TOLEDO EDISON
A Centerior Energy Company

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Docket No. 50-346

License No. NPF-3

Serial No. 1520

May 4, 1988

United States Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

Subject: Additional Information Regarding License Amendment Application to Revise Main Steam Safety Valve Relief Capacity/High Flux Trip Setpoint and Restate ASME Code Requirements for Main Steam Safety Valves (TAC No. 67394)

Gentlemen:

During a March 17, 1988, meeting with Mr.. A. W. DeAgazio, NRR Project Manager for Davis-Besse Nuclear Power Station (DBNPS), Unit 1 and members of the NRC Staff, Toledo Edison (TED) provided a presentation and information regarding the subject License Amendment application as previously submitted on March 4, 1988 (Serial No. 1487). During this meeting TED was requested to provide additional information with respect to the impact of the proposed changes on the present Updated Safety Analysis Report (USAR) Chapter 15 Accident Analyses. Attached please find information which further assesses the impact of the proposed change as requested. The results of this assessment reconfirm the conclusions presented in Serial No. 1487. Your expeditious review and approval consistent with the previously requested June 1, 1988 License Amendment issuance date is herewith reiterated.

If you have any further questions, please contact Mr. R. W. Schrauder, Nuclear Licensing Manager, at (419) 249-2366.

Very truly yours,

RMC:tlt

Attachment

cc: A. B. Davis, Regional Administrator
DB-1 Resident Inspector

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Docket No. 50-346
License No. NPF-3
Serial No. 1520
Enclosure

ADDITIONAL INFORMATION

REGARDING

APPLICATION FOR AMENDMENT

TO

FACILITY OPERATING LICENSE NO. NPF-3

FOR

DAVIS-BESSE NUCLEAR POWER STATION

UNIT NO. 1

Attached is additional information to support issuance of requested changes to the Davis-Besse Nuclear Power Station, Unit No. 1, Facility Operating License No. NPF-3, as previously submitted by Serial No. 1487, dated March 4, 1988.

By _____
D. C. Shelton, Vice President, Nuclear

Sworn and subscribed before me this 4th day of May, 1988.

_____
Notary Public, State of Ohio

My commission expires NANCY L. DAMSCHRODER, Notary Public
OTTAWA COUNTY, OHIO
My Commission Expires Oct. 8, 1989

Question: The proposed Technical Specification change presented in Serial No. 1487 dated March 4, 1988 will replace the present staggered MSSV setpoints with wording that will allow all but one MSSV per SG header to be set as high as 1100 psig. Provide additional supporting information for this change by further assessing its impact on the present Chapter 15 Accident Analyses.

Answer: The purpose of the MSSVs is to provide overpressure protection for the secondary side of the steam generators (SG) and the Main Steam (MS) System. During normal plant operation the MSSVs are closed and the turbine-condenser combination provides the heat sink for the RCS. The MSSVs are only utilized following a turbine trip when the steam removal path provided by the turbine is lost. This causes the MS System to pressurize until the MSSV setpoints are reached and sufficient steam release through the MSSVs is obtained to maintain MS System pressure at or below the MSSV setpoint. Actuation of MSSVs establishes another path for SG heat removal by the venting of steam directly to the atmosphere.

The heat sink temperature for the RCS that is established by the SGs corresponds to the saturation temperature associated with the SG pressure. The increase in SG pressure following a turbine trip up to the 1050 - 1100 psig setpoint range of the MSSVs causes the heat sink temperature for the RCS to increase from ~ 530°F before the turbine trip to the 550 to 560°F range following the turbine trip. If a reactor trip has not occurred in conjunction with the turbine trip, this increase in the RCS heat sink temperature could cause a transient increase in average coolant temperature and pressure. If this increase in temperature and pressure exceeds the normal operating envelope of the RCS, the Reactor Protection System (RPS) trips the reactor. This terminates the RCS temperature and pressure excursion.

If a reactor trip has occurred in conjunction with the turbine trip, the increase in heat sink temperature to the 550 to 560°F range establishes the average RCS temperature corresponding to this heat sink temperature. Since the reactor core decay heat decreases with time following a reactor trip, within approximately one minute the decay heat load is low enough that only the first bank of MSSVs would be needed to match the RCS decay heat. As noted in the TED submittal of March 4, 1988 (Serial No. 1487), this first bank of MSSVs is made up of a minimum of two valves per header set at 1050 psig. After this time, the maximum RCS heat sink temperature is determined by the setpoint of this first bank (lowest set) of MSSVs. Also, as noted in Serial No. 1487, the ASME code requires that at least one safety valve be set at the system design pressure (1050 psig). This setpoint is unaffected by the proposed changes. It is noted that to ensure adequate long term cooling of the RCS by use of the

SGs, it is only necessary that the MSSVs be able to vent sufficient steam to match the RCS decay heat load. The proposed changes ensure that overpressure protection of the SG and MS System is being provided. Variation of the exact setpoint pressure for this steam venting, in the range from 1050 psig to 1100 psig, has a minimal and acceptable effect on the RCS.

The Updated Safety Analysis Report (USAR) Chapter 15 Accident Analyses demonstrate that the plant is designed to provide the required degree of protection for the RCS and to limit off-site doses to within 10CFR100 limits. Consequently, the accidents and abnormal transients investigated in Chapter 15 of the USAR must satisfy appropriate acceptance criteria. Although the MSSVs are included in the analytical models used for certain accidents, their setpoints are not important for satisfying the appropriate acceptance criteria as evaluated below.

The acceptance criteria specified for protection of the RCS in Chapter 15 accidents are typically:

- Thermal power $\leq$ 112% of rated power
- RCS pressure $\leq$ code pressure limits
- Minimum DNB ratio of $\geq$ 1.3

The MSSVs are not required to satisfy any of the above criteria. The Reactor Protection System (RPS) ensures that the above criteria are satisfied by tripping the reactor on appropriate RCS conditions, typically on either high neutron flux or high RCS pressure. Once the reactor is tripped, the reactor power rapidly decays, thereby ensuring the thermal power criteria is satisfied. The thermal power limitation of 112% ensures that a departure from nucleate boiling (DNB) heat transfer condition does not occur in the core. This provides protection to the fuel cladding by limiting the fuel cladding temperature to approximately the core coolant temperature. Since the peak thermal power typically occurs immediately following the reactor trip and before MSSVs are actuated, the MSSVs have no impact upon satisfying this acceptance criteria. The reactor trip, in conjunction with the pressurizer code safety valves, is utilized to ensure that the RCS pressure remains within code limits. The MSSV setpoint may affect the initiation of steaming from the secondary side, but it has no measurable impact upon the ability of the plant to satisfy the acceptance criteria for RCS pressure limits. For any event, RCS pressure is maintained within code limits by the presence of the pressurizer code safety valves.

The ability of the plant to satisfy 10CFR100 dose limits is also unaffected by MSSV setpoint changes. The setpoint change has some impact upon the timing of valve actuation and steaming of the secondary side in the first few seconds following a turbine trip, and also affects the secondary side

pressure response during the first minute following a reactor trip. As noted above, after approximately 1 minute the reactor decay heat is low enough that only the first bank of MSSVs set at 1050 psig is required to match decay heat. Although the timing of actuation and pressure response for the MS System can initially be affected by MSSV setpoints, the integrated amount of steam released to the atmosphere through the MSSVs is essentially unaffected. The secondary side of the SG provides an integrated heat removal capability that is dependent upon the mass inventory in the SGs. Since the integrated energy released by the primary system over time and the initial SG inventory are basically independent of MSSV setpoint, the integrated steaming of water mass through the MSSV is also independent of the MSSV setpoints. Consequently, off-site doses due to mass release through the MSSVs are unaffected by the MSSV setpoints.

A list of Chapter 15 accidents that include modeling of the steam generator secondary side where MSSV actuation can occur is presented in Table 1. This Table also identifies the accident acceptance criteria and describes how MSSV setpoints impact the response of the plant to satisfy the specified acceptance criteria.

Table 1 - List of Chapter 15 Accidents That Utilize MSSVs

Section	Accident	Acceptance Criteria	Evaluation
15.2.2	Uncontrolled CRA Group Withdrawal at Power	i) Thermal power $\leq$ 112% of rated power. ii) RCS pressure does not exceed code pressure limits.	Reactor trip on either high RCS pressure or high neutron flux terminates transients. Since peak values occur before MSSVs would actuate, MSSVs are not modeled for this transient.
15.2.5	Loss of Forced RC Pump Flow	i) Minimum DNB ratio $\geq$ 1.30 for pump coastdown transients. ii) No fuel cladding failure for locked rotor accident.	Reactor trip by RPS terminates the transient. Immediately following reactor trip DNB ratio increases with decreasing neutron power. Since minimum values of DNB ratio occur before MSSV actuation occurs, MSSVs are not modeled for this transient.
15.2.7	Loss of External Load/Turbine Trip	i) No fuel damage. ii) RCS pressure does not exceed code pressure limits.	For transients initiated at high power levels where the plant can no longer successfully runback, a reactor trip occurs on high RCS pressure. This reactor trip causes reactor power to rapidly decrease providing protection against fuel damage. RCS pressure protection is provided by the decrease in reactor power and the

Section	Accident	Acceptance Criteria	Evaluation
			pressurizer code safety valves. The MSSVs provide the steaming path for heat removal by the SGs. The change in MSSV setpoints does not prevent secondary side steaming from being established.
15.2.8	Loss of Feedwater	i) No fuel damage. ii) RCS pressure does not exceed code pressure limits.	As with the evaluation provided for 15.2.7, a RPS reactor trip on high RCS pressure in combination with pressurizer code safety valves is utilized to satisfy the accident acceptance criteria. The secondary side provides the long term cooling for the RCS via steaming through the MSSVs. The MSSV setpoint change does not prevent this heat sink from being established. Within one minute decay heat is low enough for the first bank of MSSVs at 1050 psig to accommodate the steam demand. The 1050 psig setpoint for the first bank of MSSVs is unaffected by this proposed change because it is an ASME code requirement.

Section	Accident	Acceptance Criteria	Evaluation
15.2.9	Loss of AC Power to Station Auxiliaries (Station Blackout)	i) No fuel damage. ii) RCS pressure does not exceed code pressure limits.	Reactor trip occurs with loss of station power. Auxiliary Feedwater (AFW) flow establishes natural circulation cooling of RCS. MSSVs provide the steaming path from SGs. Ability to steam the SG and establish AFW flow is unaffected by MSSV setpoints. Within one minute SG pressure is at the 1050 psig pressure associated with first bank of MSSVs due to the reduced decay heat. The 1050 psig setpoint for the first bank of MSSVs is unaffected by this proposed change because it is an ASME code requirement.
15.2.10	Excessive Heat Removal due to Feedwater Malfunction	i) No fuel damage. ii) RCS pressure does not exceed code pressure limits.	RCS acceptance criteria are satisfied by a reactor trip on high flux if required. MSSVs are not used to mitigate primary side response. Even with the change in MSSV setpoints sufficient relieving capacity is available to prevent overpressurizing the secondary side.

Section	Accident	Acceptance Criteria	Evaluation
15.2.11	Excessive Load Increase	i) Core cooling remains intact. ii) No SG tube failure to cause loss of RCS pressure integrity. iii) Doses are within 10CFR100 limits.	Events of this type are either controlled by the Integrated Control System (ICS) without causing a reactor trip and actuation of MSSVs or are bounded by steam line breaks. See 15.4.4 evaluation for steam line breaks.
15.3.1	Small break LOCAs	i) No core damage.	Small break LOCAs that utilize the SGs are long term transients (> 1000 sec). The impact of revised MSSV settings on initial pressure response of SG during first minute following reactor trip has no noticeable impact on the total heat removal capability of the SGs during this transient. After ~ 1 minute decay heat is low enough for MSSVs at 1050 psig to provide necessary steaming.
15.3.2	Minor Secondary System Pipe Ruptures	-	These accidents are bounded by steam line breaks discussed in Section 15.4.4.
15.4.2	Steam Generator Tube Rupture	i) Doses are within 10CFR100 limits.	Change in MSSV setpoint may slightly decrease

Section	Accident	Acceptance Criteria	Evaluation
		ii) No loss of RCS pressure boundary integrity due to secondary side pressure and resultant temperature gradients causing a SG tube failure.	inventory release off-site by initially decreasing ΔP between the primary and secondary sides. Impact is negligible on off-site release. Analyses conservatively assumed a constant leak flow from the primary to secondary independent of pressure. Change in MSSV setpoint does not impose any limiting thermal stresses on SG tubes.
15.4.4	Steam Line Break	i) The core remains intact for effective cooling. ii) No loss of RCS pressure boundary integrity due to loss of secondary side pressure and resultant temperature gradients causing a SG tube failure. iii) Doses are within 10CFR100 limits.	Change in MSSV setpoint has no impact upon Chapter 15 Main Steam Line Break (MSLB) Analysis. A MSLB causes secondary side depressurization and resultant cooldown of RCS. MSSVs are only actuated following isolation of the unaffected SG which terminates its depressurization. Subsequent re-pressurization of the unaffected SG is dependent upon RCS conditions resulting from continued blowdown of the affected generator. Any actuation of

Section	Accident	Acceptance Criteria	Evaluation
			MSSVs that would occur following a MSLB would only lift the first bank of MSSVs at 1050 psig. Change in MSSV setpoint has no impact on transient results shown in Chapter 15.
15.4.5	Break in Instrument Line or line from Primary System that Penetrates Containment	i) Doses are within 10CFR100 limits.	Limiting accident in Chapter 15 is a letdown line rupture outside containment. This break is assumed to be terminated by Safety Features Actuation System (SFAS) closure of the letdown line isolation valve upon low RCS pressure of 1600 psig. Since the accident involves a reactor trip and is terminated after reactor trip by a SFAS signal, steam generator heat removal following the reactor trip is required. Change in MSSV setpoint would slightly delay initiation of MSSV steaming, and consequently, could cause a slight increase in RCS temperature following reactor trip. Although this effect could slightly delay

Section	Accident	Acceptance Criteria	Evaluation
			isolation of the break, there is no significant effect upon off-site doses and the 10CFR100 dose criteria for this accident would still be satisfied.