CEOG Approach to PSA Quality and Quality Applications

Task 1164

August 2001

CEOG COMBUSTION ENGINEERING OWNER'S GROUP

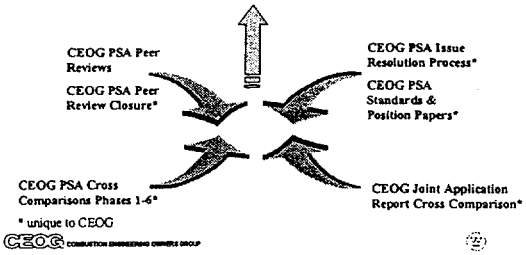
Task Status

- Report represents a unique CEOG capstone for PSA quality
- Final Report Issued in March
- Information provided to NRC but not formally documented
- Report used to support CEOG applications

CEOG COMBUSTION ENGINEERING OWNER'S GROUP

Probabilistic Safety Assessment Process

Ensures Quality In PSA Applications



* unique to CEOG

CEOG COMBUSTION ENGINEERING OWNER'S GROUP

Task Objective

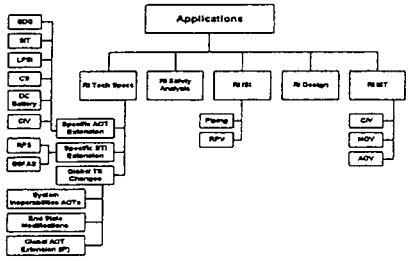
- Develop summary report for submittal to NRC describing the CEOG activities towards RI Regulation
- Report will provide additional basis for NRC position on the Quality of CEOG PSA applications

CEOG COMBUSTION ENGINEERING OWNERS GROUP

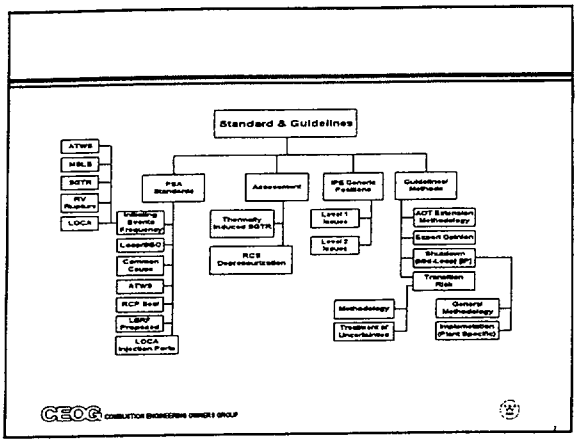
PSA Quality

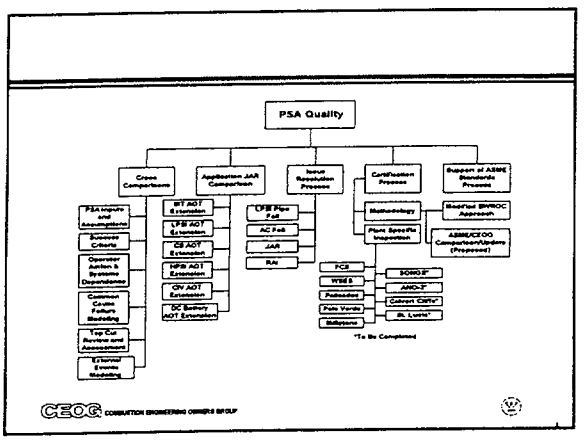
- CEOG process evolutionary and has evolved aver a period of 5 years
- Consistent with ACRS vision of "top down"/"bottom up" approach which both supports PSA development and validates specific applications
- Key elements of Quality process include:
  - PSA Insights gained from focused applications
  - Plant-Plant PSA feature comparisons
  - PSA Standards and Guidelines
  - "Peer Review" / Certification process

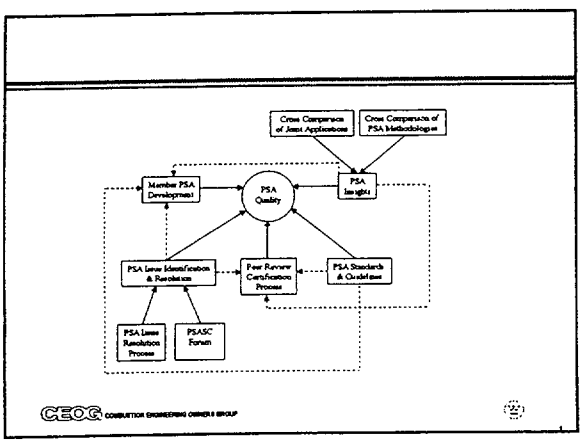
CEOG COMBUSTION ENGINEERING OWNERS GROUP



CEOG COMBUSTION ENGINEERING OWNERS GROUP


Standard & Guidelines
ATWS
MSLB
SGTR
RV Rupture
LOCA
PSA Standards
Assessment
IPE Generic Positions
Guidelines/ Methods
Initiating Events Frequency
Loss/SBO
Common Cause
ATWS
RCP Seal
LBRF Proposed
LOCA Injection Paths
Thermally Induced SGTR
RCS Depressurization
Level 1 Issues
Level 2 Issues
AOT Extension Methodology
Expert Opinion
Shutdown (and Low-Level) (IP)
Transition Risk
Methodology
Treatment of Uncertainties
Generic Methodology
Implementation (Plant Specific)
CEOG COMBUSTION ENGINEERING OWNER'S GROUP


PSA Quality
Cross Comparisons
Application JAR Comparison
Issue Resolution Process
Certification Process
Support of ASME Standards Process
PSA Inputs and Assumptions
Success Criteria
Operator Action & Systems Dependency
Common Cause Failure Modeling
Top Cut Review and Assessment
External Events Modeling
BIT AOT Extension
LPSI AOT Extension
CS AOT Extension
HPSI AOT Extension
CIV AOT Extension
DC Battery AOT Extension
LPSI Pipe Fail
AC Fail
JAR
RAI
PCS
WSES
Palo Verde
Millstone
Methodology
Plant Specific Inspection
Modified BWROC Approach
ASME/CEOG Comparison/Vendors (Proposed)
*To Be Completed
CEOG COMBUSTION ENGINEERING OWNER'S GROUP


Cross Comparison of Joint Applications
Cross Comparison of PSA Methodologies
Member PSA Development
PSA Quality
PSA Insights
PSA Issue Identification & Resolution
Peer Review Certification Process
PSA Standards & Guidelines
PSA Issue Resolution Process
PSASC Forum
CEOG COMBUSTION ENGINEERING OWNER'S GROUP

PSA Comparisons

Task 2025

CEOG COMBUSTION ENGINEERING OWNER'S GROUP

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

CEOG COMBUSTION ENGINEERING OWNER'S GROUP

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

CEOG COMBUSTION ENGINEERING OWNER'S GROUP

Typical Comparisons

CEOG COMBUSTION ENGINEERING OWNER'S GROUP

Typical Comparisons

CEOG COMBUSTION ENGINEERING OWNER'S GROUP

CEOG PSA Comparisons

- Questionnaire not yet issued
  - will be modified version of NEI
  - additional detail and consistency needed in reporting of initiating events
  - added information on key assumptions and success criteria will be collected
- From a preliminary look of new data most CE plants have CDF in the 2-4 x 10^{-6} /year range.
  - One outlier due to temporary conservatisms taken in model (issues being addressed)
- NEI responses will be used to focused CE Request. Duplication will be minimized.

CEOG COMBUSTION ENGINEERING OWNER'S GROUP

PSA Comparisons

- Task Schedule
  - CEOG data request to be issued early September
  - Data collection to be complete mid-October
  - Draft report to be prepared by November 10.
  - Member review by December 10
  - Report issued by December 31
- CEOG Report will highlight the impact of key plant differences on PSA results and place results in a proper prospective for use by an interested third party.

CEOG COMBUSTION ENGINEERING OWNER'S GROUP

DEVELOPMENT AND IMPLEMENTATION OF A FLEXIBLE AOT

August 2001

CEOG COMBUSTION ENGINEERING OWNERS GROUP

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
  - Integrate Maintenance Rule, Tech Spec Actions and Risk Informed Decision Making (RIDM) to:
    - prioritize plant activities
    - select appropriate action
    - control plant risk to acceptable levels
  - Drive plant to the appropriate end-state and action

CEOG COMBUSTION ENGINEERING OWNERS GROUP

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

CEOG COMBUSTION ENGINEERING OWNERS GROUP

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

CEOG COMBUSTION ENGINEERING OWNER'S GROUP

Concept

- Identify high risk operational considerations which may require expedited plant shutdown.
- Develop a Risk Informed Shutdown Decision Process
- Provide a lower limit AOT
- Use Maintenance Rule Process to control outage time
- Define Backstop AOTs for extended repairs
- Use of Flexible AOT tracked via MR targets and Oversight Process

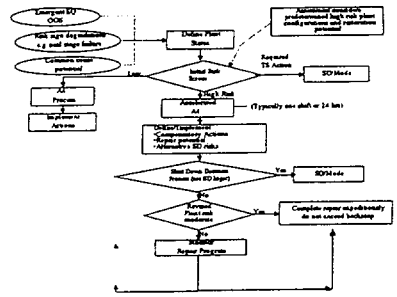
CEOG COMBUSTION ENGINEERING OWNER'S GROUP

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

CEOG COMBUSTION ENGINEERING OWNER'S GROUP

Initiative 4B Process



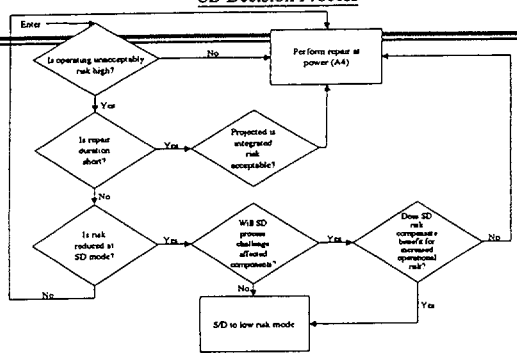
CEOG COMBUSTION ENGINEERING OWNER'S GROUP

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

CEOG COMBUSTION ENGINEERING OWNER'S GROUP

SD Decision Process



CEOG COMBUSTION ENGINEERING OWNER'S GROUP

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 likely recommend 30 days
    - sufficient time for most all component repairs/replacements
    - provides adequate time for alternatives

CEOG COMBUSTION ENGINEERING OWNER'S GROUP

10

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
- NRC needs to understand that sufficient regulatory controls exist to ensure plant safety is maintained

CEOG COMBUSTION ENGINEERING OWNER'S GROUP

11

Long Term Vision of a R-I TS

- Required Actions (time to repair, repair mode, etc) driven by CRMP (A4) RIDM process
- Increase flexibility in definition to allow partial functionally and alternative risks to be considered in RIDM
- High risk actions outside of known/analyzed conditions addressed within RIDM process
- Early risk assessment emphasizes identification and treatment of common cause

CEOG COMBUSTION ENGINEERING OWNER'S GROUP

12

CEOG Pilot

- Use HPSI AOT extension to Provide focused pilot for Initiative 4B
  - Establishes proof of concept
  - High risk system with some low risk states
  - Easy to demonstrate control and plant status
  - Philosophy already discussed with NRC

CEOG COMBUSTION ENGINEERING OWNERS GROUP

CEOG Pilot

- Pilot will consider and address
  - Philosophy of change
  - Nexus to (a)(4)
  - Role of PSA "quality"
  - Identify utility pre-requisites for implementation
  - Identify Implementation Options (Risk Matrix vs. Robust Monitor)
  - Example TS changes and expected example usages
  - Modified MR actions to be identified in Appendix
  - Include industry Draft TS

CEOG COMBUSTION ENGINEERING OWNERS GROUP

CEOG Pilot

- Questions
  - Use of existing vs. upgraded analyses, key plants
  - Any new experiences to include in data base/need discussion
  - Extent of industry review of A4 "enhancements" and submittal
  - Value of numbers in "enhanced process"
  - Schedule
    - Submittal planned for fall
  - Process validation
    - exercises vs inspection
  - Implementation
    - single AOT or complete set later

CEOG COMBUSTION ENGINEERING OWNERS GROUP

Future

- Draft report to address Initiative 4B in progress.
- Fast submittal provides a concept on the table so that more detailed discussion may be held
- Once process is agreed to and TS philosophy is defined more global application will be likely.

CEOG COMBUSTION ENGINEERING OWNERS GROUP

Prerequisites for Future Vision

- To maximally partake in the new vision a utility must be committed to an A4 program with use of PSA and RIDM process.
  - Robust PSA
  - Process to efficiently establish risk informed decisions
  - Consideration of all plant risks including dominant external events
  - Effective means of addressing current plant conditions

CEOG COMBUSTION ENGINEERING OWNER'S GROUP

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 (millions dollars per year) provides industry with local control, reduces unnecessary regulation and enhances public safety.

CEOG COMBUSTION ENGINEERING OWNER'S GROUP