"Automatic" Sprinkler
CORPORATION OF AMERICA

GENERAL OFFICES

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June 4, 1984

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

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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,

CB Barnett

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

TABLE I

6" MODEL C DELUGE VALVE

Serial No.	Static Water Pressure (psi)	Trip Test Satisfactory	Location
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.

"Automatic" Model C Deluge Valves

"Automatic" Model C Suprotex-Deluge Valves

MAINTENANCE

The "Automatic" Model C Deluge and Suprotex-Deluge Valves and their related equipment should be examined periodically to ensure proper operation and trouble-free service. Several areas to be routinely inspected are:

Clapper / Clapper Latch. The mating surfaces of the clapper nose and the clapper latch must be kept clean and smooth. As required, sand each surface with No. 220 grit sandpaper until smooth, then finish the surface with crocus cloth.

Clapper Facing. The rubber clapper facing should be checked for wear or damage, and to determine that it is free of dirt and other foreign substances. If found to be worn or damaged (e.g., foreign matter imbedded in the surface), the facing should be replaced. If it is dirty, it should be cleaned, but compounds which could damage the rubber facing must never be used.

Seat Ring. The seat ring should be cleaned thoroughly and checked for possible damage. If it is found to be severely damaged, the complete deluge valve assembly should be replaced or returned to "Automatic" for possible reconditioning.

Alarm Line Strainer. The strainer in the alarm line should be checked and cleaned thoroughly.

Alarm Test Valve & Main Drain Valve. All controlling valves normally closed when the deluge valve is in the set position should be checked to be sure that they are fully closed and not leaking.

System Control Valve, Alarm Control Valve & Air (or Nitrogen) Supply Control Valve. All controlling valves normally open when the deluge valve is in the set position should be checked to be sure that they are in the fully open position and sealed, where required.

Deluge Valve & Trim. The overall setup should be checked for visible leaks and possible physical damage to the valve and connections (e.g., broken pipes).

Valve Enclosure. The temperature in the enclosure around the deluge valve should be maintained at a temperature above 40° F (4° C).

Supervisory Air Supply. Strainers and regulators should be checked and cleaned as required. Air reservoirs and drum drips should be drained as often as required to remove any water that has accumulated.

The air dryer should be checked and replaced when the blue granules become pink or white.

Air Compressor. The air compressor should be lubricated as recommended by the manufacturer. The motor unit should be kept free of dirt. Filters and strainers should be cleaned as required.

Air Pressure. Air or nitrogen pressure must be maintained on the detection system as recommended in the operational instructions. Low-air-pressure alarms should be tested and switches should be checked to see that they are properly set to operate at the required pressure level.

Detection System. The detection system and related components are to be tested and checked as recommended in the operational instructions.

"Automatic" Model C Pre-Action Valves

"Automatic" Model C Suprotex Valves

MAINTENANCE

The "Automatic" Model C Pre-Action and Suprotex (supervised Pre-Action) Valves and their related equipment should be examined periodically to ensure proper operation and trouble-free service. Several areas to be routinely inspected are:

Clapper / Clapper Latch. The mating surfaces of the clapper nose and the clapper latch must be kept clean and smooth. As required, sand each surface with No. 220 grit sandpaper until smooth, then finish the surface with crocus cloth.

Clapper Facing. The rubber clapper facing should be checked for wear or damage, and to determine that it is free of dirt and other foreign substances. If found to be worn or damaged (e.g., foreign matter imbedded in the surface), the facing should be replaced. If it is dirty, it should be cleaned, but compounds which could damage the rubber facing must never be used.

Seat Ring. The seat ring should be cleaned thoroughly and checked for possible damage. If it is found to be severely damaged, the complete pre-action valve assembly should be replaced or returned to "Automatic" for possible reconditioning.

Alarm Line Strainer. The strainer in the alarm line should be checked and cleaned thoroughly.

Alarm Test Valve & Main Drain Valve. All controlling valves normally closed when the pre-action valve is in the set position should be checked to be sure that they are fully closed and not leaking.

System Control Valve, Alarm Control Valve & Air (or Nitrogen) Supply Control Valve. All controlling valves normally open when the pre-action valve is in the set position should be checked to be sure that they are in the fully open position and sealed, where required.

Pre-Action Valve & Trim. The overall setup should be checked for visible leaks and possible physical damage to the valve and connections (e.g., broken gages).

Valve Enclosure. The temperature in the enclosure around the pre-action valve should be maintained at a temperature above 40° F (4° C).

Supervisory Air Supplies. Strainers and regulators should be checked and cleaned as required. Air reservoirs and drum drips should be drained as often as required to remove any water that has accumulated.

The air dryer should be checked and replaced when the blue granules become pink or white.

Air Compressors. The air compressors should be lubricated as recommended by the manufacturer. The motor units should be kept free of dirt. Filters and strainers should be cleaned as required.

Air Pressure. Air or nitrogen pressure must be maintained on the sprinkler and detection system as recommended in the operational instructions. Low-air-pressure alarms should be tested and switches should be checked to see that they are properly set to operate at the required pressure level.

Detection System. The detection system and related components are to be tested and checked as recommended in the operational instructions.