

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

March 14, 1980

IE Information Notice No. 80-11

GENERIC PROBLEMS WITH ASCO VALVES IN NUCLEAR APPLICATIONS INCLUDING FIRE PROTECTION SYSTEMS

Description of Circumstances:

Enclosure 1 is a Recall Notice from The Viking Corporation, dated July 16, 1979 that identifies ASCO valves used in certain Viking fire protection equipment that could fail.

Licensees should review their fire protection system components to determine if the equipment identified in the Viking Recall Notice is in their facility. If the identified equipment is installed in the fire protection system, then the modifications specified in the Recall Notice should be made and tested for proper operation. The requirements of the technical specifications or any other licensee commitment should be complied with when a fire protection system is disabled.

South Carolina Electric and Gas Company (Virgil C. Summer Nuclear Station) reported to the NRC on October 24, 1979, a potential significant deficiency regarding the effects of oil on elastomeric materials used in ASCO NP-1 solenoid valves. Specifically, these valves utilize an ethylene propylene elastomer which expands or swells when brought into contact with oils, possibly causing valve failure. For this reason, ASCO specifies these NP-1 solenoid valves for use in "oil free instrument air" systems.

Although instrument air systems are "oil free" by design, installation instructions may specify the use of thread lubricants utilizing an oil base. Thus, the potential exists for traces of this lubricant from threaded connections in the air system, in addition to traces of oil from the air compressors themselves, to come into contact with the elastomers in the solenoid valves. Degraded elastomers can cause the solenoid valve to fail by sticking, swelling closed flow paths, or rupturing causing leakage across the seat or to atmosphere. Failure of the solenoid to function properly on an active valve could prevent a system from performing its required safety function.

Some ASCO NP-1 solenoid valves are equipped with tags which state: "Important - this valve is equipped with ethylene propylene elastomers which can be attacked by oils and greases. To be used for oil-free instrument quality air. Clean pipe threads of cutting oils." Care should be taken to use approved thread lubricants which do not contain oil for the installation of these valves.

ASCO offers viton elastomers as an option for their NP-1 solenoid valves. The viton elastomers are not affected by oil or grease. Replacement kits of viton elastomers are available for the NP-1 solenoid valves from ASCO. It is recommended that ethylene propylene elastomers found in Class IE qualified ASCO NP-1 solenoid valves be replaced with the viton kits.

In addition, enclosed is a letter from EG&G (Enclosure 2) dated December 26, 1979 that provides the results of an LER review of failure of solenoid valves.

This Information Notice provided information about a potential safety concern. No written response is required. If you desire additional information regarding this matter, contact the Director of the appropriate Regional Office.

Enclosure:

1. Viking Corporation Recall Notice
2. EG&G Letter, Dearien to Tiller dated December 26, 1979



Enclosure 1

THE VIKING CORPORATION  
270 N. INDUSTRIAL PARK ROAD,  
HASTINGS, MICH. U.S.A. 49058  
TELEPHONE (616) 947-9501

**announcement**

July 16, 1979

RECALL NOTICE

Viking Model B-2 Magnetic Bypass and Firecycle Trim Box

We have been informed by the manufacturer that the following listed solenoid valves may contain a black teflon coated core which could cause improper valve operation under certain water and heat conditions. Such failure could result in the sprinkler system not operating or, once having operated, not being capable of being reset.

Solenoid valves in question are as follows:

"ASCO" Automatic Switch Co., with the following specifications:

<u>Catalog No.</u>	<u>Voltage</u>	<u>Serial No.</u>
THT8210B34	120/60	19913E
THT8210B34	120/60	70440E
THT8210B34	120/60	59284E
THT8210B34E	120/60	79329E
THT8210B34	120/60	97504E
TFTX8210B34E	120/60	28508H
THT8210B34E	120/60	42536H
8211B34	24/60	28510H
THT8210B34E	12/DC	79328E
THT8210B34	24/DC	13912E
THT8210B34	24/DC	50445E
THT8210B34	24/DC	56556E
THT8210B34	24/DC	59285E
THT8210B34E	24/DC	79327E
THT8210B34E	24/DC	82928E
THT8210B34E	24/DC	91819E
THT8210B34E	24/DC	16871H
THT8210B34E	24/DC	18391H
8211B34	24/DC	28511H
THT8210B34E	125/DC	79330E

These valves may have been used on the following items of Viking equipment:

The Model "B-2" Magnetic Bypass and the Firecycle Valve Trim Box shipped from Viking from January 1977 through May 1979, including those modified as a result of the Viking January 20, 1978 Recall Notice.

(OVER)

In 1977 the manufacturer received some teflon coated cores that may not have been processed properly. It has now become apparent that under certain water and heat conditions, the teflon coating may blister and flake off and this may cause the valve to stick in either the open or closed position. In May, 1979 the manufacturer changed to a non-coated core which he believes will correct the problem.

Viking became aware of the problem as the result of reports from the field indicating failures of devices during routine testing. A check with the manufacturer indicated that the above described changes had taken place.

Viking feels very strongly that the presence of potentially defective solenoid valves in the field constitutes an extremely dangerous situation and recommends to all owners of the above listed equipment that they immediately inspect the equipment to determine if the suspect solenoids are employed.

ALL VIKING INSTALLERS ARE REQUESTED TO INFORM ANY OWNERS WITH WHOM THEY MAY BE ACQUAINTED OF THIS POTENTIALLY DANGEROUS SITUATION AND TO OFFER THEIR SERVICES TO SUCH OWNERS.

If suspect solenoid valves are found, the system should immediately be tested in accordance with the owner's instructions and a Modification Kit should be ordered directly from ASCO at the following address:

Automatic Switch Company  
56-A Hanover Rd.  
Florham Park, New Jersey 07932

Attn: Mike Colaneri  
Asst. Mgr., Service Dept.

Telephone (201) 966-2314

ORDER ASCO KIT NO. 214-997 (For AC or DC Service)

Order one kit for each Magnetic Bypass to be modified and two kits for each Fire-cycle System.

The Modification Kit will consist of: Core and sufficient parts with specific instructions for repair of Magnetic Bypass and Firecycle Trim Box.

In order to effect the modification, it will be necessary to take the system out of service, shut off the power, disconnect the solenoid leads and disassemble the coil. There is no disassembly of piping. It is estimated that modifications to the solenoid valve itself can be accomplished in approximately 20 minutes.

The Modification Kit will be furnished without charge by ASCO. The modifications should be made as soon as possible and the replaced parts returned to ASCO by January 1, 1980. Any questions should be referred to ASCO.

Owners should be reminded of the extreme importance of conducting maintenance and tests in accordance with Viking's instructions. All of the above noted failures were determined by such activities. Proper testing and maintenance are particularly important when electro-mechanical components are involved. Such components should be exercised frequently. An emergency system is no better than the care it receives.



**EG&G** Idaho, Inc.

ENCLOSURE 2

P. O. Box 1825  
Idaho Falls, Idaho 83401

December 26, 1979

Mr. R. E. Tiller, Director  
Reactor Operations and Programs Division  
Idaho Operations Office - DOE  
Idaho Falls, ID 83401

**SOLENOID VALVE FAILURES REPORTED IN LICENSEE EVENTS REPORTS -  
JAD-252-79**

Ref: D. G. Eisenhut Ltr to All Pressurized Water Reactors dated  
September 21, 1979

Dear Mr. Tiller:

EG&G is in the process of summarizing and evaluating Licensee Event Reports (LERs) under contract to the Probabilistic Analysis Staff of NRC. Having received a copy of the above referenced letter, EG&G felt that some of the information gleaned from the LERs may be of value to NRC in investigating the nature and frequency of solenoid valve failures.

In evaluating Licensee Event Reports (LERs) on valves and valve operators we have encountered many failures of solenoid valves which control the air supply to air operated valves. Fifty failures of solenoid valves in air supply systems appear in 41 LERs. Twenty-three of the 50 failures occurred in ten sets of two or three failures. Each set of multiple failures was discovered in one plant on a single date. We considered these sets to be possible common cause failures because each set exhibited a common failure mechanism.

Fifteen of the 50 failures were reported by one plant, Zion 1. All of Zion's failures resulted from the same failure mechanism - foreign material contamination. Twelve of Zion's 15 failures were multiple failures; that is, they appeared in sets of failures as discussed above. The remaining 35 failures were reported by 20 different plants; one reported five failures and the rest reported three or less.

In evaluating these solenoid valves, it appears that generic problems may exist in the use of solenoid valves for controlling air

R. E. Tiller  
December 26, 1979  
JAD-258-79  
Page 2

supply systems. The major problem appears to be the incompatibility of the solenoid valves with foreign material, specifically oil, which can be present in the air supply system. Forty percent of the solenoid valve failures were reported as being caused by oil or other foreign material in the air supply system. Another problem appears to be the environment in which the solenoid resides. Eighteen percent of the failures were reported as being caused by high temperature and humidity resulting in electrical failure of the solenoid.

We hope that this information will be useful. If you should have any questions, please contact C. F. Miller at (FTS) 583-9673, or R. D. Cox at (FTS) 583-9685.

Very truly yours,

Original signed by

J. A. Dearien, Manager  
Code Assessment and  
Applications Program

NDC:tn

cc: W. E. Vesely, NRC-PAS  
D. G. Eisenhut, NRC-DOR  
R. W. Kiehn, EG&G Idaho

IE Information Notice No. 80-11  
March 14, 1980

Enclosure

RECENTLY ISSUED  
IE INFORMATION NOTICES

Information Notice No.	Subject	Date Issued	Issued To
80-10	Partial Loss of Non-Nuclear Instrument System Power Supply During Operation	3/7/80	All power reactor facilities holding OLs and CPs
80-09	Possible Occupational Health Hazard Associated with Closed Cooling Systems	3/7/80	All holders of power reactor OLs and near term CPs
80-08	The States Company Sliding Link Electrical Terminal Block	3/7/80	All power reactor facilities with an OL or a CP
80-07	Pump Shaft Fatigue Cracking	2/29/80	All Light Water Reactor Facilities holder power reactor OLs and CPs
80-06	Notification of Significant Events	2/27/80	All holders of Reactor OLs and to near term OL applicants
80-05	Chloride Contamination of Safety Related Piping	2/8/80	All licensees of nuclear power reactor facilities and applicants and holders of nuclear power reactor CPs
80-04	BWR Fuel Exposure in Excess of Limits	2/4/80	All BWR's holding a power reactor OL or CP
80-03	Main Turbine Electro-Hydraulic Control System	1/31/80	All holders of power reactor OLs and CPs
80-02	8X8R Water Rod Lower End Plug Wear	1/25/80	All BWR Facilities holder power reactor OLs or CPs
80-01	Fuel Handling Events	1/4/80	All holders of power reactor OLs and CPs
79-37	Cracking in Low Pressure Turbine Discs	12/28/79	All power reactor OLs and CPs
79-36	Computer Code Defect in Stress Analysis of Piping Elbow	12/31/79	All power reactor OLs and CPs