



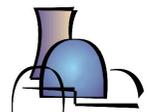
# EPRI HRA Users Group Review of DRAFT NUREG-1842

*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

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

# EPRI HRA Users Group Members (cont'd)

<b>NPPD</b>	Joe Edom, Glen Seaman
<b>CANDU Owner Group/OPG/NSS</b>	Keith Dinnie, Marcello Oliverio, Sugata Ganguli, Ranbir Parmar, Ben Hryciw
<b>OPPD</b>	Jay Fluehr, Alan Hackerott, Tom Giebelhausen
<b>PG&amp;E</b>	Amir Afzali, Nathan Barber, John Pyo
<b>PSEG</b>	Tom Carrier, Shahin Seyedhosseini
<b>SAROS</b>	Stuart Lewis
<b>SCIENTECH</b>	Jan Grobbelaar, Kaydee Kohlhepp, Jeff Julius, Dieter Spiegel
<b>SCE&amp;G</b>	Leo Kachnik, Tyndall Estes
<b>SCE</b>	Michelle Carr, Parvis Moieni, Gary Chung
<b>Southern</b>	Anees Farruk, Young Jo, David McCoy, Ed Ingram, Owen Scott, Roger Hayes
<b>STPNOC</b>	Roland Dunn, Alice Sun, Ray Fine, Bill Stillwell
<b>TVA</b>	Bill Mims, Anne Robinson
<b>TXU</b>	Bob Lichtenstein, Dan Tirsun, Steve Karpyak
<b>Westinghouse</b>	David Finnicum, Gerard Samide, John Kitzmiller, Reed LaBarge
<b>Wolf Creek</b>	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
  - 1<sup>st</sup> phase is NUREG-1792, Good Practices in HRA
  - 2<sup>nd</sup> 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

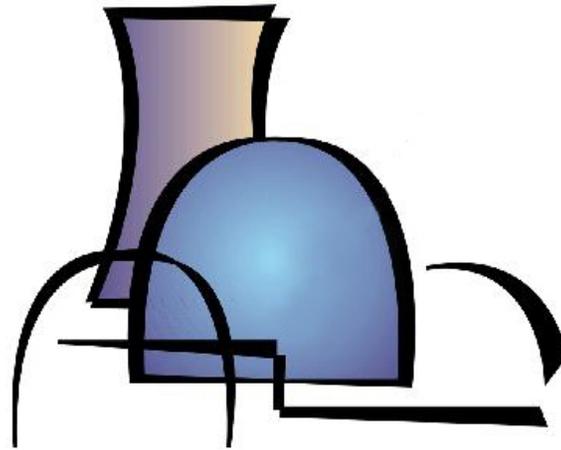
- **Current HRA tools and methods are sufficiently robust for successful risk-informed applications.**
- **Although industry is supportive of NRC research, and in fact is developing new methods / approaches itself, we believe that meeting the current standards (e.g. ASME PRA Standard as implemented by 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](http://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](http://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](mailto:jgrobbelaar@scientechnology.com)) (800) 862.6702
  - Jeff Julius ([jjulius@scientechnology.com](mailto: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](mailto:zelawar@apsc.com)) 623.393.5328
  - Frank Rahn at 650 855.2037 or [FRAHN@epri.com](mailto:FRAHN@epri.com)



# EPR2



SCIEN<sup>T</sup>TECH<sup>®</sup>

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

