

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555-0001

December 19, 1996

NRC INFORMATION NOTICE 96-68: INCORRECT EFFECTIVE DIAPHRAGM AREA
VALUES IN VENDOR MANUAL RESULT IN
POTENTIAL FAILURE OF PNEUMATIC DIAPHRAGM
ACTUATORS

Addressees

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

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to the fact that some vendors have published incorrect values for effective diaphragm area for some spring-type pneumatic diaphragm actuators and that use of these incorrect values may result in safety-related air-operated valves not fully closing under design basis conditions. 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 are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

On October 4, 1996, Commonwealth Edison, licensee for the LaSalle County Station, issued a notification pursuant to 10 CFR Part 21 (Accession No. 9610080102). The notification identified the deficiency as incorrect values for the effective diaphragm areas, as published by the original and current valve vendors, for certain models of pneumatic actuators.

The original valve vendor, Black, Sivalls, and Bryson (BS&B), was later purchased by WKM Valve Division of ACF Industries, then by Muesco, and by Anchor/Darling Valve Company. The affected model of actuator is the Model 70-13 pneumatic diaphragm actuator, sizes 35, 70, 140, and 280. The size refers to the published diaphragm area in square inches. The affected actuators are either direct acting (extends the valve stem when air pressure is applied) or reverse acting (retracts the stem when air is applied) spring return actuators.

The Part 21 notification included an attachment providing a Nuclear Plant Reliability Data System (NPRDS) listing of valves of the applicable model number by plant; however, the listing may not include all of the applicable valves and may include valves that are not safety related or that are not required to isolate as are the primary containment isolation

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valves at the LaSalle County Station. Some of the valves listed are not diaphragm actuated valves and the identification of some items is incomplete. The present manufacturer, Anchor/Darling Valve Company, was unable to compile a complete listing of the actuator applications because purchase order records from the original vendor are unavailable.

Discussion

The licensee found discrepancies in the bench set values of the actuators during the LaSalle County Station refueling outage that took place from February through April 1996. The published bench set and the actual bench set values, indicated from testing by the plant mechanics, were inconsistent. "Bench set" refers to the amount of preload and final compression force placed on the actuator spring so that the applied spring force on loss of air will achieve the required travel of the valve stem. Bench set adjustments are made by applying air pressure to the actuator in accordance with the manufacturer's published values and adjusting the spring compressive force by means of an adjusting screw to achieve the desired relationship between air pressure and valve stem travel. When performing bench set testing, incomplete valve stroke is typically indicative of a stiffer-than-expected spring. However, testing by the licensee indicated that the springs were within manufacturer's tolerances and additional testing with a known spring force, a known air supply pressure, and a known load indicated that the actual effective diaphragm area, which relates to the force opposing the spring as well as to the compression of the spring for proper preloading, was less than the published values.

Anchor/Darling Valve Company was contacted by the licensee and performed a series of tests to determine the actual effective diaphragm area. These tests indicated that the actual diaphragm areas of the various sizes of the Model 70-13 actuators were approximately 90 percent of the published values. Further testing by the licensee uncovered a contributing problem that further reduced the effective diaphragm area. The diaphragm case consists of two halves bolted together. Generally one half is deeper than the other. It was discovered that reverse-acting actuators assembled with a deep upper half caused unintended stretching of the diaphragm within the casing.

The licensee determined that the primary containment isolation valves would have closed at the design-basis-accident containment pressure of 40 pounds per square inch; however, many of the valves may not have been properly set up to close against the normally higher system pressure under some operating conditions. That is, the valves may not have closed under the highest expected differential pressure of the contained system fluid. Further details of the concern are in Licensee Event Report 50-373/96-011, dated October 28, 1996, (Accession No. 9611010277).

The licensee determined which valves at the LaSalle County Station were affected and was able to properly adjust the actuators to account for the discrepancies between the published values for the diaphragm area and the actual diaphragm area by (1) adjusting the bench set on the spring to achieve the required closing force and (2) reversing the diaphragm casings so that the deeper part of the casing was installed on the bottom with the shallower part of the casing installed on top to prevent the diaphragm from stretching.

The licensee has not identified similar problems on actuators made by other manufacturers, but licensees should be aware of the concern when testing and making adjustments to the bench set of pneumatic actuators. The proper setup of these actuators is especially important when the attached valve is used for isolation in a safety-related application. Licensees may wish to review their valves and actuators for applicability of this information.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.



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LIST OF RECENTLY ISSUED
 NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
96-67	Vulnerability of Emergency Diesel Generators to Fuel Oil/Lubricating Oil Incompatibility	12/19/96	All holders of OLs or CPs for nuclear power reactors
96-66	Recent Misadministrations Caused by Incorrect Calibrations of Strontium-90 Eye Applicators	12/13/96	All U.S. Nuclear Regulatory Commission Medical Use Licensees authorized to use strontium-90 (Sr-90) eye applicators
96-65	Undetected Accumulation of Gas in Reactor Coolant System and Inaccurate Reactor Water Level Indication During Shutdown	12/11/96	All holders of OLs or CPs for nuclear power reactors
96-64	Modifications to Containment Blowout Panels Without Appropriate Design Controls	12/10/96	All holders of OLs or CPs for nuclear reactors
96-63	Potential Safety Issue Regarding the Shipment of Fissile Material	12/05/96	All U.S. Nuclear Regulatory Commission licensees authorized to possess special nuclear material in unsealed quantities greater than a critical mass
96-62	Potential Failure of the Instantaneous Trip Function of General Electric RMS-9 Programmers	11/20/96	All holders of OLs and CPs for nuclear power plants

OL = Operating License
 CP = Construction Permit

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signed by

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Tech Editor has reviewed and concurred on 11/08/96

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OFFICE	TECH CONTS	C/PECB:DRPM	D/DRPM				
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DATE	12/05/96	12/12/96	12/16/96				

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OFC	D/DRPM
NAME	TMartin
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RAD 12/6/96

OFC	PECB:DRPM	Region III	EMEB:DE	C/EMEB:DE	C/PECB:DRPM
NAME	D. Skeen <i>DS</i>	A. Dunlop <i>AD</i>	P. Campbell	R. Wessman	A. Chaffee
DATE	12/15/96	11/27/96 <i>via Email</i>	11/21/96	11/22/96	1/1996

OFC	D/DRPM
NAME	T. Martin
DATE	1/1996

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NAME	D. Skeen <i>DS</i>	A. Dunlop <i>AD</i>	P. Campbell	R. Weisman <i>RW</i>	A. Chaffee
DATE	11/21/96	11/27/96 <i>11/27/96</i>	11/21/96	11/21/96	1/ /96

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NAME	T. Martin
DATE	1 / /96

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