AEOD TECHNICAL REVIEW REPORT

UNIT: Oconee 1, 2, and 3
DOCKET NOS.: 50-269, 50-270, 50-287
LICENSEE: Duke Power Company
NSSS/AE: B&W(Utility/Bechtel)

TR REPORT NO.: AEOD/T928
DATE: December 20, 1989
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SUBJECT: INADEQUATE OVERPRESSURE PROTECTION FOR AUXILIARY STEAM HEADERS AT THE OCONEE PLANTS

SUMMARY

The auxiliary steam header supplies steam to the emergency feedwater pump turbines (EFWPT). The auxiliary boiler or main steam system supplies steam to the auxiliary steam header. Safety valve AS-23 on the steam line leading from the auxiliary steam header to the EFWPT provides overpressure protection.

The inadequacy of safety valve AS-23 was discovered as a result of the NRC inspectors questioning the licensee following a Safety System Function Inspection (SSFI) in May and June of 1986 (Ref. 1). A licensee event report regarding this deficiency was submitted on March 30, 1987 (Ref. 2). The auxiliary steam header safety valve (AS-23) was too small to provide adequate overpressure protection, as described by Section VIII of American Society of Mechanical Engineers (ASME) Code, in the event both control valves MS-126 and MS-129 were to fully open owing to an erroneous control signal, or in the event that manual bypass valve MS-131 were to fully open during a design basis event. A design basis event corresponds to any event that causes steam generator pressure to reach 1050 psig.

Following discovery of the inadequacy of safety valve AS-23, the licensee temporarily corrected the problem until a permanent solution to the problem could be found. To temporarily correct the problem, the licensee put temporary travel stops on control valve MS-126, and to permanently solve the problem, the licensee installed two additional safety valves.

A search of licensee event reports submitted by B & W plants in the last five years was conducted using the NUDOCS system (Ref. 3). The search results indicated that no other B & W plants had reported similar problems.

DISCUSSION

The auxiliary boiler or main steam system supplies steam to the auxiliary steam header. The auxiliary steam header supplies steam to run the EFWPT. This configuration is shown in Figure 1. Control valves MS-126 (6") and MS-129 (2") are used to reduce main steam pressure. Also, a 6-inch hand-operated bypass valve, MS-131, can be

used for controlling steam flow. The auxiliary steam header is the only source of steam for the EFWPT during startup or shutdown when main steam pressure is below 200 psig. During these times, the steam demand is high and both control valves MS-126 and MS-129 are fully open.

Both MS-126 and MS-129 receive the same position signal from a controller and a selector station. Both of these valves may fully open with a single erroneous signal. These valves operate on air with a nitrogen backup.

The safety concern was that the 4" steam header safety valve (AS-23) with relief capacity of 5.0E+04 lbs./hr was too small to provide over-pressure protection, consistent with the requirements of Section VIII of the ASME Code, in the event both control valves MS-126 and MS-129 were to fully open owing to an erroneous control signal, or in the event that manual bypass valve MS-131 were fully open during a design basis event. A design basis event is any event that causes the steam generator pressure to reach the first set of safety valve set pressures of 1050 psig.

During the Safety System Function Inspection (SSFI) in May and June of 1986, the NRC inspectors questioned the adequacy of safety valve (AS-23) on the steam line leading to the EFWPT during a design basis event. At that time, the licensee lacked formal calculations to demonstrate the adequacy of the safety valve.

The licensee analyzed the adequacy of the safety valve (AS-23) on the steam line to the EFWPT during a simulated design basis accident. The results indicated that the potential for overpressurization existed in the event control valves MS-126 and MS-129 are given an erroneous signal to fully open. Therefore, during a design basis event in which control valves MS-126 and MS-129 are wide open, the auxiliary steam header safety valve AS-23 was inadequate to keep the pressure below the limits specified in Section VIII of the ASME Code.

To permanently resolve this problem, the licensee has installed two additional 6" safety valves on the auxiliary steam header downstream of control valves MS-126 and MS-129. Installation of the additional safety valves was completed in June of 1989 at Oconee Unit 2. Installation of additional safety valves in Unit 1 and 3 were completed earlier this year. Additional safety valves will adequately take care of possible overpressurization problems during a design basis accident even with control valves MS-126 or MS-129 wide open.

To assess if similar problems were reported by other B & W plants, a search of licensee event reports submitted by B & W plants in the last five years was conducted using the NUDOCS system. The search results indicated that no other B & W plants had reported similar problems.

CONCLUSION

The root cause of the problem was failure during initial design work to accurately determine the required safety valve capacity for the auxiliary steam headers. The problem was discovered as a result of NRC inspectors questioning the licensee during an SSFI. Inadequacy of the safety valve capacity would have occurred only during a design basis event. The inadequate overpressure protection for auxiliary steam headers at Oconee plants has been resolved by the licensee installing two additional safety valves. The deficiency appears plant specific to the three units at Oconee, and no further AEOD action is warranted at this time.

REFERENCES

1. U.S. Nuclear Regulatory Commission, Safety System Functional Inspection Report Nos. 50-269/86-16, 50-270/86-16, and 50-287/86-16.

2. Licensee Event Report No. 87-003, Docket No. 50-269, Oconee Nuclear Station, March 30, 1987.

3. United States Nuclear Regulatory Commission Nuclear Document System (NUDOCS), June 1988.

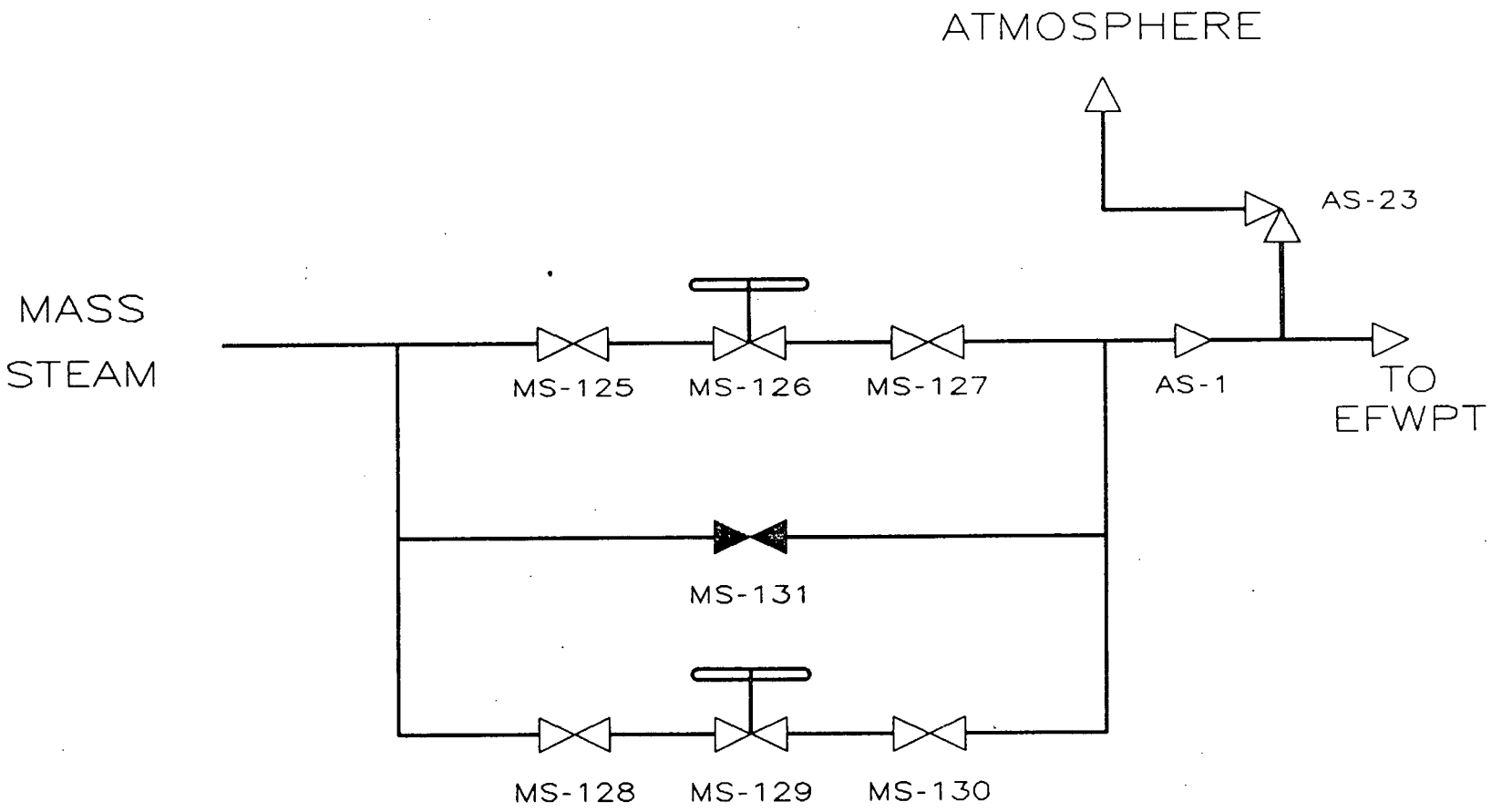

FIGURE 1. STEAM FLOW PATH TO EMERGENCY FEEDWATER PUMP TURBINE (EFWPT)