DEVELOPMENT AND IMPLEMENTATION OF A FLEXIBLE AOT

December 2001

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Goal of Risk-Informed Technical Specifications

- Use Risk Informed Strategies to Adjust Technical Specification in order to establish a safe haven for plant operation
  - No changes to 10CFR50.36
  - Remove shutdown as a punitive action~~. Essentially becomes a "plant centered" NOED~~
  - Integrate Maintenance Rule activities as a specified required Tech Spec Action for use in Risk Informed Decision Making (RIDM)

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Risk Informed TS Effort

- Several Issues are bundled in this Overall Effort. Goal is to establish a RI approach to control plant configuration and maintenance and reduce impact of TS by making them consistent with RIDM .
- Mode End State Change
  - Missed Surveillance Treatment
  - Relaxation of Mode Restraints
  - **Replacement of AOTs with A4 based Action Statements(Initiative 4B)**
  - Move STI to admin control and allow RI extensions
  - 3.03 Changes and 3.0.3 Avoidance
  - Redefine OPERABLE

Goals of Initiative 4B

- Develop a Risk - Informed Flexible AOT structure that:
  - Maintain general TS structure
  - Is integrated with Maintenance Rule (a)(4)
  - May be implemented by plants with robust (a)(4) programs
    - graded implementation approach
    - flexibility commensurate with capability
    - implementation likely to require
      - appropriate plant control process within and associated with MR
      - Acceptable PSA quality based on Peer reviews (ASME?) other?

Key Features of Initiative 4B and Associated A4 Process

- Identify high risk operational considerations which may require expedited plant shutdown.
- Provide a lower limit AOT (frontstop)
- Develop a Risk Informed Shutdown Decision Process
- Use Maintenance Rule Process to control outage time
- Define Backstop AOT
- Use of Flexible AOT may tracked via existing Regulatory process; e.g.,MR targets and Oversight Process

TS Structure

- Utilizes RITSTF Pilot Language (Sample provided to NRC in October)
  - TS Actions modified to allow Risk Informed Assessment to Justify plant operation beyond a defined Front Stop AOT
  - For very low risk repair situations, assessment can risk justify operation up to the backstop AOT
  - Emergence of high risk conditions or exceeding backstop AOT result in plant shutdown.

Typical Inoperabilities Would allow Plant Operation Beyond the Frontstop AOT

- Example HPSI System has many states of partial degradation including:
  - Single train inoperable due to random pump failure
  - One SI HDR Valve Inoperable
  - HPSI Autostart inoperable
  - Sump Recirculation INOP-one train
  - HPSI pump mini-flow valve inop
  - HPSI Pump flow degraded (< 20%)
  - HPSI Seismic Supports INOP

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Impact for Example Plant

Example Plant			
INOPERABILITY		Incremental CDF	Time to reach ICCDP=10-6 DAYS
Random Pump Failure		1.32E-05	27.7
One SI HDR Valve		4.52E-05	8.1
Auto Start (SIAS)		6.38E-05	5.7
Recirc. Sump (one train)		8.05E-05	4.5
HPSI mini-flow line		6.16E-06	>30
Degraded Pmp Delivery Curve (<20%)		4.52E-05	8.1

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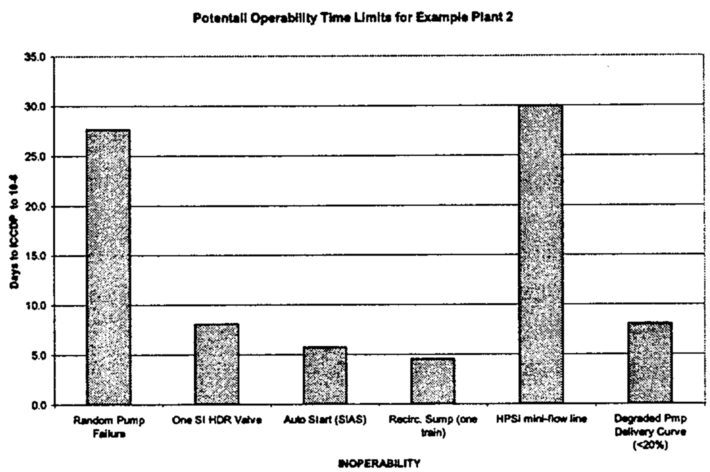
Impact for Example Plant



Observations and Comments

- Risk informed methods can readily establish impact of many partial degradations
- Entries beyond frontstop will continue to be infrequent however acknowledgement of low risk states of high risks systems will reduce regulatory burden in generation of NOEDs
- Note that transition risks are on the order of 10-6 . Thus, repair could often be offset by avoidance of shutdown. Thus, if implemented within a risk informed MR structure change is likely to be risk neutral over it's life
- Aggregate impact of change can be followed via Performance Indicators, MR audits and Oversight process

Maintenance Rule Process to Support Flexible AOTs

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Bases for Concept

- The proposed concept attempts to maintain several features that exist within the current TS
  - High risk conditions are identified and dealt with promptly
  - A period to complete the repair and return the plant to the DB configuration is defined
  - Shutdown of the plant may be a required outcome of the process
  - Controlled via MR and Oversight process

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Risk Informed Shutdown Process

- Process should look at:
  - Risk of continued plant operation
  - Time to complete repair
  - Risk of transitioning from existing state
  - Risk of operating in target state
  - Impact of Contingency Actions

Use of Backstop

- **Backstop AOT should reflect low risk usage of TS LCO.**
  - For Example: One SI valve OOS may result in declared INOPERABILITY of the HPSI train with minimal risk. Thus extended time could be used if needed. However, 1 SI train completely inoperable would not be expected to take advantage of full backup AOT.
  - 10CFR50.59 defines permanent change as 90 days
  - Initiative 4 B will recommend 30 days
    - sufficient time for most all component repairs/replacements
    - provides adequate time for alternatives

Use of Flexible AOT tracked via MR targets and Oversight Process

- Maintenance Rule Performance Criteria
- Oversight Process Regulatory Risk associated with unknown configurations.Metric will drive plant to keep operation in the GREEN range.
- Individual system availability PMs may also control actions
- Regulatory controls exist to ensure plant safety is maintained

CEOG Pilot

- CEOG activity to address degraded operational states initiated in 1996 with HPSI AOT extension. Concept evolved to Flexible AOTs
- HPSI AOT extension to provide focused pilot for Initiative 4B
  - Establishes proof of concept
  - High risk system with some low risk states
    - Plant Specific HPSI degradation analyses will be provided
  - Easy to demonstrate control and plant status
  - Philosophy already discussed with NRC
    - Degraded state concept
    - Preliminary Initiative 4B concept paper provided via NEI
- RITS Risk levels will be controlled
  - Per entry ICCDP goal
  - Yearly impact target limit

CEOG Pilot Status

- Draft HPSI report in preparation
- Final report to be submitted to NRC early part of first quarter 2002

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Summary

- Proposed program increases plant safety and reduces potential for unnecessary plant shutdowns and inappropriate violations
- Phased and graded aspects of relief provides timely benefit for the entire industry.
- Program is Win-Win. Utility payback is large and provides industry with local control; reduces NOED generation, and enhances public safety.

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CEOG Approach to PSA Quality and Quality Applications

Task 1164,2025

December 2001

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Task Status

- Report represents a unique CEOG capstone for PSA quality
- Final Report Issued
- Information provided to NRC
- Report used to support CEOG applications
- Follow up task includes updated PSA comparisons
  - Report to include
    - comparison of results
    - comparison of key plant design/operational features
    - High level discussion
  - Data request submitted (half plants responded)
  - Preliminary comparison based on mixture of industry High level responses and detailed CE questionnaire

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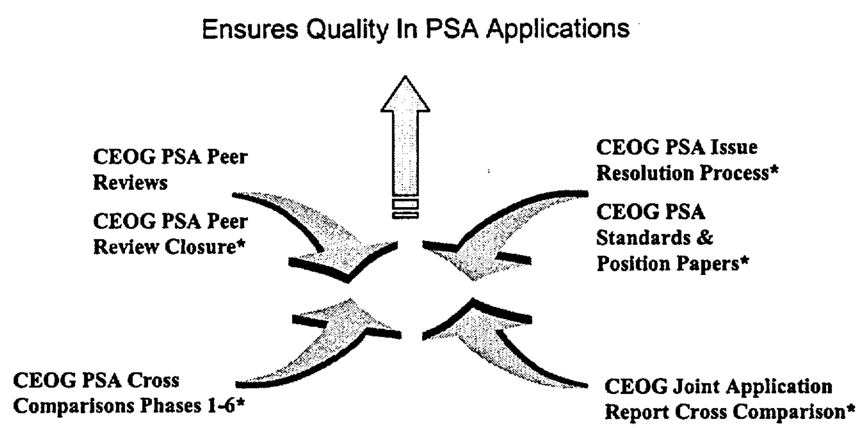
Probabilistic Safety Assessment Process



* unique to CEOG

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Task Objective

Task 1164

- Develop summary report for submittal to NRC describing the CEOG activities towards RI Regulation
- Report will provide additional basis for NRC position on the Quality of CEOG PSA applications

Task 2025

- High Level PSA comparison for use in internal and NRC discussions and reviews

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CEOG History of Cross Comparisons

- Cross Comparison Tasks initiated in 1995
- Cross Comparisons looks at detailed PSA aspects from several directions
  - CDF, LERF
  - CDF (per event)
  - Conditional core damage frequency
  - Data Comparisons
    - IEF, reliability data
  - Assumptions
    - treatment of common cause
    - success criteria
    - treatment of human factors
  - Cutset comparisions

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Lessons Learned

- Comparisons are useful in identifying
  - impact of conservative modeling approaches
  - impact of plant uniquenesses
  - importance of key assumptions
  - benefits of potential model improvements
- Cross comparisons used a partial measure of quality in early applications. Small variability and bounded impacts across the fleet suggest the adequacy of a generic decision.
- Comparisons lead to modeling changes and standards

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Lessons Learned

- Comparison showed considerable spread in absolute and conditional CDFs
- Plant uniqueness contributed to some spread
- Modeling assumptions had significant impact
  - Level of conservatism applied
  - IEFs selected
  - Data

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