



"Automatic" Sprinkler
CORPORATION OF AMERICA

*N-105
IC-109
Dist.*

① *Zach-wf*
② *Jordan*

BG

GENERAL OFFICES

POST OFFICE BOX 180
1000 EAST EDGERTON ROAD
CLEVELAND, OHIO 44147
PHONE: 216-526-9900
TELEX: 098-5406

April 7, 1986

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
Attention: Director, Office of Inspection and Enforcement

RE: Title 10, Code of Federal Regulations, Part 21, Reporting of Defects and Noncompliances

Dear Sir or Madam:

Recently we have received inquiries from NRC Region I and II about our Model "C" Deluge Valve notification program.

"Automatic" Sprinkler Corporation manufactures and sells a deluge valve for fire protection systems in sizes 2-1/2" and 6" that we call our Model "C" Deluge Valve. This valve is a commercial grade item that is used in some fire protection systems at some nuclear power plants.

We have become aware of a potential problem which may affect the operation of the valve. We would like to point out that we do not believe that this problem is a defect, a deviation, or a noncompliance. It is a condition that occurs after the valves are installed for a period of time. Regardless, we would like to advise you of our situation and to address to you a response to NRC Region I and II's inquiries.

The valve is listed by Underwriter's Laboratory and approved by Factory Mutual Research Corporation, both independent approval organizations. Each valve is tested for operation at both 200 psi and 50 to 75 psi water pressure for release of the clapper and latch prior to shipment. Every valve functions properly when it ships from our plant.

Following is a chronology of events:

October 1983: We became aware of a fire that occurred at Grand Gulf, Unit 1 Emergency Diesel Generator. NRC IE Information Notice No. 84-16, dated March 2, 1984 describes this (copy enclosed).

November 1983 thru June 1984: We investigated the incident at Grand Gulf and deduced that the operational failure was peculiar to that facility. Refer to a letter dated June 4, 1984 to NRC (copy enclosed).

B604160214 B60407
PDR ADCK 05000416
S PDR

*IE09
1/1*

U.S. Nuclear Regulatory Commission
Page 2
April 7, 1986

November - December 1984: Upon further investigation of the situation, we decided to issue a notification letter to all users of our Model "C" valve. Enclosed please find a copy of our December 1, 1984 notification letter. We included in our mailing campaign all utilities which have a license to operate or construct a nuclear power plant. We advised your office in a letter dated November 19, 1984 (copy enclosed) that we would be starting a mailing campaign and a list of the utilities we would notify.

December 1985: As a result of our continued evaluations, it was decided to issue another notification letter (copy attached) that supersedes our December 1984 letter. We advised a temporary solution to the situation and used the same mailing list used in 1984. A copy of our December 12, 1985 notification letter was sent to your office, attention Mary Wegner, via certified mail on January 16, 1986. We have a return receipt dated January 21, 1986 signed by N.W. Matovich.

We have stopped all shipments of our Model "C" valve. At present, we intend to change the material of the latch and latch arm.

Once we have finalized this program, we will instigate another mailing campaign.

We will keep you advised of any further developments.

Sincerely,

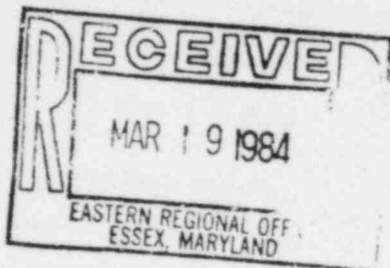


Mr. John J. Gullo, Jr.
Manager, Quality Assurance

JJG/cmb

cc: USNRC
631 Park Avenue
King of Prussia, PA 19406
Attn: Ari Krasotoulos

USNRC
101 Marietta Street, Suite 3100
Atlanta, GA 30303
Attn: Gerry Wiseman



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

March 2, 1984

IE INFORMATION NOTICE NO. 84-16: FAILURE OF AUTOMATIC SPRINKLER SYSTEM VALVES TO OPERATE

Addressees:

All nuclear power reactor facilities holding an operating license (OL) or a construction permit (CP).

Purpose:

This information notice provides notification of a problem involving the operational failure of deluge and pre-action fire protection water control valves, identified as Model C, manufactured by Automatic Sprinkler Corporation of America of Cleveland, Ohio. It is expected that recipients will review this information notice for applicability to their facilities. No specific action or response is required.

Description of Circumstances:

On September 4, 1983, Mississippi Power and Light (MP&L) Company's Grand Gulf Unit 1 was performing an operational test of an emergency diesel-generator when a fire involving the diesel engine occurred. The fire brigade arrived to find that the automatic deluge valve had not opened. The manual release failed to open the valve. A mechanic opened the actuator box cover and struck the actuation weight, forcing the clapper latch to release, permitting water spray from the sprinkler system to extinguish the fire. (See Attachment 1.) The valve was a 6-inch Model C, manufactured by Automatic Sprinkler Corporation of America of Cleveland, Ohio. (Reference LER 50-416/83-126.)

During subsequent testing and examination, excessive friction was noted between the weight and the weight guide rod; bowing (0.005-inch) was observed in the weight guide rod; evidence of scoring was found in two locations on the rod's surface; the weight's upper guide collar had an inside diameter (ID) of 0.637 inch rather than the manufacturer's recommended minimum of 0.647 inch; and scoring was noted on the enclosing box along the path that the weight guide bushing traces during actuation.

On December 5, 1983, a Model C valve for a pre-action sprinkler system protecting a diesel generator room failed to operate during a test at Grand Gulf. Similar roughness was found in its internals. A search of records uncovered

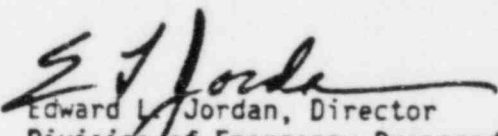
another event at Grand Gulf in which a Model C valve installed to protect a main transformer failed to open during a test in September 1979.

The valve manufacturer has been notified of these failures and is evaluating this problem to determine the action required.

The licensee's preliminary investigation indicates that these failures may be related to the surface condition of the latch which holds the water clapper in the normally closed position. If the mating surfaces of the latch and clapper are not smooth, the latch may fail to disengage when the actuation weight hits the latch arm. If the normal water system pressure applied to the clapper valve exceeds 140 psig, the problem becomes more acute. The water pressure at Grand Gulf is maintained at 140 psig.

MP&L has sanded and trued the guide rod; reworked the ID of the weight's upper guide collar; lubricated the rod, latch pin, clapper hinge pin, and the enclosed box along the path of the weight guide bushings; temporarily increased the testing frequency of the valves; and revised the surveillance procedures to visually verify that the clapper has lifted and locked open following the test under normal system pressure.

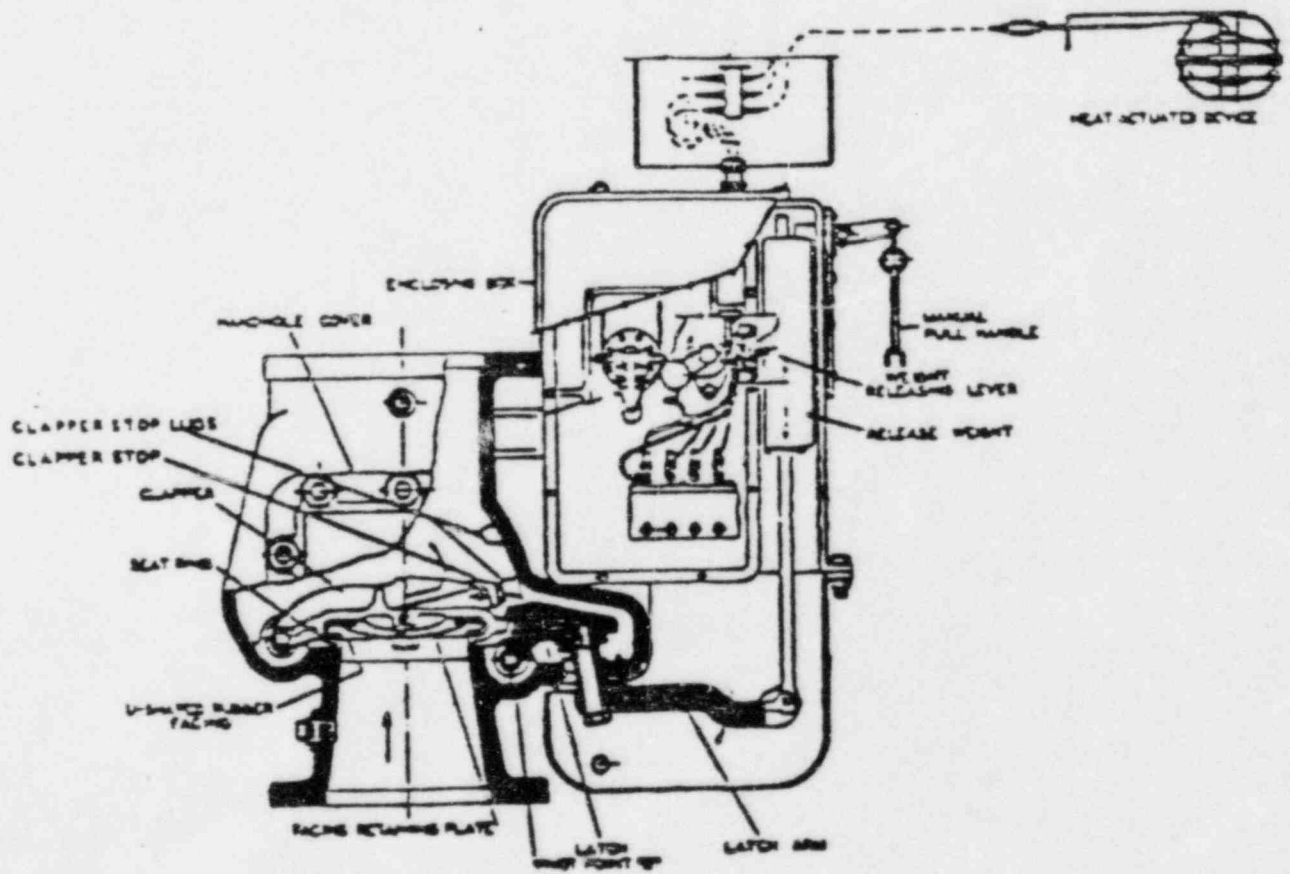
If you have any questions regarding this matter, contact the Regional Administrator of the appropriate NRC Regional Office, or this office.


Edward L. Jordan, Director
Division of Emergency Preparedness
and Engineering Response
Office of Inspection and Enforcement

Technical Contact: M. S. Wegner, IE
(301) 492-4511

Attachments:

1. Drawing of Automatic Model C Valve
2. List of Recently Issued IE Information Notices



MODEL C VALVE

LIST OF RECENTLY ISSUED
IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
84-15	Reporting of Radiological Releases	3/2/84	All power reactor facilities holding an OL or CP
84-14	Highlights of Recent Transport Regulatory Revisions by DOT and NRC	3/2/84	All NRC licensees
84-13	Potential Deficiency in Motor-Operated Valve Control Circuits and Annunciation	2/28/84	All power reactor facilities holding an OL or CP
84-12	Failure of Soft Seat Valve Seals	2/27/84	All power reactor facilities holding an OL or CP
84-11	Training Program Deficiencies	2/24/84	All power reactor facilities holding an OL or CP
84-10	Motor-Operated Valve Torque Switches Set Below the manufacturer's Recommended Value	2/21/84	All power reactor facilities holding an OL or CP
84-09	Lessons Learned from NRC Inspections of Fire Protection Safe Shutdown Systems (10 CFR 50, Appendix R)	02/13/84	All power reactor facilities holding an OL or CP
83-63 Supp 1	Pontential Failures of Westinghouse Electric Corporation Type SA-1	2/15/84	All power reactor facilities holding an OL Or CP
84-08	10 CFR 50.7, "Employee Protection"	2/14/84	All power reactor facilities holding an OL or CP; and MSSS & AE

OL = Operating License
CP = Construction Permit

June 4, 1984

POST OFFICE BOX 180
1000 EAST EDGERTON ROAD
CLEVELAND, OHIO 44147
PHONE: 216-526-9900
TELEX: 098-5406

Mr. Richard C. DeYoung
Director, Office of Inspection
& Enforcement
US Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Nuclear Regulatory Commission Information Notice 84-16,
"Failure of Automatic Sprinkler System Valves to Operate"

Dear Mr. DeYoung:

The following information is provided in response to the Nuclear Regulatory Commission Information Notice 84-16 concerning operational failures of our Model C deluge valve at Grand Gulf Unit No. 1 of the Mississippi Power and Light Company.

To obtain an indication of whether this problem existed at other installations, we tested a total of seventeen (17) 2-1/2" Model C deluge valves at eight (8) different locations and eight (8) 6" Model C deluge valves at three (3) different locations, using a special test procedure (130.002SP), and found no operational failures. Two (2) additional six inch (6") Model C deluge valves were tested at a fourth location without failure using the standard test procedure.

The special test procedure required the weight on each valve to be dropped only one-half the normal distance so that only one-half the energy is generated to unlatch the valve under this special test condition. A tabulation of the 2-1/2" and 6" valves tested is given on Table I.

The results of our field tests do not indicate a problem with our valve design or manufacture.

We performed a number of tests in our laboratory on a 6" Model C deluge valve and found we could duplicate the type of operational failure experienced at the Grand Gulf facility if the latch and clapper nose mating surfaces were rough (approximately a 500 microinch finish or rougher).

We reviewed our drawings to determine if any changes were made which could have caused the problem observed at the Grand Gulf facility. A drawing change was made in September of 1973 which changed the finish requirement on the clapper and latch mating surfaces from a 63 microinch to a 125 microinch finish.

Valves with serial numbers higher than 4586 for 2-1/2" valves and 6821 for 6" valves were manufactured after the September 1973 drawing change and, since the Grand Gulf Unit No. 1 valve serial numbers were higher than those identifying the 1973 finish change, we required that the valves tested in the field to our special test procedure have serial numbers which indicate that they were produced after the surface finish change. As previously stated, no operational failures were found on the valves tested which were produced after the surface finish change.

Although we did not find the Grand Gulf mode of failure at any other installation, we made two changes to increase the probability of successful valve operation. The surface



finish drawing requirement of the clapper nose and latch mating surfaces was changed from a 125 microinch finish to a 16 microinch finish on November 1983, and our data pages G8a and G22a (copies enclosed) were changed to require refinishing of the clapper nose and latch mating surfaces at each routine, periodic inspection.

With respect to the conditions noted in Information Notice No. 84-16 regarding bowing of the guide rod and the undersize I.D. of the upper guide rod collar, the following information is offered.

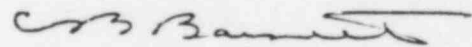
The guide rod we install in our valves is purchased under ASTM B16, material C36000. The ASTM B16 (Table 15) straightness requirement is 1/32" maximum curvature (depth of arc) in any 2 ft long portion. The bowing observed (0.005 inch) in the 20 inch long guide rod used in our 6" Model C deluge valve easily meets the ASTM requirement.

The upper guide collar was stated to have an I.D. of 0.637 inch and our minimum I.D. dimension was stated to be 0.647 inch. Our actual drawing minimum dimension for this I.D. is 0.640 so the collar was measured by the Grand Gulf people to be undersize by 0.003 inches. However, the ASTM B16 requirement for the guide rod is 0.625 ± 0.002 ". The minimum clearance for the guide rod in this undersize hole is $0.637 - 0.627$ or 0.010 inches which is adequate to allow the weight to slide freely on the guide rod even if the guide collar I.D. was undersize as claimed.

It is our conclusion that no design or manufacturing fault exists in our Model C deluge valves; however, we revised the maintenance procedure and require smoother surfaces in manufacturing to increase the probability of successful operation of both new and existing Model C deluge valves.

We further conclude the operational failures at Grand Gulf Unit #1 are peculiar to that facility.

Very truly yours,



Charles B. Barnett, Manager
Research and Development

CBB/mn
Attachment

cc: W. H. Miller, Resident Inspector
E. L. Jordan, Director of Engr. & Q.A.
J. P. O'Reilly, Regional Administrator

bcc: C. Miner
C. Hura
J. Stout
M. Hutchinson

TABLE I

6" MODEL C DELUGE VALVE

<u>Serial No.</u>	<u>Static Water Pressure (psi)</u>	<u>Trip Test Satisfactory</u>	<u>Location</u>
8429	150	Yes	Perth Amboy, NJ
8153	110	"	Omaha, NE
8106	93	"	Mankato, MN
8102	90	"	" "
8077	175	"	Atlanta, GA
8082	"	"	" "
8078	"	"	" "
8094	"	"	" "
8095	"	"	" "
8096	"	"	" "

Total 10 valves at four (4) different locations.

2-1/2" MODEL C DELUGE VALVE

8200	130	Yes	Carson City, CA
8183	132	"	" "
8604	130	"	" "
4878	125	"	" "
8148	120	"	Baytown, TX
8149	120	"	" "
8293	150	"	Perth Amboy, NJ
8294	150	"	" "
8291	150	"	" "
8277	150	"	" "
5113	200	"	Nebraska City, NE
S8204	77	"	Oakland, CA
S8199	80	"	" "
8276	115	"	McKeesport, PA
8190	100	"	Greensburg, PA
8188	110	"	" "
S8215	100	"	Des Moines, IA

Total 17 valves at eight (8) different locations.