CENTRAL FILES

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
631 PARK AVENUE
KING OF PRUSSIA, PENNSYLVANIA 19406

November 14, 1980

Docket No. 50-293

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

Gentlemen:

The enclosed IE Bulletin 80-23, "Failures of Solenoid Valves Manufactured by Valcor Engineering Corporation" is forwarded to you for action. No written response is required.

In order to assist the NRC in evaluating the value/impact of each Bulletin on licensees, it would be helpful if you would provide an estimate of the manpower expended in conduct of the review and preparation of the report(s) required by the Bulletin. Please estimate separately the manpower associated with corrective actions following identification of problems through the Bulletin.

If you desire additional information regarding this matter, please contact this office.

Sincerely,

Boyce H. Grier

Boyce H. Grier
Director

Enclosures:
1. IE Bulletin No. 80-23
2. List of Recently Issued IE Bulletins

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cc w/encls:
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SSINS No.: 6820
Accession No.:
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IEB 80-23

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

November 14, 1980

IE Bulletin No. 80-23: FAILURES OF SOLENOID VALVES MANUFACTURED BY VALCOR ENGINEERING CORPORATION

Introduction:

Valcor Engineering Corporation (Valcor) has submitted 10 CFR Part 21 Reports addressing failures of Valcor solenoid valves used at nuclear power facilities. These failures have occurred at nuclear facilities owned by Duke Power Company and Omaha Public Power District, and are purportedly limited to solenoid valves having part numbers (P/N's) V70900-21-1 and V70900-21-3.

The information presented in this bulletin is intended to shed light on the defective solenoid valves so that appropriate actions can be taken to circumvent the degradation of any safety-related system using such solenoid valves.

DISCUSSION:

The specific Valcor solenoid valves addressed herein were purportedly designed as Class IE components. However, in light of the reported failures, it appears that neither the design nor the qualification tests were adequate for Class IE service. Valcor has attributed the failures to a latent defect in the magnet wire. Valcor believes that this defect manifests itself when the solenoid valves are continuously energized at elevated temperatures by an incompatability between the magnet wire's polyvinyl varnish coating and the wire's polyimide insulation which causes a dielectric breakdown leading to turn-to-turn shorts within the coil.

Valcor states that the above incompatability is limited to solenoid valves having P/N's V70900-21-1 and V70900-21-3, and that all customers affected by the aforementioned defect have been notified. A listing of Valcor customers so notified and valves purchased follows.

CUSTOMER	P.O. NO.	VALVE P/N	QTY
Anchor-Darling	P-827	V70900-21-1,-3	24
Anchor-Darling	N663	V70900-21-1	6
Cesare Bonetti (Italy)	1535/79	V70900-21-3	10
Duke Power Company	E95188-11	V70900-21-3	100
Duke (Mill Power)	C-97733	V70900-21-1,-3	335
Duke Power Company	E97822-11	V70900-21-3	70
Ralph Hiller	HA-187-0	V70900-21-3	14
Mill Power	E52462-73	V70900-21-1,-3	20
Omaha Public Power Dist.	43472	V70900-21-3	19
Stone and Webster	L000 #43	V70900-21-3	8
Copes Vulcan	911,553	V70900-21-1	4
		TOTAL	610

Valcor's corrective actions include making arrangements for replacing existing coils with a newly designed coil using a 997 silicone varnish coating instead of the polyvinyl varnish. Sample coils of the new design are scheduled to undergo qualification tests. We do not know the particulars of these tests, but Valcor has scheduled the first phase of these tests for completion by November 15, 1980, and has identified the second phase as an on-going aging test.

Fort Calhoun has replaced twelve of its original solenoid valves with Valcor type V70900-21-3 valves, ten of which are located inside containment and two outside. This substitution was made because the original solenoid valves did not meet the requirements of IE Bulletin No. 79-01. However, subsequent to the replacement, Fort Calhoun has experienced five failures of these Valcor solenoid valves. Each failure involved a solenoid valve located inside containment and designed for operation in the normally energized mode. These two factors (i.e., continuously energized mode of operation and a somewhat elevated temperature inside containment) tend to support Valcor's contention regarding the failure mechanism.

ACTIONS TO BE TAKEN BY HOLDER OF OPERATING LICENSES:

1. Determine whether Valcor solenoid valves having P/N's V70900-21-1 or -3 are used to perform any safety-related function at your facility. If so, identify the safety-related systems using these solenoid valves, the total number of such solenoid valves used, and evaluate acceptability of continued operation with potentially defective solenoid valves. A report of the results of the evaluation of continued operation shall be submitted within ten (10) days of the date of this bulletin and should include factors such as (a) operator's ability to promptly identify a failing or failed solenoid valve, (b) effect of solenoid valve failures on safety-related systems and subsequent operator actions required, and (c) possible degradation of the power supply serving a failed solenoid valve and the effects on other components served by said power supply. If no such solenoid valves are used, you need only submit a negative declaration to this effect within thirty (30) days of the date of this bulletin and you need not respond to the remaining items.

2. Licensees of operating plants using the aforementioned solenoid valves in safety-related applications shall periodically test the coils for potential turn-to-turn shorts in a manner that will not violate any LCO or cause any undesirable transient. The tests should account for coil resistance changes due to temperature effects attributed to the environment and to I^2R losses in the coil to provide accurate indications of changes in resistance due to turn-to-turn shorts.

   These tests are to be initiated within ten (10) days of the date of this bulletin. The following schedule is recommended until the units are replaced with qualified units:

   (a) Daily for solenoid valves operated in a normally energized mode;

   (b) Weekly for solenoid valves operated in a normally deenergized mode.

Whenever the tests indicate that ten percent or more of the coil turns have been shorted, said solenoid valve, or its coil, shall be replaced with a new unit.

3. Licensees of operating plants shall submit a report within forty-five (45) days of the date of this bulletin describing their longer term corrective action plan and the date by which the corrective actions will be implemented. As a minimum, the longer term corrective measures should include the replacement of the coils with fully qualified coils. New solenoid valve assemblies (i.e., a repaired unit with a replacement coil or a completely new unit) shall be demonstrated to be qualified for its safety-related application per the applicable requirements of IEEE 323-1974, IEEE 344-1975, IEEE 382-1972 and IE Bulletin No. 79-01B and supplements thereto.

ACTIONS TO BE TAKEN BY HOLDERS OF CONSTRUCTION PERMITS:

1. Determine whether Valcor solenoid valves having P/N's V70900-21-1 or -3 are to be used to perform safety-related functions at your facility. If so, a report addressing this matter shall be submitted by the earlier of the two following dates: (a) within ninety (90) days of the date of this bulletin; (b) two weeks prior to the date by which you expect to receive an operating License.

   The above report should indicate your plans to replace said valves prior to commencing operation, if this is the case. Otherwise, if you propose to commence operation prior to replacing said valves, the report should indicate the safety-related systems where such valves are to be used, and should include an evaluation of the acceptability of operating with potentially defective valves. This evaluation should address factors such as your proposed test plan, operator's ability to promptly identify a failing or failed valve, effect of solenoid valve failure on safety-related systems and subsequent operator actions required, and the preventive measures you plan to implement to circumvent the effects of failures of these valves.

   If no such valves are to be used in your facility, submit a negative declaration to this effect within forty-five (45) days of the date of this bulletin but prior to the date by which you expect to receive an operating license.

The above requested reports shall be submitted to the director of the appropriate NRC region within time stipulated for each item in the this bulletin. A copy of each report shall be forwarded to the Director, Division of Resident and Regional Reactor Inspection, Office of Inspection and Enforcement, United States Nuclear Regulatory Commission, Washington, D. C. 20555.

Approved by GAO, B180225(R0072); clearance expires November 30, 1980. Approval was given under a blanket clearance specifically for identified generic problems.

RECENTLY ISSUED
IE BULLETINS

Bulletin No.	Subject	Date Issued	Issued To
80-22	Automation Industries, Model 200-520-008 Sealed-Source Connectors	9/12/80	All holders of a radiography license
80-21	Valve Yokes Supplied by Malcolm Foundry Company, Inc.	11/6/80	All holders of a power reactor OL or CP
Revision 1 to 79-26	Boron Loss from BWR Control Blades	8/29/80	All holders of a BWR power reactor OL
Revision 1 to 80-19	Failures of Mercury-Wetted Matrix Relays in Reactor Protective Systems of Operating Nuclear Power Plants Designed by Combustion Engineering	8/15/80	All holders of a power reactor OL or CP
80-20	Failures of Westinghouse Type W-2 Spring Return to Neutral Control Switches	7/31/80	All holders of a power reactor OL or CP
80-19	Failures of Mercury-Wetted Matrix Relays in Reactor Protective Systems of Operating Nuclear Power Plants Designed by Combustion Engineering	7/31/80	All holders of a power reactor OL or CP
80-18	Maintenance of Adequate Minimum Flow Thru Centrifugal Charging Pumps Following Secondary Side High Energy Line Rupture	7/24/80	All holders of a PWR power reactor OL or CP
Supplement 3 to 80-17	Failure of Control Rods to Insert During a Scram at a BWR	8/22/80	All holders of a BWR power reactor OL or CP
Supplement 2 to 80-17	Failure of Control Rods to Insert During a Scram at a BWR	7/22/80	All holders of a BWR power reactor OL
Supplement 1 to 80-17	Failure of Control Rods to Insert During a Scram at a BWR	7/18/80	All holders of a BWR power reactor OL or CP