

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

June 22, 1987

NRC INFORMATION NOTICE NO. 87-28: AIR SYSTEMS PROBLEMS AT U.S. LIGHT
WATER REACTORS

Addressees:

All nuclear power reactor facilities holding an operating license or a construction permit.

Purpose:

This information notice is being provided to alert recipients to potentially significant problems pertaining to air systems at light water reactors. The NRC expects that recipients will review this notice for applicability to their facilities. The suggestions in this notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Background:

The NRC Office for Analysis and Evaluation of Operational Data (AEOD) has recently issued a case study report entitled "Air Systems Problems at U.S. Light Water Reactors," AEOD/C701.* The report discusses degradations of air systems and plant responses to air systems losses. It also highlights more than two dozen events in which, contrary to licensing assumptions, a safety-related system failed as a result of an air system degradation or failure. Operating events involving the loss or degradation of air systems were judged to be safety significant because they may lead, under different circumstances, to potentially serious events and conditions that have not been analyzed.

Discussion:

The study provides a comprehensive review and evaluation of potential safety implications associated with air systems problems. The report analyzes operating data, focusing on degraded air systems, and the vulnerability of safety-related equipment to common mode failures associated with air systems. The report analyzes these data from the perspectives of trends and patterns, risk assessments, and cost/benefit studies.

*A copy of the study report is available in the NRC Public Document Room, 1717 H Street NW, Washington, DC 20555, for inspection and copying.

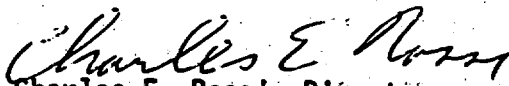
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Air systems are not classified as safety-related systems at most operating plants. As a result, plant accident analyses assume that safety-related equipment dependent on air systems will either "fail safe" on loss of air or perform its intended function with the assistance of safety-related backup air accumulators. This report highlights 29 failures of safety-related systems that resulted from degraded or malfunctioning air systems. These failures contradict the assumption that safety-related equipment dependent on air systems will always either fail safe on loss of air or perform its intended function with the assistance of backup accumulators. Some of the systems that were significantly degraded or failed were decay heat removal, auxiliary feedwater, BWR scram, main steam isolation, salt water cooling, emergency diesel generator, containment isolation, and the fuel pool seal systems. For example:

1. Leakage of 140,000 gallons of radioactive water from the spent fuel pool at the Hatch Nuclear Plant on December 3, 1986, was caused by the mispositioning of a single valve in the instrument air system.
2. Failure of several main steam isolation valves to close at Brunswick 2 on September 27, 1985, was due to contaminants in the instrument air.
3. A loss of the auxiliary feedwater systems at Turkey Point 3 and 4 in July 1985 was caused by water and dirt particles in the air system.
4. The inability to scram four control rods at Susquehanna 1 on October 6, 1984, was caused by oil in the air system.
5. A loss of decay heat removal and significant primary system heatup at Palisades in 1978 and 1981 were caused by water in the air system.

The root causes of most of the failures were traceable to design and/or maintenance deficiencies. The design and operating problems appear to reflect a lack of adequate attention to the design, maintenance, operation, and administrative control of air systems.

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


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

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(301) 492-8196

Hal Ornstein, AEOD
(301) 492-4439

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED
INFORMATION NOTICES 1987

Information Notice No.	Subject	Date of Issuance	Issued to
87-27	Iranian Official Implies Vague Threat to U.S. Resources	6/10/87	All nuclear power reactor facilities holding an OL or CP, research and nonpower reactor facilities, and fuel fabrication and processing facilities using or possessing formula quantities of special nuclear material.
87-26	Cracks In Stiffening Rings on 48-Inch Diameter UF ₆ Cylinders.	6/11/87	All uranium fuel fabrication and conversion facilities.
87-25	Potentially Significant Problems Resulting from Human Error Involving Wrong Unit, Wrong Train, or Wrong Component Events.	6/11/87	All nuclear power reactor facilities holding an OL or CP.
87-24	Operational Experience Involving Losses of Electrical Inverters.	6/4/87	All nuclear power reactor facilities holding an OL or CP.
87-23	Loss of Decay Heat Removal During Low Reactor Coolant Level Operation	5/27/87	All PWR facilities holding an OL or CP.
87-22	Operator Licensing Requali- fication Examinations at Nonpower Reactors	5/22/87	All research and nonpower reactor facilities.
87-21	Shutdown Order Issued Because Licensed Operators Asleep While on Duty	5/11/87	All nuclear power facilities holding an OL or CP and all licensed operators.
87-20	Hydrogen Leak in Auxiliary Building	4/20/87	All nuclear power facilities holding an OL or CP.

OL = Operating License
CP = Construction Permit

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The root causes of most of the failures were traceable to design and/or maintenance deficiencies. The design and operating problems appear to reflect a lack of adequate attention to the design, maintenance, operation, and administrative control of air systems.

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*SEE PREVIOUS CONCURRENCES

*AEOD
Hornstein
06/16/87

*OGCB:DOEA:NRR
CVHodge
06/18/87

*PPMB:ARM
MHarwell
05/21/87

*C/OGCB:DOEA:NRR
CHBerlinger
06/16/87

*AEOD
JRosenthal
06/16/87

CE
D/DOEA:NRR
CERossi
6/17/87

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