Technical Specifications Sections 3.4 and 3.5

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 3.4 Reactor Coolant Systems

- 3.4.1; Recirculation Loops Operating
  - Action is required to ensure that the loss of core flow through the idle jet pumps does not result in a reduction in safety margins.
- 3.4.2; Jet Pumps
  - Safety analysis assumes that the jet pumps are intact and therefore the core can be re-flooded, at least, to 2/3 core height
- 3.4.3; Safety/Relief Valves
  - Automatically open to provide over pressure protection to the reactor coolant system pressure boundary.

Section 3.4 Reactor Coolant Systems

- 3.4.4; RCS Operational LEAKAGE:
  - LEAKAGE is defined in Section 1.1. This section provides operational limitations on RCS leakage.
- 3.4.5; RCS Pressure Isolation Valve (PIV) Leakage:
  - If PIV leakage becomes excessive low pressure systems can be over pressurized resulting in an “interfacing system LOCA”.
- 3.4.6; RCS Leakage Detection Instrumentation:
  - Provides the methods used to provide remote monitoring of RCS leakage into containment to ensure compliance with LCO 3.4.4.

Section 3.4 Reactor Coolant Systems

- 3.4.7; RCS Specific Activity:
  - RCS activity is measured periodically to ensure continued operation within the assumptions of the safety analysis.
- 3.4.8; RHR Shutdown Cooling System – Hot Shutdown:
  - This specification addresses core circulation and cooling provided that pressure is below the SDC Cut-in Permissive Setpoint (125 psig) in mode 3.
- 3.4.9; RHR Shutdown Cooling System – Cold Shutdown:
  - The same as LCO 3.4.8 except that in Mode 4, there is more flexibility for the system alignments.

Section 3.4 Reactor Coolant Systems

- 3.4.10; RCS Pressure and Temperature (P/T) Limits:
  - Operational limitations are upon RPV pressure, temperature and there rate of change to minimize the potential for RPV brittle failure.
- 3.4.11; Reactor Steam Dome Pressure:
  - This specification ensures plant operation remains within the assumed value of RPV pressure.

The plant is in MODE 1 with both recirculation pumps running. Total core flow is at 60 Mlbm/hr (≈78% rated core flow) with “A” loop flow at 28 Mlbm/hr (≈36% of rated flow) and “B” loop flow at 32 Mlbm/hr (≈41.5% of rated flow). Is LCO 3.4.1 met for two recirculation loops with matched flow? If not, which loop is inoperable?

MODE 1
Total core flow is at 60 Mlbm/hr (78%)
"A" loop flow at 28 Mlbm/hr (36%)
"B" loop flow at 32 Mlbm/hr (41.5%)
Is LCO 3.4.1 met?
If not, which loop is inoperable?

- LCO given in stem, 3.4.1 applicable in MODE 1
- SR 3.4.1.1 used to determine "matched flows".
- Since total flow ≥ 70%, mismatch must be ≤ 5%.
- LCO is NOT met (5.5% Δflow)
- From Bases (LCO Section), "A" loop is inoperable.

Without adjusting flow, could the LCO be met?

What action is required if both pumps trip?

Following an outage, the SRVs are being cycled per SR 3.4.3.2. During the testing, the solenoid valve on one SRV that allows the valve to be open with the control switch is found to be shorted out and blowing fuses. What MODE is the plant in? Is the LCO met if SR 3.4.3.2 cannot be completed due to the faulty solenoid?

- LCO given in stem (LCO 3.4.3)
- SR 3.4.3.2 not required until 12 hours after adequate pressure and flow.
- From Bases for the SR, pressure ≥ 920 psig and flow of at least 1 ¼ bypass valves open: Mode 1 or 2.
- Normally SR 3.0.1 would apply (LCO not met), **BUT** Bases for SR specifically allows continued OPERABLITY if solenoid failure only.

The plant is in MODE 4 making preparations for reactor startup. RHR Pumps “B” and “D” are operable and the “B” pump is operating in shutdown cooling mode. There are no recirculation pumps running and both the “A” and “C” RHR pumps are under a clearance and cannot be operated. Is LCO 3.4.9 met for this condition?

- LCO given in stem (LCO 3.4.9), applicable in MODE 4
- LCO requires 2 SDC subsystems to be OPERABLE
- Bases for the LCO defines a subsystem as a pump and HX, and allows common HX and discharge piping.
- Therefore the LCO is met with both pumps in one loop or one pump in each loop.

The plant is in MODE 4 making preparations for reactor startup. RHR Pumps “B” and “D” are operable and the “B” pump is operating in shutdown cooling mode. The recirculation pumps are started and SDC is secured while RHR is realigned for injection. Is LCO 3.4.9 still being met for this condition?

- LCO only requires the SDC subsystem to be in operation if NO recirculation pumps are running.
- Bases (LCO Section) states that the subsystem is still OPERABLE if it can be manually aligned for SDC.
- Therefore, the LCO is met.

Section 3.5 ECCS and RCIC

- 3.5.1; ECCS – Operating:
  - Provides the criteria for ECCS systems to ensure that the ECCS Acceptance Criteria of 10CFR-50.46 are met.
- 3.5.2; ECCS – Shutdown:
  - With the reactor at lower energy states in MODE 4 and 5, fewer ECCS systems are needed to meet the ECCS Acceptance Criteria.
- 3.5.3; RCIC System:
  - RCIC is needed for inventory makeup in the event of a MSIV Isolation.

The plant is in MODE 1. RHR Pump “B” is removed from service for maintenance. Is LCO 3.5.1 met for this condition?

- LCO is given, applicable in MODE 1.
- LCO requires each ECCS injection/spray subsystem to be operable.
- Bases for the LCO for LPCI describes two subsystems, but is not specific on what makes up a subsystem (how many pumps).
- SR 3.5.1.7 specifies LPCI flow requirement of 17000 gpm with **two** pumps.
- Therefore, the LCO is not met and Condition A should be entered.

What is the Action is both B and D are inoperable?

Following an outage, the SRVs are being cycled per SR 3.4.3.2. During the testing, the solenoid valve on one SRV that allows the valve to be open with the control switch is found to be shorted out and blowing fuses. If this SRV is also one of the 7 ADS valves, what action is required?

- From ToC (or search) ADS is covered by LCO 3.5.1
- As discussed before, pressure > 920 psig in MODES 1 or 2 and therefore 3.5.1 is applicable.
- SR 3.5.1.12 cannot be met with the solenoid shorted out. Per SR 3.0.1, the LCO is not met (no exemption in Bases for SR like in SR 3.4.3.2)
- Condition E should be entered: restore within 14 days.

The plant is in MODE 1 with the HPCI system inoperable for planned maintenance. Later, the RCIC system becomes inoperable. Which LCOs are not met and what is the Required Action?

- From ToC (or search) HPCI is covered by LCO 3.5.1 Condition C and RCIC by 3.5.3 Condition A.
- LCO 3.5.1 Action C.1 cannot be met with RCIC inoperable, so Condition G must also be entered.
- LCO 3.5.3 Action A.1 cannot be met with HPCI inoperable, so Condition B must also be entered.
- In both cases: Be in MODE 3 in 12 hours and < 150 psig within 36 hours **from the time RCIC failed**.

With an ADS valve inoperable in MODE 1, HPCI becomes inoperable, assuming neither can be restored, what are the required actions and when can they be exited?

- From ToC (or search) HPCI and ADS are covered by LCO 3.5.1
- Conditions C, E and H must be entered.
- Action H.1 requires LCO 3.0.3 to be entered immediately.
- LCO 3.0.3 requires Mode 2 in 7 hours, MODE 3 in 13 hours and MODE 4 in 37 hours
- However, LCO 3.5.1 is only applicable to ADS and HPCI when pressure > 150 psig. Therefore the actions can be exited at 150 psig (not MODE 4)

Is operation of the HPCI keep-fill pump required to maintain the HPCI system OPERABLE?

- From ToC (or search) HPCI is covered by LCO 3.5.1
- No specific reference to keep-fill in LCO.
- Should recognize that keep-fill is used to maintain discharge piping full: SR 3.5.1.1.
- Bases of LCO 3.5.1 (Background section) states that “keep-fill” is not required for HPCI. Therefore HPCI is OPERABLE

What if the “A” Core Spray system keep-fill pump fails?

Questions?