



Idaho National Laboratory

RIC 2007

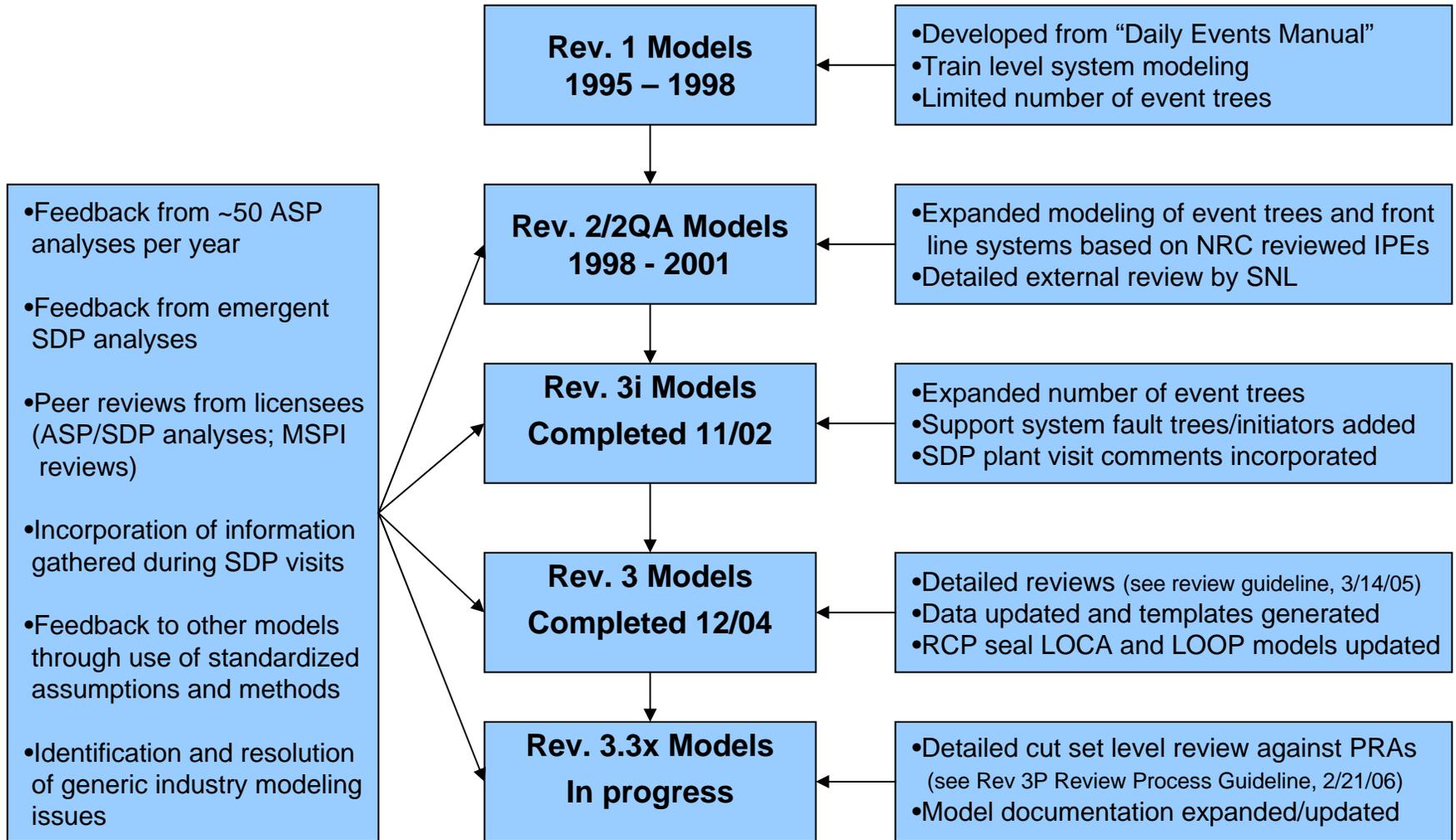
Introduction to SPAR Models

Robert F. Buell
Risk, Reliability and NRC Programs
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Standardized Plant Analysis Risk (SPAR) Models

- **‘Standardized’ vs. ‘Simplified’**
- **Standardized**
 - **Assumptions**
 - **Data**
 - **HEP methodology (NUREG/CR-6883)**
 - **Level of detail**
 - **Naming convention**
 - **Miscellaneous (CCF application, RCP seal logic, equipment and power recovery, etc.)**

SPAR Model Development



Current Status

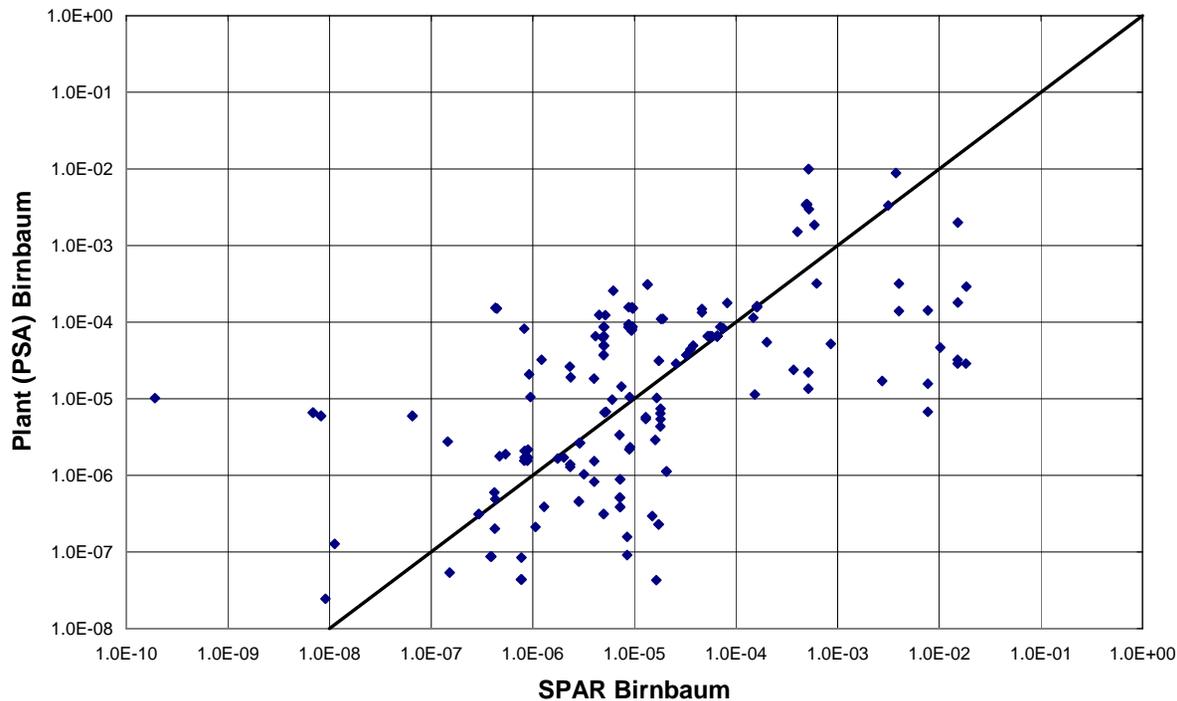
- **72 level 1 models covering 103 operating units**
- **Standard set of Event Trees**
 - **Other event trees added if >1% of PRA CDF**
 - **Includes support system initiators**
- **Point values used for all initiating event frequencies**
- **Detailed fault tree modeling of support systems**
 - **Limited modeling of actuation/control logic**
- **Typically 900 – 1000 component level basic events**
- **Limited number of LERF, Shutdown, External Event models**

SPAR-PRA Cut Set Level Reviews

- **Purpose of the reviews:**
 - More accurately model plant operation and configuration
 - Identify the significant differences between PRA and SPAR logic
- **The main steps in the review process:**
 - Load licensee's cut sets into SAPHIRE
 - Map important events (based on Birnbaum importance) in the licensee PRA to analogous SPAR events
 - Incorporate key licensee probabilities into SPAR model (via temporary change set)
 - Load SPAR and PRA importance reports into comparison spreadsheet
 - Identify the outliers and make changes allowed by SPAR policy and precedent

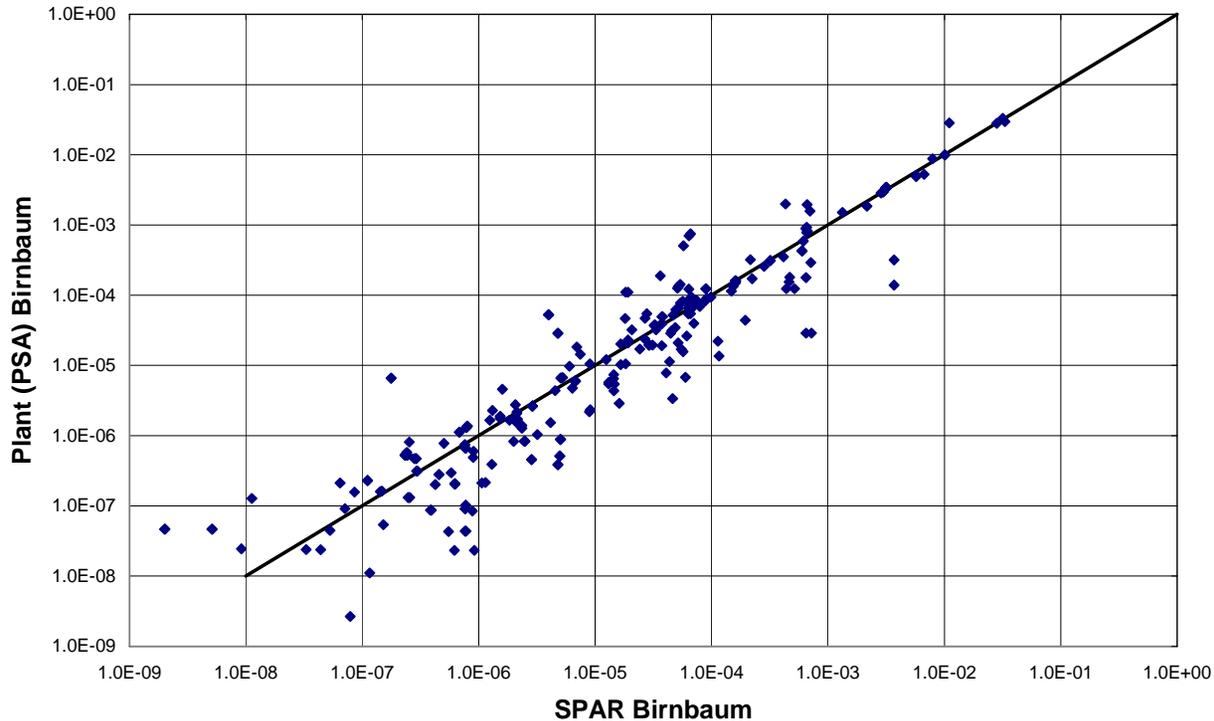
Plant X Prior to Cut Set Level Review

Plant (PSA) vs SPAR Birnbaum Importances



Plant X After Cut Set Level Review

Plant (PSA) vs SPAR Birnbaum Importances



Cut Set Level Review Summary

- In the preceding figures outlying points have a story
- The dominant contributors to differences between PRA and SPAR results involve:
 - PORV success criteria during feed and bleed
 - Impacts DC importances
 - PRA credits AFW TDP after battery depletion
 - Impacts DG importances
 - Other differences related to key technical issues and divergent assumptions

Other Ongoing SPAR Efforts

- **Enhancing and updating of SPAR documentation**
- **Splitting of models at select multi-unit sites**
- **Incorporation of new data (NUREG/CR-6928)**
- **Integration of internal events models, external events models, shutdown models, etc.**
- **Resolution and incorporation of solutions to key technical issues (more details in later session)**

How to Obtain Your Plants' SPAR Model

- **At the present time, SPAR models will only be provided to the Licensee.**
- **Send an email requesting your SPAR model to:**
 - Pete Appignani
 - SPAR Model Level 1 Development Project Manager
 - US NRC, Office of Nuclear Regulatory Research
 - Email: pla@nrc.gov
 - Phone: (301) 415-6857
- **Include the following information:**
 - Name
 - Title
 - Company
 - Mailing Address
 - Phone number
 - Email Address
- **The SPAR models will be provided only for your organization's use and are not to be distributed further without the written consent of the Nuclear Regulatory Commission.**
- **SPAR models are not available to the general public.**
- **You will need the latest version of SAPHIRE to use the SPAR model. To obtain SAPHIRE, fill out, sign and return the non-disclosure agreement. The non-disclosure agreement can be obtained at <http://www.nrccodes.com/>. A copy of the agreement will also be provided on the CD-ROM containing the SPAR model(s). The code is provided for no fee, although no technical assistance is provided. Technical assistance can be obtained from the NRC contractor responsible for code distribution, the Idaho National Laboratory, by joining the SAPHIRE Users Group.**
- **If you have any questions about obtaining SAPHIRE please contact Dan O'Neal, SAPHIRE Project Manager at (301) 415-4146 or dma@nrc.gov.**