

TECHNICAL EVALUATION REPORT

DAVIS-BESSE NUCLEAR POWER STATION UNIT 1

Alternate to Keylock
Control to Bypass Valves

Docket Number 50-346

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Prepared by:

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1.0 INTRODUCTION:

In the Safety Evaluation Report, related to operation of Davis-Besse Nuclear Power Station Unit 1, Supp. No. 1 NUREG-0136, dated April 1977, NRC requested that a reliability study be made for a spectrum of hypothesized design modifications to be compared with the present design of the low pressure residual heat removal system. NRC would evaluate the design modifications to determine if the modifications enhance the safety of the system, and determine that the final system is acceptable to minimize the potential for inadvertent opening of the bypass valves during high pressure operations.

2.0 PROPOSED MODIFICATION:

On January 11, 1979, Toledo Edison transmitted the technical report, "Reliability Study of Davis Besse Unit No. 1 Decay Heat Removal System Suction Bypass," dated January 5, 1979. The study evaluates the rate of occurrence at Davis Besse Unit 1 of incidents in which the Decay Heat Removal (DHR) system is exposed to overpressure due to the improper opening of the DHR suction bypass. This evaluation covers a spectrum of design and procedural options for the bypass. The designs include (1) present design, (2) present design plus warning sign, and (3) present design plus flange. Procedural methods include (1) no lock, (2) lock, (3) lock with unique key, and (4) lock with two unique locks. Four categories of events leading to inadvertent opening of bypass while the unit is above cold shutdown were considered:

1. Maintenance activities in the vicinity of the bypass may result in inadvertent opening of bypass.
2. Startup from cold shutdown might be attempted with the bypass left open.
3. Valve confusion: personnel dispatched to enter containment to check or realign valves might select the wrong valves.
4. Panic: personnel near the bypass at the time of what they perceive to be a LOCA or severe transient might panic and irrationally realign valves.

Results and conclusions were presented for frequency of DHR overpressure incidents. The dominant problem is maintenance on the pressure relief valve, PSV 4849, which is located on the DHR suction line downstream of the tee at which the bypass line rejoins the principal DHR suction line. This relief valve must be removed occasionally for bench testing, and it is a plausible error for the maintenance personnel to open the bypass after reinstalling the pressure relief valve. Maintenance on PSV 4849 can only be performed while the reactor coolant system is between hot shutdown and cold shutdown. Therefore, the risk of exposing the DHR to damaging overpressure or initiating a severe interfacing systems LOCA is much less than for accident sequences applicable to periods of power generation.

3.0 REASON FOR CHANGES:

SER Supplement No. 1 (p.5-5 and p.E-3) states that the license condition 2.C(3)(p) requires that the licensee submit an analysis of design modification alternatives for the present key lock control in the manual bypass valves DH21 and DH23 around the DHR suction line valves to decrease the likelihood

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3.0 REASON FOR CHANGES: (cont'd)

of the bypass path being opened inadvertently when isolation of the DHR loop is required. (See diagram.) The submitted analysis and installation of approved design modifications shall be completed prior to startup following the first scheduled refueling outage.

The bypass loop contains two manually operated valves around the DHR suction line valves. The normally closed bypass valves would be opened in the event of a spurious closure of one of the DHR system suction line isolation valves during system operation. NRC requires that further attention be given to the means employed for isolation of the low pressure residual heat removal system from the primary system while the latter is pressurized, and that reliable means be developed to assure such isolation. Present procedures have a chain and padlock. The key opens no other valves, but does open certain restricted area doors. The two manual isolation valves are in series on the bypass line.

4.0 REVIEW OF LICENSEE'S SUBMITTAL

The Toledo Edison's technical report, "Reliability Study of Davis Bese Unit No. 1 Decay Heat Removal System Suction Bypass," dated January 5, 1979, gives results of occurrence rate of incidents in which inadvertent opening of the bypass exposes the DHR to pressures greater than the design pressure for each of the 12 design and procedural options. For all 12 options the dominant accident sequence is associated with maintenance on PSV 4849. The presence of the pressure relief valve is useful in reducing the risk posed by startup with the bypass left open and to protect against RCS overpressure if high-pressure injection occurs while the RCS is in cold shutdown. Therefore, Toledo Edison does not recommend the elimination of the pressure relief valve. Rather, one of several more stringent administrative procedures applied to the present design would reduce the probability of DHR overpressure to a very low level; i.e., less than 4.0×10^{-7} per year.

The Toledo Edison technical report states that the NRC has no clear-cut policy on a probabilistic criterion for the acceptability of design provisions to avoid interfacing systems LOCA. However, a criterion can be inferred from the disposition of the overpressurization event leading to the interfacing systems LOCA problem that arose in the Reactor Safety Study (RSS). The RSS estimated the frequency of an interfacing systems LOCA at the low-pressure safety injection check valves at 4×10^{-6} /year. The NRC responded by suggesting design changes which reduce the probability of this event by a factor of 10, to about 4×10^{-7} /year and by promulgating Standard Review Plan 6.3, "Emergency Core Cooling System," which endorses the fix at Surry as adequate. By implication, then, a frequency of 4×10^{-7} per year is sufficiently safe.

5.0 CONCLUSION:

The Toledo Edison technical report, dated January 11, 1979, concludes that the present design and procedures offer sufficient protection for the health and safety of the public. However, present design and procedure do not meet the criterion inferred from WASH-1400, the accident sequence which fails to

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5.0 CONCLUSION: (cont'd)

meet the criterion associated with shutdown when the risk is much reduced. In order to improve safety and meet the inferred acceptance criterion without question, Toledo Edison is prepared to implement procedural option 3 entailing the use of one unique key and lock to secure the bypass valves.

The Toledo Edison technical report fulfills the NRC Safety Evaluation Requirements (April 1977) for the analysis of design modification alternatives for the present key lock control of the manual bypass valves DH21 and DH23. The proposed procedural change entailing the use of one unique key and lock to secure bypass valves decreases the likelihood of the bypass being opened inadvertently when isolation of the DHR loop is required. This unique key and lock procedure will be implemented prior to startup following the first regularly scheduled refueling outage. NRC Safety Evaluation Report (April 1977) requirements are being met. Therefore, I see nothing technically wrong with the alternative to the key lock control procedure.

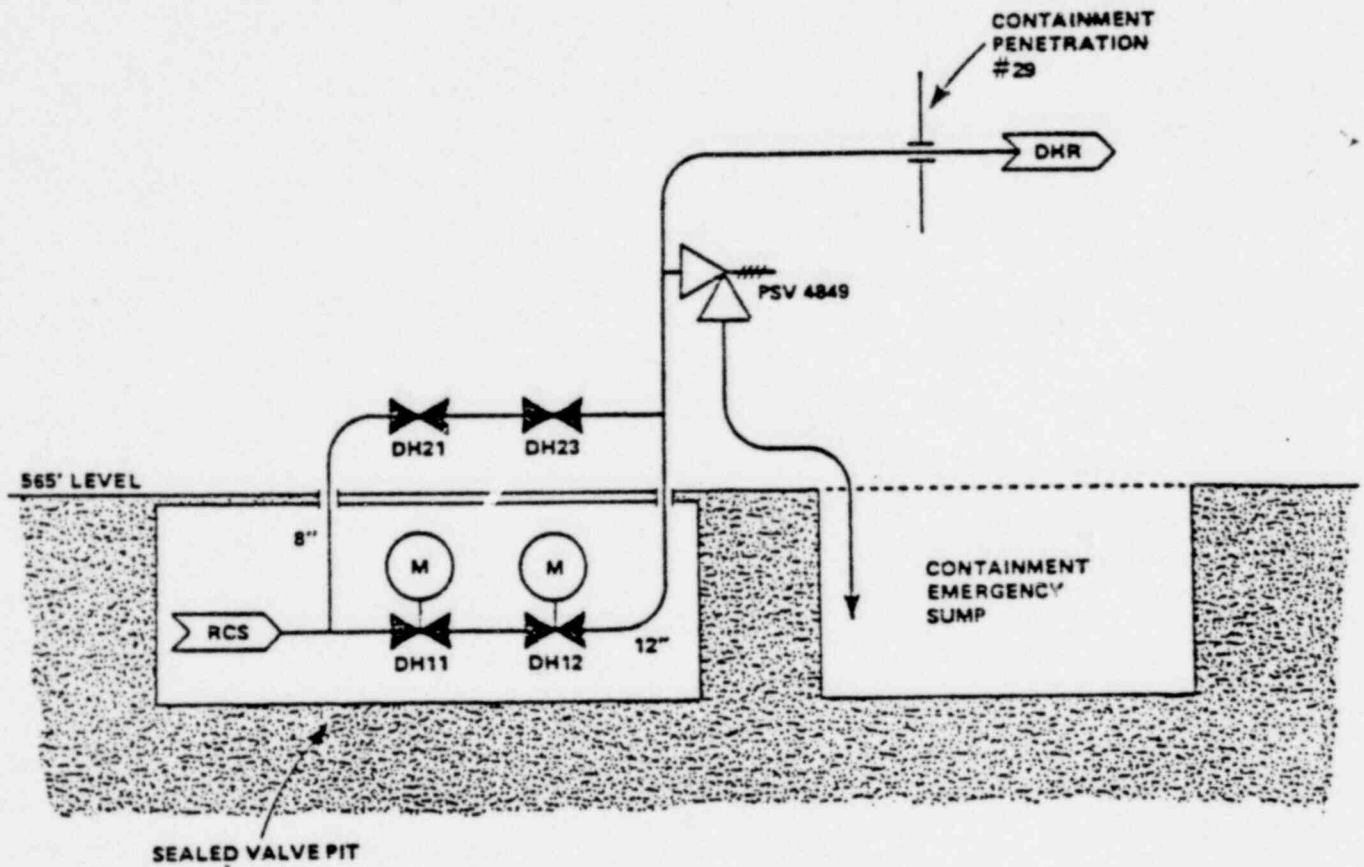
6.0 REFERENCES:

1. Safety Evaluation Report by NRC related to operation of Davis-Besse Nuclear Power Station Unit 1.
2. Letter, Toledo Edison to Reid, January 11, 1979.

Enclosed submittal:

Reliability Study of Davis-Besse Unit No. 1 Decay Heat Removal System Suction Bypass.

DHR SUCTION LINE DIAGRAM



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