Technical Specifications Sections 3.1 through 3.3

R504B – Chapter 3.0

5. Given Improved Standard Technical Specifications and Bases, specific plant conditions and system knowledge, apply the following ISTS sections to determine the required actions by the licensee:
   a. Definitions in section 1.1
   b. The use of Logical Connectors in section 1.2
   c. Completion Time guidance in section 1.3
   d. Surveillance Frequency guidance in section 1.4
   e. The Safety Limit guidance of section 2.0
   f. General LCO guidance of section 3.0
   g. General SR guidance of section SR 3.0
   h. The LCO and Surveillance Requirements guidance of section 3.1 through 3.10
   i. The Design Feature guidance of section 4.0
   j. The Administrative Controls guidance of section 5.0

FOR ANY T/S RELATED PROBLEM

Review your system understanding

- Of course, critical to this guidance is a sound system understanding.

Review TOC for potential LCO(s)

- Frequently a given component or issue may have effect on multiple specifications.

Review applicability of LCO(s)

- It is not infrequent that improper determinations are made due to the plant condition applicability

Review LCO bases

- A given component having effect on multiple specifications or with different requirements in multiple applicability's may result in inoperability determinations in some but not necessarily all. The LCO bases will clarify these conditions.

Review SR's and bases

- A given surveillance that fails, cannot be performed or cannot be met does not necessarily result in equipment inoperability.

Apply definitions (ALL CAPS)

- Remember that ALL CAPS means some additional detail is contained in the definitions of section 1.1

Apply T/S motherhood statements

- The LCO 3.0 and SR 3.0 motherhood statements frequently provide twists to what seems to be black and white.

Identify the required actions

- What we are trying to accomplish

Section 3.1 Reactivity Controls

- 3.1.1; SHUTDOWN MARGIN:
  - Defines a minimum amount of negative reactivity that is needed to ensure the reactor is / will remain shutdown.
- 3.1.2; Reactivity Anomalies:
  - The reactivity effect of control rod movement in or out of the core must be predictable.
- 3.1.3; Control Rod OPERABILITY:
  - Addresses the loss of safety function of the control rods for various reasons.

Section 3.1 Reactivity Controls

- 3.1.4; Control Rod Scram Times:
  - The Transient and Accident Analyses for the licensee assumes a given scram insertion time.
- 3.1.5; Control Rod Scram Accumulators:
  - Scram accumulator operability is continuously monitored, essential to meeting the 3.1.4 scram times.
- 3.1.6; Rod Pattern Control:
  - Control rod symmetry ensures LPRMs accurately reflect reactor power. The BPWS establishes control rod symmetry.

Section 3.1 Reactivity Controls

- 3.1.7; Standby Liquid Control (SLC) System:
  - Standby Liquid Control provides a diverse independent means of inserting negative reactivity should control rod insertion fail.
- 3.1.8; Scram Discharge Volume (SDV) Vent and Drain Valves:
  - Dual safety function valves:
    - Valves close to prevent a leakage from the RPV directly to secondary containment .
    - Valves are open to ensure sufficient volume remains in the scram discharge volume to accommodate a scram.

After a refueling outage, a reactor startup and heatup are in progress. The calculated SHUTDOWN MARGIN is 0.29% $\Delta k/k$. In this calculation the highest worth control rod was determined by testing prior to startup. Is the SHUTDOWN MARGIN satisfactory for the current plant conditions?

- From the TOC, SDM is covered by LCO 3.1.1
- From MODE definition, the reactor is operating in MODE 2, so LCO is applicable.
- LCO 3.1.1.b is the applicable LCO since the highest rod worth rod was determined by test.
- The LCO is met ($\geq$ 0.28% $\Delta k/k$) and no Condition entry or Required Actions are applicable.

While operating at full power, several periodic performances of SR 3.1.4.2 have resulted in declaring a total of 9 operable control rods “slow”, but none are inoperable. During today’s performance of SR 3.1.4.2, another operable control rod is declared “slow” and is directly adjacent to one of the previously declared “slow” rods. No other “slow” rods are in adjacent locations. What are the Required Actions for this situation?

9 operable control rods are “slow”, when another operable control rod, adjacent to a “slow” rod, fails SR 3.1.4.2 and is declared “slow”. No other “slow” rods are adjacent. What are the Required Actions for this situation?

- Review of the SR 3.1.4.2 shows that LCO 3.1.4, Control Rod Scram Times, is applicable.
- Since the unit is at full power it must be in MODE 1.
- Since there are no more than 10 slow control rods and no more than 2 slow rods that are adjacent, LCO 3.1.4.a and 3.1.4.b are met and no Condition entry is required.

What if 10 control rods were declared inoperable instead of “slow”?

With a reactor startup in progress at 2% power and steam dome pressure at 920 psig, an accumulator trouble alarm on a control rod is received and locally the accumulator pressure is found to be 0 psig. The accumulator cannot be re-pressurized. This control rod scram time has previously been declared “slow” per LCO 3.1.4. All other control rod accumulators are at their normal pressure. What are the Required Actions for this situation?

Reactor startup at 2% power and pressure at 920 psig. An accumulator is found to be at 0 psig and cannot be re-pressurized. This control rod's scram time has previously been declared "slow". What are the Required Actions for this situation?

- Review of the Table of Contents shows that Control Rod Accumulators are covered by LCO 3.1.5.
- At 2% power, the unit is in MODE 2: LCO applicable.
- SR 3.1.5.1 cannot be met for this control rod and as required by SR 3.0.1, this constitutes failure to meet the LCO.
- LCO 3.1.5 Action A.2 must be entered: declared inoperable within 8 hours. Since the rod was previously declared "slow", cannot take A.1 action per the NOTE.

During SLC pump testing in MODE 1, the manual pump suction isolation valve from the Boron Tank is closed and the manual pump suction valve from the Test tank is opened. What is the TS Action that needs to be entered during the testing?

- Review of the Table of Contents shows that SLC System is covered by LCO 3.1.7.
- MODE 1, so LCO applicable.
- Although SR 3.1.7.6 appears not to be met with the Boron Tank suction valve closed, review of the Bases for the SR reveals that the valves can be out of position if a dedicate operator is available to reposition them.
- The LCO is met and no action is required.

The reactor is operating at full power with one of the scram discharge volume drain valves inoperable. SR 3.1.8.2 is performed and one of the scram discharge volume vent valves fails to close. What are the Required Actions for this situation?

- Review of the Table of Contents shows that SDV valves are covered by LCO 3.1.8.
- Mode 1 when at full power: 3.1.8 is applicable.
- Condition A should have been entered on the previous inoperability of the drain valve. When the vent valve failed, a separate entry into Condition A should be made per Note 1. Action A.1: 7 days to isolate the vent line (tracked separately).

What if it was the other drain valve that failed?

Section 3.2 Power Distribution Limits

- 3.2.1 APLHGR
  - Limitation based upon preventing post-LOCA peak clad temperatures from exceeding 2200 °F
- 3.2.2 MCPR
  - Limitation based upon preventing transition boiling during RPV transients
- 3.2.3 LHGR (Optional Specification)
  - May be rolled into APLHGR, prevents exceeding plastic strain limitation due to PCI.
- 3.2.4 APRM Gain and Setpoints (Optional Specification)
  - Allows adjustment of APRMs if there is local power peaking

With the reactor at 20% RTP, the reactor engineer reports that the MCPR values of SR 3.2.2.1 are exceeding the limitation of the COLR for MCPR at 100% RTP. What are the Required Actions for this situation?

- Review of the Table of Contents shows that MCPR is covered by LCO 3.2.2.
- MODE 1 since above 15% power.
- Applicability of LCO 3.2.2 is ≥ 25% RTP, so LCO is not applicable at this power level and no action required.

While operating at full power, reactor engineering reports that the limiting MCPR core value is 1.06 while the COLR limitation is 1.40. What are the Required Actions for this situation?

- Review of the Table of Contents shows that MCPR is covered by LCO 3.2.2
- MODE 1 since at full power, LCO 3.2.2 is applicable when ≥ 25% RTP.
- Action A.1 is required (restore to within limit within 2 hours). **BUT ….**
- MCPR is also a Safety Limit covered by LCO 2.1.1.2. Since MCPR is less than the SL of 1.07: within 2 hours, restore below SL and insert all rods.

Section 3.3 Instrumentation

- 3.3.1.1 RPS Instrumentation:
  - LSSS parameters that initiate automatic scram before a Safety Limit can be violated
- 3.3.1.2 SRM Instrumentation:
  - describes the actions for the four SRM detectors
- 3.3.2.1 Control Rod Block Instrumentation:
  - describes the actions for RBM, RWM and Mode Switch
- 3.3.2.2 FW and MT Level Trip Instrumentation:
  - Level 8 trips of feed pumps and main turbine from the 3 narrow range level detectors in the FWLCS.
- 3.3.3.1 PAM Instrumentation:
  - Instrumentation required to be available post-accident

Section 3.3 Instrumentation

- 3.3.3.2 Remote Shutdown System:
  - Instrumentation available on the remote SD panel
- 3.3.4.1 EOC-RPT Instrumentation:
  - Actions when RPT on turbine trip unavailable
- 3.3.4.2 ATWS-RPT Instrumentation:
  - Actions when RPT on Level 2 or Hi pressure unavailable
- 3.3.5.1 ECCS Instrumentation:
  - Instrumentation that causes ECCS actuation (HPCI, LPCI, CS, and ADS)
- 3.3.5.2 RCIC Instrumentation:
  - Instrumentation that causes ECCS actuation (Level 2)

Section 3.3 Instrumentation

- 3.3.6.1 PCIS Instrumentation:
  - parameters that initiate NSSSS actuations for Prim. Cont.
- 3.3.6.2 SCI Instrumentation:
  - parameters that initiate Secondary Cont. Isolation signals
- 3.3.6.3 LLS Instrumentation:
  - Low Level Set for SRVs (not installed in base plant)
- 3.3.7.1 MCREC System Instrumentation:
  - instruments that cause MCR to go on recirculation
- 3.3.8.1 LOP Instrumentation:
  - instruments that sense under and/or degraded voltage
- 3.3.8.2 RPS Electrical Power Monitoring Inst:
  - instruments to ensure RPS bus at proper voltage and freq.

While in MODE 1, the “A” and “D” APRMs both fail. Is the LCO for the APRM trip function met?

- From systems training it should be recognized that APRMs are covered by the RPS TS, LCO 3.3.1.1.
- MODE 1 given in the stem.
- Review Table 3.3.1.1-1 to determine applicability. Functions 2d, 2c, 2d, and 2e are applicable.
- Review Table 3.3.1.1.-1 to determine the number of channels required per trip system: 2 channels for all APRM functions.
- From system knowledge (or review of the bases), 2 channels are still OPERABLE in each trip channel (C and E in A trip system and D and F in the B trip system). LCO is met and no action required.

What if it was the A and C channels failed?

While in MODE 1, the “A” and “C” APRM channels fail low and the “A” channel is placed in a tripped condition. Can the unit continue to operate in this Condition for an unlimited period of time?

- As long as the Required Actions of A.1 are taken the unit can remain in MODE 1, however, taking the “A” channel to trip places the unit in a half scram condition.

How can the required B channel Functional Tests (which result in a half scram on the B trip system) be performed?

- LCO 3.0.5 allows equipment removed from service to comply with ACTIONS to be returned to service solely to perform testing required to demonstrate its OPERABILITY or the OPERABILITY of other equipment.

While in MODE 1, one of the two required Drywell Pressure Post-Accident Monitoring instruments fails it's surveillance. What is the required action?

- Review of the Table of Contents shows that PAM Instruments are covered by LCO 3.3.3.1 which is applicable in MODE 1.
- Review of Table 3.3.3.1-1, reveals that Drywell Pressure is Function 4 and 2 channels are required.
- Condition A is entered and Required Action A.1 (restore in 30 days) will need to be entered.

Note that PAM inst. are normally not the same instruments used for actuation or isolation; 3.3.1.1, 3.3.5.1 and 3.3.6.1 all have high drywell instruments. ASK if unsure.

While in MODE 1, the initiation timer for the ADS channel “A” fails. Assuming the LCOs are met for all other ECCS systems, how long can the timer remain inoperable before the ADS valves have to be declared inoperable?

- From systems training it should be recognized that ADS is part of the ECCS system and the timer would be covered by LCO 3.3.5.1, (or search the TS with “timer” or “ADS” to find it).
- Review Table 3.3.5.1-1: Function 4c for “A” channel ADS, applicable in MODE 1, 1 channel is required.
- With the timer inoperable, Required Action A.1 directs immediate entry into the Condition referenced in the table: (Action G for Function 4c).

While in MODE 1, the initiation timer for the ADS channel “A” fails. Assuming the LCOs are met for all other ECCS systems, how long can the timer remain inoperable before the ADS valves have to be declared inoperable?

<u>NOTE</u> that a completion time that contains the words “from discovery” implies the completion time starts when another situation (in addition to the LCO Condition) is discovered, whether it existed before the LCO Condition was entered or happened while in the LCO Condition.

- Condition G requires both Action G.1 <u>AND</u> G.2 to be taken.

While in MODE 1, the initiation timer for the ADS channel “A” fails. Assuming the LCOs are met for all other ECCS systems, how long can the timer remain inoperable before the ADS valves have to be declared inoperable?

- Action G.1 is required only **IF** both ADS channels are inoperable (i.e., function 5c was also lost).
- Action G.2 has a 96 hour completion time only **IF** HPCI or RCIC is inoperable (which they are not), otherwise 8 days.
- If unable to meet Action G.2, Condition H is entered which requires ADS (the supported feature) to be declared inoperable immediately.
- Therefore the timer can be inoperable for 8 days before having to declare ADS inoperable.

While in MODE 1 with the RCIC system in a normal alignment, both the required CST level switches that cause an automatic swap of the RCIC suction to the suppression pool are declared inoperable. What is the required action?

- Review of the Table of Contents shows that RCIC Instruments are covered by LCO 3.3.5.2 which is applicable in MODE 1.
- Review Table 3.3.5.2-1: Function 3 for CST level, 2 channels are required.
- Required Action A.1 directs immediate entry into the Condition referenced in the table: (Action D for Function 3).

While in MODE 1 with the RCIC system in a normal alignment, both the required CST level switches that cause an automatic swap of the RCIC suction to the suppression pool are declared inoperable. What is the required action?

- Action D.1 AND either D.2.1 OR D.2.2 must be taken (see Section 1.2 Logical Connectors).
- Action D.1 also has a “from discovery” completion time contingent on loss of RCIC initiation capability.
- Review of the Bases for this action reveals that this is component initiation (suction valve swap to suppression pool) and not RCIC system initiation capability. It also states that loss of both Function 3 channels is a loss of initiation capability.

While in MODE 1 with the RCIC system in a normal alignment, both the required CST level switches that cause an automatic swap of the RCIC suction to the suppression pool are declared inoperable. What is the required action?

- Based on system knowledge, the normal alignment for RCIC is to the CST and D.1 is applicable.
- Therefore RCIC should be declared inoperable within one hour, however ….
- D.2.1 (placing the channels in trip) OR D.2.2, (aligning the suction to the SP) will also need to completed within 24 hours, after which D.1 will no longer be applicable (per the note) and RCIC can be restored to OPERABLE status.

While in MODE 1, one of the pressure switches in the main steam header that cause a Group 1 isolation, fails high. What action is required and what is the associated completion time?

- From systems training it should be recognized that Gp 1 isolation or MSIV closure is part of the Primary Containment Isolation system.
- Review of the Table of Contents shows that PCI Instruments are covered by LCO 3.3.6.1 (or search with “containment isolation”).
- Review Table 3.3.6.1-1: Function 1b for steam line low pressure, applicable in Mode 1, and 2 channels are required per trip system.

While in MODE 1, one of the pressure switches in the main steam header that cause a Group 1 isolation, fails high. What action is required and what is the associated completion time?

- From systems training (or review of the Bases) it should be recognized that this failure is on 1 of the 2 instruments on a trip system.
- Required Action A.1 directs placing the channel in trip within 24 hours (since Function 1b is a Function other than 2a, 2b, 6b, 7a and 7b).

If the channel is not repaired, how long (from the time the failure was discovered) can the unit remain in MODE 1 without placing it in trip?

While in MODE 1, one of the pressure switches in the main steam header that cause a Group 1 isolation, fails high. If the channel is not repaired, how long (from the time the failure was discovered) can the unit remain in MODE 1 without placing it in trip?

- If Action A.1 is not met, Condition C would be entered, which requires the Condition referenced in the table to be entered immediately.
- From the Table, for Function 1b the Condition is E.
- Action E.1 requires being in MODE 2 within 6 hours.
- Therefore, the unit can remain in MODE 1 for 30 hours (24 hours in A.1 plus 6 hours in E.1)

Questions?