Comanche Peak Nuclear Power Plant Units 3 and 4

Technical Specification Methodology

Risk-Managed Technical Specifications (RMTS)

Surveillance Frequency Control Program (SFCP)

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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.

As noted in these two specifications, actions are to be taken in accordance with the applicable NEI documents – NEI 06-09 (Revision 0) for RMTS and NEI 04-10 (Revision 1) for SFCP. Both of these documents were originally written for plants currently operating.. Section 2.0 of this proposed methodology incorporates the intent of these NEI documents 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.

This report applies to CPNPP Units 3 and 4 from issuance of the COL through construction and subsequent operation of the units. Potential enhancements after operation to reflect operating experience would be discussed with the NRC and any proposed changes communicated to the NRC at that time.

2.0 Incorporation of NEI Documents

TS 5.5.18 and 5.5.19 adopt NEI 06-09 and NEI 04-10. These NEI documents address many aspects of the RMTS and SFCP. In order to fully implement the documents, they are incorporated into the Technical Specification Methodology for CPNPP Units 3 and 4 with the modifications needed to make them fully applicable to these plants. The full incorporation is addressed in sections 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 hereby incorporated into this methodology report with the following revisions. These revisions serve to modify the Industry Guidance Document to make it applicable to CPNPP. These modifications are necessary as the Industry Guidance Document was prepared for operating plants with an OL and CPNPP is a new plant with a COL. This section of the Methodology is considered a basis for possible future addendum to NEI 06-09, Revision 0.

General

NEI 06-09 relies on several other documents including USNRC Regulatory Guides 1.174 and 1.177. CPNPP proposes to use the aspects of these documents as described in NEI 06-09 and the addendum below.
Large release frequency (LRF) is used as a metric for early fatality risk for new plants, while large early release frequency (LERF) is used as a metric for operating plants. When the NEI 06-09 is applied to new plants, LRF is proposed to be applied as a substitute for LERF.

2.2 RMTS Thresholds

Replace the Table 2-2 with the following:

Table 2-2

RMTS Quantitative Risk Management Thresholds

Criterion*		**RMTS Risk Management Guidance**
CDF	LRF	
$\geq 10^{-3}$	**$\geq 10^{-4}$**	- Voluntary entrance into configuration prohibited. If in configuration due to emergent event, implement appropriate risk management actions.
ICDP	ILRP	
$\geq 10^{-5}$	**$\geq 10^{-6}$**	- Follow the Technical Specification requirements for required action not met.
$\geq CDF_{base}$ or 10^{-6} whichever is more restrictive	**$\geq LRF_{base}$ or 10^{-7} whichever is more restrictive**	– RMAT and RICT requirements apply – Assess non-quantifiable factors – Implement compensatory risk management actions
$< CDF_{base}$ or 10^{-6} whichever is more restrictive	**$< LRF_{base}$ or 10^{-7} whichever is more restrictive**	– Normal work controls

2.3.1 Configuration Risk Management Process & Application of Technical Specifications

Item 1, first bullet, replace "10^{-6} ICDP or 10^{-7} ILERP RMA" with "CDF_{base} or 10^{-6} whichever the restrictive for ICDP or LRF_{base} or 10^{-7} whichever the restrictive for ILRP RMA".

Item 14, replace the first sentence with.

> The as-occurred cumulative risk associated with the use of RMTS beyond the front-stop CT for equipment out of service shall be assessed and compared to the guidelines for small risk changes in Regulatory Guide 1.174, with consideration of low baseline risk due to enhanced safety, and corrective actions applied as appropriate.

Acceptable criteria for accumulated risk for new plants with enhanced safety are discussed in section 3.3.3.

2.3.2 Documentation

Item 7.1, replace paragraph with:

The accumulated annual risk above the zero maintenance baseline due to equipment out of service beyond the front-stop CT and comparison to the guidelines for small risk changes in Regulatory Guide 1.174, with consideration of low baseline risk due to enhanced safety, shall be documented every refueling cycle not to exceed 24 months. Acceptable criteria for accumulated risk for new plants with enhanced safety are discussed in section 3.3.3.

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 important to RMTS 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 10, after the third sentence, insert the following sentence:

Key sources of uncertainty and key assumptions of the US-APWR DCD PRA documented in US-APWR DCD Chapter 19, Table 19.1-38, will be reviewed. Uncertainties associated with any lack of operational experience and plant-specific data will be addressed.

3.1.1 Risk Management Thresholds for RMTS Programs

Replace the third sentence of the second paragraph with:

Table 3-1 presents RMTS quantitative risk management thresholds and RMTS action guidance.

Replace Table 3-1 with the following table:

Criterion*		Maintenance Rule Risk Management Guidance	RMTS Risk Management Guidance
CDF	LRF		
$\geq 10^{-3}$	$\geq 10^{-4}$	– Careful consideration before entering the configuration (none for LERF)	- Voluntary entrance into configuration prohibited. If in configuration due to emergent event, implement appropriate risk management actions.
ICDP	ILRP		
$\geq 10^{-5}$	$\geq 10^{-6}$	– Assess non-quantifiable factors – Establish compensatory risk management actions	- Follow the Technical Specification requirements for required action not met.
$\geq CDF_{base}$ or 10^{-6} whichever is more restrictive	$\geq LRF_{base}$ or 10^{-7} whichever is more restrictive	– Assess non-quantifiable factors – Establish compensatory risk management actions	– RMAT and RICT requirements Apply – Assess non-quantifiable factors – Implement compensatory risk management actions
$< CDF_{base}$ or 10^{-6} whichever is more restrictive	$< 10\% LRF_{base}$ or 10^{-7} whichever is more restrictive	– Normal work controls	– Normal work controls

Replace the last paragraph with:

In a RMTS program the CDF_{base} or 10^{-6} whichever is more restrictive threshold for ICDP and LRF_{base} or 10^{-7} whichever is more restrictive threshold for ILERP, respectively, are referred to as Risk Management Action (RMA) thresholds and the RMAT is the corresponding risk management action time. The 10^{-5} and 10^{-6} thresholds for ICDP and ILRP, respectively, are referred to as Risk Informed Completion Time (RICT) Thresholds.

3.1.2 RMTS Risk Management Time Intervals

Replace the second sentence with:

The RMAT is the time interval from discovery of a condition requiring entry into a Technical Specification with provisions for utilizing a RICT and which results in a plant configuration other than the zero-maintenance state until the CDF_{base} or 10^{-6} whichever is more restrictive ICDP RMA threshold, or LRF_{base} or 10^{-7} whichever is more restrictive ILRP RMA threshold is reached, whichever is the shorter duration.

3.2.4 Examples Demonstrating Application of RMAT and RICT in RMTS Programs

Replace the second sentence of the first paragraph with:

Figures 3-2 and 3-3 illustrate these concepts when risk management thresholds for operating plants are applied. The concepts described in this section are applicable to new plants with an exception that new plants apply risk management thresholds shown in Table 3-1.

3.3.3 Cumulative Risk Tracking

Add the following after the last sentence of the first paragraph:

For new plants with enhanced safety acceptance criteria for cumulative risk taking into consideration of the low baseline risk should be considered. Acceptable criteria for cumulative risk for new plants are shown in Table 3-3.

Table 3-3 Cumulative risk tracking criteria

Incremental Added Risk for the cumulative 52 week		Action to be Taken
ICDP	ILRP	
< 50%CDF_{base} and < 10^{-6}	< 50%LRF_{base} and < 10^{-7}	No Action Required
> 50%CDF_{base} or 10^{-6} whichever is more restrictive	> 50%LRF_{base} or 10^{-7} whichever is more restrictive	Consider Compensatory Measures
> 2 times CDF_{base} or 10^{-5} whichever is more restrictive	> 2 times LRF_{base} or 10^{-6} whichever is more restrictive	Provide report to NRC within 7 days discussing impact of compensatory measures, unique circumstances, and justification

3.3.4 Uncertainty Consideration in a RMTS Program

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

> Key sources uncertainty and key assumptions of the US-APWR DCD PRA documented in US-APWR DCD Chapter 19 Table 19.1-38 should be reviewed.

4.1 PRA Attributes

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 NRC-endorsed consensus standard on PRA and updates to RG 1.200 in effect one year prior to initial fuel load.

A Glossary Of Terms

Replace the second sentence in definition of risk-managed action time (RMAT) with:

> Stated formally, the RMAT is the time interval from discovery of a condition requiring entry into a Technical Specifications action for a SSC with the provision to utilize a RICT until the CDF_{base} or 10^{-6} whichever is more restrictive ICDP RMA threshold, or LRF_{base} or 10^{-7} whichever is more restrictive ILRP RMA threshold is reached, whichever is the shorter duration.

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 hereby incorporated into this methodology report with the following revisions. These revisions serve to modify the Industry Guidance Document to make it applicable to CPNPP. These modifications are necessary as the Industry Guidance Document was prepared for operating plants with an OL and CPNPP is a new plant with a COL. This section of the Methodology is considered a basis for possible future addendum to NEI 04-10, Revision 1.

General

NEI 06-09 relies on several other documents including USNRC Regulatory Guides 1.174 and 1.177. CPNPP proposes to use the aspects of these documents as described in NEI 04-10 and the addendum below.

Large release frequency (LRF) is used as a metric for early fatality risk for new plants, while large early release frequency (LERF) is used as a metrics for operating plants. When the NEI 04-10 is applied to new plants, LRF is applied as a substitute for LERF.

2.0 OVERALL APPROACH

Add the following sentence at the end of the third paragraph:

> For the CPNPP units 3 and 4, bounding risk criteria considering enhanced safety is applied. These risk criteria will be used until RG 1.174 has been revised to address quantitative acceptance guidelines for new plants.

Item 4 second paragraph, after the second sentence insert the following sentence:

> Since the current RG 1.174 has not been officially endorsed by the NRC to support risk informed applications for new plants, bounding risk criteria considering enhanced safety of new plants, as described in section 4, will be applied.

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 and the identified key sources of uncertainty serve as inputs to identifying appropriate sensitivity cases in Step 14 below.

Step 10b, replace the risk criteria for ΔCDF "1E-07/yr CDF" with "10%CDF_{base} or 1E-07/yr CDF whichever is more restrictive" and risk criteria for ΔLERF "1E-08/yr LRF" with "10%$LERF_{base}$ and 1E-08/yr LRF whichever is more restrictive".

Step 10c, replace the risk criteria for ΔCDF "1E-07/yr CDF" with "10% CDF_{base} or 1E-07/yr CDF whichever is more restrictive" and risk criteria for ΔLERF "1E-08/yr LERF" with "10%LRF_{base} or 1E-08/yr LRF whichever is more restrictive".

Step 12 item a), replace the first sentence of the first paragraph with:

For each individual STI analyzed, total change in CDF/LRF for all PRAs (i.e., internal events, external events, and shutdown events), shall be less than an acceptance criterion of 50% CDF_{base} or 1E-06/yr whichever is more restrictive for CDF and 50% LRF_{base} or 1E-07/yr whichever is more restrictive for LRF.

Step 12 item a), replace the second paragraph with:

However, as shown in Step 12-B2, where conservative or bounding estimates of CDF/LRF are used for external events or shutdown events, if it can be reasonably shown that that the ΔCDF or ΔLRF contribution for external events or shutdown events is less than 10%CDF_{base} or 1E-07/yr whichever is more restrictive for CDF and 10%LRF_{base} or 1E-08/yr whichever is more restrictive for LRF, the change in CDF/LRF from STI changes for external events or shutdown events need not be considered further.

Step 12 item b), replace the paragraph with:

For a cumulative change in CDF/LERF resulting from all STI changes using SFCP, from a baseline starting point, an acceptance criterion of two times the CDF_{base} or 1E-05/yr whichever is more restrictive for CDF and two times the LRF_{base} or 1E-06/yr whichever is more restrictive for LRF will apply. In addition, the total CDF must be reasonably shown to be less than 1E-04/yr when using the above mentioned ΔCDF criterion. Similarly, the total LERF must be reasonably shown to be less than 1E-06 /yr when using the above mentioned ΔLRF criterion.

Step 12-B2, replace the title with:

ΔCDF and ΔLRF Below 10%CDF_{base} and 1E-07/yr for CDF and 10%LRF_{base} or 1E-08/yr for LRF Based on Bounding Analysis?

Step 12-B2, replace the risk criteria for ΔCDF "1E-07/yr CDF" with "10%CDF_{base} or 1E-07/yr whichever is more restrictive" and risk criteria for ΔLERF "1E-08/yr LERF" with "10%LRF_{base} or 1E-08/yr whichever is more restrictive".

Step 12-B3, replace the title with:

ΔCDF and ΔLRF Below 50%CDF_{base} and 1E-06/yr for CDF and 50%LRF_{base} or 1E-07/yr for LRF Based on Refined Analysis?

Step 12-B3, replace the first sentence of the first paragraph with:

This step is entered from Step 12-B2 if conservative or bounding analysis does not show that the net impact of the STI change is less than 10%CDF_{base} or 1E-07/yr whichever is more restrictive for ΔCDF and 10%LRF_{base} or 1E-08/yr whichever is more restrictive for ΔLRF.

Step 12-B3, replace the first sentence of the second paragraph with:

The final ΔCDF and ΔLRF values calculated from this step must be compared against the criterion of 50%CDF_{base} or 1E-06/yr whichever is more restrictive for CDF and 50%LRF_{base} or 1E-06/yr whichever is more restrictive for LRF.

Step 12-A2, replace the second sentence with:

These values are utilized to see if the total CDF and LERF change is within limits of 50%CDF_{base} or 1E-06/yr whichever is more restrictive for CDF and 50%LRF_{base} or 1E-07/yr whichever is more restrictive for LRF.

Step 12-A3, replace the title with:

Total Change Below 50%CDF_{base} and 1E-06/yr for CDF and 50%LRF_{base} and 1E-7/yr for LRF?

Step 12-A3, replace the title with:

In Step 12-A3, the total CDF and LERF change from the individual STI change being assessed is compared to bounding limits for CDF and LRF changes – taken as CDF increase < 50%CDF_{base} or 1E-06/yr whichever is more restrictive, and LRF increase < 50%LRF_{base} or 1E-07/yr whichever is more restrictive , for this method. If the above bounding limits are met, then proceed to Step 12-A4 to evaluate the cumulative impact of all STI changes. If the bounding limits for CDF and LRF changes are not

met, proceed to Step 13 to consider a revised surveillance test interval for re-evaluation in Step 12 or to Step 4 to end the process.

Step 12-A4, replace the title with:

Cumulative Change Below two times the CDF_{base} and 1E-05/yr for CDF and two times the LRF_{base} and 1E-06/yr for LRF?

Step 12-A4, replace "RG 1.174 limits" with "bounding limits".

Step 12-A4, replace the forth sentence with:

Additionally, the total CDF must be reasonably shown to be less than 1E-04/yr when using the two times the CDF_{base} or 1E-05/yr whichever is more restrictive ΔCDF criterion and the total LRF must be reasonably shown to be less than 1E-06/yr when using the two times the $LERF_{base}$ or 1E-06/yr whichever is more restrictive ΔLRF criterion.

Step 13, first sentence, replace "RG 1.174 acceptance criterion" with "bounding criterion for risk changes".

Step 14, replace "RG 1.174 limits" with "bounding limits described in Step 12".

Step 14, last sentence in the first bullet, replace "RG 1.174 limits" with "bounding limits described in Step 12".

Step 19, replace "RG 1.174 guidance for small changes" with "bounding criteria for acceptable changes in risk".

Step 19, replace the second sentence in the third paragraph with:

When the PRA model is updated with the revised STI impact integrated into the base model per Option 1 or Option 2 above, individual changes to STIs that resulted in a change in CDF of less than 10%CDF_{base} or 5E-08/yr whichever is more restrictive, or change in LRF of less than 10%LRF_{base} or 5E-09/yr whichever is more restrictive, may be excluded from cumulative tracking following a PRA model update.

Figure 1. Surveillance Frequency Control Program Change Process

Step 10b, replace the risk criteria for CDF "1E-07/yr" with "10% CDF_{base} or 1E-07/yr whichever is more restrictive" and risk criteria for LERF "1E-08/yr" with "10% LRF_{base} or 1E-08/yr whichever is more restrictive".

Step 10c, replace the risk criteria for CDF "1E-07/yr" with "10% CDF_{base} or 1E-07/yr whichever is more restrictive" and risk criteria for LERF "1E-08/yr" with "10% LRF_{base} or 1E-08/yr whichever is more restrictive".

Figure 2. Evaluation of Total and Cumulative Effect on CDF and LERF

Step A3, replace the risk criteria for CDF change "1E-06/yr" with "50%CDF_{base} or 1E-06/yr whichever is more restrictive" and risk criteria for LERF change "1E-07/yr" with "50%LRF_{base} or 1E-7/yr whichever is more restrictive".

Step A4, replace the risk criteria for Cumulative CDF change "1E-05/yr" with "two times the CDF_{base} or 1E-05/yr whichever is more restrictive" and risk criteria for Cumulative LERF change "1E-06/yr" with "two times the LRF_{base} or 1E-06/yr whichever is more restrictive".

Step B3, replace the risk criteria for ΔCDF "1E-07/yr" with "10%CDF_{base} or 1E-07/yr whichever is more restrictive" and risk criteria for ΔLERF "1E-08/yr" with "10%LRF_{base} or 1E-08/yr whichever is more restrictive".

Step B3, replace the risk criteria for ΔCDF "1E-06/yr" with "50%CDF_{base} or 1E-6/yr whichever is more restrictive" and risk criteria for ΔLERF "1E-07/yr" with "50%LRF_{base} or 1E-7/yr whichever is more restrictive".

Figure 3. Periodic Re-assessment Following a PRA Model Update

Step B3, replace the risk criteria for CDF and LERF tracking "CDF Change <5E-08/yr LERF Change <5E-09/yr" with "CDF Change < 10%CDF_{base} or 5E-08/yr whichever is more restrictive, LRF Change < 10%LRF_{base} or 5E-09/yr whichever is more restrictive".

3.0 Programs

The sections below describe the CRMP and SFCP.

3.1 CRM Program Description

The CRMP must be in place and implemented before the requirements of 5.5.18 may be applied to any technical specification. The program must comply with the methodology provided in 5.5.18 including NEI 06-09 per the discussions in section 2.1 above. The program has the following basic characteristics:

- The basic elements of the program will be contained in an approved CPNPP procedure
- The program will identify the members of the CPNPP organization that have actions or responsibilities with respect to the program.
- The program will delineate who has each of the designated responsibilities.
- The program will identify 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) needs to match the as-built plant and needs to be up to date to the extent necessary to assess the combined risk of the unit in its current and projected configurations.
- The risk metrics used in the program (see section 3.3) needs to meet NRC approved guidance or bound the projected NRC guidance.
- The supporting PRA must meet the description provided in section 3.3 below.
- The program will state how the PRA is modified to support the CRMP.
- The program procedure must fully describe the CRM tool to be used.

3.2 SFC Program Description

The SFCP must be in place and implemented before the requirements of 5.5.19 may be applied to any technical specification. The program must comply with the methodology provided in 5.5.19 including NEI 04-10 per the discussions in section 2.2 above. The program has the following basic characteristics:

- The basic elements of the program will be contained in an approved CPNPP procedure
- The program will identify the members of the CPNPP organization that have actions or responsibilities with respect to the program.
- The program will delineate who has each of the designated responsibilities.
- The program will identify 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) needs to match the as-built plant and needs to be up to date to the extent necessary to assess the combined risk of the unit in its current and projected configurations.
- The risk metrics used in the program (see section 3.3) needs to meet NRC approved guidance or bound the projected NRC guidance.
- The supporting PRA must meet the description provided in section 3.3 below.
- The program will state 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 US NRC Regulatory Guide 1.200 and NEI 06-09 and NEI 04-10 as incorporated in section 2.0 above.

- The PRA scope will envelope all the system, structures and components covered by the technical specification 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 in effect one year prior to initial fuel load. The peer review will specifically examine the capability of the PRA to implement these RITS programs. All findings from the peer review will be considered and dispositioned.

- For uncertainties due to operator actions, the PRA will rely upon the experience from units of similar design. Because the US-APWR design has not been operated prior to the issuance of a COL for CPNPP Units 3 and 4, the PRA will rely heavily upon experience from operating US plants. Experience from operating Japanese PWRs will also be used if applicable.

- For components which 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.

4.0 Risk Metrics

One aspect of these programs was uncertain when Luminant applied for COLs for CPNPP Units 3 and 4. This aspect was the risk metrics to be applied. Risk Metrics are the values for various risk parameters used to make decisions. The risk metrics are contained in several regulatory guides (e.g., RG 1.174 and RG 1.177). The thresholds and limits in such guidance are based upon the base risk associated with the nuclear plants which were operating at the time. The new plants applying for licenses at the same time frame as CPNPP Units 3 and 4 have base risk values assessed to be lower than the operating plants. Studies were performed to determine how to ensure that risk metrics did not erode the enhanced safety of the new plants while not creating a disincentive to design safer plants.

Luminant addressed this issue by adopting bounding values for RMTS and SFCP, pending NRC issuing guidance on risk metric for new plants. Once the NRC guidance is approved and issued, Luminant will adopt the new NRC guidance.

In a letter to the Commission dated July 27, 2010 (ADAMS Accession No. ml102000422), the ACRS agreed with the NRC staff's position on the proposed framework as described in Option 2 "Identify and implement appropriate changes to the existing risk-informed guidance":

> We concur with the general principle that the regulatory process should seek to prevent a significant decrease in the level of safety over the life of a plant. However, plants that have lower overall risk should be allowed more regulatory flexibility, compared with plants that have higher overall risk. For example, a conceivable regulatory framework under Option 2 could apply a variable determination of the acceptable level of cumulative risk increase as a function of a plant's baseline risk profile. New reactors with very low overall risk would be allowed a larger relative increase in that risk, provided that their total risk remains substantially below the estimates for currently operating plants. These concepts are consistent with Commission expectations for new reactor safety margins, our past recommendations, and the basic principles in Regulatory Guide 1.174.

Sets of risk criteria for the RMTS and SFCP for the US-APWR design were proposed based on the philosophy that new plants that have lower overall risk should be allowed more regulatory flexibility, provided that the level of enhanced safety is maintained.

4.1 Risk Criteria for RMTS

Risk management thresholds for RMTS relate to integrated plant risk impacts that are occasional and temporary in nature (versus permanent). The thresholds for cumulative risk tracking provide plant configuration control over long periods of implementation, to ensure that the risk accumulated as result of SSC inoperability beyond the front stop does not result in significant increase in baseline risk.

Table 4-1 shows the proposed risk management thresholds for the US-APWR design. The RICT thresholds are maintained the same with those for currently operating plants, and allow maintenance flexibility maintaining the enhanced level of safety provided by the US-APWR design compared to the fleet of operating plants. Regarding RMA thresholds, threshold values that are relative to the baseline risk are applied, taking into consideration that the plant staff should be aware that the risk profile during those configurations could be different from normal operation before the SSC has been taken out of service.

Table 4-2 shows the proposed cumulative risk tracking thresholds. Here, relative risk thresholds are applied taking into consideration the changes in values of "small increase" that would be acceptable to maintain the enhanced safety of new plants.
Table 4-1 Quantitative Risk Management Thresholds for RMTS

Table 4-1 Quantitative Risk Management Thresholds for RMTS

Criterion		Risk Thresholds	
		NEI 06-09	US-APWR
CDF	Voluntary entrance into configuration prohibited. If in configuration due to emergent event, implement appropriate risk management actions.	≥1E-3	≥1E-4
LRF		LERF≥1E-4	≥1E-4
ICDP	- Follow the Technical Specification requirements for required action not met.	≥1E-5	≥1E-5
	– RMAT and RICT requirements apply – Assess non-quantifiable factors – Implement compensatory risk management actions	≥1E-6	≥CDF_{base} or 1E-6 whichever is more restrictive
	– Normal work controls	<1E-6	<10%CDF_{base} or 1E-6 whichever is more restrictive
ILRP	- Follow the Technical Specification requirements for required action not met.	LERP ≥1E-6	≥ 1E-6
	– RMAT and RICT requirements apply – Assess non-quantifiable factors – Implement compensatory risk management actions	LERP ≥1E-7	≥10%LRF_{base} or 1E-7 whichever is more restrictive
	– Normal work controls	LERP <1E-7	<10% LRF_{base} or 1E-7 whichever is more restrictive

Table 4-2 Cumulative Risk Tracking Criteria for RMTS

Incremental Added Risk for the cumulative 52 week		Action to be Taken
ICDP	ILRP	
< 50% CDF_{base} and 10^{-6}	< 50% LRF_{base} and 10^{-7}	No Action Required
> 50% CDF_{base} or 10^{-6} whichever is more restrictive	> 50% LRF_{base} or 10^{-7} whichever is more restrictive	Consider Compensatory Measures
> 2 times CDF_{base} or 10^{-5} whichever is more restrictive	> 2 times LRF_{base} or 10^{-6} whichever is more restrictive	Provide report to NRC within 7 days discussing impact of compensatory measures, unique circumstances, and justification

4.2 Risk Criteria for SFCP

Risk criteria for SFCP relate to integrated plant risk impacts that are permanent. Table 4-2 shows the proposed risk criteria for the SFCP. Here, relative risk thresholds are applied taking into consideration of the changes in values of "small increase" that would be acceptable to maintain the enhanced safety of new plants.

Table 4-3 Risk Criteria for SFCP

Criterion		Risk Thresholds	
		NEI 04-10	US-APWR
Criteria for Bounding Analysis (Step B2 in NEI 04-10)	ΔCDF	<1E-7	<10%CDF_{base} or 1E-7 whichever is more restrictive
	ΔLRF	ΔLERF <1E-8	<10%LRF_{base} or 1E-8 whichever is more restrictive
Criteria for Refined Analysis (Step B3 in NEI 04-10)	ΔCDF	<1E-6	<50%CDF_{base} or 1E-6 whichever is more restrictive
	ΔLRF	ΔLERF <1E-7	<50%LRF_{base} or 1E-7 whichever is more restrictive
Acceptable total change in risk from individual STI changes (Step A3 in NEI 04-10)	CDF	<1E-6	<50%CDF_{base} or 1E-6 whichever is more restrictive
	LRF	ΔLERF <1E-7	<50%LRF_{base} or 1E-7 whichever is more restrictive
Acceptable Cumulative in risk (Step A4 in NEI 04-10)	CDF	<1E-5	<200%CDF_{base} or <1E-5 whichever is more restrictive
	LRF	LERF <1E-6	<200%LRF_{base} or 1E-6 whichever is more restrictive
Exclusion from Cumulative Risk Tracking	CDF	<5E-8	<10%CDF_{base} or 5E-8 whichever is more restrictive
	LRF	LERF<5E-9	<10%LRF_{base} or 5E-9 whichever is more restrictive