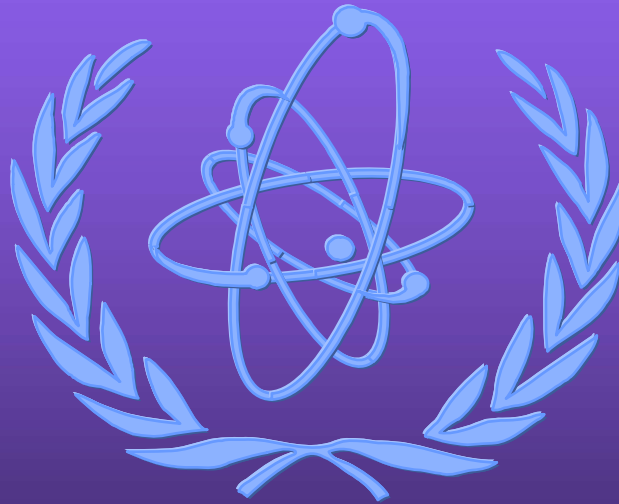


Diablo Canyon NPP Maintenance Rule Program



Lecturer
Lesson IV 3_11.4

Workshop Information

IAEA Workshop

City, Country
XX - XX Month, Year

Maintenance Rule and it's Application at Diablo Canyon NPP (DCPP)

A process that:

- Monitors the performance or condition of structures, systems and components (SSCs) against established goals in a manner sufficient to provide reasonable assurance that such SSCs are capable of fulfilling their intended functions.
- Assesses and manages the increase in risk that may result from performing maintenance activities.

Maintenance Rule and it's Application at DCP

➤ Motivation

- Clear link between effective maintenance and safety
- Good maintenance is necessary to ensure that failures are minimized
- Maintenance is important to ensure that design assumptions and margins in the original design basis are maintained and are not unacceptably degraded

Maintenance Rule

➤ Scope

- Safety-related SSCs that are relied upon to remain functional during and following design basis events
- Nonsafety-related SSCs that are relied upon to
 - mitigate accidents or transients
 - used in plant emergency operating procedures
 - whose failure could prevent safety-related SSCs from fulfilling their safety-related function
 - whose failure could cause a reactor scram or actuation of a safety-related system.

Scoping Process

- ◆ Is SSC Safety Related? All safety related SSCs are considered to be within the scope of the MR program.
- ◆ If Non-Safety Related, Does SSC Mitigate Accidents or Transients? All non-safety related SSCs that are relied upon to mitigate accidents or transients are within the scope of the MR program
- ◆ If Non-Safety Related, Is SSC in EOPs? All non-safety related SSCs that are in the EOPs and abnormal procedures are within the scope of the Maintenance Rule program.
- ◆ If Non-Safety Related, Does SSC Prevent a Safety Related SSC From Performing Its Safety Related Function? All non-safety related SSCs which satisfy this condition are within the scope of the MR program.



Scoping Process (Cont.)

- ◆ If Non-Safety Related, Does SSC Cause a SCRAM or Actuate Safety Systems?
- ◆ : All of the following non-safety related SSCs are within the scope of the MR program
 - SSCs whose failure has caused a reactor scram or actuation of a safety related system at the site (DCPP)
 - SSCs whose failure has caused a reactor scram or actuation of a safety related system at a site with a similar configuration
 - SSCs identified in plant analyses (e.g., FSAR, PSA) whose failure could cause a reactor scram or actuation of a safety related system

Risk Significance Determination

- The SSCs that are determined to be within the scope of the MR are evaluated to determine which of the SSC functions are risk significant. PSA risk ranking procedure
- Risk is determined by combination of the following:
 - DCPP PSA for SSCs modeled in the PSA
 - A safety function assessment matrix applicable to modes 1-4 for SSCs found to be non-risk significant based on the PRA or found to be not modeled in the PSA
 - A safety function assessment matrix applicable to modes 5-6 for SSCs found to be non-risk significant based on PRA or found to be not modeled in the PSA
- Expert Panel review and approval

Performance Criteria Assignment

- The performance criteria is used as the standard against which performance of the SSCs to be measured
- Unavailability Hours for MR PC Function (PC1)- This represents the SSC unavailability against which SSC performance is measured
- Number of Maintenance Preventable Functional Failures (PC2)- PC2 represents the number of SSC maintenance preventable functional failures over a cycle that should not be exceeded by the SSC
- Failure Rates (PC3) - PC3 applies to SSCs that have component failure rate data that can be tracked/compared with the rest of the industry. PC3 is established based on plant specific and industry wide data, that should not be exceeded



PSA Contribution to MR

- PSA Contribution to scooping
 - 26 Systems were determined to be risk significant based on PSA
 - Several non-safety related systems were determined to be risk significant (e.g. Fire Water to the CCPs)
- PSA Contribution to performance criteria
 - Unavailability criteria (PC-1) were set based on PSA data
 - Component failure rate criteria were set based on the PSA data (PC-2)

MR Implementation

- Daily review of problem reports by System Engineers (about 50)
- Monthly evaluation of problems and assignments of corrective action by System Engineer and Expert Panel
- Continuous monitoring of performance
- Quarterly Senior management overview of program
- Biannual self-assessment of program effectiveness using industry peers
- Constant oversight by NRC



Maintenance Activity Risk Assessment

- 10CFR50.56(a)(4) states that

Before performing maintenance activities, the licensee shall assess and manage the increase in risk that may result the proposed activities. The scope of the assessment maybe limited to structures, systems, and components that a risk-informed evaluation process has shown to be risk significant

- Risk assessment can be done qualitatively or quantitatively.
 - Shutdown risk is controlled by the Outage Safety Plan which incorporates ORAM risk information.
 - On Line risk is assessed using ORAM -Sentinel Software



Maintenance Activity Risk Assessment

- The purpose is to plan and schedule maintenance such that the risk increases are limited, and take additional actions beyond routine work controls to address situations where the temporary risk increase is above certain thresholds
- These thresholds are set on the basis of:
 - Qualitative considerations (e.g. remaining mitigation capability)
 - Quantitative considerations (e.g. temporary increase in CDF)
 - Blended approaches using qualitative and quantitative insights



Conclusion

- Maintenance Rule program is used to monitor reliability and availability of component important to safety
- Maintenance Rule program is used to assess and manage the risk of maintenance activities
- Maintenance Rule program uses PSA Model to establish realistic criteria for risk significant functions and SSCs
- Maintenance Rule program uses PSA Model to set quantitative limits for maintenance activities and quantify allowed outage time for SSCs

