



Commonwealth Edison
1400 Opus Place
Downers Grove, Illinois 60515

July 22, 1994

Mr. William Russell, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington D.C. 20555

Attention: Document Control Desk

Subject: Commonwealth Edison Company
10 CFR Part 21 Final Report (File 94-07)
Body to Bonnet Nuts on Copes-Vulcan Air Operated Valves

Dear Mr. Russell:

The purpose of this letter is to notify the NRC Staff of concerns by ComEd toward the cracks found in body to bonnet nuts on Copes-Vulcan air operated valves. These nuts were supplied by Erie Fastener & Industrial Supply, Inc. to Copes-Vulcan Inc. for use on air operated valves installed in safety-related applications at Braidwood and Byron Stations.

*Nuc. Mfg. Div., ERIC PA-16512
3902 W. 18th St.*

It has been determined that this deviation could create a substantial safety hazard for the following two reasons:

- ▶ The discovery of three nuts with indications on one valve, and the fact that the failure of two or more adjacent nuts could jeopardize the integrity of the reactor coolant pressure boundary.
- ▶ Some of the affected valves are ASME Class 1. The ASME Code acceptance criteria for Class 1 bolting specifies that no radial indications are allowed. This requirement was not met.

Braidwood Station replaced the accessible nuts with heat number I on affected Unit 1 valves during the most recent refuel outage (Spring, 1994). Also during this outage, magnetic particle inspection of all the removed nuts was performed. Six nuts of heat number I were found with indications, and all were replaced. Similarly, nuts with heat number I were replaced on affected Unit 2 valves. Magnetic particle inspection of all the removed nuts was performed. Five nuts of heat number I were found with indications, and all were replaced.

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Mr. W. T. Russell

2

July 22, 1994

A magnetic particle inspection was performed on 25% of the total number of Braidwood Unit 1 and 2 valves with nuts of heat number H. All six nuts on four out of these sixteen valves with nuts of heat number H were tested. No indications were found.

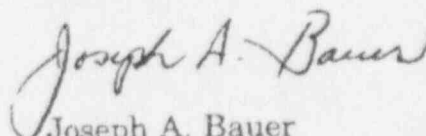
A 100% visual inspection of nuts of both heat numbers H and I were completed on both units at Byron Station. During the next Byron Unit 1 refuel outage (Fall, 1994), accessible nuts with heat number I will be replaced. Also during this outage, 10% of the nuts of heat number H will be randomly chosen for magnetic particle inspection.

Magnetic particle inspection of 10% of the combined suspected population of heat numbers H and I was performed during the most recent Unit 2 refuel outage (Fall, 1993). No indications were found during this inspection. The future course of action on Unit 2 will depend on the results of a metallurgical examination of a sample of the Braidwood nuts in which indications were found. The next Unit 2 refuel outage is in the Spring of 1995.

Provided as an attachment to this letter is ComEd's notification in accordance with the requirements of 10 CFR Part 21.

If there are any questions regarding this notification, please direct them to this office.

Respectfully,



Joseph A. Bauer
Nuclear Licensing Administrator

Attachment: 10 CFR Part 21 Final Report

cc: J.B. Martin, Regional Administrator - RIII
H. Peterson, Senior Resident Inspector - Byron
S. G. Dupont, Senior Resident Inspector - Braidwood
R. Capra, Directorate III-2 Director, NRR
R. R. Assa, Braidwood Project Manager, NRR
G. F. Dick, Byron Project Manager, NRR
Office of Nuclear Facility Safety - IDNS

10 CFR Part 21 NOTIFICATION

Body to Bonnet Nuts on Copes-Vulcan Air Operated Valves
(Nuts are sizes 1-1/4" and 1-1/8", with heat numbers I and H, respectively)

10 CFR Part 21 File No. 9407

Applicability

This notification is submitted in accordance with the requirements of 10 CFR 21, sections 21.1(b), 21.3a(3), and 21.3.d(4).

Identification of Facility and Component

This notification concerns cracked body to bonnet nuts supplied by Erie Fastener & Industrial Supply, Inc. to Copes-Vulcan Inc. for use on air operated valves installed in safety-related applications at Braidwood and Byron Stations. No other ComEd Stations are affected by this Part 21 notification.

Identification of Component Manufacturer

Copes-Vulcan, Inc.
P.O. Box 577
Lake City, Pa. 16423
Phone: (814) 774-3151

Nature of Defect

Two cracked hex nuts (1-1/4", heat number I) in non-adjacent positions were identified on one Copes-Vulcan valve (1CV121, Class 2) at Byron Station. One cracked nut (1-1/8", heat number H) was also identified on another Copes-Vulcan valve (2CV8145, Class 1). The failed nuts were replaced. Two of these nuts, one of each heat number, were sent to a metallurgical laboratory to be analyzed. This analysis determined that the nuts had failed from the application of stress in the presence of intergranular cracking caused by pre-existing quench cracks from the manufacturing process.

Two cracked nuts (1-1/4", heat number I) in non-adjacent positions were also identified on one Copes-Vulcan valve (2CV8146, Class 2) at Braidwood Station. The failed nuts were replaced.

All accessible valves with the suspect heat numbers in Byron Unit 1 and Braidwood Unit 2 were visually examined. No other failures were noted. Calculations were performed to quantify the impact of body to bonnet bolting nut failures on the reactor coolant pressure boundary. It was concluded that the failure of two non-adjacent nuts would not cause the valve to catastrophically fail and, therefore, was not a substantial safety hazard. On the bases that none of the

failed bolts were adjacent to each other and no indications were found on those nuts that were visually inspected, it was determined that there was no substantial safety hazard and this issue was not reportable.

Subsequently, Byron and Braidwood Stations performed magnetic particle examinations based on the recommendation of ComEd's System Materials Analysis Department. During the Braidwood Unit 1 refuel outage, linear indications in the radial direction were found on three hex nuts on the same Copes-Vulcan valve (1CV8149B, Class 2). None of the nuts had actually failed. Based on this additional information, ComEd reevaluated this issue for reportability.

It has been determined that this deviation could create a substantial safety hazard for the following two reasons:

- The discovery of three nuts with indications on one valve, and the fact that the failure of two or more adjacent nuts could jeopardize the integrity of the reactor coolant pressure boundary.
- Some of the affected valves are ASME Class 1. The ASME Code acceptance criteria for Class 1 bolting specifies that no radial indications are allowed. This requirement was not met.

Time of Discovery

The original evaluation of this issue was begun on May 12, 1993. The evaluation concluded that since none of the failed nuts were adjacent to each other, this was not a safety significant issue.

On May 24, 1994, an evaluation of this issue was initiated for Part 21 reportability after three nuts on the same valve were found with radial indications during a magnetic particle inspection.

Corrective Actions

Immediate corrective action was to identify the locations of the Copes-Vulcan valves which have size 1-1/4" nuts with heat number I and size 1-1/8" nuts with heat number H.

Byron:

A 100% visual inspection of nuts of both heat numbers H and I were completed on both units.

During the next Unit 1 refuel outage (Fall, 1994), nuts with heat number I will be replaced. All six nuts will be replaced on those valves where nuts are accessible and five of the six nuts will be replaced on those valves with limited access due to the position of leak-off lines. Previous calculations have shown that the ASME

Code stress analysis will be met with only five of the six nuts. Also during this outage, 10% of the nuts of heat number H will be randomly chosen for magnetic particle inspection.

Magnetic particle inspection of 10% of the combined suspected population of heat numbers H and I was performed during the most recent Unit 2 refuel outage (Fall, 1993). No indications were found during this inspection.

The future course of action on Unit 2 will depend on the results of a metallurgical examination of a sample of the Braidwood nuts in which indications were found. The next Unit 2 refuel outage is scheduled for the Spring of 1995.

Because the nuts with heat number I are scheduled to be replaced in the future, an operability evaluation, for both Units 1 and 2, of all the affected valves with nuts of heat numbers H and I was completed on June 22, 1994. This evaluation concluded that all valves are operable.

Braidwood:

Nuts with heat number I were replaced on affected Unit 1 valves during the most recent refuel outage (Spring, 1994). All six nuts were replaced on those valves whose nuts were accessible and five of the six nuts were replaced on those valves with limited access due to the position of leak-off lines. Previous calculations have shown that the ASME Code stress analysis will be met with only five of the six nuts. Also during this outage, magnetic particle inspection of all the removed nuts was performed. Six nuts of heat number I were found with indications, and all were replaced.

Similarly, nuts with heat number I were replaced on affected Unit 2 valves. All six nuts were replaced on those valves whose nuts were accessible and five of the six nuts were replaced on those valves with limited access due to the position of leak-off lines. Previous calculations have shown that the ASME Code stress analysis will be met with only five of the six nuts. Magnetic particle inspection of all the removed nuts was performed. Five nuts of heat number I were found with indications, and all were replaced.

A visual inspection of all accessible nuts of both heat numbers H and I was also completed on Unit 2. No indications were found.

A magnetic particle inspection was performed on 25% of the total number of Unit 1 and 2 valves with nuts of heat number H. All six nuts on four out of these sixteen valves with nuts of heat number H were tested. No indications were found.

A 50.59 safety evaluation for both Braidwood units, including all valves with nuts of both heat numbers, was completed after this corrective action was completed.

Number and Location of All Defective Components

Copes-Vulcan valves (sizes 1-1/4" and 1-1/8") with nuts of heat numbers H and I are only installed at Byron and Braidwood Stations.

The affected valves are:

Byron

1 & 2 CV121 (I)
 1 & 2 CV182 (I)
 1 & 2 CV184 (H)
 1 & 2 CV459 (I)
 1 & 2 CV460 (I)
 1 & 2 CV8145 (H)
 1 & 2 CV8146 (I)
 1 & 2 CV8147 (I)
 1 & 2 CV8149A (I)
 1 & 2 CV8149B (I)
 1 & 2 CV8149C (I)
 1 & 2 CV8324A (I)
 1 & 2 CV8324B (I)
 1 & 2 CV8389A (I)
 1 & 2 CV8389B (I)
 1 & 2 RC8036A (H)
 1 & 2 RC8036B (H)
 1 & 2 RC8036C (H)
 1 & 2 RC8036D (H)
 1 & 2 RC8037A (H)
 1 & 2 RC8037B (H)
 1 & 2 RC8037C (H)
 1 & 2 RC8037D (H)
 1 & 2 RY455A (I)
 1 & 2 RY456 (I)

Braidwood

1 & 2 CV121 (I)
 1 & 2 CV182 (I)
 1 & 2 CV184 (H)
 1 & 2 CV459 (I)
 1 & 2 CV460 (I)
 1 & 2 CV8145 (H)
 1 & 2 CV8146 (I)
 1 & 2 CV8147 (I)
 1 & 2 CV8149A (I)
 1 & 2 CV8149B (I)
 1 & 2 CV8149C (I)
 1 CV8324A (I)
 1 CV8324B (I)
 1 CV8389A (I)

 1 & 2 RC8036A (H)
 1 & 2 RC8036B (H)
 1 & 2 RC8036C (H)
 1 & 2 RC8036D (H)
 1 & 2 RC8037A (H)
 1 RC8037B (H)
 1 RC8037C (H)

 1 & 2 RY455A (I)
 1 & 2 RY456 (I)

It will be confirmed that Copes-Vulcan valves and spare parts in the Byron and Braidwood storerooms are acceptable.

Contacts

Questions pertaining to this notification should be addressed to:
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 Part 21 Coordinator
 Nuclear Engineering and Technology Services
 ComEd
 1400 Opus Place, Suite 400
 Downers Grove, IL 60515.
 (708) 663-3753