

NON-PUBLIC?: N
ACCESSION #: 8802100013

LICENSEE EVENT REPORT (LER)

FACILITY NAME: Three Mile Island, Unit 2 PAGE: 1 of 6

DOCKET NUMBER: 05000320

TITLE: Failure of the Locknut and Stemnut for Isolation Valve DH-V-4A
EVENT DATE: 10/09/87 LER #: 87-012-00 REPORT DATE: 02/03/88

OPERATING MODE: N POWER LEVEL: 000

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION

Other - Special Report

LICENSEE CONTACT FOR THIS LER:

NAME: Russell D. Wells, TMI-2 Licensing Engineer
TELEPHONE #: 717-948-8693

COMPONENT FAILURE DESCRIPTION:

CAUSE: B SYSTEM: BP COMPONENT: ISV MANUFACTURER: L200
REPORTABLE TO NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT: On October 9, 1987, a flush of the Decay Heat Removal System Piping was completed which required containment isolation valve DH-V-4A to be closed. Following the evolution at 0230 hours on October 9, 1987, the breaker for DH-V-4A was energized. Control Room Operators noticed that the valve position indicator was cycling open and closed. The breaker for DH-V-4A was de-energized and an Unit Work Instruction (UWI) was issued to repair the valve. On October 24, 1987, Maintenance Personnel energized the breaker for DH-V-4A from the Motor Control Center. Subsequent operation of the valve indicated a problem with the valve assembly. On October 25, 1987, Maintenance inspected DH-V-4A and observed that the locknut was uncoupled from the drive sleeve assembly, which was cracked. The root cause of this event was determined to be the failure to stake the locknut and drive sleeve assembly resulting in the geared limit switch alternatively indicating open and closed. The locknut and drive sleeve assembly were replaced and the locknut was staked to the drive sleeve assembly. DH-V-4A was restored to operable status at 1818 hours on October 30, 1987. Isolation valve DH-V-4B was inspected and observed to be in a satisfactory

condition. Similar type valves are also being inspected.

Though this event is not reportable per 10 CFR 50.73, a Special Report is being submitted due to the potential generic implications.

(End of Abstract)

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I. PLANT OPERATING CONDITIONS BEFORE THE EVENT

The TMI-2 facility was in a long-term cold shutdown state; the defueling evolution was in progress. The reactor decay heat was being removed via loss to ambient. Throughout this event there was no affect on the Reactor Coolant System or the core.

II. STATUS OF STRUCTURES, COMPONENTS, OR SYSTEMS THAT WERE INOPERABLE AT THE START OF THE EVENT AND THAT CONTRIBUTED TO THE EVENT

N/A

III. EVENT DESCRIPTION

This event concerns containment isolation valve DH-V-4A (IEEE 803 A Code-ISV). This motor-operated valve isolates penetration R-589 and is located on the discharge line from the 'A' Decay Heat Line (IEEE 805 Code-BP) to the Reactor Coolant System (RCS) (IEEE 805 Code-AB). This valve is normally maintained closed and its position is verified monthly via Surveillance Procedure 4210-SUR-3244.01, "Containment Integrity Verification-Recovery Mode." However, this valve is allowed open for boron addition to the RCS via a NRC-approved procedure. The following locations are applicable to this event:

Control Room (IEEE 805 Code-NA_) - Contains a position indicator and remote operation capability for DH-V-4A

Motor Control Center (MCC) - Contains the breaker for DH-V-4A. Located in the Auxiliary Building (IEEE 805 Code-NF).

Local Control Station - Contains a position indicator and local operation capability for DH-V-4A. Located in the Fuel Handling Building (FHB, IEEE Code-ND).

Mini Decay Heat Cooler Room - Contains DH-V-4A and is located in

the FHB.

On October 9, 1987, a flush of the Decay Heat Removal System Piping, via NRC-approved Special Operating Procedure (SOP) 4250-4330-87-065, was completed. This SOP required DH-V-4A to be closed and red-tagged; as an additional precaution the breaker for DH-V-4A was de-energized at the MCC. At 0230 hours on October 9, 1987, upon completion of the above evolution, the breaker for DH-V-4A was re-energized. Control Room Operators observed that the valve position indicator located in the Control Room was cycling open and closed. Operators then de-energized the breaker for DH-V-4A when the valve indicated closed and an Incident Event Report was initiated to document this event.

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On October 24, 1987, Maintenance personnel initiated troubleshooting of DH-V-4A via NRC-approved Unit Work Instruction (UWI) 4220-3212-87-H694. The breaker for DH-V-4A was re-energized at the MCC. At the Motor Control Center in the Auxiliary Building, maintenance personnel observed that neither the "open" or "closed" contactor energized. Maintenance personnel then cycled DH-V-4A several times and observed that the open and closed contactors energized correctly which indicated that a problem existed with the valve assembly. The breaker for DH-V-4A was de-energized with the valve position indicating open.

On October 25, 1987, Maintenance personnel entered the Mini Decay Heat Cooler Room in the FHB where DH-V-4A is located. The valve was observed to be in the open position by evidence of the valve stem position. However, it was observed that the locknut (see attached figure) was uncoupled from the drive sleeve assembly. The drive sleeve assembly was cracked circumferentially a few threads down from the top. Additionally, the stemnut had run up the valve stem and disengaged from the splines on the inside of the drive sleeve assembly.

Maintenance personnel observed that the apparent root cause of this event was the failure to properly stake the locknut to the drive sleeve assembly thus resulting in the locknut uncoupling from the drive sleeve assembly. Additionally, based on discussions with operations and maintenance personnel, it was determined that when the switching and tagging order for DH-V-4A was cleared on October 9, 1987, operator personnel did not observe any position indication at the local control station. (NOTE: It was later determined that bulbs for the open and closed indicators were not operable.) The

operator at the local control station activated the closed button to verify closure. This action apparently initiated this event and resulted in the cycling of the position indicator in the Control Room as discussed in Section IV of this report.

A replacement drive assembly and locknut were installed and properly staked. After repairs were completed, the valve was cycled and observed to operate satisfactorily. At 1818 hours on October 30, 1987, DH-V-4A was restored to service upon completion of Technical Specification Surveillance Procedure 4210-SUR-3213.01. "Boron Injection System Valve Lineup Verification."

TMI-2 Technical Specification (Tech. Spec.) 3.6.1.1, "Containment Integrity," requires double valve isolation of containment penetrations unless it is not required per a NRC-approved procedure. On October 24, 1987, Maintenance personnel observed that DH-V-4A did not change position when the breaker was energized. Prior to the event on October 9, 1987, DH-V-4A was last verified to be closed on September 15, 1987, via the monthly performance of Tech. Spec. Surveillance Procedure 4210-SUR-3244.01 and there is no record of DH-V-4A having been operated prior to this event. The apparent initiation of this event was activation of the closure

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button for DH-V-4A from the local control station. Additionally, on October 24, 1987, when maintenance personnel initially operated DH-V-4A to the open position, no electrical abnormalities were observed. Thus, to the best of GPU Nuclear's knowledge, DH-V-4A remained in the closed position at the time of the event. Subsequent operation of DH-V-4A, for purposes of corrective maintenance, was performed in accordance with a NRC-approved procedure (i.e., UWI 4220-3212-87-H694).

TMI-2 Technical Specification 3.1.1.1.a, "Borated Cooling Water Injection," requires two operable flowpaths downstream from the Borated Water Storage Tank and common drop line which requires the capability to open DH-V-4A. On October 25, 1987, Maintenance personnel visually verified that the capability existed to operate DH-V-4A. Thus, the unit was in compliance with Specifications 3.1.1.1.a and 3.6.1.1 and a reportable condition did not exist pursuant to 10 CFR 50.73.

IE Circular 79-04, "Loose Locking Nut in Limitorque Valve Operators," dated March 16, 1979, documented similar type events where the lock nut in Limitorque Valve Operators was not fastened securely.

Preventive Maintenance Procedure E-13, "Motor Operator Valves," (currently Procedure 4223-PME-3918.01), which was in effect prior to the date of the referenced IE Circular, requires verification that the locknut in Limitorque Valve Operators is secured and properly staked. This procedure is scheduled on an one per 90-month basis (i.e., 5R) or on an "as needed" basis when repairing or performing maintenance on Limitorque Operator Valves. However, as a result of the March 28, 1979, accident, numerous valves, including DH-V-4A, became inaccessible due to radiological conditions and this procedure was not scheduled for performance. As a result of this event, however, GPU Nuclear is in the process of inspecting Limitorque Operator Valves which are in Containment Isolation and/or borated water injection systems.

Due to the potential generic nature of this event, GPU Nuclear is submitting this event as a Special Report.

IV. ROOT CAUSE OF THE EVENT

The root cause of this event was the failure to stake the locknut and drive sleeve assembly which resulted in the disengagement of the stemnut from the drive assembly. The locknut and drive stem assembly are usually staked by either the valve vendor or the valve actuator manufacturer depending on the type of the valve. To the best of GPU Nuclear's knowledge the locknut and drive sleeve assembly were part of the original valve assembly for DH-V-4A.

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The initiating cause of this event was apparently the activation of the closure button for DH-V-4A while the valve was physically in the closed position. This action would have energized the valve motor causing the stemnut to rise along the valve stem until it disengaged the spline of the drive sleeve assembly. With the locknut and stemnut disengaged, sufficient torque was not developed to activate the torque switch. With the motor still energized, the geared limit switches continued to rotate (similar to an automobile odometer). This caused the position indicator lights in the Control Room to change state and give the impression the valve was cycling open and closed.

V. CORRECTIVE ACTIONS

Immediate - The locknut and drive sleeve assembly were replaced. The locknut was staked to the drive sleeve assembly. The valve was

cycled and observed to operate satisfactorily. At 1818 hours on October 30, 1987, DH-V-4A was restored to service upon completion of Tech. Spec. Surveillance Procedure 4210-SUR-3213.01.

Containment Isolation Valve DH-V-4B, located on the 'B' Decay Heat Discharge Line to the RCS was inspected. The locknut and drive sleeve assembly for this valve were observed to be properly staked.

Long-Term - Due to the potential common mode failure aspects of this event, a list has been developed of Limitorque Operator Valves located in containment isolation and/or borated water injection systems. These valves are currently in the process of being inspected.

VI. COMPONENT FAILURE DATA

- o The valve assembly for DH-V-4A is manufactured by Velan Engineering.
- o The valve vendor is Babcock and Wilcox Co.
- o The motor actuator for DH-V-4A is manufactured by Limitorque Corporation which includes the following components:
 - Locknut Part No. 60-558-0007-1
 - Drive Sleeve Assembly Part No. 60-206-0005-3

VII. AUTOMATIC OR MANUALLY INITIATED SAFETY SYSTEM RESPONSES

N/A

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VIII. ASSESSMENT OF THE SAFETY CONSEQUENCES AND IMPLICATIONS OF THE EVENT

DH-V-4A is located on the discharge side from the 'A' Decay Heat Pump to the RCS. This valve serves two (2) purposes:

- o DH-V-4A is the outboard containment isolation valve for penetration R-589.
- o This valve is located in a flowpath for borated water make-up to the Reactor Vessel.

To the best of GPU Nuclear's knowledge, DH-V-4A remained in the closed position at the time of this event. Subsequently, the valve was operated, per an NRC-approved procedure, for purposes of corrective maintenance. Thus, this event did not effect the capability to isolate the referenced containment penetration.

The capability to operate DH-V-4A was verified by Maintenance Personnel during this event. Thus, the capability to provide borated water to the Reactor Vessel, via the DH-V-4A flowpath, was not adversely affected. Additionally, no changes to the RCS level were detected during this event. Therefore, this event had no adverse consequences to the health and safety of public.

ATTACHMENT # 1 TO ANO # 8802100013 PAGE: 1 of 1

FIGURE
4410-88-L-0001

FIGURE OMITTED - NOT KEYABLE (DRAWING)

ATTACHMENT # 2 TO ANO # 8802100013 PAGE: 1 of 1

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February 3, 1988
4410-88-L-0001/0334P

US Nuclear Regulatory Commission
Attn: Document Control Desk
Washington,DC 20555

Dear Sirs:

Three Mile Island Nuclear Station, Unit 2 (TMI-2)
Operating License No. DPR-73
Docket No. 50-320
Special Event Report

Attached is a Special Event Report concerning a malfunction in the motor

operator assembly for containment isolation valve DH-V-4A on
October 19, 1987.

Sincerely,

/s/ F. R. Standerfer
F. R. Standerfer
Director, TMI-2

RDW/emf

Attachment

cc: TMI-1, Resident NRC Inspector - R. J. Conte
Regional Administrator, Region 1, NRC - W. T. Russell
Director, TMI Cleanup Project Director, NRC - Dr. W. D. Travers

*** END OF DOCUMENT ***
