



# Use of MAAP in Regulatory Applications

**NRC Headquarters**

**December 15, 2003**

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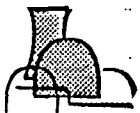
Jim Hawley, AEP; MUG

Marc Kenton, Creare

Rick Hill, GE

Ken Canavan, EPRI

Gary Vine, EPRI



**EPRI**

# Meeting Objective

- Understand NRC staff concerns regarding industry use of MAAP in regulatory/risk-informed applications

# Discussion Outline

- Introductions, Opening Remarks
- Summary of Issue
- Historical MAAP Perspective
- Selected Recent Events
- Industry Perspective
- NRC Perspective
- Open Discussion

## Summary of Issue: Industry Perspective

- MAAP has been widely used in the development of PRA success criteria and to estimate accident sequence timing.
- The technical adequacy of MAAP has been demonstrated on many occasions and in a variety of ways including benchmarking and comparison.
- MAAP will continue to be used to support risk informed applications and submittals.
- Technical issues raised in 2000 dispositioned; also got general agreement on means to satisfy NRC review process issues
- NRC Staff has recently raised issues on use of MAAP in regulatory applications (e.g., SDP, MSPI)
- Industry getting mixed messages on MAAP acceptability

# History of Interactions with NRC re: MAAP

- MAAP 3B established as industry standard for IPE and related analyses/submittals in mid/late 1980s
- Extensive familiarization sessions provided to NRC staff early '90s
- New MAAP issue #1 in 2000: differences in analyses results observed between MAAP and RELAP/SCDAP (e.g., TI-SGTR)
  - Raised with NEI at 4/2000 and 9/2000 Sr. Mgt. Meetings
  - Dispositioned at 15 Dec. 2000 meeting at NRC
- New MAAP issue #2 in 2000: NRC review of MAAP-4
  - 26 Sept. 2000 Sr. Mgt. Meeting: NRC agreed it did not need formal review and SER of MAAP-4. NRC said it needs sufficient understanding to make adequacy determinations on RIR submittals
  - Path forward agreed at 15 Dec. 2000 MAAP meeting at NRC
  - NRC staff already had MAAP-4; documentation provided 4/2001
  - 5 Oct. 2001 Sr. Mgt. Mtg.: Industry agreed it should provide "focused review" linked to likely applications

# History of Interactions with NRC re: MAAP

- NRC (Holahan) letter to EPRI (Marston), 4 Dec. 2001
  - Acknowledged agreements to date and receipt of requested documentation
  - NRC will review portions of code relevant to the application
  - Above approach applies to all applications using PRA success criteria, with exception of urgent license amendment requests
  - Review costs billable to licensee (plant specific applications) or an organization submitting topical
- EPRI response to NRC, 12 March 2002
  - Reiterated prior agreements (no SER, support focused review)
  - EPRI would provide MAAP familiarization for NRC
  - Fee issue may still be obstacle (not on agenda for today)

# Examples of Recent NRC Interactions

- Palisades

- Millstone 2

- Surry

- MSPI

# Palisades

- 3/25/2003 Loss of Shutdown Cooling Event
- For Phase 3 SDP, MAAP analyses performed to estimate available time for AC power recovery
  - 30 minutes until core damage w/o AFW
  - 8 hrs with AFW available
- NRC calculations using RELAP resulted in less time available (6.9 hrs with AFW)
- These relatively small differences likely due to assumptions on initial conditions and/or seal LOCA and PORV leakage modeling – NOT MAAP models
- NRC staff rejected MAAP analyses
- NMC is now using 6.9 hrs (from RELAP calc) and maintains a “Green”
- NRC still reviewing the analysis



## Millstone Unit 2

- 3/7/2003 Inadvertent trip resulted in temporary loss of all charging pumps
- As part of Phase 3 SDP, NRC requested input on modeling charging pumps to support changes to SPAR model
- MAAP analysis performed to demonstrate success for HPSI in Feed & Bleed scenario
- MAAP analysis rejected by NRC staff
- Utility needed to confirm MAAP results with RELAP5
- Code comparison demonstrated excellent agreement

# Surry Fire Analysis

- NRC reviewing resolution of generic Westinghouse RCP seal issue as part of the triennial fire protection audit
- December 2000 WOG ERG DW-00-13 recommends that loss of RCP seal cooling be mitigated by natural circulation cooling rather than re-establishing RCP seal cooling
- Guidance implemented in EOPs but not Fire Mitigation procedures
- For a fire in the emergency switchgear area, fire mitigation procedure requires re-establishment of seal injection by cross connecting charging

## Surry Fire Analysis (cont.)

- Issue being evaluated under SDP
- Thermal hydraulic analysis needed to determine whether core would remain covered for this scenario
- NRC insisted that MAAP cannot be used for this analysis
- Westinghouse contracted to perform analysis using NOTRUMP

## Mitigating System Performance Index (MSPI)

- During recent meetings on implementation of the new MSPI, the NRC staff has expressed concerns regarding the role that MAAP plays in defining system success criteria.

# Summary, Recent Industry Experience

- The use of MAAP to support SDP evaluations is being rejected
- This is not consistent with:
  - Many previously approved NRC applications
  - Approach outlined in 4 Dec. 2001 NRC letter
  - ASME PRA standard and DG-1122
- Limited or no technical justification provided to the utilities



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