

SURVEILLANCE REQUIREMENTS

| SURVEILLANCE | | FREQUENCY |
|--------------|--|-----------|
| SR 3.7.2.1 | <p>-----NOTE----- Only required to be performed in MODES 1 and 2. -----</p> <p>Verify closure time of each TSV is ≤ 1.0 seconds on an actual or simulated actuation signal from Channel A.</p> | 18 months |
| SR 3.7.2.2 | <p>-----NOTE----- Only required to be performed in MODES 1 and 2. -----</p> <p>Verify closure time of each TSV is ≤ 1.0 second on an actual or simulated actuation signal from Channel B.</p> | 18 months |

B 3.7 PLANT SYSTEMS

B 3.7.2 Turbine Stop Valves (TSVs)

BASES

BACKGROUND

The TSVs partially isolate steam flow from the secondary side of the steam generators following a high energy line break (HELB). TSV closure partially terminates flow from the unaffected (intact) steam generator.

Two TSVs are provided for each main steam line and are located outside of containment. The TSVs are downstream from the main steam safety valves (MSSVs) and emergency feedwater pump turbine's steam supply to prevent the MSSVs and EFW pump's steam supply from being isolated from the steam generators by TSV closure. Closing the TSVs partially isolates each steam generator from the other, and isolates the turbine from the steam generators.

TSV Closure is initiated by a reactor trip. To keep from rapidly cooling down the primary plant by drawing off too much steam, the turbine is tripped when the reactor trips. Two independent and redundant "Reactor Trip Confirmed" signals in the form of contact closures from the control rod drive system will energize two independent turbine trip mechanisms. The Channel A and B trip circuits will close all four TSVs within a maximum of 1 second.

A discussion of the TSV's function is found in the UFSAR, Section 10.3 (Ref. 1).

APPLICABLE SAFETY ANALYSES

The design basis of the TSVs is established by the analysis for the main steam line break (MSLB) as discussed in the UFSAR, Section 15.13 (Ref. 2). TSV closure is necessary to stop steam flow to the turbine (to prevent overcooling) following all reactor trips. Another failure considered is the loss of one switchgear.

The accident analysis compares several different MSLB events. The main SLB outside containment upstream of the TSV is limiting for offsite dose. The MSLB with ICS low level control and no operator action prior to ten minutes is the limiting case for a post-trip return to power. With offsite power available, the reactor coolant pumps continue to circulate coolant through the steam generators, maximizing the Reactor Coolant System (RCS) cooldown. With a loss of offsite power, the response of mitigating systems, such as the High Pressure Injection (HPI) System pumps, is delayed.

BASES

ACTIONS

C.1 and C.2 (continued)

Inoperable TSVs that cannot be restored to OPERABLE status within the specified Completion Time, but are closed, must be verified on a periodic basis to be closed. This is necessary to ensure that the assumptions in the safety analysis remain valid. The 7 day Completion Time is reasonable, based on engineering judgment, in view of TSV status indications available in the control room, and other administrative controls, to ensure these valves are in the closed position.

D.1 and D.2

If the TSV cannot be restored to OPERABLE status or closed in the associated Completion Time, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 12 hours and in MODE 4 within 18 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from MODE 2 conditions in an orderly manner and without challenging unit systems.

**SURVEILLANCE
REQUIREMENTS**

SR 3.7.2.1 and SR 3.7.2.2

These SRs verify that TSV closure time of each TSV is ≤ 1.0 second on an actual or simulated actuation signal from Channel A and Channel B. The 1.0 second TSV closure time is assumed in the accident and containment analyses. This Surveillance is normally performed upon returning the unit to operation following a refueling outage.

The Frequency for this SR is 18 months. The 18 month Frequency to demonstrate valve closure time is based on the refueling cycle. Operating experience has shown that these components usually pass the Surveillance when performed at the 18 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.

This test is conducted in MODE 3, with the unit at operating temperature and pressure, as discussed in the Reference 5 exercising requirements. This SR is modified by a Note that allows entry into and operation in MODE 3 prior to performing the SR. This allows delaying testing until MODE 3 in order to establish conditions consistent with those under which the acceptance criterion was generated.

BASES

- REFERENCES
1. UFSAR, Section 10.3.
 2. UFSAR, Section 15.13.
 3. 10 CFR 50.36.
 4. 10 CFR 100.11.
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