Comanche Peak Nuclear Power Plant Units 3 and 4

Technical Specification Methodology for Risk-Managed Technical Specifications and Surveillance Frequency Control Program

Revision 2
June, 2012

Contents

1.0 Introduction

This methodology addresses how the Risk-Managed Technical Specification (RMTS) and the Surveillance Frequency Control Program (SFCP) are proposed to be implemented for Comanche Peak Nuclear Power Plant (CPNPP) Units 3 and 4 Technical Specifications (TS) 5.5.18 and 5.5.19, respectively. This methodology document will be referenced in Sections 5.5.18 and 5.5.19 of the CPNPP Units 3 and 4 TS.

As noted in these two specifications, actions are to be taken in accordance with NEI 06-09 (Revision 0) for RMTS and NEI 04-10 (Revision 1) for SFCP. Both of these documents were originally written for plants that are currently operating. Section 2.0 of this methodology incorporates these NEI documents by reference and proposes the changes needed to make the documents applicable to CPNPP Units 3 and 4. Section 3.0 provides a complete description of the programs and addresses the technical adequacy of the PRA to support these programs. Finally, Section 4.0 provides discussion on the use of existing risk metrics applied to these risk informed applications.

This methodology applies to CPNPP Units 3 and 4 from issuance of the Combined License (COL) through construction and subsequent operation of the units. Changes to the TS after COL issuance will be performed in accordance with the 10 CFR 50.90 process.

2.0 Incorporation of NEI Documents

TS 5.5.18 and TS 5.5.19 incorporate by reference NEI 06-09 and NEI 04-10, respectively. These NEI documents address many aspects of the RMTS and SFCP. In order to fully implement the documents, they are incorporated by reference into the Technical Specification Methodology for CPNPP Units 3 and 4 with the modifications contained herein to make them fully applicable to these plants. The full incorporation is addressed in Subsections 2.1 and 2.2.

2.1 NEI 06-09, Revision 0, "Risk-Managed Technical Specifications (RMTS) Guidelines"

NEI 06-09, Revision 0, "Risk-Managed Technical Specifications (RMTS) Guidelines" is incorporated by reference into this methodology with the following revisions. These revisions serve to modify the NEI 06-09, which is guidance for operating plants, to make it applicable to pre-operating CPNPP units 3 and 4. These modifications are necessary as NEI 06-09 was prepared for plants with an operating license (OL) and CPNPP is a new plant with a COL. This section of the methodology is considered to be the basis for a future addendum to NEI 06-09.

CPNPP proposes to use the aspects of these documents as described in NEI 06-09 and the addendum below.

2.3.1 Configuration Risk Management Process & Application of Technical Specifications

Item 7: replace the bullet before the last with:

> The impact of all initiating events (e.g., internal fire and floods and other external events) and modes of operation (e.g., low power and shutdown operation if applicable), shall be addressed in accordance with 10 CFR 50.71(h)(1), (h)(2) and (h)(3) and included in the Risk Management Action Time (RMAT) and Risk-Informed Completion Time (RICT) calculation."

Item 9: replace the sentence with:

> A RICT may not be applied for pre-planned activities when multiple trains of similar equipment required by the Technical Specification Limiting Condition for Operation (LCO) would be

inoperable. For example, in a four train system where the applicable LCO requires three trains to be operable, RICT may be applied if one train is not operable and a second train becomes inoperable but not if a third train becomes inoperable.

Item 10: delete item.

2.3.2 Documentation

Item 2: Add the following sentence after the last sentence:

The process for conducting and using the results of risk assessment in station decision-making regarding the treatment of uncertainties associated with the lack of operating experience and lack of reliability data for innovative design features shall be documented during the initial stage of plant operation.

Item 6: Add the following item after the last item:

6.8 The list of actions, if any, taken to address the PRA uncertainties associated with the lack of operating experience and lack of reliability data for innovative design features.

2.3.3 Training

Item 2.2: Add the following sentence after the last sentence:

During the initial stage of plant operation where sufficient operating experience has not been accumulated to support the basis of the reliability data to be applied, training is required regarding the treatment of uncertainties associated with the lack of operating experience and lack of reliability data for innovative design features.

2.3.4 PRA Technical Adequacy

Item 2, replace the first sentence with:

The PRA shall be reviewed against Capability Category 2 for the supporting requirements of NRC-endorsed consensus standards

on PRA in effect one year prior to initial fuel load. The review will consider and accept that the plant does not yet have operating experience to be included in the PRA and the plan to add this experience at a later date.

Item 3, replace the last sentence with:

Conservative or bounding assumptions may be used in RMTS calculations as long as they are used in conjunction with PRA models meeting consensus standards if so desired by the licensee for the sake of simplicity.

Item 10: after the first sentence, insert the following sentence:

Key sources of uncertainty and key assumptions of the US-APWR DCD PRA, documented Table 19.1-38 of the US- APWR DCD Chapter 19 or in Chapter 19 of the Comanche Peak Units 3 and 4 FSAR, shall be reviewed (together with any additional potential sources of uncertainty and key assumptions identified by the COL licensee or the peer review process for the detailed as-built, as-operated PRA) to characterize and understand their impact on the RMTS-related decision making. Uncertainty associated with the initial lack of operating experience and the lack of adequate reliability data for some innovative equipment designs (e.g., advanced accumulators and digital I&C) shall be identified and characterized by sensitivity analyses and addressed by using appropriately conservative reliability values in RMTS calculations.

3.2.1 RMTS Implementation Process

Item 3: replace the third paragraph before the last with the following sentence:

Quantitative risk assessments used to support RMTS evaluations shall be performed with a full scope plant specific PRA model approved by station management in accordance with approved station procedures.

3.2.2 RMTS Implementation Process

Item 3: replace the second sentence with the following sentence:

In a RMTS program, a RICT exceeding the current front-stop Completion Time (CT) may not be applied in cases where a total

loss of function has occurred (e.g., multiple trains of a required Technical Specifications LCO are determined to be non-functional, such as in a four train system where the applicable LCO requires three trains to be operable, RICT may be applied if one train is not operable and a second train becomes inoperable but not if a third train becomes inoperable).

3.3.4 Uncertainty Consideration in a RMTS Program

Item 1: add the following sentence after the last sentence:

Key sources of uncertainty and key assumptions of the US-APWR DCD PRA, documented Table 19.1-38 of the US- APWR DCD Chapter 19 or in Chapter 19 of the Comanche Peak Units 3&4 FSAR, should be reviewed (together with any additional potential sources of uncertainty and key assumptions identified by the COL licensee or the peer review process for the detailed as-built, as-operated PRA) to characterize and understand their impact on the RMTS-related decision making. Uncertainty associated with the initial lack of operating experience and the lack of adequate reliability data for some innovative equipment designs (e.g., advanced accumulators and digital I&C) shall be identified and characterized by sensitivity analyses and addressed by using appropriately conservative reliability values in RMTS calculations.

3.3.5 External Events Consideration

Replace the first and second sentences of the first paragraph with the following sentences:

When evaluating risks for use in a RMTS program, plant PRA models should include external floods, fires, high winds, seismic, and other external events that the PRA would indicate as risk significant and that would impact maintenance decisions. For stations without external events PRAs incorporated into their quantitative Configuration Risk Management (CRM) Tools, the station should apply the following criteria to support maintenance activities beyond the front-stop CT:

Replace Item 1 with the following sentence:

Provide a reasonable technical argument (to be documented prior to the implementation of the associated RICT) that the

configuration risk of interest is dominated by internal events, and that external events, including external floods, fires, high winds, and seismic events, are not a significant contributor to configuration risk (i.e., they are not significant relative to a RICT calculation).

Replace Item 2 with the following sentence:

Perform a reasonable bounding analysis of the external events, including external floods, fires, high winds, and seismic events, contribution to configuration risk (to be documented prior to the implementation of the associated RICT) and apply this upper bound external events risk contribution along with the internal events risk contribution in calculating the configuration risk and the associated RICT.

Replace the first sentence of Item 3 with the following sentence:

For limited scope RMTS applications, a licensee may use pre-analyzed external events, including external floods, fires, high winds, and seismic events to restrict Risk Management Action (RMA) thresholds and identify and implement compensatory risk management actions.

Delete the second and fifth sentences in the second paragraph.

3.3.6 Common Cause Failure Consideration

Replace the second sentence of the first paragraph with the following sentences:

For all RICT assessments of planned configurations, the treatment of common cause failures in the quantitative CRM Tools may be performed by considering only the removal of the planned equipment and not adjusting the common cause failure terms if all combinations of common cause failures among the redundant equipment are explicitly modeled and are considered in risk quantification of the CRM tool. However, if the CRM Tool does not take into account the contribution of common cause failure terms that directly result in system failure for configurations where equipment is removed from service, removal of the equipment without adjusting common cause failure terms could result in a artificially low calculated risk when equipment is taken out of service. In such cases, validity of the common cause failure treatment in the CRM Tool shall be justified or the common cause

failure term shall be adjusted to ensure the configuration risk is not underestimated.

4.1 PRA Attributes

Replace the third and forth sentences of the first paragraph with:

The scope of this PRA shall include impact of all initiating events (e.g., internal events, internal and external floods, fire, high winds, seismic, and other external events) and modes of operation (e.g., low power and shutdown operation, if applicable) in accordance with 10CFR 50.71 (h)(1), (h)(2) and (h)(3).

Replace the last sentence of the first paragraph with:

However, where the PRA can demonstrate that one more of the challenges are not significant to the site or application, quantitative modeling may be omitted.

Replace the first sentence of the last paragraph with:

The PRA model attributes and technical adequacy requirements for RMTS applications must be consistent and compatible with the NRC-endorsed consensus standards on PRA and updates to RG 1.200 in effect one year prior to initial fuel load.

2.2 NEI 04-10, Revision 1, "Risk-Informed Method for Control of Surveillance Frequencies"

NEI 04-10, Revision 1, "Risk-Informed Method for Control of Surveillance Frequencies" is incorporated by reference into this methodology with the following revisions. These revisions serve to modify NEI 04-10 to make it applicable to CPNPP. These modifications are necessary because NEI 04-10 was prepared for operating plants with an OL and CPNPP is a new plant with a COL. This section of the methodology is considered to be the basis for a future addendum to NEI 04-10.

CPNPP proposes to use the aspects of these documents as described in NEI 04-10 and the addendum below.

4.0 SURVEILLANCE FREQUENCY CONTROL PROGRAM CHANGE PROCESS

Step 5: replace the last sentence of the third paragraph with the following sentence:

> The identified "Gaps" to Capability Category II requirements from the endorsed PRA standards in the RG one year prior to initial fuel load, the key sources of uncertainty identified in the US-APWR DCD Chapter 19, Table 19.1-38, and the sources of uncertainty associated with lack of operational experience and lack of reliability data on innovative designs will all serve as inputs to identifying appropriate sensitivity cases in Step 14 below.

Step 10: replace the first sentence of item "*Initial Assessment for Fire Events*" with the following sentence:

> The next step of the screening process is to determine whether the SSC is evaluated in the fire PRA.

Step 10: Delete the second and third paragraph of item "*Initial Assessment for Fire Events*".

Step 10: replace the first sentence of the last paragraph of item "*Initial Assessment for Fire Events*" with the following sentence:

> If the SSC is not evaluated in the fire PRA, (either explicitly or implicitly, and it is judged to have no impact on the PRA results), then the SSC can be qualitatively screened with the information summarized in Step 15 for presentation to the Independent Decision making Panel (IDP).

Step 10: replace the first sentence of item "*Initial Assessment for Seismic Events*" with the following sentence:

> The next step of the screening process is to determine whether the SSC is evaluated in the seismic PRA.

Step 10: Delete the second paragraph of item "*Initial Assessment for Seismic Events*".

Step 10: replace the first sentence of the last paragraph of item "*Initial Assessment for Seismic Events*" with the following sentence:

> If the SSC is not evaluated in the seismic PRA, (either explicitly or implicitly, and it is judged to have no impact on the PRA results),

then the SSC can be qualitatively screened with the information summarized in Step 15 for presentation to the IDP.

Step 10: replace the first sentence of the second paragraph of item "*Initial Assessment for Other External Events*" with the following sentence:

If the plant does not have an external hazards PRA, then an external hazards screening evaluation should be performed using the PRA available that meets the requirements of 10 CFR 50.71 (h)(1), (h)(2) and (h)(3).

Step 14: add the following bullets after the last bullet of the third paragraph:

- Review the key sources of uncertainty and key assumptions identified in the US-APWR DCD PRA, documented in Table 19.1-38 of the US- APWR DCD Chapter 19 or in Chapter 19 of the Comanche Peak Units 3 and 4 FSAR together with any additional potential sources of uncertainty and key assumptions identified by the COL licensee or the peer review process for the detailed as-built, as-operated PRA to characterize and understand their impact on the change in Core Damage Frequency (ΔCDF) and change in Large Early Release Frequency (ΔLERF) calculations. Compare the results to the RG 1.174 limits.

- Identify and characterize uncertainties associated with the initial lack of operating experience and the lack of adequate reliability data for some innovative equipment designs (e.g., advanced accumulators and digital I&C) by sensitivity analyses and address the uncertainties by using appropriately conservative reliability values. Compare the results to the RG 1.174 limits.

Step 15: add the following bullet after the last bullet:

- Uncertainties associated with the lack of operating experience and lack of reliability data for innovative design features that impact the CDF and LERF changes.

3.0 Programs

3.1 Configuration Risk Management Program Description

The Configuration Risk Management Program (CRMP) must be implemented before the requirements of TS 5.5.18 may be applied to any TS. The program must comply with the methodology provided in TS 5.5.18, including NEI 06-09, per the discussion in Section 2.1. The program has the following basic characteristics:

- The basic elements of the program are contained in an approved CPNPP procedure.
- The program identifies the departments of the CPNPP organization that have actions or responsibilities with respect to the program.
- The program delineates who has each of the designated responsibilities.
- The program identifies the training requirements for the members of the organization assigned actions or responsibilities per the program.
- The program and the supporting PRA (see Section 3.3) matches the as-built plant and is updated to the extent necessary to assess the combined risk of the unit in its current and projected configurations.
- The supporting PRA meets the description provided in Section 3.3.
- The program states how the PRA is modified to support the CRMP.
- The program procedure fully describes the CRM tool to be used.

3.2 Surveillance Frequency Control Program Description

The Surveillance Frequency Control Program (SFCP) must be implemented before the requirements of TS 5.5.19 may be applied to any TS. The program must comply with the methodology provided in TS 5.5.19, including NEI 04-10, per the discussion in Section 2.2. The program has the following basic characteristics:

- The basic elements of the program are contained in an approved CPNPP procedure
- The program identifies the departments of the CPNPP organization that have actions or responsibilities with respect to the program.

- The program delineates who has each of the designated responsibilities.

- The program identifies the training requirements for the members of the organization assigned actions or responsibilities per the program.

- The program and the supporting PRA (see Section 3.3) matches the as-built plant and is updated to the extent necessary to assess the combined risk of the unit in its current and projected configurations.

- The supporting PRA meets the description provided in Section 3.3.

- The program states how the PRA is modified to support SFCP.

3.3 PRA Support

Both the CRMP and the SFCP are supported by appropriate PRA models. The PRA models are described in sufficient detail to allow issuance of the COLs for CPNPP Units 3 and 4 and to allow continued implementation of these programs during operations. The supporting PRA will have the following essential elements:

- Numerous documents are used to describe the PRA models being used. The three primary documents are Regulatory Guide 1.200 and NEI 06-09 and NEI 04-10 as incorporated in Section 2.0.

- The PRA scope will envelope all the system, structures and components covered by the TS to which the programs apply. The PRA will comply with 10 CFR 50.71(h) which will assure that this scope requirement is met.

- The PRA developed for the DCD and COLA will be updated and upgraded to meet the PRA quality required for these programs according to the NRC-endorsed standards effective one year prior to initial fuel load. PRA insights, such as key assumptions and uncertainties summarized in the US-APWR DCD, will be addressed in the program.

- The PRA will undergo a peer review against Capability Category 2 for the supporting requirements of NRC-endorsed consensus standards on PRA per 10 CFR 50.71 (h) and Regulatory Guide 1.200 in effect one year prior to initial fuel load. The peer review will specifically examine the capability of the PRA to implement these Risk Informed Technical Specification (RITS) programs. All findings from the peer review will be considered and dispositioned.

- The PRA will rely upon the experience from units of similar design for uncertainties due to operator actions. The PRA will also rely heavily upon experience from operating US plants because the US-APWR design has not been operated prior to the issuance of a COL for CPNPP Units 3 and 4. Experience from operating Japanese PWRs will also be used if applicable. Uncertainties associated with the lack of operating experience that impact reliability will be identified.

- For components that are new to the US-APWR design (e.g., the Advanced Accumulators and the Gas Turbine Generators), the PRA will rely on experience data for equipment of similar design wherever used in the nuclear and non-nuclear industry, with consideration of features of the new design. The peer review will include an assessment of the validity of the data applied.

- Model translation from the approved PRA to a CRM tool will be traceable. Quality assurance checks of the model and quantification results translation from the approved PRA model will be performed to validate the model translation.