

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

June 9, 1992

NRC INFORMATION NOTICE 92-43: DEFECTIVE MOLDED PHENOLIC ARMATURE CARRIERS
FOUND ON ELMWOOD CONTACTORS

Addressees

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

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to fractures found in the molded phenolic armature carrier blocks (armature carriers) in certain Elmwood and Fasco electrical contactors. 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 are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

In 1990, Fasco Industries, Incorporated (Fasco) took over the manufacture of Elmwood Sensors, Incorporated (Elmwood) electrical contactors. Elmwood and Fasco were sister companies. Before this change, the contactors were identified as Elmwood contactors with part numbers prefixed by "30D," "30E," or "30F." After the change, the contactors were identified as Fasco contactors with part numbers prefixed by either "2M" or "3M." Nutherm International, Incorporated (Nutherm) examined the Fasco and Elmwood contactor models discussed in this notice and determined them to be identical.

In October 1991, the Georgia Power Company (GPC) informed Nutherm that it was experiencing problems with Elmwood model 30F030 contactors supplied to GPC by Nutherm. Nutherm had dedicated and qualified these components, and sold them to GPC as Class 1E components. GPC informed Nutherm that several Elmwood model 30F030 contactors used in safety-related applications had failed. GPC had determined that the phenolic armature carrier in the contactors shrank slightly such that the designed clearance fit between the armature carrier and the laminated steel armature became an interference fit. This condition then caused the armature carrier to fracture. The fractured armature carriers caused Elmwood contactors at GPC's Vogtle Electric Generating Plant (Vogtle) to fail, and resulted in a safety-related system malfunction. GPC was concerned that similar failures could occur in other Elmwood or Fasco

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contactors used in safety-related applications at Vogtle. Therefore, GPC replaced all of the Elmwood and Fasco contactors that were installed in safety-related applications.

After being informed of the contactor failures by GPC, Nutherm tested the contactors and determined that the shrinkage of the contactor carrier exceeded the amount provided for in the design. Nutherm found the maximum shrinkage of the contactor carrier to be 0.018 inch whereas the design of the armature carrier slot allowed for a shrinkage of 0.015 inch. Nutherm determined this deficiency to be reportable under Part 21 of Title 10 of the Code of Federal Regulations (10 CFR Part 21) and reported it to the NRC.

GPC documented its evaluation of the failed Elmwood contactors on Vogtle "Deficiency Card," (DC) 191-209 of August 27, 1991, and DC 291-162 of September 30, 1991. In DC 191-209, GPC stated that similar failures (fracture of the armature carrier) of Elmwood's model 30F030 contactor had occurred in other safety-related and nonsafety-related applications at Vogtle. One contactor that failed was installed in an electrical panel with an ambient temperature of about 90°F, had been in service 4 years, and had operated for less than 100 cycles. In the root cause determination for DC 191-209, GPC concluded that, in part, "...this shrinkage is of a magnitude exceeding that which can be accommodated by the [armature carrier]...design without failure, and a consequent re-evaluation of the qualified life is necessary." Most, if not all, of the Elmwood contactors replaced by GPC and subsequently tested were identified with the manufacturer's date codes for 1982 or 1983. However, the Fasco staff stated that the design of the armature carrier slot had not changed until Nutherm and GPC informed Fasco of this problem in 1991.

Upon reviewing the results of GPC's evaluation and Nutherm's testing of armature carrier specimens, Fasco revised its phenolic armature carrier manufacturing process to enlarge the armature carrier slot from 2.110 inches to 2.115 inches. Fasco informed Nutherm that this change should reduce the potential for future armature carrier fractures. Fasco stated that it began incorporating the newly modified armature carriers into its "2M" and "3M" contactors about April 13, 1992. However, Fasco stated that the suspect armature carrier assemblies had been used in all of its "2M" and "3M" contactors and in Elmwood's "30D," "30E," and "30F" contactors manufactured before this date.

These contactors were manufactured and marketed as commercial-grade items by Elmwood or Fasco and were subsequently dedicated for safety-related use. The failures of the contactors after dedication suggests that certain requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50 (Criterion III) were not appropriately addressed during the dedication process. Criterion III requires, in part, that measures be established to review the suitability of application of materials and parts that are essential to the functions of safety-related structures, systems, and components.

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 Office of Nuclear Reactor Regulation (NRR) project manager.

Carl E. Rossi

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

Technical contacts: Randolph N. Moist, NRR
(301) 504-2945

Joseph J. Petrosino, NRR
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Attachment: List of Recently Issued NRC Information Notices

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Attachment
IN 92-43
June 9, 1992
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LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
92-42	Fraudulent Bolts in Seismically Designed Walls	06/01/92	All holders of OLs or CPs for nuclear power reactors.
92-41	Consideration of the Stem Rejection Load in Calculation of Required Valve Thrust	05/29/92	All holders of OLs or CPs for nuclear power reactors.
92-40	Inadequate Testing of Emergency Bus Under-voltage Logic Circuitry	05/27/92	All holders of OLs or CPs for nuclear power reactors.
92-39	Unplanned Return to Criticality during Reactor Shutdown	05/13/92	All holders of OLs or CPs for nuclear power reactors.
92-38	Implementation Date for the Revision to the EPA Manual of Protective Action Guides and Protective Actions for Nuclear Incidents	05/12/92	All holders of OLs or CPs for nuclear power reactors, non-power reactors and materials licensees authorized to possess large quantities of radioactive material.
92-37	Implementation of the Deliberate Misconduct Rule	05/08/92	All Nuclear Regulatory Commission Materials Licensees.
92-16, Supp. 1	Loss of Flow from the Residual Heat Removal Pump during Refueling Cavity Draindown	05/07/92	All holders of OLs or CPs for nuclear power reactors.
92-36	Intersystem LOCA Outside Containment	05/07/92	All holders of OLs or CPs for nuclear power reactors.

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Attachment: List of Recently Issued NRC Information Notices

Document Name: 92-43.IN

+Discussed IN narrative via telephone

*SEE PREVIOUS CONCURRENCES

Discussed with GPC staff on 05/06/92

D/DOEA:NRR

CERossi

06/3/92

*C/OGCB:DOEA:NRR+NUTHERM

CHBerlinger

06/03/92

*OGCB:DOEA:NRR

JLBirmingham

05/28/92

*RPB:ADM

TechEd

05/07/92

*D/DRIS:NRR

LPatterson

05/07/92

BKGrimes

05/08/92

*VIB:DRIS:NRR

JJPetrosino

04/03/92

*C/VIB:DRIS:NRR+FASCO

LJNorrholm

05/08/92

*VIB:DRIS:NRR

RMoist

04/03/92

AOdette

05/07/92

*A/SC/VIB:DRIS:NRR

JJacobson

04/30/92

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D/DOEA:NRR

CERossi

06/ /92

C/OGCB:DOEA:NRR+NUTHERM *D/DRIS:NRR *C/VIB:DRIS:NRR+FASCO

CHBerlinger LPatterson BKGrimes LJNorrholm AOdette

06/ /92 05/07/92 05/08/92 05/08/92 05/07/92

*OGCB:DOEA:NRR *RPB:ADM *VIB:DRIS:NRR *VIB:DRIS:NRR *A/SC/VIB:DRIS:NRR

JLBirmingham TechEd JJPetrosino RMoist JJacobson

05/28/92 05/07/92 04/03/92 04/03/92 04/30/92

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RIS-1:VIB JJPetrosino 04/03/92*	RIS-2:VIB RMoist 04/03/92*	AC:RIS-2:VIB JJacobson 04/30/92*	TECHEDIT JMain 05/07/92*	FASCO AOdette 05/07/92+
BC:VIB:DRIS LJNorrholm 05/08/92	DIR:DRIS BKG 05/04/92	OGCB:DOEA CBerlinger 05/ /92	DIR:DOEA CERossi 05/ /92	NUTHERM LPatterson 05/07/92+

+ Discussed IN narrative via telephone

* See previous concurrence

Discussed with GPC staff on 05/06/92

SAVE All Concurrences
Petrosino

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BC:VIB:DRIS LJNorrholm 04/ /92	DIR:DRIS BKGrimes 04/ /92	OGCB:DOEA CBerlinger 04/ /92	DIR:DOEA CERossi 04/ /92	NUTHERM LPatterson 05/04/92+

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* See previous concurrence

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04/03/92*

AC:RIS-2:VIB
JJacobson
04/30/92*

TECHEDIT
JMain
05/04/92*

FASCO
AOdette
05/04/92+

BC:VIB:DRIS
LJNorrholm
05/ /92

DIR:DRIS
BKGrimes
05/ /92

OGCB:DOEA
CBerlinger
05/ /92

DIR:DOEA
CERossi
05/ /92

07
NUTHERM
LPatterson
05/04/92+

+ Discussed IN narrative via telephone
* See previous concurrence
Discussed with GPC staff on 05/06/92

and again
on 5/7/92

discussed
apparently

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RIS-1:VIB	RIS-2:VIB	AC:RIS-2:VIB	TECHEDIT	FASCO
JJPetrosino	RMoist	JJacobson	JMain ^{Qm}	AOdette
04/03/92*	04/03/92*	04/30/92*	05/4/92	05/04/92+

BC:VIB:DRIS	DIR:DRIS	OGCB:DOEA	DIR:DOEA	NUTHERM
LJNorrholm	BKGrimes	CBerlinger	CERossi	LPatterson
05/ /92	05/ /92	05/ /92	05/ /92	05/04/92+

+ Discussed IN narrative via telephone

* See previous concurrence

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manufactured by Fasco Industries, St. Louis, Missouri, and sold as commercial-grade components. Prior to approximately 1981 the subject contactors were identified as ELMWOOD contactors and were prefixed by a 30D, E, or F. After approximately 1981, the subject contactors were identified as FASCO and were prefixed by either 2M or 3M.

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BC:VIB:DRIS	DIR:DRIS	OGCB:DOEA	DIR:DOEA	NUTHERM
LJNorrholm	BKGrimes	CBerlinger	CERossi	L Patterson
04/ /92	04/ /92	04/ /92	04/ /92	05/04/92

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AI Odette
314 392
7151

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JJ Petrosino
04/03/92

RIS-2:VIB
RM Moist
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AC:RIS-2:VIB
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04/ /92

TECHEDIT
04/ /92

BC:VIB:DRIS
LJNorrholm
04/ /92

DIR:DRIS
BKGrimes
04/ /92

OGCB:DOEA
CBerlinger
04/ /92

DIR:DOEA
CERossi
04/ /92