CEOG TASK 1037
PSA CERTIFICATION PROCESS

Status Report to the
Probabilistic Safety Analysis
Subcommittee
December 1-3, 1999

PSA CERTIFICATION PROCESS

- Project Objectives
- Status
- Peer Review Schedule
- Lessons Learned
- Lessons Learned - Process

PSA CERTIFICATION PROCESS -PROJECT OBJECTIVES-

- Develop Process for Performing Peer Reviews of CEOG Plant PSAs
  - Coordinate with other Owners Groups
  - Support use of PSAs for Joint Applications
- Perform Peer Review of All CEOG Plant PSAs over period of 2 and a half years.

PSA CERTIFICATION PROCESS -STATUS-

- Draft Peer Review Process Report Issued 9/98
- Revised Checklists Issued 2/99
- Fort Calhoun Peer Review: March 1-5, 1999
  - Pilot Peer Review
  - Draft Report Issued for Review 3/19/99
  - Final Report Issued in April, 1999
- Palo Verde Peer Review: September 13-17
  - Draft Report Issued for Review Oct xxxx,
  - Final Report Issued November, 1999
- Millstone 2 Peer Review: October 25-29, 1999
  - Draft Report in Process

CEOG PSA PEER REVIEW SCHEDULE

- **ABB Can Support a Review Approximately Every Six Weeks If We Have a Fixed Schedule**
- **Need to Identify Host Utilities and Month(/week) For Review**
- **Need to Set up Review Teams for Next Two Reviews**
  - **Each plant will need to support at least 3 - 4 reviews**
- **Schedule Attached**

CEOG PSA PEER REVIEW SCHEDULE

PLANT	Fort Calhoun	Palo Verde	Millstone 2	Waterford 3
DATE	Mar. 1-5, 1999	Sept. 13-18, 1999	Oct. 25-29, 1999	Jan. 16-22, 2000
STATUS	**Complete**	**Complete**	Draft Report in Process	In Process
TEAM - 1	D. J. Finnicum	D. J. Finnicum	D. J. Finnicum	D. J. Finnicum
-2	J. Powers	J. Powers (NU)	M. Hulet (APS)	B. Mrowca
-3	B. Brogan	R. White (CPCo)	B. Mrowca (BGE)	BGE (TBA)
-4	M. Hulet	B. Mrowca (BGE)	R. Cavedo (BGE)	R. Weston (ABB)
-5	B. Mrowca	R. Cavedo (BGE)	J. Koelbel (BGE)	
-6	R. Cavedo	B. Logan (INPO)	B. Vincent (FPL)	
-7	T. Mikschl	J. Stone (BGE)	R. Schneider (ABB)	
-8		M. Cimock (CPCo)		

CEOG PSA PEER REVIEW SCHEDULE

PLANT	Palisades	Calvert Cliffs	Arkansas 2	St. Lucie	SONGS
DATE	Apr 17-2, 2000	TBD	TBD	TBD	TBD
STATUS	Scheduled	Not Scheduled	Not Scheduled	Not Scheduled	Not Scheduled
TEAM - 1	D. J. Finnicum	D. J. Finnicum	D. J. Finnicum	D. J. Finnicum	D. J. Finnicum
-2					
-3					
-4					
-5					
-6					
-7					
-8					
-9					

Lessons Learned - Technical

- Initiating Events
  - Need to address the generic set of initiators (e.g. NP-2230)
  - Specify which events subsumed and why
  - Need process for identifying support system/unique initiators
  - Use combination of Industry and plant specific data for determination of frequencies
  - Define basis for frequencies (calendar year vs on-line year)
    - use consistently
  - Frequencies should be consistent with CEOG standards
  - Analyses should be documented
    - analyses reproducible
    - basis traceable

Lessons Learned - Technical
-Cont'd -

- Accident Sequence Analysis
  - Event trees should cover expected plant response for all initiators subsumed in the Initiator for each event tree.
  - Success criteria should be documented and traceable
  - Success criteria for similar events should be equivalent or basis for difference documented
  - Multi-unit dependencies, if any, need to be addressed
  - Impacts of "non-modeled" systems on accident progression need to be addressed
    - e.g. steam removal systems
  - Documentation

Lessons Learned - Technical
-Cont'd -

- Thermal-Hydraulic Analyses
  - Analyses supporting success criteria or timing needs to be traceable from application to the analyses
  - Code limitations need to be considered
  - Analyses need to reflect current plant

Lessons Learned - Technical
-Cont'd -

- System Analysis
  - Should have procedure for modeling
  - Need to have dependency matrices
  - Need documented bases for assumptions with respect to equipment cooling requirements
  - Common cause failure modeling
    - AFW pumps with the same pump bodies should have CCF of pump bodies even if have different drivers
    - model CCF at function failure level plus lower level to cover selected important random failure plus maintenance alignments
  - Procedure driven manual control actions should be modeled
  - Batteries
    - Depletion time basis
    - Demand failures

Lessons Learned - Technical
-Cont'd -

- Systems Analysis (cont'd)
  - Flow diversion modeling
  - Treatment of asymmetries
  - Process for identifying and breaking logic loops
  - Treatment of multiple operation cycles during mitigation
    - DG fuel oil transfer pumps
    - relief valves

Lessons Learned - Technical
-Cont'd -

- Data Analysis
  - Common cause grouping (See Systems Analysis)
  - Documentation of treatment of unique unavailabilities
  - Use of most recent generic data sources
  - Documentation of basis for component repair included in models
  - Use of plant specific data for test and maintenance

Lessons Learned - Technical
-Cont'd -

- Human Reliability Analysis
  - Incomplete evaluation of dependency between multiple human actions in cutsets
  - Incomplete treatment of latent human errors
  - Excessive use of screening values
  - Use of limited performance shaping factors
  - Lack of documented review of HRA by operations staff
  - Incompleteness in documentation of HRA
    - definition of actions
    - tie to procedure steps
    - basis for performance shaping factor values
    - timing
  - Documented procedure for performing HRA

Lessons Learned - Technical
-Cont'd -

- Dependency Analysis
  - Limited dependency matrices
  - Incomplete evaluation of dependencies between multiple human actions
  - Common cause grouping levels
  - Spatial dependencies
    - cooling/HVAC impacts
    - Flood potential/impact

Lessons Learned - Technical
-Cont'd -

- Quantification
  - Review of dominant and non-dominant cutsets to ensure they make sense.
  - Inclusion of appropriate recovery actions
  - Incomplete evaluation of dependencies between multiple human actions
  - evaluation of stability of results based on truncation level
  - Evaluation of uncertainty/sensitivity studies

Lessons Learned - Technical
-Cont'd -

- Maintenance and Update
  - Process to track/identify changes to plant design ands/or operation
  - re-evaluation of plant data (data update)
  - Fixed schedule plus as-needed for major changes
  - Re-evaluation of past PSA applications

Lessons Learned - Technical
-Cont'd -

- Level 2 Analyses
  - Evaluate against NRC simplified approach in NUREG/CR-6451
  - Full scale Level 2 analysis is benefit if up-to-date
- Structural Analysis
  - Assumptions on low pressure pipe rupture for ISLOCA
  - Include vessel rupture as place holder
  - Detailed Containment Analysis a benefit

Lessons Learned - Process

- Host Plant Should Send Out PSA Information Early
- Reviewers Need to Provide Good Mailing Address
- Host Utility Should Do a Self-Assessment Prior to Visit.
- Host Utility Incoming Presentation:
  - Plant design - Key Systems and Components
  - Plant Operations - any unique aspects
  - Plant PSA - special features, known problems
- Hold Plant Tour Early to Facilitate Familiarization

Lessons Learned - Process

(cont'd)

- Good Documentation Makes Review Easier
- CEOG PSA Standards and Position Papers Made Review Easier for Covered Topics/Issues
  - documented standard/criteria
  - makes review more consistent from plant to plant
- Availability of PSA staff and other plant staff to answer questions facilitates review
- Use of Review Checklists on Laptop PCs for Immediate Capture of Review Findings Electronically Greatly Aids in Preparation of Draft Final Report

Lessons Learned - Process

(cont'd)

- Review Task/Team Member Assignments
  - Review covers eleven technical area
  - Each team member reviews multiple technical areas over the week. Fixed time windows for reviewing the technical areas lead to switching from one area to another "unrelated" with potential for losing train of investigation.
  - Approach:
    - mapped the 11 technical areas into 4 "review areas" so that elements of review area are related
    - review team divided into sub-teams
    - schedule review periods by "review area" and sub-team.
    - During a given review period, review team will focus on related technical areas
  - Benefits:
    - Sub-team can focus on review of related areas
    - Consistent review flow for related technical areas

Lessons Learned

(cont'd)

- **Important Areas**
  - **Documentation of Processes Used to Perform a PSA**
  - **Documentation of Assumptions and Bases**
  - **Thoroughness of and Documentation of System Dependency Analyses**
  - **Use of Performance Shaping Factors in HRA**
    - **Bases for timing assumptions**
    - **Link to procedures**
  - **Collection and Use of Plant Specific Data**
  - **General Documentation of Model**
  - **Formal Procedures for Maintaining PSA**