

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
WASHINGTON, D.C. 20555

September 8, 1988

NRC INFORMATION NOTICE NO. 88-73: DIRECTION-DEPENDENT LEAK CHARACTERISTICS  
OF CONTAINMENT PURGE VALVES

Addressees:

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose:

This information notice is being provided to alert addressees to a potential problem regarding unexpected direction-dependent leakage through containment purge valves. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

On May 18, 1988, during the performance of a Diablo Canyon Unit 1 containment integrated leak rate test (ILRT), the licensee discovered that the 48-inch purge system valves inside containment did not have adequate leakage integrity (Licensee Event Report 50-275/87-25). The licensee then successfully performed a local leak rate test (LLRT) on the purge supply and exhaust penetrations by pressurizing the volume between the inboard and outboard isolation valves. Although the LLRT was apparently a success, the valves inside containment were pressurized from the direction opposite to the one required for them to perform their safety function. The licensee determined earlier that this practice was acceptable, based on information and test data supplied by the manufacturer stating that pressure could be applied to the valve from either direction and the valve would be leaktight.

The discrepancy between the ILRT and LLRT findings indicated that the LLRT methodology of pressurizing the volume between the isolation valves did not adequately confirm the operability of the inside valve.

The licensee's subsequent investigation found that the valves, Fisher Series 9200 butterfly valves, have a tapered seat that gives them a directionally dependent leakage characteristic. The valves inside containment are oriented so that the discs face outward. Pressure from containment tends to unseat the disc gaskets, whereas pressure from the opposite direction tends to seal

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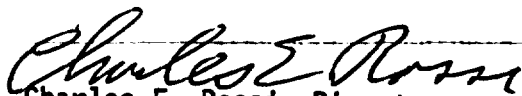
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the gaskets against the tapered valve seats. The valves were purchased because the manufacturer had specified that they could seal in either direction. The licensee reversed the inboard purge valves in Unit 1 and made a commitment to do the same for Unit 2.

Discussion:

Section III.C, "Type C tests," of Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors," to 10 CFR Part 50 states that for containment isolation valve local leak rate testing, "pressure shall be applied in the same direction as that when the valve would be required to perform its safety function, unless it can be determined that the results from the tests for a pressure applied in a different direction will provide equivalent or more conservative results." LLRT results could be misleading if the assumption that an isolation valve does not have directionally-dependent leakage characteristics is not true. Direction-dependent leakage could be a characteristic of valves other than the make and model used at Diablo Canyon.

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact the technical contact listed below or the Regional Administrator of the appropriate regional office.



Charles E. Rossi, Director  
Division of Operational Events Assessment  
Office of Nuclear Reactor Regulation

Technical Contact: James C. Pulsipher, NRR  
(301) 492-0877

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED  
 NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
88-72	Inadequacies in the Design of dc Motor-Operated Valves	9/2/88	All holders of OLs or CPs for nuclear power reactors.
88-71	Possible Environmental Effect of the Reentry of COSMOS 1900 and Request for Collection of Licensee Radioactivity Measurements Attributed to That Event	9/1/88	All holders of OLs or CPs for nuclear power reactors, fuel cycle licensees, and Priority 1 material licensees.
88-70	Check Valve Inservice Testing Program Deficiencies	8/29/88	All holders of OLs or CPs for nuclear power reactors.
88-69	Movable Contact Finger Binding in HFA Relays Manufactured by General Electric (GE)	8/19/88	All holders of OLs or CPs for nuclear power reactors.
88-48, Supplement 1	Licensee Report of Defective Refurbished Valves	8/24/88	All holders of OLs or CPs for nuclear power reactors.
88-68	Setpoint Testing of Pressurizer Safety Valves with Filled Loop Seals Using Hydraulic Assist Devices	8/22/88	All holders of OLs or CPs for nuclear power reactors.
88-67	PWR Auxiliary Feedwater Pump Turbine Overspeed Trip Failure	8/22/88	All holders of OLs or CPs for nuclear power reactors.
88-66	Industrial Radiography Inspection and Enforcement	8/22/88	All NRC industrial radiography licensees.
88-65	Inadvertent Drainages of Spent Fuel Pools	8/18/88	All holders of OLs or CPs for nuclear power reactors and fuel storage facilities.

OL = Operating License  
 CP = Construction Permit

the gaskets against the tapered valve seats. The valves were purchased because the manufacturer had specified that they could seal in either direction. The licensee reversed the inboard purge valves in Unit 1 and made a commitment to do the same for Unit 2.

Discussion:

Section III.C, "Type C tests," of Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors," to 10 CFR Part 50 states that for containment isolation valve local leak rate testing, "pressure shall be applied in the same direction as that when the valve would be required to perform its safety function, unless it can be determined that the results from the tests for a pressure applied in a different direction will provide equivalent or more conservative results." LLRT results could be misleading if the assumption that an isolation valve does not have directionally-dependent leakage characteristics is not true. Direction-dependent leakage could be a characteristic of valves other than the make and model used at Diablo Canyon.

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Transmitted by Region V in memo dated June 21, 1988

\*SEE PREVIOUS CONCURRENCES

		D/DOEA:NRR CERose 09/1/88	*C/OGCB:DOEA:NRR CHBerlinger 08/22/88	*RPB:ARM TechEd 07/28/88
*OGCB:DOEA:NRR PKadambi 08/30/88	*SPLB:DEST:NRR JPulsipher 08/3/88	*SPLB:DEST:NRR JCraig 08/05/88	*SAD/DEST:NRR ATHadani 08/17/88	*D/DEST:NRR LCShao 08/18/88

to seal the gaskets against the tapered valve seats. The valves were purchased because the manufacturer had specified that they could seal in either direction. The licensee reversed the inboard purge valves in Unit 1 and made a commitment to do the same for Unit 2.

Discussion of Safety Significance:

Section III.C, "Type C tests," of Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors," to 10 CFR Part 50 states that for containment isolation valve local leak rate testing, "pressure shall be applied in the same direction as that when the valve would be required to perform its safety function, unless it can be determined that the results from the tests for a pressure applied in a different direction will provide equivalent or more conservative results." LLRT results could be misleading if the assumption that an isolation valve does not have directionally-dependent leakage characteristics is not true.

The NRC staff considers the Diablo Canyon experience relevant for all licensees who use the purge capability during power operation. Direction-dependent leakage could be a characteristic of valves other than the make and model used at Diablo Canyon. The corrective action taken at Diablo Canyon is appropriate since operability of the purge valve under the dynamic conditions of a blowdown remains satisfied.

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Attachments:

1. Figure 1: Schematic Sealing Mechanism for Original Orientation of Inside Purge Valve
2. List of Recently Issued NRC Information Notices

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SPLB:DEST:NRR JCraig 07/28/88		D/DEST:NRR LCShao 08/ /88

See Previous Concurrence.

to seal the gaskets against the tapered valve seats. The valves were purchased because the manufacturer had specified that they could seal in either direction. The licensee reversed the inboard purge valves in Unit 1 and made a commitment to do the same for Unit 2.

Discussion of Safety Significance:

Section III.C, "Type C tests," of Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors," to 10 CFR Part 50 states that for containment isolation valve local leak rate testing, "pressure shall be applied in the same direction as that when the valve would be required to perform its safety function, unless it can be determined that the results from the tests for a pressure applied in a different direction will provide equivalent or more conservative results." LLRT results could be misleading if the assumption that an isolation valve does not have directionally-dependent leakage characteristics is not true.

The NRC staff considers the Diablo Canyon experience relevant for all licensees who use the purge capability during power operation. Licensees who keep the purge valves closed during power operation are not affected significantly as long as the LLRT tests at least one valve in the proper direction. Direction-dependent leakage could be a characteristic of valves other than the make and model used at Diablo Canyon. The corrective action taken at Diablo Canyon is appropriate since operability of the purge valve under the dynamic conditions of a blowdown remains satisfied.

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08/22/88	07/28/88	08/ /88

*See previous concurrence.*

to seal the gaskets against the tapered valve seats. The valves were purchased because the manufacturer had specified that they could seal in either direction. Neither the licensee nor the vendor realized that there could be direction-dependent leakage. The licensee reversed the inboard purge valves in Unit 1 and made a commitment to do the same for Unit 2.

Discussion of Safety Significance:

Section III.C, "Type C tests," of Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors," to 10 CFR Part 50 states that for containment isolation valve local leak rate testing, "pressure shall be applied in the same direction as that when the valve would be required to perform its safety function, unless it can be determined that the results from the tests for a pressure applied in a different direction will provide equivalent or more conservative results." LLRT results could be misleading if the assumption that an isolation valve does not have directionally-dependent leakage characteristics is not true.

The NRC staff considers the Diablo Canyon experience relevant for all licensees who use the purge capability during power operation. Licensees who keep the purge valves closed during power operation are not affected significantly as long as the LLRT tests at least one valve in the proper direction. Direction-dependent leakage could be a characteristic of valves other than the make and model used at Diablo Canyon. The corrective action taken at Diablo Canyon is appropriate since operability of the purge valve under the dynamic conditions of a blowdown remains satisfied.

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*N.P. Kadambari*

OGCB:DOEA:NRR  
E.Hodge ;nw  
08/22/88

SPLB:DEST:NRR  
J.Pulsipher  
08/3/88

D/DOEA:NRR  
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08/ /88  
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08/5/88

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08/ /88  
SAD/DEST:NRR  
ATHadani  
08/17/88

\*RPB:ARM  
TechEd  
08/ /88  
D/DEST:NRR  
LCShao  
08/17/88

*because the manufacturer had specified*

*par*

*realized*

direction tends to seal the gasket against the tapered valve seat. The valves were purchased with the specification that they could seal in either direction. There was no recognition by either the licensee or the vendor that there could be a directional dependence of leakage. The licensee has reversed the inboard purge valves in Unit 1 and has made a commitment to do the same for Unit 2.

*Neither direction dependant*

Discussion of Safety Significance:

*to 10 CFR Part 50*

*Section III.C, Type C tests*

10 CFR, Part 50, Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors," in Section III.C, "Type C tests," states that for containment isolation valve local leak rate testing, "pressure shall be applied in the same direction as that when the valve would be required to perform its safety function, unless it can be determined that the results from the tests for a pressure applied in a different direction will provide equivalent or more conservative results." LLRT results may be misleading if the assumption that an isolation valve does not have directionally-dependent leakage characteristics does not hold.

*is not true*

*could relevant for*

The staff considers the Diablo Canyon experience to have relevance to all licensees who use the purge capability during power operation. Licensees who maintain the purge valves closed during power operation are not affected as significantly so long as the LLRT tests at least one valve in the proper direction. The direction-dependence of leakage could be a characteristic of valves other than the make and model used at Diablo Canyon. The corrective action at Diablo Canyon is appropriate since operability of the purge valve under the dynamic conditions of a blowdown remains satisfied.

*keep as*

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