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TRM1 - TECHNICAL REQUIREMENTS MANUAL UNIT 1

REMOVE MANUAL TABLE OF CONTENTS DATE: 07/01/2021

ADD MANUAL TABLE OF CONTENTS DATE: 07/15/2021

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A001
NRR

ID: TEXT 3.3.7
ADD: REV: 3

REMOVE: REV:2

CATEGORY: DOCUMENTS TYPE: TRM1
ID: TEXT B3.3.7
REMOVE: REV:2

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Manual Title: TECHNICAL REQUIREMENTS MANUAL UNIT 1

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TEXT B3.11.1.3 0 11/19/2002
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TEXT B3.12.3 0 11/19/2002

Title: LOADS CONTROL PROGRAM BASES LIGHT LOADS REQUIREMENTS

3.3 Instrumentation

3.3.7 Main Turbine Overspeed Protection System

TRO 3.3.7 One Main Turbine Overspeed Protection System shall be OPERABLE.

Applicability: MODES 1 and 2

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Two of eight stop valves and control valves inoperable.	A.1.1 Close one of the inoperable valves. AND	72 hours
	A.1.2 Limit THERMAL POWER ≤ 75% RTP. AND	12 hours following closure of the inoperable valve
	A.1.3 Apply the following limits for a closed Turbine Stop Valve or Turbine Control Valve as specified in the COLR: a. LCO 3.2.2, "MINIMUM CRITICAL POWER RATIO (MCPR)," b. LCO 3.2.3, "LINEAR HEAT GENERATION RATE (LHGR)."	12 hours following closure of the inoperable valve
	OR	
	A.2 Isolate main turbine from the steam supply.	72 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Two of twelve intercept valves and intermediate stop valves inoperable.	B.1 Close either the intercept valve or the intermediate stop valve within one of the affected combined intermediate valves. OR B.2 Isolate main turbine from the steam supply.	72 hours 72 hours
C. Turbine Overspeed Protection System inoperable for reasons other than Condition A or B.	C.1 Isolate main turbine from the steam supply.	6 hours

TECHNICAL REQUIREMENT SURVEILLANCE

---NOTE---
When a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed up to 6 hours provided the redundant overspeed trip device is OPERABLE.

	SURVEILLANCE	FREQUENCY
TRS 3.3.7.1	---NOTE--- The provisions of TRS 3.0.4 are not applicable --- Cycle each high pressure turbine control valve from the running position and observe valve closure.	122 days
TRS 3.3.7.2	---NOTE--- The provisions of TRS 3.0.4 are not applicable --- Cycle each low pressure turbine combined intermediate valve from the running position and observe valve closure.	122 days
TRS 3.3.7.3	---NOTE--- The provisions of TRS 3.0.4 are not applicable --- Cycle each high pressure turbine stop valves from the running position and observe valve closure.	122 days
TRS 3.3.7.4	Perform a CHANNEL CALIBRATION of main turbine overspeed protection instrumentation.	24 months
TRS 3.3.7.5	Disassemble one of each type valve identified in TRS 3.3.7.1, TRS 3.3.7.2, and TRS 3.3.7.3, perform a visual and surface inspection of valve seats, disks and stems and verify no unacceptable flaws or corrosion.	40 months on a STAGGERED TEST BASIS

B 3.3 Instrumentation

B 3.3.7 Main Turbine Overspeed Protection System

BASES

TRO

The Main Turbine Overspeed Protection System is designed to protect the main turbine from excessive overspeed by initiating a turbine trip by fast closure of the turbine control valves and closure of the intercept valves to essentially secure all steam flow to the turbine (Ref. 1).

To protect the turbine generator from overspeed conditions, two trip devices are provided. Either device, when initiated, will close the main stop valves, control valves, and combined intermediate valves thus isolating the turbine (Ref. 2).

These two trip devices are as follows:

- A mechanical overspeed trip which is initiated if the turbine speed reaches approximately 10% above rated speed, and
- An electrical overspeed trip which serves as a backup to the mechanical trip and is initiated at approximately 12% above rated speed.

OPERABILITY of at least 1 of the 2 overspeed protection systems is required for the Turbine Overspeed Protection System to be considered OPERABLE.

Main Turbine Overspeed Protection System (MTOPS) OPERABILITY is also based upon the ability of the valves that control steam flow to the turbine to close following the receipt of a closure signal. The 4 stop valves, 4 control valves, 6 intermediate stop valves, and 6 intercept valves make up a system of 20 valves. A single failure to any one of the above system of 20 valves will not prevent a turbine trip (Ref. 2). Hence, if 19 of the 20 noted valves are OPERABLE, the MTOPS is OPERABLE. Note that for this statement to be true, the intermediate stop valves and intercept valves are considered separate valves. Overspeed protection is only disabled on a CIV failure if both valves within a CIV are inoperable. Failure of only one valve in a CIV does not prevent an overspeed trip, and does not affect operability. Actions to close one inoperable valve if two valves are inoperable maintain the unit within the analysis in Ref. 2. However, redundancy is reduced and repairs should be completed in accordance with the corrective action program.

Excessive turbine overspeed could generate potentially damaging missiles that could present a personnel and equipment hazard. MTOPS is not necessary to provide adequate protection of the public health and safety and is not required to obviate the possibility of an abnormal situation or event giving rise to an immediate threat to the public health and safety.

BASES

ACTIONS

The Actions are defined to ensure proper corrective measures are taken in response to the inoperable components.

A.1.1, A.1.2, A.1.3 and A.2

If two of eight stop valves and control valves are inoperable, action must be taken to restore at least one of the valves to OPERABLE status in 72 hours. This action ensures steam isolation to the turbine in the event of an overspeed condition, and maintains the unit within the bounds of the FSAR analysis. The 72-hour Completion Time provides a reasonable time to troubleshoot the problem, make repairs, and reduce power in an orderly manner if required without challenging plant systems. The required action if the problem is not resolved is to close one of the inoperable valves, or to isolate the main turbine from the steam supply. If one of the inoperable valves is closed, then limit thermal power to less than or equal to 75% of rated power, and apply Minimum Critical Power Ratio (MCPR) and Linear Heat Generation Rate (LHGR) limits as specified in the COLR within 12 hours. Restricting thermal power to less than or equal to 75% of rated power eliminates possible shock loads to the turbine blades that could occur from a non-uniform circumferential steam flow distribution entering the HP turbine for this configuration. If the MCPR and LHGR limits are not in compliance with the applicable requirements at the end of this period, the ACTIONS required by the applicable specifications must be implemented. This time is provided to stabilize operation with a closed Turbine Stop Valve or Turbine Control Valve.

B.1 and B.2

If two of twelve intercept valves and intermediate stop valves are inoperable, action must be taken to restore at least one of these valves to OPERABLE status in 72 hours. This action ensures steam isolation to the turbine in the event of an overspeed condition. The 72-hour Completion Time provides a reasonable time to troubleshoot the problem, make repairs, and reduce power in an orderly manner if required without challenging plant systems. The required action if the problem is not resolved is to close either the intercept valve or the intermediate stop valve within one of the affected combined intermediate valves, or to isolate the main turbine from the steam supply.

C.1

If the MTOPS is inoperable for reasons other than conditions A or B, then action must be taken to isolate the main turbine from the steam supply. 6 hours allows a reasonable amount of time to complete the plant shutdown associated with isolating the main turbine from the steam supply.

BASES

TRS

The TRSs are performed at the specified Frequency to ensure that the turbine overspeed protection function is maintained OPERABLE.

The TRSs are modified by a Note to indicate that when a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided the redundant overspeed trip device is OPERABLE. Upon completion of the Surveillance, or expiration of the 6 hour allowance, the channel must be returned to OPERABLE status or the applicable Condition entered and Required Actions taken. This Note is based on the average time required to perform channel Surveillance. The 6 hour testing allowance does not significantly reduce the probability that the Main Turbine Overspeed Protection System will function when necessary.

TRS 3.3.7.1, TRS 3.3.7.2, and TRS 3.3.7.3

Verification of the movement of each of the four high pressure turbine control valves, six low pressure turbine combined intermediate valves (composed of 6 intermediate stop valves and 6 intercept valves), and four high pressure turbine stop valves ensures the OPERABILITY of each valve and that it will be able to close in the event of a turbine trip condition. The Frequency ensures the assumptions of the turbine missile probability analysis remain valid (Ref. 4).

TRS 3.3.7.4

This TRS is for the performance of a CHANNEL CALIBRATION of the required main turbine overspeed protection instrumentation. The calibration is a complete check of the instrument channel from the sensing device to main turbine trip initiation. The Frequency of 24 months is a typical refueling cycle and considers channel reliability.

TRS 3.3.7.5

The disassembly and inspection of the valves referenced ensures that abnormal wear is not occurring which could result in the valves inability to close upon receipt of a close signal. The Frequency is such that only one of each type valve (i.e., high pressure turbine stop; high pressure turbine control; and low pressure turbine combined intermediate), is required to be inspected within a 40 month period. If unacceptable flaws or excessive corrosion are found in a valve, all valves of its type are inspected (Ref. 3). Valve bushings are inspected and cleaned, and bore diameters are checked for proper clearance.

BASES

REFERENCES
1. FSAR Section 7.7.1.5
2. FSAR Section 10.2.2.6.
3. FSAR Section 10.2.3.6.
4. FSAR Section 3.5.1.3.