

January 30, 1997

EA 96-217

Mr. J. H. Mueller
Site Vice President
Zion Generating Station
Commonwealth Edison Company
101 Shiloh Boulevard
Zion, IL 60099

SUBJECT: NOTICE OF VIOLATION (NRC INSPECTION REPORT 50-295/304/96013(DRS))

Dear Mr. Mueller:

This will acknowledge receipt of your letter dated January 22, 1997, in response to our letter dated December 23, 1996, transmitting a Notice of Violation associated with Inspection Report 50-295/304/96013(DRS). The focus of this inspection was the inservice inspection efforts at your Zion Plant. We have reviewed your corrective actions and have no further questions at this time. These corrective actions will be examined during future inspections.

Sincerely,

/s/ G. E. Grant

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PDR ADOCK 05000295
Q PDR

Geoffrey E. Grant, Director
Division of Reactor Safety

Docket No. 50-295
Docket No. 50-304

Enclosure: Ltr 01/22/97 J. H. Mueller,
ComEd, to US NRC w/encl

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January 30, 1997

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cc w/encl: Richard Hubbard
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January 22, 1997

U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Document Control Desk

Subject: Commonwealth Edison Reply to Notice of Violations in NRC Inspection
Report Number 50-295/304-96013;
Zion Nuclear Power Station Units 1 and 2;
NRC Docket Numbers 50-295 and 50-304

Reference: G. E. Grant letter to J. H. Mueller, dated December 23, 1996

Attached is the Commonwealth Edison (ComEd) response to the Notice of Violations (NOV) transmitted by the referenced letter and discussed in the subject inspection report. The NOV cited two severity level IV violations.

Zion Station recognizes the seriousness of these two violations and has developed and implemented the necessary corrective actions to assure that the violations will not be repeated.

From the standpoint of the steam generator tube violation, Zion Station has implemented and will maintain a comprehensive inspection program to assure the integrity of the steam generators. Our commitment to ensure steam generator integrity is further reflected in the comprehensive efforts that were undertaken during the recent outage, which included insitu pressure testing 33 tubes and removing 5 tubes for further metallurgical analysis.

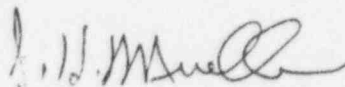
During the time period addressed by this violation, in particular, ComEd believes that it was proactive in assessing and interpreting information as it became available. As discussed in Attachment A, ComEd was closely following the issues surrounding the ABB/CE sleeve flaw indications. In many cases, ComEd served to focus the industry to resolve the technical issues. While the indications were ultimately determined to reflect flaws, the flaws themselves did not impact the structural integrity of the steam generator tubes, nor did they represent a serious potential for gross primary to secondary leakage to occur. In fact, the lessons learned by the activities surrounding the investigation of the problems led the industry to enhanced installation and inspection techniques.

Corrective actions to address the specific root causes associated with the violations are discussed in Attachment A of this letter.

ZOSR\007-97.OSR

If you have any questions or require additional information, please contact Mr. Dennis Farrar, Regulatory Assurance Manager, at (847) 746-2084, extension 3353.

Sincerely,

A handwritten signature in dark ink, appearing to read 'J. H. Mueller', with a stylized, flowing script.

J. H. Mueller
Site Vice President
Zion Station

Attachment A: Response to the Notice of Violations
Attachment B: Summary of Commitments

cc: A. B. Beach, Regional Administrator, Region III
C. Y. Shiraki, Zion Project Manager, NRR
Senior Resident Inspector, Zion Station
Office of Nuclear Facility Safety - IDNS

ATTACHMENT A
Notice of Violation Response

VIOLATION: 50-295(304)-96013-03

During an NRC inspection conducted on October 1-3, 28-30, and November 7, 1996, violations of NRC requirements were identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," NUREG-1600, the violation is listed below:

Criterion XVI, "Corrective Action," of 10 CFR Part 50, Appendix B, requires that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected.

Contrary to the above, in February 1995 and in October 1995, the licensee failed to take prompt corrective action prior to returning potentially defective steam generator tubes to service. Corrective action (an operability assessment) was not implemented until March of 1996 for the Unit 2 indications and corrective action (plugging affected steam generator tubes) was not implemented until February of 1996 for the Unit 1 indications.

This is a Severity Level IV violation (Supplement I).

REASONS FOR THE VIOLATION

ComEd acknowledges this violation.

An investigation into the issue identified 4 reasons that contributed to the violation:

1. ABB/Combustion Engineering Non-Conformance Reports (NCR's) were dispositioned consistent with the methodology employed by other utilities. This action resulted in tubes with Weld Zone Indications (WZI) being left in service. These indications were not understood prior to the availability of the Prairie Island (PI) tube metallurgical examination results.
2. NCR's were dispositioned by the vendor and not appropriately reviewed by ComEd management.
3. The Plus Point Probe was not qualified to Appendix H (of the EPRI steam generator inspection guidelines). In addition, no acceptance criteria had been developed for the Plus Point Probe.

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4. Ultrasonic Testing (UT), which was also performed, did not detect lack of fusion in very small areas in the upper sleeve welds. This was also not understood prior to the availability of the Prairie Island (PI) tube metallurgical examination results.

DISCUSSION:

On November 18, 1986 the NRC granted Zion Station approval of the ABB/CE Topical Report CEN-331-P Revision 1-P. This report described the design and qualification testing of the ABB/CE TIG welded sleeve as well as the installation and inspection requirements. Zion began using this sleeve design in October, 1986, and had installed 951 sleeves (697 Zion Unit 1, 254 Zion Unit 2) through 1992. These sleeves were installed and inspected per the requirements of the NRC approved Topical Report. This topical required visual and ultrasonic inspections to be performed for initial sleeve installation, and eddy current inspections using a crosswound probe for subsequent inspections.

In 1994, the standard crosswound eddy current inspection technique was shown to be unable to reliably detect circumferential indications in Westinghouse HEJ sleeve expansions. In an effort to better detect circumferential cracking the Plus Point probe was developed. This probe demonstrated increased sensitivity to defects in the expansion area, especially circumferentially oriented defects, by eliminating geometry interferences.

Aware of the crosswound inspection technique limitations, ComEd elected to perform Plus Point inspection in addition to the inspections required by the Topical during the February 1995 Zion Unit 2 refueling outage (Z2R13). ComEd believed this was a conservative decision and was in keeping with industry advancements. A total of 408 sleeves were inspected with Plus Point including 252 newly installed sleeves. During the inspection 26 tubes were identified as having weld zone indications (WZIs) as determined by the Plus Point Probe. These WZIs were present in both the 24 inservice and 2 newly installed sleeves. These indications were not identified on the crosswound probe inspection and did not exhibit "flawlike" eddy current responses with the Plus Point probe inspection. These inspections were believed to be due to weld geometry, probe liftoff, surface roughness and weld start-stop points.

This determination was based upon input from the two major Non-Destructive Examination (NDE) vendors involved in the Zion inspection and the EPRI NDE Center. This was supported by acceptable visual and ultrasonic inspection results. Prairie Island had also seen similar indications when using the I-Coil Probe (this is a predecessor to the Plus Point Probe), and had also dispositioned these type of indications as irrelevant based on the eddy current signal response. Considering the information available at the time of the inspection, which included input from two major NDE vendors, and the EPRI NDE Center and Prairie Island, ComEd believed that the decision to leave these type of indications in service was justified.

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During the October, 1995 Zion Unit 1 refuel outage (Z1R14), ComEd continued using the Plus Point Probe and discontinued using the crosswound probe. A total of 1716 sleeves were inspected with Plus Point including 911 newly installed sleeves. During the inspection 43 tubes were identified as having weld zone indications (WZIs) as determined by the Plus Point Probe. These WZIs were dispositioned as irrelevant indications similarly to those found in Unit 2. Again, based on the information available at the time of the inspection, ComEd believed that the decision to leave these type of indications in service was justified.

In January, 1996 Prairie Island (PI) Unit 1 began using the Plus Point Probe for sleeve inspection. One of the PI sleeves containing a WZI was identified as leaking during a secondary side pressure test at 750 psi. All WZIs contained in inservice sleeves could be identified in their previous outage which used the I-Coil Probe. This demonstrated that the indications had not changed cycle to cycle. Based on industry sensitivity to circumferential cracking, the emerging concern over the nature of the new type of WZIs being detected by the Plus Point probe throughout the industry, and the fact that one sleeve containing a WZI at PI was shown to be leaking, PI removed 5 sleeves with similar WZIs, including the leaking sleeve, for metallurgical testing and examination. The sleeves were sent to ABB/CE for testing and examination.

ComEd participated throughout the course of the PI sleeve testing and examination program. This included investigation for applicability to Zion Unit 1 and 2 and possible effect on unit operability. On February 28, 1996, ComEd personnel attended a meeting at the ABB/CE metallurgical facility to discuss preliminary sleeve analysis results. Based on the information received, Zion Station initiated a Problem Identification Form (PIF) the next day because of the questionability of the WZIs.

A review of Zion Unit 1 eddy current data for the 43 welds which were identified as having WZIs in previous outage was performed. Since Zion Unit 1 was in an unscheduled shutdown, it was conservatively decided to plug all 43 Unit 1 sleeves with WZIs prior to restarting Unit 1.

Subsequent phone calls with ABB/CE ensured ComEd that based on destructive laboratory results from the PI tube pulls, there was not an immediate structural concern and that any leakage through the weld defects would be minimal.

On March 6, 1996 a meeting between ComEd / PI and NRR took place to discuss the sleeve analysis results, the root cause, and the corrective actions. Based on this meeting, ComEd concluded that the WZIs were actual defects and not irrelevant indications as previously believed. An Operability Assessment was immediately initiated for Unit 2 for the 26 WZIs which were in service.

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On March 7, 1996 the Unit 2 initial operability assessment was completed. Unit operability was based on PI eddy current indications bounding Zion Unit 2 data, metallurgical results from the PI sleeves which indicated structural integrity would be maintained, and recognition that possible leakage from sleeves with WZI indications would be minimal. As additional data became available the initial operability assessment was enhanced and was submitted to the NRC on March 25, 1996. The NRC reviewed the operability assessment and issued a letter on October 31, 1996, which concluded, "The final operability assessment dated March 25, 1996, which was based on the final CE report, was adequate and substantiated the initial operability assessment."

CORRECTIVE STEPS THAT HAVE BEEN TAKEN AND RESULTS ACHIEVED

On March 28, 1996, a meeting between ComEd / PI and NRR took place to explain the basis for unit operability, the root cause for the poor sleeve installation, and the corrective actions to ensure proper installation.

Subsequently, ABB/CE issued report CEN-628-P Revision 01 to address the resolution of problems which resulted in the WZIs and poor sleeve installations. This report included discussions on the following:

- PI sleeve metallurgical results
- Root cause and corrective actions for the weld inclusions
- Enhancements to the eddy current inspection techniques
- Enhancements to the ultrasonic technique
- Laboratory test results demonstrating the bounding structural and leakage potential for the type of defects found at PI

The brush used in the cleaning and preparation process was determined to be the root cause of the weld indications. The brush manufacturer had been changed by CE and the "new" brush did not perform adequately. (See CE Topical Report, "Verification of Structural Integrity of the ABB CENO Steam Generator Welded Sleeve," CEN-628-P). The corrective action was to revert to the brush type that was originally used to qualify the sleeve and the development of specific acceptance criteria for the visual inspection of the tube inner diameter (ID) surfaces after cleaning, to ensure that the inner surface oxides are removed.

The ultrasonic inspection (UT), performed after the sleeve is installed, was not able to detect a lack of fusion in very small areas in upper sleeve welds. An improved UT methodology has been developed and qualified to improve the sensitivity of the UT system. Specific inspection criteria is now in place for application of this technique.

The Plus Point probe as used in 1995 was not appendix H qualified and the EC analysts did

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not have experience with the probe. The implemented corrective action has been: a.) The Plus Point Probe has now been qualified to EPRI guidelines, and analysis guidelines have been provided to analysts on the use of the probe; b.) Specific acceptance criteria has been developed for the dispositioning of EC indications in the weld; and c.) The analysts have been required to pass a site specific test on the plus point probe in order to successfully demonstrate their ability to use and interpret their signals.

The sleeve indications had been documented in CE travelers and non-conformance reports which had been issued concerning the indications. Further evaluation should have been performed to document the process of dispositioning these indications. The corrective action has been to: a.) Develop a process flow chart describing the proper process for dispositioning these indications. The flow chart provides direction in recording and evaluating all upper weld zone indications; and b.) Disposition vendor NCRs to Station PIFs.

In addition, a License Amendment Request was submitted to the NRC to reflect Zion's commitment to utilize the enhanced cleaning and inspection processes described in CE Topical Report CEN-629-P.

All corrective actions listed above were implemented for the Z2R14 outage which began in September of 1996.

DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED

Zion Station is currently in full compliance.

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VIOLATION: 50-295(304)-96013-04

During an NRC inspection conducted on October 1-3, 28-30, and November 7, 1996, violations of NRC requirements were identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," NUREG-1600, the violation is listed below:

10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," states that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate for the circumstances.

10 CFR 50.55a(g)(4)(ii) requires the inservice examination of components to comply with the ASME Code incorporated by reference.

ASME Code, 1980 Edition Winter 1981 Addenda, Section XI, Table IWF-2500-1, requires a VT-3 inspection on component supports that includes the support up to the building structure.

ASME Code, Section XI, paragraph IWA-2213(b) requires that, "The VT-3 visual examination may require, as applicable to determine structural integrity, the measurement of clearances, detection of physical displacement, structural adequacy of supporting elements...."

Contrary to the above, on September 5, 1996, procedure VT-3/4-1, revision 2, "VT-3/4 Visual Inspection Performed for Section XI," was used for an inspection and did not specify acceptance criteria for clearances between the building structure and the pipe support baseplate.

This is a Severity Level IV violation (Supplement I).

REASONS FOR THE VIOLATION

ComEd acknowledges this violation. The Visual Inspection procedure for supports, VT-3/4-1, has general instructions for the identification of support deficiencies. These deficiencies include structural distortion, loose mechanical connections, and mechanical attachments to the building structure. Additionally, the procedure also requires the inspector to record any observed conditions not specifically addressed and as a minimum record them for Information Only.

The following sections of the VT-3/4-1 procedure requires that the inspector report gap

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related deficiencies:

- 1) VT-3/4-1 section 6.3.1.h states to identify "Any evidence of physical displacement, distortion, or clearance not meeting the design drawing (if required)."
- 2) VT-3/4-1 section 6.3.2.c states to identify "Any significant lack of bearing surface contact (with the exception of normal surface irregularities)."

These indications are then required to be reviewed and evaluated by the Station Level III VT inspector. The requirements cited above were included in the VT-3/4-1 procedure used in the 1992/93 time frame during which the supports cited in this violation were inspected, per the ISI inspection schedule.

Nevertheless, even though all inspectors were properly trained in the use of the VT-3/4-1 procedure, the indications were not identified by the individual inspectors and were not recorded.

CORRECTIVE STEPS THAT HAVE BEEN TAKEN AND RESULTS ACHIEVED

The pipe supports that were cited in the violation were bounded by the evaluation performed on Operability Assessment #ER9604805 and were found to be within design limits with no further actions needed. The supports are listed below:

For Unit 1 - SIH-1058, SIRS-1229, SIH-1059, SIH-1057, SIH-1057A, SIH-1057B, SIH-1055, SIRS-1230, SIH-1056.

For Unit 2 - 2MSRS-1133B, ASH-2123, FWRS-2250, FWRS-2251, FWRS-2253, FWRS-2252.

Component Examination Detail Instruction, (CEDI) #2VT-3/4-1 was written and approved for use on January 9, 1997, and a copy of this CEDI has been distributed to all Zion VT-3/4 Visual Inspectors to supplement the inspections on those supports with baseplates. The CEDI incorporates the requirements of ComEd corporate procedure NSWP S-05 as the recording criteria that will be followed. The inspection criteria are as follows:

- 1) Check for gaps between the concrete surface and the anchor plate by using a 1/32" feeler gauge along the entire perimeter of the anchor plate.
- 2) The anchor plate and the concrete surface shall be considered in contact if a 1/32" feeler gauge inserted between them makes contact with both surfaces. The anchor

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plate shall be checked for contact/gap along the entire perimeter.

- 3) If this gap criteria cannot be met then the gap location and the gap length and depth must be recorded and the gap considered a recordable indication on the VT-3/4-1 data sheet.
- 4) The Station VT level III shall initiate an engineering evaluation to disposition the indication.
- 5) All dispositioned indications shall be recorded in the station ISI program database with the appropriate support number for future ISI inspections.

CORRECTIVE STEPS THAT WILL BE TAKEN TO AVOID FURTHER VIOLATIONS

The Station Level III Inspector will discuss the purpose and use of CEDI # 2VT-3/4-1 with the certified visual inspectors at Zion Station and the Site ANII Inspector by February 21, 1997. Visual inspections performed after this date without the appropriate VT procedure and CEDI number referenced will not be accepted by the Station Level III Inspector or by the Site ANII Inspector.

ComEd has initiated a review of Section XI applicable pipe supports with baseplates to verify gap compliance. This initial review will focus on a sufficient population of baseplates to provide reasonable assurance that a gap concern affecting the operability of supports is not an issue at Zion. This initial review will be complete prior to Unit-2 leaving cold shutdown in the current Z2R14 outage. Subsequently, Zion will undertake a more in-depth review of baseplates throughout the safety related systems of the station. The number of supports reviewed will be based on support location, radiation levels, the need for scaffolding and support configuration. Zion will complete this in-depth baseplate inspection for Unit-1 no later than 90 days after the next Unit-1 refueling outage (Z1R15), which is currently scheduled to begin April 5, 1997. The Unit-2 inspections will be completed no later than 90 days after the next Unit-2 refueling outage (Z2R15), which is currently scheduled to begin March 21, 1998.

DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED

Zion Station inservice inspection procedure VT-3/4-1, revision 2, "VT-3/4 Visual Inspection Performed for Section XI," is currently in full compliance with the addition of form CEDI # 2VT-3/4-1. As noted above, additional walkdowns for gap measurements will be performed

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on ASME Section XI applicable code piping supports with baseplates to verify gap compliance.

ATTACHMENT B

Summary of Commitments identified in this Violation Response:

The Station Level III Inspector will discuss the purpose and use of CEDI # 2VT-3/4-1 with the certified visual inspectors at Zion Station and the Site ANII Inspector by February 21, 1997. Visual inspections performed after this date without the appropriate VT procedure and CEDI number referenced will not be accepted by the Station Level III Inspector or by the Site ANII Inspector.

ComEd has initiated a review of Section XI applicable pipe supports with baseplates to verify gap compliance. This initial review will focus on a sufficient population of baseplates to provide reasonable assurance that a gap concern affecting the operability of supports is not an issue at Zion. This initial review will be complete prior to Unit-2 leaving cold shutdown in the current Z2R14 outage. Subsequently, Zion will undertake a more in-depth review of baseplates throughout the safety related systems of the station. The number of supports reviewed will be based on support location, radiation levels, the need for scaffolding and support configuration. Zion will complete this in-depth baseplate inspection for Unit-1 no later than 90 days after the next Unit-1 refueling outage (Z1R15), which is currently scheduled to begin April 5, 1997. The Unit-2 inspections will be completed no later than 90 days after the next Unit-2 refueling outage (Z2R15), which is currently scheduled to begin March 21, 1998.