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New York Power Authority

June 22, 1994
IPN-94-072

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Station P1-137
Washington, DC 20555

Subject: Indian Point 3 Nuclear Power Plant
Docket No. 50-286
License No. DPR-64
Report of a Defect Under 10 CFR 21
"Defect in a Valve Actuator for a Copes Vulcan Valve"

Dear Sir:

The attached report of a defect is being submitted as required by 10 CFR 21.21(c)(3)(i). The Authority initially notified the NRC Operations Center of the defect on May 25, 1994. Also attached are the commitments made by the Authority in this submittal. If you have any questions, please contact Mr. P. Kokolakis at (914) 681-6254.

Very truly yours,

W. A. Josiger
Acting Executive Vice President
Nuclear Generation

att: as stated
cc: see next page

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Mr. J. R. Scarpelli
Director, Quality Assurance
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Lake City, PA 16423-0577

10 CFR 21 REPORT FOR COPES VULCAN VALVE

I. Name and Address

W. A. Josiger
New York Power Authority
123 Main Street
White Plains, NY 10601

II. Basic Component

The defect was found in the Actuator Spring Adjusting Nut for the Pressurizer Power Operated Relief Valve (Copes Vulcan Part No. 137610, Drawing No. L-181214, Item 10). This defect was found while attempting to install a spare actuator on a power operated relief valve (PORV) at the Indian Point 3 Nuclear Power Plant.

III. Supplier

The spare valve actuator was originally supplied by Copes Vulcan, Inc. (Martin and Rice Avenues, Lake City, Pennsylvania 16423-0577) in 1986 to Consolidated Edison, who supplied it to the New York Power Authority (NYPA) in 1994.

IV. Defect and Safety Hazard

Non-conformance: Each PORV has a spring adjusting nut and a spring adjusting screw. The spring adjusting nut is threaded to allow movement of the nut along the spring adjusting screw. The spring adjusting nut is used to adjust tension in the spring and thereby control both the nitrogen volume used during each valve stroke, and valve stroke time. All spring adjusting nut threads were found stressed or loaded (damaged) to the point where the thread dimensions were either impossible to measure or were not within specified manufacturer drawing tolerances.

Evaluation: The Authority recently discovered damaged threads in a spring adjusting nut that was supplied to the Authority as part of an assembled Copes Vulcan model D-100-160 diaphragm actuator. The discovery was made during an investigation which was conducted after an unsuccessful attempt to install a spare actuator on a power operated relief valve. An evaluation of this nonconformance was performed, and it was determined that there could be a loss of valve function if the spring adjusting nut threads failed, and that the potential to create a substantial safety hazard therefore existed, as defined in 10 CFR 21.3(m).

- The PORVs are a basic component since they must operate to provide a Reactor Coolant System pressure boundary; mitigate a

loss of all feedwater by allowing the use of safety injection pumps in the feed and bleed for recirculation mode; provide Reactor Coolant System overpressurization protection during transients; prevent undesirable opening of the pressurizer code safety valves; and provide low temperature overpressure protection of the reactor vessel.

- The nonconformance is classified as a deviation since the manufacturer's guidance for PORV actuator setup requires use of the spring adjusting nut to minimize the nitrogen volume used during each valve stroke. For the valve to perform the functional requirements specified in the procurement document, there must be adequate nitrogen for operation. This is provided by minimizing the nitrogen required for each operation.

- There could be a loss of valve function if the spring adjusting nut threads failed. Spring adjusting nut failure was assumed because: Copes Vulcan could not calculate the strength of the damaged threads; Copes Vulcan confirmed the potential for undercut screw threads to cause nut thread damage; and, the defective assembly has not been tested (e.g., load tested) to evaluate whether there is a failure mechanism.

- The loss of valve function could create a substantial safety hazard because, considering an independent single failure, there could be a loss of Reactor Coolant pressure boundary isolation. At this time, further evaluation is being performed to determine whether the defect occurred prior to shipment from the manufacturer or at Indian Point 3, and this report will be updated.

The spring adjusting nut nonconformance was recognized on February 4, 1994, following an unsuccessful NYPA attempt to install a new valve actuator assembly to valve RC-PCV-456 (Pressurizer PORV).

The new actuator was never installed on valve RC-PCV-456 because the new spare valve stem could not be screwed into the operator assembly during a trial installation performed in the NYPA maintenance shop. The spring hardware nonconformance was discovered at that time.

Three components were shipped to Copes Vulcan for evaluation. These were the spring adjusting nut (Copes Vulcan Part No. 137610, Drawing No. L-181214, Item 10), the spring adjusting screw (Copes Vulcan Part No. 137611, Drawing No. L-181214, Item 11), and the yoke (Copes Vulcan Part No. 137608, Drawing No. L-181214, Item 23). The following was determined:

- Copes Vulcan could not evaluate the spring adjusting nut since the threads appeared to have been stressed or loaded to the point that thread dimensions were not recoverable. The high stresses could occur if the actuator was assembled and tested with the spring adjustment nut set at the lowest point on the screw threads (where, due to an undercut of the first three threads on the spring adjustment screw, incomplete thread engagement can occur).

- If the spring adjusting nut failed, the PORV actuator spring could lose approximately 2 1/8 inches of precompression and be unable to maintain the valve in the closed position under design or normal operating conditions.

At the time of the notification (May 25, 1994), the Authority believed that the hardware nonconformance had most probably existed when the actuator was shipped from Copes Vulcan in 1986 because:

- The Authority did not perform any operational tests on this actuator prior to discovering the hardware nonconformance and the nonconformance was not consistent with cross-threading.

- Con Edison has confirmed that this actuator remained undisturbed in their warehouse from 1986 to 1994, when the Authority received the actuator from Con Edison.

- The nonconformance would not be detected by normal receipt inspection methods with the operator fully assembled.

The Authority has identified additional information since the initial notification. The spring adjusting nut, the spring adjusting screw, and the yoke were returned to the Authority by Copes Vulcan on June 6, 1994. When received, the material condition of the components caused further evaluation of issues that had not been fully addressed when the deficiencies were first identified. The material conditions and results were:

- The inside of the spring adjusting screw was observed to have scoring on one side. The maintenance engineer concluded that the scoring most probably resulted from screwing in the valve stem through the yoke when the trial installation was performed in the maintenance shop. The valve stem most probably entered the inside of the spring adjusting screw at an angle and off center due to a nonconformance in the valve yoke. The threaded hole for the stem in the actuator yoke (as originally

shipped) did not meet manufacturer's drawing tolerances for concentricity and perpendicular alignment.

- The lower inside of the spring adjusting screw was observed to have relatively deep scoring on one side. Maintenance established that the yoke threads had been cleaned using a tap during the trial installation in the maintenance shop. The maintenance engineer has postulated that the observed spring adjusting screw thread damage could have been caused if the spring adjusting screw was turned while the actuator was loaded and the spring adjusting screw was off vertical. The maintenance engineer interviewed the work crew involved with this job to determine if the spring adjusting screw thread damage occurred during the tapping operation. The work crew can remember no movement of the spring adjusting screw or spring adjusting nut while the tapping was being performed. The spring exerts about 13,400 pounds on the top of the spring adjusting screw, which would limit movement of the spring adjusting screw or spring adjusting nut while tapping. Therefore, the maintenance engineer concluded that the spring adjusting screw thread damage was unlikely to have been caused by the tapping operation.

- The maintenance engineer identified damage to the threads of the spring adjusting screw which had not been previously identified by the Authority evaluators or discussed by Copes Vulcan in their communications. The damage was consistent with movement of the spring adjusting screw since the threads were rolled and not cross threaded.

The new information, summarized above, raised questions about the conclusions in the part 21 notification. The Authority is planning testing to address these questions by further evaluation of the cause of the nonconformance and the capability of the valve to perform its design function. The current plan is to retain a consultant to perform the following:

- perform a visual examination of the parts to evaluate the possible cause of the thread failure (e.g., due to rotation, due to axial load, some loading combination); and

- determine whether the as found threads were capable of performing the functional requirements of the valve.

Therefore, at this time, it is not known whether the nonconformance occurred prior to shipment from the manufacturer or at the Indian Point 3

site. This report will be updated when the above evaluations are completed.

V. Date

The nonconformance, identified on February 4, 1994, was determined to be a potential defect by the Authority on March 24, 1994, following receipt of Copes Vulcan's preliminary inspection results of the defective part. On May 25, 1994, the Authority's evaluation of the nonconformance concluded that the condition constitutes a defect as defined in 10 CFR 21.3(d)(1) since the deviation could create a substantial safety hazard.

VI. Location and Number of Defective Components

The number and location of all such components in use at, supplied for, or being supplied for one or more facilities or activities is not available to the Authority.

A review of the work history was performed on the INPO Nuclear Network for Copes Vulcan valve and PORV failures. The Nuclear Plant Reliability Data System work history was reviewed for the same model number actuator and no instances of failure were identified. Based on this review, the Authority has no reason to believe that this damage was generic in nature at Indian Point 3 or other plants.

VII. Corrective Action

Copes Vulcan has instituted an upgrade on their spring adjustment screw which reduces the thread undercut area to prevent the possibility of failures of this type.

Corrective actions by the Authority are as follows:

1. The Maintenance Department will retain a consultant to perform tests to further evaluate the cause of the nonconformance and the capability of the valve to perform its design function. The testing and evaluation of results is scheduled for completion by September 30, 1994. The Authority will supplement this letter to report additional findings, 30 days after the results of testing have been accepted by the Authority.

2. The Maintenance Department, by letter dated May 25, 1994, requested a list of design changes/upgrades from Copes Vulcan in order to evaluate the need for corrective action on existing valves. These changes will be evaluated by August 31, 1994.

3. The Maintenance Department will develop a plan and review the existing warehouse stock of Copes Vulcan valves and parts for deficiencies. The review is scheduled for completion by August 31, 1994.

VIII. Advice

Advice may be given following testing. As mentioned in section VI above, there is no current evidence that the defect is generic.

COMMITMENTS ASSOCIATED WITH IPN-94-072

Number	Commitment	Due
IPN-94-072-01	The Maintenance Department will retain a consultant to perform tests to further evaluate the cause of the nonconformance and the capability of the valve to perform its design function. The testing and evaluation of results is scheduled for completion by September 30, 1994. The Authority will supplement this letter to report additional findings, 30 days after the results of testing have been accepted by the Authority.	September 30, 1994
IPN-94-072-02	The Maintenance Department, by letter dated May 25, 1994, requested a list of design changes/upgrades from Copes Vulcan in order to evaluate the need for corrective action on existing valves.	August 31, 1994
IPN-94-072-03	The Maintenance Department will develop a plan and review the existing warehouse stock of Copes Vulcan valves and parts for deficiencies.	August 31, 1994