

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

November 29, 1990

NRC INFORMATION NOTICE NO. 90-73: CORROSION OF VALVE-TO-TORQUE TUBE
KEYS IN SPRAY POND CROSS CONNECT VALVES

Addressees:

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

Purpose:

This information notice is intended to alert addressees to possible problems related to the corrosion of valve-to-torque tube keys in submerged valve applications. 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 25, 1990, the Arizona Public Service Company (APS) submitted a 10 CFR Part 21 report to the NRC regarding the misapplication of materials in the manufacture of the manual cross connect valves for the essential spray pond at its Palo Verde Nuclear Generating Station, Units 1, 2, and 3. APS reported that during the investigation into the cause of the failure of a Unit 1 essential spray pond cross connect valve, personnel discovered that the key that connects the valve stem to the torque tube (coming from the handwheel) was missing. Each unit at Palo Verde has two such cross connect valves, and APS proceeded to inspect the other five valve keys. They found that four of the keys had significant corrosion and that the fifth key (for a Unit 2 valve) was missing.

The corrosion resulted from a misapplication of material by the manufacturer. The keys were manufactured from a carbon steel material that is susceptible to corrosion when exposed to water for extended periods of time. Two of the keys had corroded away completely, while the others had degraded significantly. The valves are 10-inch series 1400 butterfly valves supplied by the Henry Pratt Company.

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Discussion:

The essential spray ponds at Palo Verde provide the ultimate heat sink for engineered safety features and safety-related components during normal shutdown or accident conditions. Each unit has two spray ponds with two valves that cross connect them. One of these two valves must be opened during a loss-of-coolant accident to provide sufficient water inventory to remove decay heat for 27 days without water makeup. If APS had not discovered the degraded condition of the remaining valve keys, additional corrosion could have prevented the operation of both cross connect valves for one or more of the units.

APS purchased the valves at Palo Verde specifically for the spray ponds, and the bid specification clearly stated that the valves would be submerged. Therefore, APS was unaware that the valves contained carbon steel which corrodes in the spray pond environment. Before the failure, the corrosion problem was not apparent through visual inspection or performance. To discover the problem, APS had to remove the valves from the pond and disassemble them. Valves that were partially corroded continued to function normally. APS replaced all six valve keys with stainless steel keys and developed a preventive maintenance task to periodically inspect and lubricate the operators for the essential spray pond cross connect valves during refueling outages. APS reviewed all Henry Pratt valves supplied to them for underwater service and identified no other deficiencies. In addition, APS will perform an engineering review of components exposed to chemistry similar to the spray pond water to ensure that a similar condition does not exist elsewhere.

The staff contacted other licensees having plants that use spray ponds, and they all indicated that their valves were kept in dry pits and were therefore protected from corrosion (in addition to being more accessible for inspection and maintenance). However, the situation encountered at Palo Verde is not necessarily limited to just spray pond environments. The operating parts of any valve used in a submerged application could be susceptible to corrosion if improper materials are used. The experience at Palo Verde indicates that even valves specifically purchased for submerged use can contain inappropriate materials.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact the technical contact listed below or the appropriate NRR project manager.



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

Technical Contact: David Terao, NRR
(301) 492-3317

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
90-72	Testing of Parallel Disc Gate Valves In Europe	11/28/90	All holders of OLs or CPs for nuclear power reactors.
90-71	Effective Use of Radiation Safety Committees to Exercise Control Over Medical Use Programs	11/6/90	All NRC licensees authorized to use by-product material for medical purposes.
90-70	Pump Explosions Involving Ammonium Nitrate	11/6/90	All uranium fuel fabrication and conversion facilities.
90-38, Supp. 1	License and Fee Requirements for Processing Financial Assurance Submittals for Decommissioning	11/6/90	All fuel facility and materials licensees.
89-30, Supp. 1	High Temperature Environments At Nuclear Power Plants	11/1/90	All holders of OLs or CPs for nuclear power reactors.
90-69	Adequacy of Emergency and Essential Lighting	10/31/90	All holders of OLs or CPs for nuclear power reactors.
90-68	Stress Corrosion Cracking of Reactor Coolant Pump Bolts	10/30/90	All holders of OLs or CPs for pressurized water reactors (PWRs).
90-67	Potential Security Equipment Weaknesses	10/29/90	All holders of OLs or CPs for nuclear power reactors and Category I fuel facilities.

OL = Operating License
CP = Construction Permit

Discussion:

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*Editorial changes to
final draft were discussed
with D. Terao on 11/23/90
CER*

Attachment: List of Recently Issued NRC Information Notices

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*OGCB:DOEA:NRR*SC/EMEB:DET:NRR *C/EMEB:DET:NRR
AJKugler DTerao LBMarsch
11/05/90 11/15/90 11/16/90
DOCUMENT NAME: IN 90-72

D/DOEA:NRR *C/OGCB:DOEA:NRR
CERoss* CHBerlinger
11/23/90 11/21/90
*D/DET:NRR *RPB:ADM
JRichardson TechEd
11/19/90 11/05/90

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