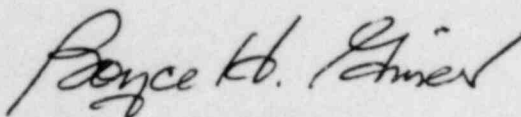


Gentlemen:

The enclosed IE Information Notice No. 81-20, "Test Failure of Electrical Penetration Assemblies" is forwarded to you for information. No written response is required. If you desire additional information regarding this matter, please contact this office.

Sincerely,



Boyce H. Grier
Director

Enclosure: IE Information Notice No. 81-20 with 1 attachment

CONTACT: S. D. Ebnetter
(215-337-5283)

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LIST OF HOLDERS OF NUCLEAR POWER REACTOR OPERATING
LICENSES AND CONSTRUCTION PERMITS RECEIVING
IE INFORMATION NOTICE NO. 81-20

Baltimore Gas and Electric Company
ATTN: Mr. A. E. Lundvall, Jr.
Vice President, Supply
P. O. Box 1475
Baltimore, Maryland 21203

Docket Nos. 50-317
50-318

Boston Edison Company M/C Nuclear
ATTN: Mr. A. V. Morisi
Nuclear Operations Support Manager
800 Boylston Street
Boston, Massachusetts 02199

Docket No. 50-293

Connecticut Yankee Atomic Power Company
ATTN: Mr. W. G. Council
Vice President - Nuclear
Engineering and Operations
P. O. Box 270
Hartford, Connecticut 06101

Docket No. 50-213

Consolidated Edison Company of
New York, Inc.
ATTN: Mr. John D. O'Toole
Vice President - Nuclear
Engineering and Quality Assurance
4 Irving Place
New York, New York 10003

Docket Nos. 50-03
50-247

Duquesne Light Company
ATTN: Mr. J. J. Carey
Vice President
Nuclear Division
P. O. Box 4
Shippingport, Pennsylvania 15077

Docket No. 50-334

Jersey Central Power and Light Company
ATTN: Mr. Ivan R. Finfrock, Jr.
Vice President
Oyster Creek Nuclear Generating Station
P. O. Box 388
Forked River, New Jersey 08731

Docket No. 50-219

Maine Yankee Atomic Power Company
 ATTN: Mr. Robert H. Groce
 Senior Engineer-Licensing
 1671 Worcester Road
 Framingham, Massachusetts 01701

Docket No. 50-309

Metropolitan Edison Company
 ATTN: Mr. H. D. Hukill
 Vice President and Director of TMI-1
 P. O. Box 480
 Middletown, Pennsylvania 17057

Docket No. 50-289

Metropolitan Edison Company
 ATTN: Mr. G. K. Hovey
 Vice President and Director of TMI-2
 P. O. Box 480
 Middletown, Pennsylvania 17057

Docket No. 50-320

Niagara Mohawk Power Corporation
 ATTN: Mr. T. E. Lempges
 Vice President
 Nuclear Generation
 300 Erie Boulevard West
 Syracuse, New York 13202

Docket No. 50-220

Northeast Nuclear Energy Company
 ATTN: Mr. W. G. Council
 Senior Vice President - Nuclear
 Engineering and Operations
 P. O. Box 270
 Hartford, Connecticut 06101

Docket Nos. 50-336
 50-245
 50-423

Philadelphia Electric Company
 ATTN: Mr. S. L. Daltroff
 Vice President
 Electric Production
 2301 Market Street
 Philadelphia, Pennsylvania 19101

Docket Nos. 50-277
 50-278

Power Authority of the State of New York
 Indian Point 3 Nuclear Power Plant
 ATTN: Mr. J. C. Brons
 Resident Manager
 P. O. Box 215
 Buchanan, New York 10511

Docket No. 50-286

Power Authority of the State of New York
James A. FitzPatrick Nuclear Power Plant
ATTN: Mr. R. J. Pasternak
Resident Manager
P. O. Box 41
Lycoming, New York 13093

Docket No. 50-333

Public Service Electric and Gas Company
ATTN: Mr. F. W. Schneider
Vice President - Production
80 Park Plaza - 15A
Newark, New Jersey 07101

Docket Nos. 50-272
50-311

Rochester Gas and Electric Corporation
ATTN: Mr. John E. Maier
Vice President
Electric and Steam Production
89 East Avenue
Rochester, New York 14649

Docket No. 50-244

Vermont Yankee Nuclear Power Corporation
ATTN: Mr. Robert L. Smith
Licensing Engineer
1671 Worcester Road
Framingham, Massachusetts 01701

Docket No. 50-271

Yankee Atomic Electric Company
ATTN: Mr. James A. Kay
Senior Engineer-Licensing
1671 Worcester Road
Framingham, Massachusetts 01701

Docket No. 50-29

Duquesne Light Company
ATTN: Mr. E. J. Woolever
Vice President
435 Sixth Avenue
Pittsburgh, Pennsylvania 15219

Docket No. 50-412

Jersey Central Power & Light Company
ATTN: Mr. I. R. Finfrock, Jr.
Vice President
260 Cherry Hill Road
Parsippany, New Jersey 07054

Docket No. 50-363

Long Island Lighting Company
ATTN: Mr. M. S. Pollock
Vice President - Nuclear
175 East Old Country Road
Hicksville, New York 11801

Docket No. 50-322

Niagara Mohawk Power Corporation
ATTN: Mr. Gerald K. Rhode
Vice President
System Project Management
c/o Miss Catherine R. Seibert
300 Erie Boulevard, West
Syracuse, NY 13202

Docket No. 50-410

Pennsylvania Power & Light Company
ATTN: Mr. Norman W. Curtis
Vice President
Engineering and Construction - Nuclear
2 North Ninth Street
Allentown, Pennsylvania 18101

Docket Nos. 50-387
50-388

Philadelphia Electric Company
ATTN: Mr. John S. Kemper
Vice President
Engineering and Research
2301 Market Street
Philadelphia, Pennsylvania 19101

Docket Nos. 50-352
50-353

Public Service Electric & Gas Company
ATTN: Mr. T. J. Martin
Vice President
Engineering and Construction
80 Park Plaza - 17C
Newark, New Jersey 07101

Docket Nos. 50-354
50-355

Public Service Company of New Hampshire
ATTN: Mr. W. C. Tallman
Chairman and Chief Executive Officer
1000 Elm Street
Manchester, New Hampshire 03105

Docket Nos. 50-443
50-444

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 confinement 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

RECENTLY ISSUED
 IE INFORMATION NOTICES

Information Notice No.	Subject	Date Issued	Issued to
81-19	Lost Parts in Primary Coolant System	7/6/81	All holders of a power reactor 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
81-16	Control Rod Drive System Malfunctions	4/23/81	All holders of a BWR power reactor OL or CP
81-15	Degradation of Automatic ECCS Actuation Capability by Isolation of Instrument Lines	4/22/81	All holders of a power reactor OL or CP
81-14	Potential Overstress of Shafts on Fisher Series 9200 Butterfly Valves with Expandable T Rings	4/17/81	All holders of a power reactor 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 holders of a power reactor OL or CP
81-11	Alternate Rod Insertion for BWR Scram Represents a Potential Path for Loss of Primary Coolant	3/30/81	All holders of a BWR power reactor OL or CP
81-10	Inadvertant Containment Spray Due to Personnel Error	3/25/81	All holders of a power reactor OL or CP