

July 13, 1981

Docket Nos. 50-528, 50-529, 50-530

Arizona Public Service Company
P. O. Box 21666
Phoenix, Arizona 85036

Attention: Mr. E. E. Van Brunt, Jr.
Vice President, Nuclear Projects

Gentlemen:

The enclosed information notice provides early notification of an event that may have safety significance. Accordingly, you should review the information notice for possible applicability to your facility.

No specific action or response is requested at this time; however, contingent upon the results of further staff evaluation, a bulletin or a circular recommending or requesting specific licensee actions may be issued. If you have any questions regarding this matter, please contact this office.

Sincerely,

Original signed by

R. C. Haynes for
R. H. Engelken
Director

Enclosure:
IE Information Notice
No. 81-20

cc w/enclosure:
F. W. Hartley, APS

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PDR ADOCK 05000133
Q PDR

OFFICE	RV/Mar	<i>RV</i>					
SURNAME	FAULKENBERRY	ENGELKEN					
DATE	7/13/81	7/13/81					

SSINS No.: 6870

Accession No.:

810330405

IN 81-20

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D.C. 20555

July 13, 1981

IE Information Notice No. 81-20: TEST FAILURES OF ELECTRICAL PENETRATION ASSEMBLIES

Summary of Observed Problem:

Environmental qualification testing of containment electrical penetration assemblies (EPA) by the D. G. O'Brien Company and similar NRC sponsored tests conducted by the Sandia National Laboratories disclosed a potential material application problem and/or a potential problem with the accelerated aging technique as applied during these tests. Following exposure of the assemblies to high temperatures during simulated aging and LOCA testing sequences (NUREG-0588), the grommet sealing material was observed to have extruded through the spacer assembly around the electrical conductors. The extruded grommet sealing material stripped insulation from the conductors resulting in electrical grounding during steam/chemical spray test conditions and failure of the assembly to satisfy the qualification test requirements.

The grommet material is a Dow Corning Company, Silgard 170 silicone RTV (elastomer). Extrusion of the material was attributed to confinement in the assembled EPA which did not allow for thermal expansion during exposure to sustained elevated temperatures during the thermal aging process.

Details:

The Sandia National Laboratory, under contract to the NRC, recently completed an independent environmental qualification test of a D. G. O'Brien model K EPA. The test EPA was obtained from the Duke Power Company's Catawba plant. The only other known application of EPAs of the same design is in the McGuire plant and two replacement units at Yankee Rowe. The EPAs are designed for low voltage power, instrumentation and control applications.

The test resulted in a failure (electrical grounding) of three of the 104 circuits passing through the penetration assembly. Ten additional circuits showed a reduction in resistance to ground to less than the 5×10^6 ohm acceptance requirement; however, electrical operability was maintained. Investigation of the failure disclosed the mechanism to be extrusion of the grommet material through a spacer plug containing the insulated conductors. The extruded grommet material stripped insulation from all of the conductors to a varying degree establishing a low resistance pathway between the conductors and a metallic plug sleeve. The electrical grounding was observed during the steam and chemical spray environment test. The extrusion of the grommet material was caused by mechanical confinement during exposure to elevated temperatures applied in the accelerated aging process.

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In 1978 the D. G. O'Brien Company attempted to qualify this same EPA design to a set of test conditions applicable to the Virgil Summer plant. During that test the silicone grommet extrusion mechanism was observed and also resulted in the failure of the EPA. D. G. O'Brien concluded that the extrusion occurred because of mechanical confinement at elevated temperatures. In lieu of retesting the same design, D. G. O'Brien redesigned the module plug assembly for the Virgil Summer plant. The redesigned unit passed the Virgil Summer plant qualification test. It is noted that the retest did not include accelerated aging of the redesigned plug.

Qualification tests had been successfully performed for the McGuire plant in the 1975-1977 time period on the model K O'Brien connector. These tests did not thermally age the grommet material. The EPA was exposed to the same steam/chemical spray conditions used in the NRC/Sandia test.

The connector portion of the EPA design uses a Dow Corning Company, Silgard 170 silicone RTV material as a sealing grommet. When the individual connector modules of the EPA are placed in the fully assembled and tightened state, the grommet material is confined and unable to expand freely as the temperature of the assembly increases. During the NRC/Sandia test each individual connector module was tightened prior to thermal aging at 150°C and again prior to radiation exposure at approximately 50°C. Consequently, the sealing grommet was expanded and the extrusion process occurred twice prior to exposing the EPA to the simulated LOCA steam test. Similar tightening of the grommet was done during the testing for the Summer plant. This situation apparently caused excessive extrusion of the grommet material through the spacer plug containing the insulated conductors. The extrusion process stripped the insulation from the conductors thereby establishing an electrical failure mode.

Contact with the vendor, D. G. O'Brien, indicates that only Catawba, McGuire and Yankee Rowe units have the model K connectors with the same grommet seal arrangement. Duke Power Company has performed an evaluation and concluded that operation with the connectors is acceptable based on earlier successful testing and the early stage of plant operation. Additional testing of the connector is being performed by Duke Power Company.

No written response to this information is required. If you need additional information regarding this matter, please contact the Director of the appropriate NRC Regional Office.

Enclosure:
Recently issued IE Information Notices

Attachment
IN 81-20
July 13, 1981

RECENTLY ISSUED
IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
81-19	Lost Parts in Primary Coolant System	7/6/81	All power reactor facilities with an OL or CP
81-18	Excessive Radiation Exposures to the Fingers of Three Individuals Incurred During Cleaning and Wipe Testing of Radioactive Sealed Sources at a Sealed-Source Manufacturing Facility	6/23/81	Specified licensees holding Byproduct licenses
81-17		Not yet issued	
81-16	Control Rod Drive System Malfunctions	4/23/81	All BWR facilities with an OL or CP
81-15	Degradation of Automatic ECCS Actuation Capability by Isolation of Instrument Lines	4/22/81	All power reactor facilities with an OL or CP
81-14	Potential Overstress of Shafts on Fisher Series 9200 Butterfly Valves with Expandable T Rings	4/17/81	All power reactor facilities with an OL
81-13	Jammed Source Rack in a Gamma Irradiator	4/14/81	Specified irradiator licensees
81-12	Guidance on Order Issued January 9, 1981 Regarding Automatic Control Rod Insertion on Low Control Air Pressure	3/31/81	All BWR facilities with an OL or CP
81-11	Alternate Rod Insertion for BWR Scram Represents a Potential Path for Loss of Primary Coolant	3/30/81	All BWR facilities with an OL or CP
81-10	Inadvertant Containment Spray Due to Personnel Error	3/25/81	All power reactor facilities with an OL or CP

OL = Operating Licenses
CP = Construction Permits