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

April 10, 1991

NRC INFORMATION NOTICE NO. 91-27: INCORRECT ROTATION OF POSITIVE DISPLACEMENT PUMP

Addressees:

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

Purpose:

This information notice is intended to alert addressees to the potential existence of positive displacement pumps with reverse rotation caused by incorrect wiring. 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 February 15, 1990, one of the two positive displacement pumps in the standby liquid control system at Brunswick Unit 2 was observed rotating in the reverse direction. This discovery was made after maintenance; however, nothing in the maintenance procedure could have affected the rotational direction of the pump, and the condition had apparently existed for some indeterminate period of time. During the resulting investigation, Brunswick personnel discovered that two electrical leads had been interchanged in the motor control center that fed power to the standby liquid control pump causing the three-phase pump motor to rotate in the reverse direction. Although Brunswick personnel routinely made rotational checks following pump maintenance, apparently in this case the maintenance personnel mistakenly believed that the existing direction of rotation was correct.

Discussion:

The standby liquid control system includes positive displacement reciprocating piston pumps. The direction of rotation has no immediate effect on the performance of these pumps. However, the pump internal drive train lubrication system does depend upon the correct direction of pump rotation to fill an elevated reservoir which then drains oil over the drive pistons. Oil splash would provide some lubrication when the pump is rotated in the reverse direction. According to the pump vendor, Union Pump, the splash effect could supply

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sufficient lubrication for short-term operation, particularly for the slower speed pumps used in the standby liquid control systems. Consequently, these pumps, which are operated for approximately 15 minutes per month for surveillance testing, might not show any adverse effects for some time. In addition to depriving the pump of adequate lubrication, reverse operation could cause excessive wear to the pump seals and detectable oil leakage.

Positive displacement pumps are used in the standby liquid control system at all boiling water reactors and are also used in the charging system at some pressurized water reactors. Both of these applications involve important safety systems that might be required to operate for extended periods of time in the event of an accident. In keeping with this, Brunswick personnel have labeled the standby liquid control system pumps to indicate their correct direction of rotation. Careful visual rotational checks, included with the pump surveillance procedures, are important in ensuring that positive displacement pumps will continue to operate correctly.

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 NRR project manager.

Charles E. Rossi

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

Technical Contacts: Donald C Kirkpatrick, NRR
(301) 492-1849

Ted Cintula, AEOD
(301) 492-4493

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
89-90, Supp. 1	Pressurizer Safety Valve Lift Setpoint Shift	04/10/91	All holders of OLs or CPs for nuclear power reactors.
91-26	Potential Nonconservative Errors in the Working Format Hansen-Roach Cross-Section Set Provided with The Keno and Scale Codes	04/02/91	All fuel cycle licensees and other licensees, including all holders of operating licenses for nuclear power reactors, who use physics codes to support criticality safety in the use of fissile material.
91-25	Commercial-Grade Structural Framing Components Supplied As Nuclear Safety-Related Equipment	04/01/91	All holders of OLs or CPs for nuclear power reactors.
91-24	Recent Operating Experience Involving Reactor Operation Without A Licensed Reactor Operator or Senior Reactor Operator Present in the Control Room	03/26/91	All holders of OLs or CPs for nuclear power, test, and research reactors, and all Part 55 licensed operators.
91-23	Accidental Radiation Overexposures to Personnel Due to Industrial Radiography Accessory Equipment Malfunctions	03/26/91	All Nuclear Regulatory Commission (NRC) licensees authorized to use sealed sources for industrial radiography.
91-22	Four Plant Outage Events Involving Loss of AC Power or Coolant Spills	03/19/91	All holders of OLs or CPs for nuclear power reactors.
91-21	Inadequate Quality Assurance Program of Vendor Supplying Safety-Related Equipment	03/19/91	All holders of OLs or CPs for nuclear power reactors and all recipients of NUREG-0040, "Licensee Contractor and Vendor Inspection Status Report" (White Book).

OL = Operating License
CP = Construction Permit

sufficient lubrication for short-term operation, particularly for the slower speed pumps used in the standby liquid control systems. Consequently, these pumps, which are operated for approximately 15 minutes per month for surveillance testing, might not show any adverse effects for some time. In addition to depriving the pump of adequate lubrication, reverse operation could cause excessive wear to the pump seals and detectable oil leakage.

Positive displacement pumps are used in the standby liquid control system at all boiling water reactors and are also used in the charging system at some pressurized water reactors. Both of these applications involve important safety systems that might be required to operate for extended periods of time in the event of an accident. In keeping with this, Brunswick personnel have labeled the standby liquid control system pumps to indicate their correct direction of rotation. Careful visual rotational checks, included with the pump surveillance procedures, are important in ensuring that positive displacement pumps will continue to operate correctly.

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Original Signed by
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vendor, Union Pump, the splash effect could supply sufficient lubrication for short-term operation, particularly for the slower speed pumps used in the standby liquid control systems. Consequently, these pumps, which are operated for approximately 15 minutes per month for surveillance testing, might not show any adverse affects for a long time. In addition to depriving the pump of adequate lubrication, reverse operation could cause excessive wearing of the pump seals. Such wearing would eventually cause oil to leak from the seals that could be detected.

Periodic surveillance that does not include rotational checks would not reveal reverse rotation of positive displacement pumps. Although Brunswick personnel routinely make rotational checks following pump maintenance, this check may not have received sufficient attention in the past.

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03/13/91 DCK	03/14/91	03/14/91	03/ /91	03/ /91
			D/DSP:AEOD	*RPB:ADM
			TMNovak	TechEd
			03/18/91	03/11/91

vendor, Union Pump, the splash effect could supply sufficient lubrication for short term operation, particularly for the slower speed pumps used in the standby liquid control systems. Consequently, these pumps which are operated only approximately 15 minutes per month for surveillance testing might not show any adverse affects for a long time. In addition to depriving the pump of adequate lubrication, reverse operation could cause excessive wear of the pump seals. Such wear would eventually be detectable by oil leakage at the seals.

Periodic surveillance that does not include rotational checks would not reveal reverse rotation of positive displacement pumps. Although Brunswick personnel routinely make rotational checks following pump maintenance, this check may not have received sufficient attention in the past.

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