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

April 4, 1990

NRC INFORMATION NOTICE NO. 90-23: IMPROPER INSTALLATION OF PATEL CONDUIT SEALS

Addressees:

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

Purpose:

This information notice is intended to alert addressees to a possible safety problem caused by the improper installation of Patel conduit seals as a result of incorrect selection of grommets based on the wire gauge size. 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 November 6, 1989, the staff at the H. B. Robinson plant notified the NRC that they had discovered that some of the conduit seal grommets used to seal insulated wire conductors entering environmentally qualified instrument housings were oversized for the application. The seals are used to prevent moisture from entering safety-related electrical components following loss-of-coolant accidents. Use of oversized seals may create potential moisture intrusion paths into safety-related instrumentation inside the reactor containment.

The problem was attributed to inadequate installation instructions that were used when the seals were installed in 1986 and 1987. These instructions listed the grommets by wire gauge size and gave maximum wire insulation diameters for each wire size (see the first table, page 1, of the enclosed EGS Bulletin 90-1). In accordance with these instructions, the seals were selected based on wire gauge alone. However, since the insulation thickness for a given wire gauge varies from one wire type to another, a more appropriate parameter for choosing the correct grommet size would have been the minimum wire insulation diameter for which a particular grommet will achieve an effective seal. The selection of grommet size based only on wire gauge size resulted in the installation of some grommets that were too large to provide an effective seal. As a result, some of the seals failed pressure tests that were designed to simulate post-LOCA pressures.

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Notice 90-023

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During the investigation of the grommet leakage problem, the Robinson staff also checked the torque on the conduit seal union nuts that are used to compress the seals. EGS Corporation recommends that the union nuts be torqued to 50 ft-lb (EGS Bulletin 90-1). On approximately half of the 90 seals inspected, the union nut moved about 1/4 inch when this torque was applied. One union nut was found to be quite loose. EGS Corporation reports that 1/4 inch of movement does not necessarily indicate a degraded seal but recommends that the correct torque be verified on a representative sample of installed conduit seals.

Discussion:

In order for these conduit seals to be able to function at accident pressures and temperatures and for extended periods following an accident, it is important that the correct installation procedures be established and consistently applied. In this case, the installation of the seals according to inadequate procedures could have resulted in moisture intrusion into more than one safety component during an accident, leading to equipment failures or the display of erroneous information to the operators.

Although the vendor's use of wire range sizes to designate the grommets appears to have been intended as an aid in choosing the proper grommet for the application, differences in insulation thicknesses because of differences in insulating materials and type of application were not accounted for by either the vendor's original instructions or the licensee's initial installation procedures for the grommets. The necessary minimum insulation diameter values for each grommet size were subsequently provided by EGS Corporation, the supplier of the Patel conduit seals. These minimum diameters are also included in EGS Bulletin 90-1.

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: T. E. Conlon, RII
(404) 331-5537

N. Merriweather, RII
(404) 331-5577

Attachments:
1. EGS Letter to NRC dated 1/2/90, Enclosing
   Product Bulletin 90-1: Recent Events
   Concerning Patel Conduit Seals
2. List of Recently Issued NRC Information Notices

EGS
ENGINEERING AND ADVANCED TECHNOLOGY

January 2, 1990

U.S. Nuclear Regulatory Commission
101 Marietta Street NW
Suite 2900
Atlanta, GA 30323

Attn: Mr. Norman Merriweather

Gentlemen:

In accordance with our telephone conversation this morning, we are enclosing a copy of EGS Product Bulletin 90-1, "Recent Events Concerning Patel Conduit Seals, P/N 841206", dated November 7, 1989. Copies of the product bulletin were sent to our utility customers both by way of Facsimile and U.S. Mail. Subsequently, we followed up with personal telephone calls to each utility's EQ personnel. The utilities/sites that have purchased the Patel conduit seal are listed below:

UTILITY	PLANT SITE
Duquesne Light	Beaver Valley
Carolina Power & Light	Harris/Robinson/Brunswick
Baltimore Gas & Electric	Calvert Cliffs
Nebraska Public Power District	Cooper
Toledo Edison	Davis Besse
Omaha Public Power District	Ft. Calhoun
Systems Energy Resources, Inc.	Grand Gulf
Georgia Power Co.	Hatch/Vogtle
Wisconsin Public Service	Kewaunee
Philadelphia Electric	Peach Bottom/Limerick
Northern States Power	Monticello
Consumers Power	Palisades
Long Island Lighting Co.	Shorehan
Virginia Electric Power Co.	Surry
General Public Utilities	Oyster Creek
Public Service of Colorado	Ft. St. Vrain

Please contact us if you need further information. We would appreciate the opportunity to provide further inputs, especially concerning any notices or information to be disseminated to the nuclear industry.

Sincerely,

Gary J. Elam
Product Director

EGS Corporation ⊏ 150 West Park Loop ⊏ Suite 301 ⊏ Huntsville, Alabama 35806 ⊏ (205) 722-8500 ⊏ FAX (205) 722-8533
Knoxville Office ⊏ 408 Cedar Bluff Road ⊏ Suite 230 ⊏ Knoxville, Tennessee 37923 ⊏ (615) 690-6200 ⊏ FAX (615) 690-5423

EGS
ENGINEERING AND ADVANCED TECHNOLOGY

MEMORANDUM

TO: Patel/EGS Customers

FROM: Gary Elam, Products Director, EGS Corp

SUBJECT: Product Bulletin 90-1: Recent Events Concerning Patel Conduit Seals, P/N 841206

DATE: November 7, 1989

Grommet Use Range:

The Patel Conduit Seal was originally supplied starting in 1985. The installation instructions were supplied as Patel Drawing A-N-841206-8, Rev. Ø which specified the following:

GROMMET	MAXIMUM INSULATION DIAMETER (IN.)
GR-12	.170
GR-14	.150
GR-16	.135
GR-18	.120

Implied within these specified maximum diameters is a use range for each grommet. Revision E, 3/6/87, of Patel Drawing A-N-841206-8 formally specified the use range as follows:

GROMMET	NOMINAL USE RANGE: INSULATION DIAMETER (IN.)
GR-12	.150 - .170
GR-14	.135 - .150
GR-16	.115 - .140
GR-18	.095 - .115

EGS Corporation = 150 West Park Loop = Suite 301 = Huntsville, Alabama 35806 = (205) 722-8500 = FAX (205) 722-8533
Knoxville Office = 408 Cedar Bluff Road = Suite 230 = Knoxville, Tennessee 37923 = (615) 690-6200 = FAX (615) 690-5423

Through discussions this week with one of our customers and the NRC, it has been brought to our attention that wires with diameters smaller than those specified have been utilized. Our experience with the Patel Conduit Seal indicates that a slightly undersized wire will not degrade the sealing function. For instance, Specimen P-1 in Report PEI-TR-841203-12, Rev. A utilized a GR-16 grommet with wires ranging from .110 to .115 diameter (.005 below the use range).

The insulation diameter of all wires to be sealed should be measured or otherwise verified prior to the selection of the grommet size. The grommet part numbers (GR-12, GR-14, etc.) do not necessarily correspond with wire gauge, i.e., a 16 AWG wire may require the use of a GR-18 grommet. If further help is required, consult with EGS Products personnel at 205/722-8500.

In the near future, EGS intends to investigate and possibly extend the grommet use range.

Loosening of Union Nuts:

At the same utility, the torque on the conduit seal union nuts was verified. One of ninety conduit seals was found to have a significantly loose union nut. In approximately half of the ninety seals, the nut moved approximately 1/4 inch when 50 ft.-lb. torque was applied. This does not indicate a degraded seal. As a precaution, at a convenient time, we recommend that all conduit seal users verify the torque on a representative sample of installed conduit seals. To verify torque, attempt to tighten the union nut first at a 40 ft-lb. wrench setting, then at a 50 ft.-lb. setting. If the nut doesn't move, it can be concluded that the 50 ft.-lb. torque is intact. Be sure to hold the 2 housing halves with pipe wrenches so as not to disturb or over-torque other joints or electrical device housings which may be connected to the conduit seal.

Conclusion

We do not believe these conditions are a serious concern in that some slight variation in wire diameters and union nut torque should not degrade the sealing function. All users should be aware of conduit seal use ranges and torque requirements. If there is reason to believe that use ranges and torques are not consistent with our installation procedures, we recommend a review of your installation procedures and installed configurations. We encourage you to seek our inputs. We are in the process of revising the conduit seal installation procedure drawing, A-N-841206-8, to include specific instructions to measure wire diameters. The drawing will be forwarded soon. This bulletin was prepared as a service to our customers to provide accurate information concerning the conduit seal. Should you have further questions, please contact Gary Elam or Johnny Jenkins at 205/722-8500.

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
90-22	Unanticipated Equipment Actuations Following Restoration of Power to Rosemount Transmitter Trip Units	3/23/90	All holders of OLs or CPs for nuclear power reactors.
90-21	Potential Failure of Motor-Operated Butterfly Valves to Operate Because Valve Seat Friction was Underestimated	3/22/90	All holders of OLs or CPs for nuclear power reactors.
90-20	Personnel Injuries Resulting from Improper Operation of Radwaste Incinerators	3/22/90	All NRC licensees who process or incinerate radioactive waste.
90-19	Potential Loss of Effective Volume for Containment Recirculation Spray at PWR Facilities	3/14/90	All holders of OLs or CPs for PWRs.
90-18	Potential Problems with Crosby Safety Relief Valves Used on Diesel Generator Air Start Receiver Tanks	3/9/90	All holders of OLs or CPs for nuclear power reactors.
90-17	Weight and Center of Gravity Discrepancies for Copes-Vulcan Valves	3/8/90	All holders of OLs or CPs for nuclear power reactors.
89-59, Supp. 2	Suppliers of Potentially Misrepresented Fasteners	3/7/90	All holders of OLs or CPs for nuclear power reactors.
90-16	Compliance with New Decommissioning Rule	3/7/90	All materials licensees.

OL = Operating License
CP = Construction Permit