, Illinois 60603

Dr. Cecil Lue-Hing  
Director of Research and Development  
Metropolitan Sanitary District  
of Greater Chicago  
100 East Erie Street  
Chicago, Illinois 60611

Phillip Steptoe, Esquire  
Sidley and Austin  
One First National Plaza  
Chicago, Illinois 60603

Mayor of Zion  
Zion, Illinois 60099

Illinois Department of Nuclear Safety  
Office of Nuclear Facility Safety  
1035 Outer Park Drive  
Springfield, Illinois 62704

U.S. Nuclear Regulatory Commission  
Zion Resident Inspectors Office  
105 Shiloh Blvd.  
Zion, Illinois 60099

Regional Administrator  
U.S. NRC, Region III  
801 Warrenville Road  
Lisle, Illinois 60532-4351

Station Manager  
Zion Nuclear Power Station  
101 Shiloh Blvd.  
Zion, Illinois 60099-2797

Document Control Desk-Licensing  
Commonwealth Edison Company  
1400 Opus Place, Suite 400  
Downers Grove, Illinois 60515

RESULTS OF STAFF REVIEW OF OPERABILITY ASSESSMENTS  
AND TECHNICAL REPORT FOR ZION NUCLEAR POWER STATION, UNIT 2

Background

Zion Nuclear Power Station, Unit 2, examined 100 percent of steam generator (SG) tube sleeves designed by ABB/Combustion Engineering (ABB/CE) using a plus point probe in its February 1995 refueling outage. Twenty nine tubes with weld zone indications (WZI) in the upper weld of the sleeve were reported. Twenty six of these tubes were returned to service and the other three were plugged.

Prairie Island, Unit 1, pulled five sleeve/tube assemblies with similar WZIs during its Spring 1996 refueling outage for metallurgical examination by ABB/CE. Because the preliminary results indicated possible issues with structural and leakage integrity, Zion, Unit 2, performed the subject operability assessment to document that the 26 sleeved tubes with WZIs were acceptable for service for the remainder of the fuel cycle. The initial operability assessment was performed on March 7, 1996. The final operability assessment was performed on March 25, 1996, to incorporate the results from, "Verification of the Structural Integrity of the ABB CENO Steam Generator Welded Sleeve," Combustion Engineering, Inc., CEN-628-P, Revision 00-P, March 1996 (final ABB/CE report). Both the initial and final operability assessments were submitted to the staff in the licensee's letter dated March 25, 1996.

Evaluation

The NRC staff reviewed the licensee's operability assessment dated March 25, 1996, to assess (1) the evaluation of the structural and leakage integrity of the defective sleeves, (2) plans regarding ultrasonic testing (UT) reanalysis of the defective sleeves, and (3) plans regarding disposition of the sleeved tubes with WZIs.

Zion, Unit 2, cited preliminary results from the ABB/CE evaluation of the pulled Prairie Island, Unit 1, sleeve/tube assemblies that found the pulled assemblies satisfied the requirements of draft Regulatory Guide 1.121, "Bases for Plugging Degraded PWR Steam Generator Tubes." The licensee then reviewed the eddy current test (EC) data for the 26 sleeves with WZIs, stated that the Prairie Island, Unit 1, indications bound the Zion, Unit 2, indications and, thus, concluded that the Zion, Unit 2, sleeve/tube assemblies also had adequate structural integrity. Since the EC method was not qualified for detection or sizing these defect types, additional data were needed for a final Zion, Unit 2, operability assessment. However, the final ABB/CE report found that the structural integrity of many similarly flawed sleeve/tube assemblies with a wide range of EC indications remained intact thus providing evidence that the Zion, Unit 2, WZIs were indeed similar to the Prairie Island, Unit 1, defects.

Zion, Unit 2, cited preliminary results from ABB/CE that indicated a sleeved tube with 360 degrees of lack of fusion (LOF) could have a maximum leakage rate of 1.4 gallons per minute (gpm) under main steam line break (MSLB) conditions. The licensee applied this leakage rate to the 18 sleeves in

ENCLOSURE

one SG to reach a 25.2 gpm leakage rate. Zion, Unit 2, had a 10 CFR Part 100 limit of 5.31 gpm based on a reactor coolant system (RCS) activity of 1 microcurie per gram dose equivalent of I-131. The licensee stated that the 5.31 gpm leakage rate, however, is actually within a small fraction of 10 CFR Part 100 dose limits, but did not provide actual dose rate calculations in the operability assessment. To provide added margin, the licensee reduced the RCS activity to 0.2 microcuries per gram, but again did not provide actual dose rate calculations. ABB/Combustion Engineering presented results in the final ABB/CE report that supported a maximum leakage rate of 0.016 gpm at MSLB conditions. In the final operability assessment, the licensee showed that applying this leakage rate to all its sleeved tubes with WZIs would result in a total leakage rate well below the 5.31 gpm 10 CFR Part 100 dose limit. The licensee raised the administrative RCS activity limit back to its original level.

Included in the final operability assessment, were the Zion, Unit 2, plans to reinspect all sleeved tubes with WZIs using the enhanced UT acquisition and analysis technique described in "Repair of Westinghouse Series 44 and 51 Steam Generator Tubes Using Leak Tight Sleeves," Combustion Engineering, Inc., CEN-629-P, Revision 00, July 1996, (new ABB/CE sleeve topical report). Recent discussions between the licensee and the staff revealed changes in the plans for Zion, Unit 2, regarding the inspection of ABB/CE sleeves. The licensee now plans to perform a 100 percent inspection of ABB/CE sleeves using the plus point probe using enhanced EC analysis guidelines. All tubes with WZIs, regardless of position of the indication with respect to the weld centerline, will be plugged. The licensee no longer intends to reinspect any in service sleeved tube using the enhanced UT acquisition and analysis technique.

### Conclusion

The NRC staff reviewed the licensee's operability assessments and determined that the initial operability assessment dated March 7, 1996, relied heavily on preliminary information from the Prairie Island, Unit 1, sleeve/tube pull results and engineering judgement. Much of this information was subsequently revised. The final operability assessment dated March 25, 1996, which was based on the final CE report, was adequate and substantiated the initial operability assessment.