



ELECTRIC POWER
RESEARCH INSTITUTE

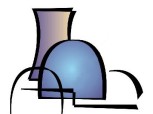
EPRI HRA Users Group Review of DRAFT NUREG-1842

Preliminary Comments

May 23, 2006

Zouhair Elawar, HRA UG Chairman
Jan Grobbelaar & Jeff Julius, Scientech LLC
Frank Rahn, EPRI

Copyright 2006 EPRI. All Rights Reserved.



Presentation Overview

- **Introduction**
 - EPRI HRA Users Group Overview
 - NRC HRA Background
 - Recent NRC HRA Projects
 - Draft NUREG-1842 Overview
- **Review Comments - Initial Feedback**
- **Summary: Current HRA tools and methods are sufficiently robust for successful risk-informed applications!**

EPRI HRA UG Overview - Mission

Charter Missions:

- Develop a tool to enable different analysts employing the same HRA method to obtain **comparable results** (for plants similar in design, procedures, & training).
- To provide an **HRA interface** to the R&R Workstation.
- To improve the **ability to do sensitivity analyses** on Human Error Probabilities used in the PRA model.
- To develop **standard guidelines** for application of human reliability data, methods, and performance shaping factors.
- A key goal for the project, ultimately, is to enable industry to converge to **common methods**.

Additions to the Mission Statement:

- Ensure HRA Calculator helps **satisfy the HRA Criteria of ASME PRA Std.**
- **Coordinate with industry groups** such as EPRI, Owners Groups, & USNRC to develop guidelines and training materials.

EPRI HRA Users Group Members

AEP	Jim Hawley, Steve Cherba, Yu Shen
Ameren UE	Keith Connelly, Mark Walz
APS	Zouhair Elawar
Constellation Energy	Jim Orr, George Lapinsky, Steve Kimbrough, Paul Jameson
Detroit Edison	Bob Slotke, Joe Lavelline, Jorge Ramirez
Dominion	George Baldwin, Song Hua-Shen, Fred Cietek, Barry Sloane, Tom Hook, Dave Bucheit, Ed Coen
Duke	Robert McAuley, Duncan Brewer
EPRI	Frank Rahn, Bill Hannaman
EXELON	John Steinmetz, Greg Kreuger
FENOC	Colin Keller, Sum Leung, Dennis Jondle, Gerry Kindred, Rick Stremple
FPL	Ching Guey, Ken Kiper, Larry Rau, Mahmoud Heiba, Brien Vincent, Mark Averett
AREVA	David Gerlits, Vesna Dimitrijevi, Laurent Michaud
NMC	Jim Masterlark, Brian Brogan, Frank Yanik, John Leiker

EPRI HRA Users Group Members (cont'd)

NPPD	Joe Edom, Glen Seaman
CANDU Owner Group/OPG/NSS	Keith Dinnie, Marcello Oliverio, Sugata Ganguli, Ranbir Parmar, Ben Hryciw
OPPD	Jay Fluehr, Alan Hackerott, Tom Giebelhausen
PG&E	Amir Afzali, Nathan Barber, John Pyo
PSEG	Tom Carrier, Shahin Seyedhosseini
SAROS	Stuart Lewis
SCIENTECH	Jan Grobbelaar, Kaydee Kohlhepp, Jeff Julius, Dieter Spiegel
SCE&G	Leo Kachnik, Tyndall Estes
SCE	Michelle Carr, Parvis Moieni, Gary Chung
Southern	Anees Farruk, Young Jo, David McCoy, Ed Ingram, Owen Scott, Roger Hayes
STPNOC	Roland Dunn, Alice Sun, Ray Fine, Bill Stillwell
TVA	Bill Mims, Anne Robinson
TXU	Bob Lichtenstein, Dan Tirsun, Steve Karpyak
Westinghouse	David Finnicum, Gerard Samide, John Kitzmiller, Reed LaBarge
Wolf Creek	JC Patel, Vern Luckert, David Alford, Bill Ketchum



Recent NRC HRA Projects

- April 2005 NUREG-1792 Good Practices issued
- August 2005 SPAR-H model update published
- Dec 2005 ACRS mtg - reviewed HRA (industry & NRC)
- **April 18, 2006 - NRC released draft NUREG-1842 “Evaluation of Human Reliability Analysis Methods Against Good Practices” for comment**
- Future:
 - NRC Plans to release ATHEANA Users Guide
 - Interface with Halden research reactor continues
 - HERA database development continues

Draft NUREG-1842 Overview

- The NRC is developing guidance for performing or evaluating **HRA to support risk-informed decision-making**, and in particular, the implementation of Regulatory Guide (RG) 1.200
- Done in 2 phases
 - 1st phase is NUREG-1792, Good Practices in HRA
 - 2nd phase is NUREG-1842, Evaluating HRA Methods Against Good Practices
- Draft NUREG-1842 “...evaluated the various HRA methods that are commonly used in regulatory applications, with a particular focus on their **capabilities to satisfy the good practices**, as well as their respective **strengths and limitations** regarding their underlying knowledge and data bases”

Draft NUREG-1842 Methods, and Relation to the EPRI HRA Calculator

- THERP
 - ASEP
 - HCR/ORE
 - CBDT
 - EPRI HRA Calculator
 - SPAR-H
 - SHARP1 (Framework used in the HRA Calculator)
-
- SLIM-MAUD (Not used in the HRA Calculator)
 - FLIM (Not used in the HRA Calculator)
 - ATHEANA (Not used in the HRA Calculator)

Initial Comments (1 of 3)

1. Negative towards HCR/ORE & THERP's TRC

- The original HCR method was not substantiated by simulator experiments, so ORE developed (and HCR dropped).
- Use of a decision tree for sigma was also not substantiated by simulator (will be dropped from the HRA Calculator)
- HCR/ORE is one of the few “data-driven” methods, using plant-specific data.
- SPAR-H timing model is analogous to THERP TRC & should have a similar comment.

2. Definitions

- Some of the “methods” are not methods,
- Need to differentiate “Process” and “Framework” from “Methods”

3. Executive Summary

- Biased towards ATHEANA
- Implies need to re-do the HRA for each application

Initial Comments (2 of 3)

4. Scope Creep

- Why not evaluate against ASME/RG 1.200 instead of the Good Practices?
- ASME Addenda B is out now.

5. EPRI HRA Calculator Section

- Evaluated Version 2 and some issues addressed in Version 3
- Insufficient guidance on method selection will be fixed in future update, and emphasized in training.
- Users should be experts. Need to define expert and distinguish from practitioner. Utilities typically require qualification or training before using.

6. Example Applications may be useful

- Would be nice to see Results and Level of Effort

Initial Comments (3 of 3)

7. **Question – Since NRC Regulation is one of the primary end users, has this document been reviewed by NRC Regulation before this public review?**
 - If not, the public should get a second chance to comment since revisions could be major.

8. **Accuracy – *all models* are approximations in that they do not reflect actual as-operated plant in every detail of every minute, and in that sense are models are not accurate.**
 - HRA models are subject to the same model inaccuracies as hardware failures
 - 1842 gives a false impression that HEPs are inaccurate (as a group)

Summary

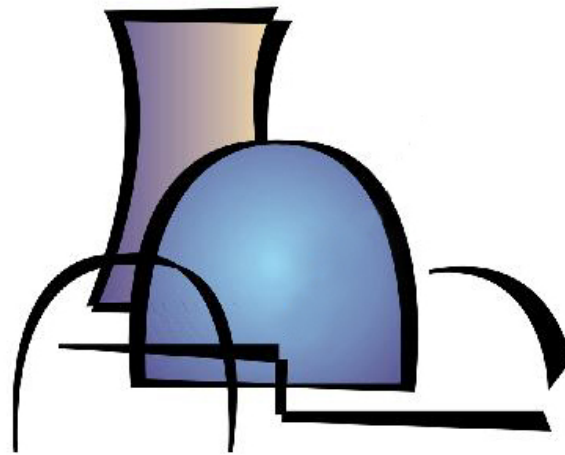
- **Current HRA tools and methods are sufficiently robust for successful risk-informed applications.**
- **Although industry is supportive of NRC research, and in fact is developing new methods / approaches itself, we believe that meeting the current standards (e.g. ASME PRA Standard as implemented by Reg Guide 1.200) is necessary and sufficient for Regulatory applications.**
 - Industry recognizes that the Good Practices document(s) indicates that not all good practices are required to meet RG 1.200 requirements.
 - For new techniques to be widely embraced, they will need to be benchmarked and vetted, and shown to be significantly better, not too complex, and sufficiently scrutable for industry use.

Contact Information

- Public website:
www.epri.com/hra/index.html (Tell your non-HRA User Group friends!)
- Support website for HRA Users Group:
www.epriweb.com/epriweb2.5/ecd/np/hra/index.html
 - Use for bug reporting, suggestions, downloads
- For software support & user group suggestions:
 - Jan Grobbelaar (jgrobbelaar@scientechnology.com) (800) 862.6702
 - Jeff Julius (jjulius@scientechnology.com) on (800) 862.6702
 - 16300 Christensen Road, Suite 300
Tukwila, WA 98188; (206) 248-1818; (206) 248-1827 Fax
- For Chairman & EPRI project management:
 - Zouhair Elawar (zelawar@apsc.com) 623.393.5328
 - Frank Rahn at 650 855.2037 or FRAHN@epri.com



EPRI



SCIENCETECH®

EPRI HRA UG Overview - Approach

- **Develop a Software Tool to conduct HRA**
 - For immediate use by members
 - Defensible and reproducible
 - Report-ready
- **Develop a Users Manual & Help supporting the tool**
 - Make the software tool easy to use
 - Promote consistency
- **Develop HRA Guidelines & Conduct Training**
 - Promote consistency
 - Maps to ASME PRA Standard for HRA
 - Start with Level 1 PSA, build the foundation for future
 - SDP Fire/Flood Shutdown

HRA UG Overview – HRA Calculator Apps

- **HRA Update to PRA Standards:**
 - Demonstrating compliance with ASME PRA Standard
 - Correct Owners Group Peer Review comments
 - Such as adding Pre-Initiating events in System fault trees
- **Configuration Risk Management/SDP Process:**
 - Add/Alter Recovery Events
- **Training:**
 - Identification of PRA-important Scenarios & Procedures
- **Licensing Issues:**
 - Impact of plant design modification such as Timing/Instrumentation

EPRI HRA UG Overview – HRA Models

Pre-Initiator HRAs:

- THERP Model (NUREG/CR-1278, 1983)
- ASEP Model (NUREG/CR-4772, 1987)

Post-Initiator HRAs:

- CBDTM/THERP Model combination
 - CBDTM (EPRI TR 100259, 1992 & NUREG/CR-1278, 1983)
 - Combination consists of “cognitive” & “execution” errors
- HCR/ORE/THERP Model combination
 - HCR/ORE (EPRI TR 100259, 1992 & NUREG/CR-1278, 1983)
- Annunciator Response Model (NUREG/CR-1278, 1983)
- SPAR-H (August 2005)



Draft NUREG-1842

Key Characteristics

- **Scope**
- **Underlying Model**
- **Underlying Data**
- **Quantification Approach**
- **Strengths**
- **Limitations**

Comment Timeline

- **Timeline**
 - April 18th Released April 18
 - May 23rd Public Meeting (preliminary feedback & discussion)
 - Mid-June Comments due
- Unless submitted in writing, then not valid!
- **To date only 2 utilities have provided comments**

