Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models Outline

1. **Considerations for using licensees' PRA Models**
   - 1.1. Regulatory Processes
   - 1.2. PRA Policy Statement
   - 1.3. Maintain independence of NRC
   - 1.4. Standardization of modeling and assessment techniques
   - 1.5. Use by the NRC staff of licensees' PRA models
   - 1.6. Effect on other NRC Programs
   - 1.7. Costs

2. **Regulatory Processes**
   - 2.1. Reactor Oversight Process (ROP)
     - 2.1.1. ROP is an NRC process
   - 2.2. Significance Determination Process (SDP)
     - 2.2.1. Today's SDP outcomes using NRC versus licensee PRA
       - 2.2.1.1. The PRA models are often in close agreement.
       - 2.2.1.2. Differences in SDP outcomes between the NRC and the licensee are driven by factors other than the baseline PRA model
         - 2.2.1.2.1. Engineering assumptions
         - 2.2.1.2.2. Modeling assumptions
         - 2.2.1.2.3. Human reliability assumptions
         - 2.2.1.2.4. Other ...
       - 2.2.1.3. These issues are also applicable to the other regulatory processes and other risk-informed licensing related activities
   - 2.3. MD 8.3 - NRC Incident Investigation Program
   - 2.4. Notice of Enforcement Discretion (NOEDs)
   - 2.5. Technical basis for rulemaking
   - 2.6. Generic issues
   - 2.7. Other risk-informed licensing related activities

3. **PRA Policy Statement**
   - 3.1. The PRA Policy Statement encouraged the agency to increase the use and application of PRA to the greatest extent practical.
   - 3.2. SPAR models are one of the key incarnations of that effort.
   - 3.3. Eliminating SPAR models would violate the spirit of that policy because it would undermine confidence in PRA-based findings.

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models Outline

4. **Maintain independence of NRC**
   - 4.1. ROP provides for an independent regulatory assessment of licensee performance
     - 4.1.1. Staff will lose ability to verify "trust but verify"
     - 4.1.2. Licensee's initially indicate an event as low safety significance in LERs that are later established as a greater than Green finding
   - 4.2. Conflict of interest issues
     - 4.2.1. OGC may need to endorse use of licensee PRA and licensee performing the assessment
   - 4.3. Public confidence
     - 4.3.1. Use of licensee PRA could erode public confidence
     - 4.3.2. In effect the licensee is communicating events and degraded plant conditions to the public and other stakeholders if they perform the analysis

5. **Standardization of modeling and assessment techniques**
   - 5.1. SPAR models have been peer reviewed by industry
     - 5.1.1. Confidence on the part of staff and industry that the current generation of SPAR models accurately portray the plants that they model.
     - 5.1.2. SPAR models were determined to be adequate for their intended application
   - 5.2. Efficiency of standardization
     - 5.2.1. Modeling assumptions
     - 5.2.2. Modeling conventions
     - 5.2.3. Naming schemes (basic events, fault trees, event tress, etc.)
     - 5.2.4. Post processing rule construction
     - 5.2.5. Reporting functions (built into SAPHIRE)
     - 5.2.6. Consistency in event tree/fault tree construction
     - 5.2.7. Single Software platform
     - 5.2.8. Uniformity of assessments (RASP Handbooks)
       - 5.2.8.1. Risk Assessment Standardization Project (RASP) Handbooks
       - 5.2.8.2. Uniform because SPAR models are standardized
       - 5.2.8.3. Software platform is standardized (SAPHIRE)
         - 5.2.8.3.1. SAPHIRE was developed and modified specifically to support the regulatory processes

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models Outline

6. **Use by the NRC staff of licensees' PRA models**
   - 6.1. Additional logistical and resource requirements
     - 6.1.1. Seventy (70) plus licensee PRAs
       - 6.1.1.1. No standardization
     - 6.1.2. Four (4) different commercial software platforms
       - 6.1.2.1. CAFTA (EPRI)
       - 6.1.2.2. WinNUPRA (Scientech)
       - 6.1.2.3. Riskman (ABS Consulting)
         - 6.1.2.3.1. Cutsets are problematic (used to gain understanding of risk insights)
       - 6.1.2.4. RiskSpectrum (Lloyd´s Register Consulting, Sweden)
       - 6.1.2.5. All lack reporting features of SAPHIRE
       - 6.1.2.6. All lack easy to use analysis tools in SAPHIRE
   - 6.2. Need for additional NRC risk analysts
     - 6.2.1. Additional staff training requirements
   - 6.3. Management and control of licensee models and model updates
     - 6.3.1. Non-uniform modeling assumptions and limitations
       - 6.3.1.1. Each model will need to be examined and understood
     - 6.3.2. Availability of PRA models and supporting documentation
       - 6.3.2.1. Will the licensee formally submit their PRA to NRC?
         - 6.3.2.1.1. Under oath and affirmation?
         - 6.3.2.1.2. Subject to 10 CFR 50.9?
     - 6.3.3. How will staff ensure NRC has the latest licensee model?

7. **Effect on other NRC Programs**
   - 7.1. Accident Sequence Precursor (ASP) program
     - 7.1.1. Abnormal occurrence report to Congress
   - 7.2. Industry trends/operating experience programs
   - 7.3. New Reactors (PRA & licensing)
   - 7.4. Inspection programs
     - 7.4.1. Inspection resources
     - 7.4.2. Inspection decisions will become reactive based on deterministic criteria alone
   - 7.5. Use of SPAR models to support system and component studies
   - 7.6. Development of Plant Information Risk eBooks (PRIBS) – superseded the SDP Notebooks

7.7. SPAR Models used for other purposes

7.7.1. Answer Commission questions

7.7.2. Japan Lesson Learned related issues (flooding, vents, seismic)

7.7.2.1. SPAR model results (CDFs) used to assist in the resolution of Fukushima NTTF Rec. 5.2 (containment venting for plants other than BWR with Mark I and Mark II containments), and Rec. 6 (hydrogen control and mitigation).

7.7.2.2. SPAR model data (equipment failure rates) supported the risk evaluation of Fukushima NTTF Rec. 5.1 (containment venting in BWR Mark I and Mark II plants)

7.7.3. SPAR-EE models supported GI-199 (updated seismic hazard curves for plants east of the Rocky Mountains)

7.7.4. Gain understanding of key basic events in the SPAR fire PRA models

7.7.5. SPAR models used to identify the most likely core-damage sequences for SOARCA analysis.

7.7.6. SPAR models and data (equipment failure rates) supported staff's analysis of containment accident pressure (CAP) credit in BWR plants.

7.7.7. Gain understanding of CDFs as estimated by SPAR (supported work for Commissioner Apostolakis, 2013).

7.7.8. NRR made heavy use of the SPAR models (event trees) while reviewing the Browns Ferry extended power uprate (EPU) license amendment request.

8. Costs

8.1. Costs to both NRC and Industry

8.2. NRC

8.2.1. Licensee model reviews

8.2.2. Logistical requirements

8.2.3. Training

8.2.4. Commercial Software licenses

8.2.4.1. Commercial PRA software typically requires additional software (licenses) to be comparable to SAPHIRE (e.g. CAFTA/FTREX)

8.2.5. Additional analyst staff

8.2.6. Other

8.3. Industry

8.3.1. Cost for model standardization

8.3.2. Cost to implement a single RG 1.200 compliant standardized modeling approach on one analysis platform

8.3.2.1. Re-invent a RASP Handbook for uniformity of assessments

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models Outline

8.3.3. Cost for licensee to submit their PRA to NRC

8.3.4. Cost to implement SAPHIRE reporting features and other tools

8.3.5. How will industry provide support to NRC Analysts?

8.3.5.1. INL is currently responding to approximately 2 requests for assistance per day via the Technical Support contract

8.3.6. Other

Marksberry, Don

From: Coyne, Kevin
Sent: Friday, September 18, 2015 11:30 AM
To: Correia, Richard; Rivera, Tammie
Cc: Nakoski, John; Appignani, Peter; Marksberry, Don
Subject: FW: ACTION: Topics and Update of Action Items for RES/NRR Periodic
Attachments: Key Talking Points for the SPAR Models.docx

Importance: High

Categories: Follow up

Rich –

Here's an updated info sheet on SPAR (vs licensee) models for Brian's quarterly with NRR. Let me know if you have any questions or need any changes.

Kevin

From: Schroer, Suzanne
Sent: Tuesday, September 08, 2015 2:28 PM
To: Ott, William ; Peters, Sean ; Appignani, Peter ; Nakoski, John ; Salley, MarkHenry
Cc: Correia, Richard ; Coyne, Kevin ; Rivera, Tammie
Subject: RE: ACTION: Topics and Update of Action Items for RES/NRR Periodic

Date correction below.

From: Schroer, Suzanne
Sent: Tuesday, September 08, 2015 8:13 AM
To: Ott, William; Peters, Sean; Appignani, Peter; Nakoski, John; Salley, MarkHenry
Cc: Correia, Richard; Coyne, Kevin; Rivera, Tammie
Subject: ACTION: Topics and Update of Action Items for RES/NRR Periodic

Hi all,

Please let Tammie know if you have any topics for the upcoming September 30 meeting for Brian's periodic with Bill Dean. Especially, any areas of good collaboration.

Please send by **COB, September 16.**

Thanks!
Suzanne

From: Rini, Brett
Sent: Friday, September 04, 2015 2:49 PM
To: Correia, Richard; Coyne, Kevin; Case, Michael; Coffin, Stephanie; Thomas, Brian; Brock, Kathryn; Landau, Mindy
Cc: Armstrong, Kenneth; Schroer, Suzanne; Chen, Yen-Ming; Martinez, Erick; Rivera, Tammie
Subject: ACTION (due 9/18): Topics and Update of Action Items for RES/NRR Periodic

All,

The periodic RES and NRR Office Director counterparts meeting is scheduled for September 30. The agenda for the June meeting is below. Please find attached the updated list of action items under each agenda item.

By September 18, please send me the following:

- Proposed agenda topics for the September meeting (all divisions)
- Updates to any action items from the June meeting, shown in yellow on pages 1-3 of the attachment (DE only)

Agenda for June 23, 2015 Meeting

1. Non Responsive
2.
3.
4.
5. SPAR models vs. licensee PRAs (RES/DRA)

Non Responsive

Thanks,

Brett

Key Talking Points for the Standardized Plant Analysis Risk (SPAR) Model Program

- Program provides **independent** risk analysis capability for NRC in support of reactor oversight process (ROP) and a variety of risk-informed technical applications
- Plant-specific SPAR models (99 operating plants are represented by 75 SPAR models) use **standardized** modeling and naming conventions. Standardization increases analyst efficiency and accuracy and supports cross comparison across models.
- The program leverages available licensee PRA information to reduce program costs, but includes validation of licensing modeling assumptions and integrates licensing model conventions into standardized SPAR modeling framework. Although SPAR models use some simplifying assumptions compared to licensee models, in several areas most pertinent to ROP applications, the SPAR models are generally more detailed (e.g., CCF, LOOP, and support system initiators)
- SPAR models and the SAPHIRE PRA code are **designed to support event and condition analyses** by performing "delta-risk" analyses (e.g., change in CDF from base case to performance deficiency). Licensee developed models and supporting codes lack this capability (requiring additional calculations and manual sequence/cutset result comparisons)
- All models run on a single code platform (SAPHIRE). SPAPHIRE can be updated and configured to directly support NRC risk assessment activities through coding changes and customized reporting functions.
- Although licensees have made progress in developing RG 1.200 compliant PRA models, these models lack the standardization and ROP-specific features that are essential to the agency's needs for performing event and condition analyses.

SPAR Model Uses

- Significance Determination Process (Reactor Oversight) - **Regions**
- Accident Sequence Precursor Program (used as an input metric to the performance budget process) - **RES**
- Evaluation of Notices of Enforcement Discretion – **Regions, NRR** *
- MD 8.3 Incident Investigation Program Risk Evolutions (e.g., determine level of inspection response to an event) – **Regions** *
- Establish technical basis for rulemaking – **RES, NRR**
- Evaluate generic issue safety significance - **RES**
- Perform system and component studies - **RES**
- Inspection Planning (e.g., risk insights from Plant Risk Information eBooks) - **Regions**

These applications typically are performed with limited time, highlighting the importance of model standardization for SPAR

SPAR Model Annual Budget

The SPAR/SPAHIRE annual budget for **FY2015 was ~$2.2 million**. This amount is scalable depending on agency needs and available resources. Major activities include:

Base Resources (i.e., minimum requirements for the program):

- SPAR Model Configuration/Quality Control and User Support Help Desk ~$500k/year
  - Help desk handles ~ 2 calls/day from SRAs
  - Ensures model version control and maintains INL Website

- Performs model updates to support specific SDP/ASP activities (~30 models were updated to support a specific analysis in FY2015). These updates are often highly specific to the event/condition that occurred and would also need to be performed for a licensee PRA model

- SAPHIRE QA and User Support ~$300k/year
  - Maintain NUREG/BR-0167 QA program
  - User help desk Support

Resources needed to Support Specific User Enhancements:

- Model Updates to Reflect Significant Plant Changes (~12 models/year) - ~$250k
  - Incorporate station blackout EDGs
  - Battery charging generators
  - Significant model upgrades

- External Hazard and Fire Models - ~ $400k/year
  - Add NFPA 805 fire modeling
  - Add seismic and high wind model capabilities

- SAPHIRE Enhancements ~$300k /year
  - New reporting features and code capabilities

- Data Updates (performed every 3 years) - ~$500k (every three years)
  - Upgrade SPAR models to reflect most recent operating data
  - Update model documentation and Plant Risk Information eBooks (PRIBs)
  - General model cleanup/improvements

Letter to NEI from OEDO on Use of SPAR models (2007, ML072490566)

This letter addressed an NEI proposal to use licensee PRA models instead of SPAR models. A detailed review was conducted and concluded that SPAR was needed to:

- Maintain **independence** of NRC analyses. Differences between NRC and Licensee assessments is not due to the base model, but by the assumptions for each specific event or condition analysis
- Provide **standardized model framework** for efficient analyses - industry does not use a standardized modeling approach
- Avoid inefficiencies in having agency risk analysts learn the conventions of over 70 licensee developed PRAs (utilizing up to four different software platforms)

The basis for the staff conclusion remains valid today.

Feedback from Regional SRAs on Potential Use of Licensee Models vice SPAR

- More efficient and objective to use SPAR models for risk assessments.
- It would take a significant increase in resources to use licensee models for event and condition assessment activities due to their lack of standardization and need for SRAs to understand unique modeling conventions and new code platforms.
- Use of licensee models would cause delays in the SDP process due to need to engage in additional requests for information to understand licensee PRA modeling assumptions.
- NRC's ability to perform independent regulatory assessment activities will be eroded by not having a centralized system evaluating Generic Safety Issues, SBO/LOOP studies, etc.

Coyne, Kevin

From: Ferrante, Fernando
Sent: Thursday, September 17, 2015 3:00 PM
To: Chang, James; Marksberry, Don; Bernhard, Rudolph; Cahill, Christopher; Circle, Jeff; Cook, William; Gonzalez, Michelle; Hanna, John; Helton, Donald; Hunter, Christopher; Kozak, Laura; Loveless, David; MacDonald, George; Mitman, Jeffrey; Gibbs, Russell; Passehl, Dave; Peters, Sean; Replogle, George; Sancaktar, Selim; Shen, Song-hua; Valos, Nicholas; Wong, See-Meng; Wood, Jeffery; Zoulis, Antonios; Yeilding, Dale; Weerakkody, Sunil; Deese, Rick; Nakanishi, Tony; Arner, Frank; Appignani, Peter; Coyne, Kevin
Subject: RE: Industry Recommendations for NRC Project AIM 2020 Prioritization and Re-baselining Initiatives

Think what it will do for HRA and CCF...

From: Chang, James
Sent: Thursday, September 17, 2015 2:28 PM
To: Ferrante, Fernando; Marksberry, Don; Bernhard, Rudolph; Cahill, Christopher; Circle, Jeff; Cook, William; Gonzalez, Michelle; Hanna, John; Helton, Donald; Hunter, Christopher; Kozak, Laura; Loveless, David; MacDonald, George; Mitman, Jeffrey; Gibbs, Russell; Passehl, Dave; Peters, Sean; Replogle, George; Sancaktar, Selim; Shen, Song-hua; Valos, Nicholas; Wong, See-Meng; Wood, Jeffery; Zoulis, Antonios; Yeilding, Dale; Weerakkody, Sunil; Deese, Rick; Nakanishi, Tony; Arner, Frank; Appignani, Peter; Coyne, Kevin
Subject: RE: Industry Recommendations for NRC Project AIM 2020 Prioritization and Re-baselining Initiatives

Following the NEI's argument, NEI may ask NRC to give up MELCOR by using MAAP...

James

From: Ferrante, Fernando
Sent: Thursday, September 17, 2015 12:26 PM
To: Marksberry, Don; Bernhard, Rudolph; Cahill, Christopher; Chang, James; Circle, Jeff; Cook, William; Gonzalez, Michelle; Hanna, John; Helton, Donald; Hunter, Christopher; Kozak, Laura; Loveless, David; MacDonald, George; Mitman, Jeffrey; Gibbs, Russell; Passehl, Dave; Peters, Sean; Replogle, George; Sancaktar, Selim; Shen, Song-hua; Valos, Nicholas; Wong, See-Meng; Wood, Jeffery; Zoulis, Antonios; Yeilding, Dale; Weerakkody, Sunil; Deese, Rick; Nakanishi, Tony; Arner, Frank; Appignani, Peter; Coyne, Kevin
Subject: RE: Industry Recommendations for NRC Project AIM 2020 Prioritization and Re-baselining Initiatives

Don,

I heard this at a public meeting with industry so I am not surprised. More disturbing was a Commission Briefing in which getting rid of SPAR was one of the examples of recommendations that have "internal and external" alignment, which gave (in my opinion) the wrong message to the Commission that everyone at the NRC and industry is on board with this.

I am not worried about having an honest debate about SPAR models and their value within the NRC, along with realistic alternatives. But I don't think this is happening. I have provided my direct input to Project Aim 2020 on this and have been trying to attend meetings where false perceptions are being propagated to try to counteract them at the technical staff level. I know RES is having conversations at high levels on this and we just had a SPAR workshop which would have been a great venue to inform decision-makers on this (that none showed up is clearly a concerning indicator of their on-going lack of information).

Hence, a question (and this is just a question, by no means intended to imply a lack of effort on anyone's part): is the risk community doing enough to try to bring this into an honest, focused discussion? Can the staff who uses and understands the value of SAPHIRE and SPAR (and, consequently, the impact that relying on licensee models will cause) be brought into this conversation more actively? I am concerned the perception game is being lost on SPAR and it may be eventually too late to change what a lot of people are being told is a great idea (and to understand what they are not hearing at some of these high level discussions).

Thanks,
Fernando

From: Marksberry, Don
Sent: Thursday, September 17, 2015 8:28 AM
To: Bernhard, Rudolph; Cahill, Christopher; Chang, James; Circle, Jeff; Cook, William; Ferrante, Fernando; Gonzalez, Michelle; Hanna, John; Helton, Donald; Hunter, Christopher; Kozak, Laura; Loveless, David; MacDonald, George; Mitman, Jeffrey; Passehl, Dave; Peters, Sean; Replogle, George; Sancaktar, Selim; Shen, Song-hua; Valos, Nicholas; Wong, See-Meng; Wood, Jeffery; Zoulis, Antonios; Yeilding, Dale; Weerakkody, Sunil; Deese, Rick; Nakanishi, Tony; Arner, Frank; Gibbs, Russell
Subject: Industry Recommendations for NRC Project AIM 2020 Prioritization and Re-baselining Initiatives

FYI. See item 21.

Coyne, Kevin

From: Correia, Richard
Sent: Thursday, September 17, 2015 1:32 PM
To: Wong, See-Meng; Marksberry, Don; Coyne, Kevin; Nakoski, John; Lane, John; Appignani, Peter
Subject: RE: NEI's recommendation for a pilot program to use PRAs in SDPs

Thanks again See-Meng. Appreciate keeping us informed and involved. We'll support.

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Wong, See-Meng
Sent: Thursday, September 17, 2015 11:53 AM
To: Correia, Richard <Richard.Correia@nrc.gov>; Marksberry, Don <Don.Marksberry@nrc.gov>; Coyne, Kevin <Kevin.Coyne@nrc.gov>; Nakoski, John <John.Nakoski@nrc.gov>; Lane, John <John.Lane@nrc.gov>; Appignani, Peter <Peter.Appignani@nrc.gov>
Subject: RE: NEI's recommendation for a pilot program to use PRAs in SDPs

Rich,

Yes, we will be briefing our management of our activities next week, and will be continuing to do so after our visits to Region III and IV next week. We are making presentations to NRR/DRA staff next Thursday on SDP Streamlining (see attachment) with an invitation to Kevin & John's groups for interested RES attendees. Unfortunately, we may have limited seating capacity in Room O-10B2. If there is a need for more than 5 RES attendees, we can set up an audio conference call arrangement.

See Meng.

From: Correia, Richard
Sent: Thursday, September 17, 2015 11:17 AM
To: Wong, See-Meng <See-Meng.Wong@nrc.gov>; Marksberry, Don <Don.Marksberry@nrc.gov>; Coyne, Kevin <Kevin.Coyne@nrc.gov>; Nakoski, John <John.Nakoski@nrc.gov>; Lane, John <John.Lane@nrc.gov>; Appignani, Peter <Peter.Appignani@nrc.gov>
Subject: RE: NEI's recommendation for a pilot program to use PRAs in SDPs

Thanks very much See-Meng for the feedback. We need to make sure or Sr managers are aware of the SRA feedback too.

Best

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Wong, See-Meng
Sent: Thursday, September 17, 2015 8:59 AM
To: Correia, Richard <Richard.Correia@nrc.gov>; Marksberry, Don <Don.Marksberry@nrc.gov>; Coyne, Kevin <Kevin.Coyne@nrc.gov>; Nakoski, John <John.Nakoski@nrc.gov>; Lane, John <John.Lane@nrc.gov>; Appignani, Peter <Peter.Appignani@nrc.gov>
Subject: RE: NEI's recommendation for a pilot program to use PRAs in SDPs

Rich,

Good bases for continuation of NRC's investment on SPAR models. Together with Russell Gibbs, I have just returned from visits to the Regions 1 & 2 to solicit feedback from DDs and SRAs on SDP Streamlining initiative. The response from the SRAs has been overwhelming support for continuing the use of SPAR models in the SDP assessments! Just to let you all know that I will be continuing to carry the torch for SPAR models in NRR activities despite the misinformed views of our management here.

See Meng.

From: Correia, Richard
Sent: Thursday, September 17, 2015 8:47 AM
To: Marksberry, Don <Don.Marksberry@nrc.gov>; Coyne, Kevin <Kevin.Coyne@nrc.gov>; Nakoski, John <John.Nakoski@nrc.gov>; Lane, John <John.Lane@nrc.gov>; Appignani, Peter <Peter.Appignani@nrc.gov>; Wong, See-Meng <See-Meng.Wong@nrc.gov>
Subject: RE: NEI's recommendation for a pilot program to use PRAs in SDPs

Thx Don. NEIs recommendation to use licensees PRAs is specific to SDP work. We need SPARs for many other applications so if we (NRC) decides to use Licensees PRAs we would still need SPARs for all our other work...a lot more time effort and $s.

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Marksberry, Don
Sent: Thursday, September 17, 2015 8:21 AM
To: Coyne, Kevin <Kevin.Coyne@nrc.gov>; Nakoski, John <John.Nakoski@nrc.gov>; Lane, John <John.Lane@nrc.gov>;

Appignani, Peter <Peter.Appignani@nrc.gov>; Wong, See-Meng <See-Meng.Wong@nrc.gov>
Cc: Correia, Richard <Richard.Correia@nrc.gov>
Subject: NEI's recommendation for a pilot program to use PRAs in SDPs

Before we invest resources in piloting NEI's proposal, we should respond by disagreeing with the statements in red, below. Our response should invite NEI to provide a listing of differences and associated reasons over the past 10 years. (They will find out that the differences were with analysis assumptions, not plant modeling details. In addition, they may realize that the resources spent by the licensee PRA staff/contractor to perform a SDP analysis were caused by the difficult task of modeling the performance deficiency in their PRA.) Further, we should invite NEI to survey all plants to see if they support this proposal and are willing to provide NRC with their PRA, routine updates to the PRA, PRA documentation (which will be docketed), on-call support for NRC analysts, emergency on-call support during MD 8.3 and NOEDs, and PRA modifications for unique and complex event/condition-specific analyses. We should also state the unintended consequences of sun setting SPAR: increase in NRC-identified findings from PRA deficiencies and the sunset of our data collection and analysis programs (NRR has already informed the Commission of their desire to sunset the Industry Trends Program, which is the second biggest user of data after SPAR). Of course, an unintended positive consequence is a more reliable PRA.

If all licensees agree with this recommendation and conditions, then let's go forward with a pilot and have some fun.

21. NRC should support a pilot that would evaluate how to better leverage licensee developed PRA models rather than NRC SPAR models in the Significance Determination Process (SDP).

    Considerable NRC time and resources are spent developing and maintaining Standardized Plant Analysis Risk (SPAR) models. Considerable industry time and resources are also spent working to resolve differences between SPAR model results and site-specific PRA models. The industry models are more detailed, comprehensive and more up-to-date than SPAR models, therefore can yield more accurate insights. The NRC should support a pilot with the industry to evaluate the benefits of a Significance Determination Process that is more focused on the licensee developed model rather than the NRC SPAR model. This study would identify the steps needed to reduce cost, improve efficiency and the results of the process.

Coyne, Kevin

From: Coyne, Kevin
Sent: Thursday, September 17, 2015 12:54 PM
To: ODriscoll, James; Mrowca, Lynn
Cc: Monninger, John; Webber, Kimberly; Rini, Brett; Correia, Richard
Subject: RE: 9/11/15-9/15/16 Project Aim Suggestions in NRO and RES areas

Jim –

I think your process would work in theory, but I'm worried that we've only seen the tip of the iceberg on these suggestions. Non Responsive

Non Responsive

For the two suggestions you provided:

- I see no value to sun setting the SPAR models at this time – the resource gain just doesn't exist and the issue is far more complex than can be explained by someone dropping two or three sentences into the "AIM Suggestion Box" – in reality, we would require substantially more resources to use licensee models for risk activities than we currently spend with SPAR. It is the standardization of the models and our regulatory independence that are important, not the quality of the licensee models. Our experience with Vogtle has been very telling in that it has taken a tremendous amount of effort to understand the licensee modeling philosophy, yet alone being able to competently manipulate the model to perform event and condition assessment activities. So there is no gain to identify.
- Non Responsive

Anyway, reviewing the two suggestions you sent probably took about 15 minutes to research and document – we will be paralyzed if we have to do this for 500 more suggestions…

Kevin

From: ODriscoll, James
Sent: Thursday, September 17, 2015 11:27 AM
To: Mrowca, Lynn <Lynn.Mrowca@nrc.gov>; Coyne, Kevin <Kevin.Coyne@nrc.gov>
Cc: Monninger, John <John.Monninger@nrc.gov>; Webber, Kimberly <Kimberly.Webber@nrc.gov>; Rini, Brett

<Brett.Rini@nrc.gov>
Subject: 9/11/15-9/15/16 Project Aim Suggestions in NRO and RES areas

Hi Kevin,

Friday September 11- Wednesday September 16 Staff suggestions.
Here are the suggestions from staff that NRO received that I believe **apply to NRO/DSRA and RES** OEDO is working on a comprehensive table, but for now, please read and consider.

I think this is how we'll handle these in NRO pending OCFO guidance:

1) I review and determine who the POC in NRO should be (e.g., in this case RES and DSRA)
2) The POC reviews the suggestion and determines if it applies to NRO's activities. If so, determines if it should be incorporated into NRO's list of sub-products.
3) If so, the POC will respond to the email cc'ing the other affected BLs and offices, that NRO is considering including, and requesting them to confirm they agree or not.
4) Based on the consensus, the item is included in the BL's breakdowns or is not.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Jim O'Driscoll
Technical Assistant
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Coyne, Kevin

From: Coyne, Kevin
Sent: Wednesday, September 16, 2015 9:16 AM
To: Marksberry, Don
Subject: RE: Talking Points on SPAR vs. Licensee Models (for September RES/NRR Coordination Meeting)

Will the SRAS be invited to a periodic OD meeting between Brian and Bill Dean? No, they will not.

From: Marksberry, Don
Sent: Monday, September 14, 2015 7:36 PM
To: Coyne, Kevin <Kevin.Coyne@nrc.gov>; Correia, Richard <Richard.Correia@nrc.gov>
Cc: Appignani, Peter <Peter.Appignani@nrc.gov>; Nakoski, John <John.Nakoski@nrc.gov>
Subject: RE: Talking Points on SPAR vs. Licensee Models (for September RES/NRR Coordination Meeting)

A few items:

- These 2 uses are performed without notice and sometimes at home and require a high degree of independence:
  - Evaluation of Notices of Enforcement Discretion
  - MD 8.3 Incident Investigation Program Risk Evolutions
- Other characteristics favoring SPAR models: See table.
- All licensees must agree to handover their PRAs; otherwise, we must keep a few SPAR models and the INL infrastructure.
- NRR must develop a SDP metric for PRA deficiencies.

When will SRAs be invited to the discussion?

From: Coyne, Kevin
Sent: Monday, September 14, 2015 5:29 PM
To: Correia, Richard <Richard.Correia@nrc.gov>
Cc: Appignani, Peter <Peter.Appignani@nrc.gov>; Nakoski, John <John.Nakoski@nrc.gov>; Marksberry, Don <Don.Marksberry@nrc.gov>
Subject: Talking Points on SPAR vs. Licensee Models (for September RES/NRR Coordination Meeting)

Rich –

Here's some "talking points"/background for Brian to use at the upcoming NRR/RES coordination meeting. Thoughts/comments?

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- Provide independent risk analysis capability for NRC
- Develop plant specific models (99 operating plants are represented by 75 SPAR models) using standardized modeling and naming conventions. The standardization increases analyst efficiency by

reducing learning time with new models, allows quick and efficient modeling changes to represent operational events, and can be readily updated. Standardization also allows efficient comparison across models to easily identify outliers.

- Leverage available licensee PRA information to reduce program costs, but integrate licensing model conventions into standardized SPAR modeling framework
- Develop a tool that is designed to support event and condition analyses -- SPAR models and SAPHIRE code are designed to support performing "delta-risk" analyses, licensing developed models and supporting codes lack this capability
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SPAR Model Uses

- Significance Determination Process (Reactor Oversight)
- Accident Sequence Precursor Program (used to support the performance budget process)
- Evaluation of Notices of Enforcement Discretion
- MD 8.3 Incident Investigation Program Risk Evolutions (e.g., determine level of inspection response to an event)
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Feedback from Regional SRAs on Potential Use of Licensee Models vice SPAR

- It is much more efficient and objective to use our own analysis rather than review the licensee's model since we don't know their model and each issue is different.

- Our inspectors don't have the skill sets to rigorously challenge the licensee PRA folks on all the issues we receive in the Regions. To offset that and to handle the increased work load without the SPAR models we need to hire many more SRAs in the Regions, about one per plant would be good start.

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- Without more SRA resources our timeliness of getting "SERP Packages" written and processed with take a severe hit. Licensee's rarely give us what we need, to begin with. I imagine a series of RAIs going back and forth for many issues. If you need examples of the kinds of input we get from licensee's I can send some horrific examples.

Appignani, Peter

From: Appignani, Peter
Sent: Tuesday, September 15, 2015 7:13 PM
To: Kozak, Laura
Subject: Re: SPAR vs Licensee models

Laura

It has come up a few times and we are trying to stay ahead of it.
Obviously the industry would like to do away with them and as for Project Aim I do to know who suggested it.

Anyway, my management asked me for a paper and the outline is the result.
If you any any suggestions to improve the outline please do not hesitate to provide them.

thanks

Pete

From: Kozak, Laura
Sent: Tuesday, September 15, 2015 4:30 PM
To: Appignani, Peter
Subject: RE: SPAR vs Licensee models

Pete

This is very good. Is the suggestion to get rid of SPAR models gaining more traction? I saw that it came up during the Project Aim Commission briefing.

It was stated that the models are used to confirm licensee results.

Laura

From: Appignani, Peter
Sent: Tuesday, September 15, 2015 8:20 AM
To: Bernhard, Rudolph; Cahill, Christopher; Loveless, David; Kozak, Laura; Cook, William
Subject: SPAR vs Licensee models

All

I incorporated your comments and others into the attached.
Any constructive comments or suggestions will be appreciated.

At this time, I would like to limit distribution of the attached, so please do not distribute

Thanks

Pete

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models
Outline

1. **Considerations for using licensees' PRA Models**
   - 1.1. Regulatory Processes
   - 1.2. PRA Policy Statement
   - 1.3. Maintain independence of NRC
   - 1.4. Standardization of modeling and assessment techniques
   - 1.5. Use by the NRC staff of licensees' PRA models
   - 1.6. Effect on other NRC Programs
   - 1.7. Costs

2. **Regulatory Processes**
   - 2.1. Reactor Oversight Process (ROP)
     - 2.1.1. ROP is an NRC process
   - 2.2. Significance Determination Process (SDP)
     - 2.2.1. Today's SDP outcomes using NRC versus licensee PRA
       - 2.2.1.1. The PRA models are often in close agreement.
       - 2.2.1.2. Differences in SDP outcomes between the NRC and the licensee are driven by factors other than the baseline PRA model
         - 2.2.1.2.1. Engineering assumptions
         - 2.2.1.2.2. Modeling assumptions
         - 2.2.1.2.3. Human reliability assumptions
         - 2.2.1.2.4. Other ...
       - 2.2.1.3. These issues are also applicable to the other regulatory processes and other risk-informed licensing related activities
   - 2.3. MD 8.3 - NRC Incident Investigation Program
   - 2.4. Notice of Enforcement Discretion (NOEDs)
   - 2.5. Technical basis for rulemaking
   - 2.6. Generic issues
   - 2.7. Other risk-informed licensing related activities

3. **PRA Policy Statement**
   - 3.1. The PRA Policy Statement encouraged the agency to increase the use and application of PRA to the greatest extent practical.
   - 3.2. SPAR models are one of the key incarnations of that effort.
   - 3.3. Eliminating SPAR models would violate the spirit of that policy because it would undermine confidence in PRA-based findings.

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models Outline

4. **Maintain independence of NRC**
   - 4.1. ROP provides for an independent regulatory assessment of licensee performance
     - 4.1.1. Staff will lose ability to verify "trust but verify"
     - 4.1.2. Licensee's initially indicate an event as low safety significance in LERs that are later established as a greater than Green finding
   - 4.2. Conflict of interest issues
     - 4.2.1. OGC may need to endorse use of licensee PRA and licensee performing the assessment
   - 4.3. Public confidence
     - 4.3.1. Use of licensee PRA could erode public confidence
     - 4.3.2. In effect the licensee is communicating events and degraded plant conditions to the public and other stakeholders if they perform the analysis

5. **Standardization of modeling and assessment techniques**
   - 5.1. SPAR models have been peer reviewed by industry
     - 5.1.1. Confidence on the part of staff and industry that the current generation of SPAR models accurately portray the plants that they model.
     - 5.1.2. SPAR models were determined to be adequate for their intended application
   - 5.2. Efficiency of standardization
     - 5.2.1. Modeling assumptions
     - 5.2.2. Modeling conventions
     - 5.2.3. Naming schemes (basic events, fault trees, event tress, etc.)
     - 5.2.4. Post processing rule construction
     - 5.2.5. Reporting functions (built into SAPHIRE)
     - 5.2.6. Consistency in event tree/fault tree construction
     - 5.2.7. Single Software platform
     - 5.2.8. Uniformity of assessments (RASP Handbooks)
       - 5.2.8.1. Risk Assessment Standardization Project (RASP) Handbooks
       - 5.2.8.2. Uniform because SPAR models are standardized
       - 5.2.8.3. Software platform is standardized (SAPHIRE)
         - 5.2.8.3.1. SAPHIRE was developed and modified specifically to support the regulatory processes

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models Outline

6. **Use by the NRC staff of licensees' PRA models**
   - 6.1. Additional logistical and resource requirements
     - 6.1.1. Seventy (70) plus licensee PRAs
       - 6.1.1.1. No standardization
     - 6.1.2. Four (4) different commercial software platforms
       - 6.1.2.1. CAFTA (EPRI)
       - 6.1.2.2. WinNUPRA (Scientech)
       - 6.1.2.3. Riskman (ABS Consulting)
         - 6.1.2.3.1. Cutsets are problematic (used to gain understanding of risk insights)
       - 6.1.2.4. RiskSpectrum (Lloyd's Register Consulting, Sweden)
       - 6.1.2.5. All lack reporting features of SAPHIRE
       - 6.1.2.6. All lack easy to use analysis tools in SAPHIRE
   - 6.2. Need for additional NRC risk analysts
     - 6.2.1. Additional staff training requirements
   - 6.3. Management and control of licensee models and model updates
     - 6.3.1. Non-uniform modeling assumptions and limitations
       - 6.3.1.1. Each model will need to be examined and understood
     - 6.3.2. Availability of PRA models and supporting documentation
       - 6.3.2.1. Will the licensee formally submit their PRA to NRC?
         - 6.3.2.1.1. Under oath and affirmation?
         - 6.3.2.1.2. Subject to 10 CFR 50.9?
     - 6.3.3. How will staff ensure NRC has the latest licensee model?

7. **Effect on other NRC Programs**
   - 7.1. Accident Sequence Precursor (ASP) program
     - 7.1.1. Abnormal occurrence report to Congress
   - 7.2. Industry trends/operating experience programs
   - 7.3. New Reactors (PRA & licensing)
   - 7.4. Inspection programs
     - 7.4.1. Inspection resources
     - 7.4.2. Inspection decisions will become reactive based on deterministic criteria alone
   - 7.5. Use of SPAR models to support system and component studies
   - 7.6. Development of Plant Information Risk eBooks (PRIBS) – superseded the SDP Notebooks

7.7. SPAR Models used for other purposes

7.7.1. Answer Commission questions

7.7.2. Japan Lesson Learned related issues (flooding, vents, seismic)

7.7.2.1. SPAR model results (CDFs) used to assist in the resolution of Fukushima NTTF Rec. 5.2 (containment venting for plants other than BWR with Mark I and Mark II containments), and Rec. 6 (hydrogen control and mitigation).

7.7.2.2. SPAR model data (equipment failure rates) supported the risk evaluation of Fukushima NTTF Rec. 5.1 (containment venting in BWR Mark I and Mark II plants)

7.7.3. SPAR-EE models supported GI-199 (updated seismic hazard curves for plants east of the Rocky Mountains)

7.7.4. Gain understanding of key basic events in the SPAR fire PRA models

7.7.5. SPAR models used to identify the most likely core-damage sequences for SOARCA analysis.

7.7.6. SPAR models and data (equipment failure rates) supported staff's analysis of containment accident pressure (CAP) credit in BWR plants.

7.7.7. Gain understanding of CDFs as estimated by SPAR (supported work for Commissioner Apostolakis, 2013).

7.7.8. NRR made heavy use of the SPAR models (event trees) while reviewing the Browns Ferry extended power uprate (EPU) license amendment request.

8. Costs

8.1. Costs to both NRC and Industry

8.2. NRC

8.2.1. Licensee model reviews

8.2.2. Logistical requirements

8.2.3. Training

8.2.4. Commercial Software licenses

8.2.4.1. Commercial PRA software typically requires additional software (licenses) to be comparable to SAPHIRE (e.g. CAFTA/FTREX)

8.2.5. Additional analyst staff

8.2.6. Other

8.3. Industry

8.3.1. Cost for model standardization

8.3.2. Cost to implement a single RG 1.200 compliant standardized modeling approach on one analysis platform

8.3.2.1. Re-invent a RASP Handbook for uniformity of assessments

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models Outline

8.3.3. Cost for licensee to submit their PRA to NRC

8.3.4. Cost to implement SAPHIRE reporting features and other tools

8.3.5. How will industry provide support to NRC Analysts?

8.3.5.1. INL is currently responding to approximately 2 requests for assistance per day via the Technical Support contract

8.3.6. Other

Appignani, Peter

From: Appignani, Peter
Sent: Tuesday, September 15, 2015 9:13 AM
To: Marksberry, Don
Subject: RE: SPAR vs Licensee models

Don

Thanks

I will seriously consider doing that.

Pete

From: Marksberry, Don
Sent: Tuesday, September 15, 2015 6:22 AM
To: Appignani, Peter
Subject: RE: SPAR vs Licensee models

Very comprehensive. You may want to send this to SRAs for comment.

From: Appignani, Peter
Sent: Monday, September 14, 2015 9:32 PM
To: Marksberry, Don <Don.Marksberry@nrc.gov>
Subject: SPAR vs Licensee models

Don

FYI

Coyne, Kevin

From: Correia, Richard
Sent: Tuesday, September 15, 2015 7:52 AM
To: Coyne, Kevin
Cc: Appignani, Peter; Nakoski, John; Marksberry, Don
Subject: RE: Talking Points on SPAR vs. Licensee Models (for September RES/NRR Coordination Meeting)

Kevin,

All great considerations. I would generalize the regional SRA inputs rather than quotes.

thx

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

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Attachments: SPAR Model Advantages.docx

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Bottom line for SPAR vs Licensee Models:

- Both approaches should arrive at the right answer.
- Analysis using the licensee's model will be more expensive due to practical difficulties.
- Analysis using licensee model will lack independence and be subject to unreviewed subtleties.
- Limitations associated with the SPAR models can be overcome.
- Only the SPAR models can be used for generic studies & issues.

COMPARISON TABLE	
SPAR	**Licensee Models**
CHARACTERISTICS FAVORING SPAR MODELS	
One software package specifically designed for event assessments to be familiar with.	Multiple software packages. (CAFTA, RISKMAN, Risk Spectrum & WinNUPRA)
Same initiating event frequency, equipment failure and human reliability data allows user to remove those affects, or quickly adjust with plant-specific information.	Difficult to determine if data, model or user error is effecting an analysis.
Simple and quick for basic runs, and NRC analysts can add/modify the model	Simple and quick for experienced user. Additions or modification to model could go wrong.
Consistent modeling approach and structure allows analyst to manipulate.	Subtle differences in structure can cause errors when the model is manipulated.
Always based on NRC-accepted success criteria (i.e., operation post-containment failure, PORVs, ADS, RCP seal models)	Based on licensee-accepted success criteria.
NEUTRAL CHARACTERISTICS	
Both will give right answer with staff and licensee review and interaction	
CHARACTERISTICS FAVORING LICENSEE MODELS	
Detail missing from SPAR model usually has small effect on analysis	Licensee models are more complete and detailed.
SPAR model may not be up to date.	PRA standard requires regular updates.
SPAR model documentation not to standard of licensee models. Analysts may or may not take time to fully use documentation.	PRA standard has improved documentation industry-wide.

Coyne, Kevin

From: Nakoski, John
Sent: Monday, September 14, 2015 5:46 PM
To: Coyne, Kevin; Correia, Richard
Cc: Appignani, Peter; Marksberry, Don
Subject: RE: Talking Points on SPAR vs. Licensee Models (for September RES/NRR Coordination Meeting)

Kevin – looks good to me. Nice writeup. I hope it helps to show others the value of SPAR models.

John

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- Evaluate generic issue safety significance

- Perform system and component studies
- Inspection Planning (e.g., risk insights from Plant Risk Information eBooks)

SPAR Model Annual Budget

- SPAR Model Configuration/Quality Control and User Support Help Desk ~$500k/year
  - Help desk handles ~ 2 calls/day from SRAs
  - Ensures model version control and maintains INL Website
  - Performs model updates to support specific SDP/ASP activities (~30 models were updated to support a specific analysis in FY2015). These updates are often highly specific to the event/condition that occurred and would be expected to be included in a base PRA model (i.e., the licensee PRA would generally also need to be updated in a similar way to assess the event/condition)

- Model Updates to Reflect Significant Plant Changes (~12 models/year) - ~$250k
  - Incorporate station blackout EDGs
  - Battery charging generators
  - Significant model upgrades

- External Hazard and Fire Models - ~ $400k
  - Add NFPA 805 fire modeling
  - Add seismic and high wind model capabilities

- Data Updates (performed every 3 years) - ~$500k (every three years)
  - Upgrade SPAR models to reflect most recent operating data
  - Update model documentation and Plant Risk Information eBooks (PRIBs)
  - General model cleanup/improvements

Letter to NEI from OEDO on Use of SPAR models (2007, ML072490566)

SPAR models are used to :

- Maintain independence of NRC analyses. Differences between NRC and Licensee assessments is not due to the base model, but by the assumptions for each specific event or condition analysis
- Provide standardized model framework for efficient analyses - industry does not use a standardized modeling approach
- Avoid inefficiencies in having agency risk analysts learn the conventions of over 70 licensee developed PRAs (utilizing up to four different software platforms)

Feedback from Regional SRAs on Potential Use of Licensee Models vice SPAR

- It is much more efficient and objective to use our own analysis rather than review the licensee's model since we don't know their model and each issue is different.

- Our inspectors don't have the skill sets to rigorously challenge the licensee PRA folks on all the issues we receive in the Regions. To offset that and to handle the increased work load without the SPAR models we need to hire many more SRAs in the Regions, about one per plant would be good start.

- Our regulatory assessment activities will be eroded by not having a centralized system evaluating Generic Safety Issues, SBO/LOOP studies, etc.

- Without more SRA resources our timeliness of getting "SERP Packages" written and processed with take a severe hit. Licensee's rarely give us what we need, to begin with. I imagine a series of RAIs going back and forth for many issues. If you need examples of the kinds of input we get from licensee's I can send some horrific examples.

Coyne, Kevin

From: Krsek, Robert
Sent: Saturday, September 12, 2015 10:20 PM
To: Coyne, Kevin
Subject: Re: SPAR Letter to NEI

Thanks

From: Coyne, Kevin
Sent: Friday, September 11, 2015 06:03 PM
To: Krsek, Robert
Subject: SPAR Letter to NEI

Memo to NEI on SPAR attached... Nothing has really changed in the basis from 2007.

SECY 2002-0041 gives some background on SPAR (http://www.nrc.gov/reading-rm/doc-collections/commission/secys/2002/secy2002-0041/2002-0041scy.pdf#pagemode=bookmarks) ... This paper references an earlier SECY (SECY 94-076) that initiated development of what was then called the ASP models (https://adamsxt.nrc.gov/WorkplaceXT/IBMgetContent?vsId={B5E39A46-1098-4A56-8551-1A372207C8FE}&objectType=document&id={1C5FB5E2-4E2B-4C21-A309-70BAF8F64CAE}&objectStoreName=Main. .Library)

I'm not sure if there is a specific SRM on SPAR, but it certainly a program the Commission has been kept well informed of through the annual ASP/SPAR SECY paper... And the existence of the models certainly was a key enabler for the current reactor oversight process (which I thought required Commission approval to kick off).

Appignani, Peter

From: Appignani, Peter
Sent: Friday, September 11, 2015 4:21 PM
To: Coyne, Kevin (Kevin.Coyne@nrc.gov)
Subject: SPAR resources
Attachments: Outline Considerations for using other than the Standardized Plant Analysis Risk rev 1.docx; SPAR-SAPHIRE Resource Estimate rev 0.xlsx

Kevin

The attached spreadsheet is the cost of SPAR models & SAPHIRE from 2010 through 2017.
I believe this is what you requested earlier this week.

I am only sharing this with you for now.

Also attached is a revised SPAR vs Licensee PRA Outline, incorporating comments from John Lane.

Pete

Operating Reactor SPAR Model Tasks	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016 (Planned)	FY2017 (Planned)
SPAR Model Technical Support	$288,585	$170,620	$242,428	$246,851	$268,698	$162,244	$293,000	$385,900
SPAR Model Coordination and Integration activities	$157,499	$276,947	$282,599	$266,445	$289,964	$291,605	$315,000	$328,000
Routine SPAR Model Updates	$161,237	$239,616	$379,569	$263,345	$134,574	$158,798	$218,000	
SPAR Model Data Updates	$0	$0	$0	$0	$6,010	$361,134	$303,100	
SPAR Model PWR Peer Review Resolution	$0	$287,719	$259,154	$135,629	$67,719	$172,341	$0	$0
SPAR Model BWR Peer Review Resolution	$0	$204,520	$162,155	$146,660	$79,910	$102,614	$0	$0
Technical Support for SPAR All Hazard Models	$0	$159,000	$357,000	$399,000	$81,000	$383,645	$125,583	$0
Develop NFPA 805 Fire SPAR Models	$0	$0	$224,000	$183,000	$186,000	$112,420	$65,580	$0
PRIB Reports	$0	$0	$275,417	$0	$0	$0	$0	$0
SPAR Model Subtotals	$607,320	$1,338,422	$2,182,322	$1,640,930	$1,113,875	$1,744,801	$1,320,263	$713,900
SAPHIRE Quality Assurance & Maintenance		$170,938	$498,905	$173,770	$304,551	$275,000	$360,000	$300,000
SAPHIRE 8	$808,293	$340,684	$27,130					
Improve SAPHIRE speed/performance (PRIBs)		$309,977	$166,307					
SAPHIRE Enhancements				$251,625	$199,073	$361,960	$336,000	$200,000
SAPHIRE Subtotals	$808,293	$821,599	$692,342	$425,395	$503,624	$636,960	$696,000	$500,000
TOTAL	$1,415,613	$2,160,021	$2,874,664	$2,066,325	$1,617,499	$2,381,761	$2,016,263	$1,213,900

New Reactor SPAR Model Tasks	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016 (Planned)	FY2017 (Planned)
New Reactor SPAR	$0	$0	$0	$87,195	$254,600	$132,151	$200,000	$200,000
New Reactor SPAR - Advanced BWR	$155,567	$161,725	$51,536	$0	$0	$0	$0	$0
New Reactor SPAR - AP1000	$39,085	$64,226	$0	$0	$0	$0	$0	$0
New Reactor SPAR - APR	$9,083	$232,239	$37,874	$0	$0	$0	$0	$0
New Reactor SPAR - EPR		$17,081	$230,583	$90,616	$0	$0	$0	$0
New Reactor SPAR Model Subtotal	$203,734	$475,271	$319,993	$177,810	$254,600	$132,151	$200,000	$200,000

Grand TOTAL	$1,619,348	$2,635,292	$3,194,657	$2,244,136	$1,872,099	$2,513,912	$2,216,263	$1,413,900

Circle, Jeff

From: Weerakkody, Sunil
Sent: Friday, September 11, 2015 6:55 AM
To: Circle, Jeff
Subject: RE: Heads Up

thanks

From: Circle, Jeff
Sent: Thursday, September 10, 2015 4:12 PM
To: Weerakkody, Sunil
Subject: FW: Heads Up

From: Circle, Jeff
Sent: Thursday, September 10, 2015 4:11 PM
To: Giitter, Joseph <Joseph.Giitter@nrc.gov>
Cc: Lee, Samson <Samson.Lee@nrc.gov>
Subject: Heads Up

Joe,

FYI. Bill spoke with us right after the GYO ceremony this afternoon regarding the old chestnut of our getting rid of the SPAR models in favor of licensees' models. He asked me what I thought and I told him that it could be problematic. I didn't want to elaborate on all the points but, did mention just a few. He stated that his problem is trying to justify the $1-2M user need that goes to RES and INL to work on these models. I did tell him that I thought that there would be a costly steep learning curve for these models since they've all been created differently (despite being RG 1.200 compliant). Another thing to consider is that we have no regulatory authority to ask for them (for a Part 50 license), etc. Michelle also weighed in telling him that licensees manipulate data in the background using techniques and tools that we might not have access to.

In the end Bill left saying that he's thinking about having us put together some cost-benefit analysis of what it would cost to continue with SPAR vs. elimination of SPAR and using licensee models. So, we might have some more work to do.

Jeff.

Jeff A. Circle
Team Leader – PRA Model Development
PRA Operations and Human Factors Branch
NRR/Division of Risk Assessment
(301) 415-1152
BB (b)(6)

Circle, Jeff

From: Giitter, Joseph
Sent: Thursday, September 10, 2015 4:51 PM
To: Circle, Jeff
Subject: RE: Heads Up

Thanks for the heads up Jeff.

From: Circle, Jeff
Sent: Thursday, September 10, 2015 4:11 PM
To: Giitter, Joseph <Joseph.Giitter@nrc.gov>
Cc: Lee, Samson <Samson.Lee@nrc.gov>
Subject: Heads Up

Joe,

FYI. Bill spoke with us right after the GYO ceremony this afternoon regarding the old chestnut of our getting rid of the SPAR models in favor of licensees' models. He asked me what I thought and I told him that it could be problematic. I didn't want to elaborate on all the points but, did mention just a few. He stated that his problem is trying to justify the $1-2M user need that goes to RES and INL to work on these models. I did tell him that I thought that there would be a costly steep learning curve for these models since they've all been created differently (despite being RG 1.200 compliant). Another thing to consider is that we have no regulatory authority to ask for them (for a Part 50 license), etc. Michelle also weighed in telling him that licensees manipulate data in the background using techniques and tools that we might not have access to.

In the end Bill left saying that he's thinking about having us put together some cost-benefit analysis of what it would cost to continue with SPAR vs. elimination of SPAR and using licensee models. So, we might have some more work to do.

Jeff.

Jeff A. Circle
Team Leader – PRA Model Development
PRA Operations and Human Factors Branch
NRR/Division of Risk Assessment
(301) 415-1152
BB (b)(6)

Appignani, Peter

From: Schroer, Suzanne
Sent: Tuesday, September 08, 2015 2:28 PM
To: Ott, William; Peters, Sean; Appignani, Peter; Nakoski, John; Salley, MarkHenry
Cc: Correia, Richard; Coyne, Kevin; Rivera, Tammie
Subject: RE: ACTION: Topics and Update of Action Items for RES/NRR Periodic

Date correction below.

From: Schroer, Suzanne
Sent: Tuesday, September 08, 2015 8:13 AM
To: Ott, William; Peters, Sean; Appignani, Peter; Nakoski, John; Salley, MarkHenry
Cc: Correia, Richard; Coyne, Kevin; Rivera, Tammie
Subject: ACTION: Topics and Update of Action Items for RES/NRR Periodic

Hi all,

Please let Tammie know if you have any topics for the upcoming September 30 meeting for Brian's periodic with Bill Dean. Especially, any areas of good collaboration.

Please send by COB, September 16.

Thanks!
Suzanne

From: Rini, Brett
Sent: Friday, September 04, 2015 2:49 PM
To: Correia, Richard; Coyne, Kevin; Case, Michael; Coffin, Stephanie; Thomas, Brian; Brock, Kathryn; Landau, Mindy
Cc: Armstrong, Kenneth; Schroer, Suzanne; Chen, Yen-Ming; Martinez, Erick; Rivera, Tammie
Subject: ACTION (due 9/18): Topics and Update of Action Items for RES/NRR Periodic

All,

The periodic RES and NRR Office Director counterparts meeting is scheduled for September 30. The agenda for the June meeting is below. Please find attached the updated list of action items under each agenda item.

By September 18, please send me the following:

- Proposed agenda topics for the September meeting (all divisions)
- Updates to any action items from the June meeting, shown in yellow on pages 1-3 of the attachment (DE only)

Agenda for June 23, 2015 Meeting

1. Non Responsive
2.
3.
4.
5. SPAR models vs. licensee PRAs (RES/DRA)
6. Non Responsive
7.

8. Non Responsive
9.
10
11
12

Thanks,

Brett

RES/NRR Executive Team Meeting
June 23, 2015
1:00 – 2:00 p.m.
OWFN – 13D20

Attendees

NRR

- Jennifer Uhle
- Michele Evans
- Allen Howe
- Mary Jane Ross-Lee
- Lawrence Kokajko
- Sunil Weerakkody
- Undine Shoop
- Leslie Perkins
- Holly Cruz
- Andrew Proffitt

RES

- Brian Sheron
- Steve West
- Tom Boyce
- Brett Rini

Agenda & Action Items

1. Non Responsive

Non Responsive

2. Non Responsive

3.

4.

Non Responsive

5. SPAR models vs. licensee PRAs (RES/DRA)
   - No follow up actions

Non Responsive

6.

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Additional Discussion

- Non Responsive

Background for Periodic NRR/RES Office Director Meeting (6/23/15)

1. Non Responsive

2.

Non Responsive

3.

Non Responsive

- User Need on SPAR Models (NRR/DRA) – input from RES under topic 7.

4. Non Responsive

5. **SPAR models vs. licensee PRAs (RES/DRA)**

The SPAR models are standardized, plant-specific, PRA models that are used to support a variety of risk-informed regulatory programs, including the SDP (NRR & Regions), NOEDs (NRR & Regions), MD 8.3 Assessments (Regions), Generic Issues (RES), ASP analysis (RES), Regulatory Analysis (NRR & RES), risk-informing inspection activities (Regions), and special studies (RES & NRO). The SPAR models provide a tool that supports consistent risk-informed regulatory decision-making for a diverse range of issues.

Key Messages

- SPAR models provide an independent and effective risk assessment tool and are fully capable of supporting the NRC's risk-informed regulatory activities. Use of a risk tool that is independent from the licensee's PRA fosters a more productive exchange of information with the licensee and reduces the potential for biasing risk results and insights.
- The use of a common software platform (SAPHIRE) and the standardized SPAR modeling approach improves the ability of the NRC to make consistent risk-informed decisions related to performance deficiencies and operating events; increases the efficiency of agency risk analysts; and permits the agency to make cost-effective improvements to our risk tools to meet emerging user needs.

- No PRA (SPAR or licensee) can accurately capture every nuance of an operational event or performance deficiency. Qualified risk analysts and an appropriate level of peer review ensure that SPAR results appropriately represent the as-built, as-operated plant.
- The NRC has not observed significant divergence in analysis results due to modeling differences between licensee and SPAR models. While divergence between licensee and NRC SDP assessments is sometimes noted, the reasons generally involve analysis-specific assumptions and boundary conditions (e.g., human reliability analysis, common cause failure assumptions, recovery credit) rather than baseline modeling differences
- For RES, the SPAR models and SAPHIRE code currently provide the only viable method for evaluating potential event precursors under the ASP Program (which provides input into the performance budget and abnormal occurrence report to Congress). NRC reliance on licensee PRA models would significantly adversely impact the efficient and effective implementation of the ASP Program.

Current Capabilities

- 76 SPAR models representing all operating plants – all include at-power models, internal hazards
- 20 models contain external hazard models (representing 25 operating plants)
- 8 models include shutdown template models
- 5 new reactor models (ABWR/GE, ABWR/Toshiba, APWR, AP1000, US EPR)

Advantages of SPAR Models Compared to Licensee Models

- Provides risk modeling capabilities that are independent of licensee models and analyses. This independence is critical in ensuring public confidence in our oversight programs (see letter from EDO to NEI, October 2007, ML072490566).
- Modeling changes needed for event and condition assessments (ECAs), including those arising from plant-specific information provided by licensees, can be quickly and easily accomplished using the standardized conventions of the SPAR and SAPHIRE environment.
- Improves Efficiency of Agency Risk Analysts
    - SPAR models use standardized modeling and naming conventions to allow agency risk analysts to efficiently navigate the models and make changes to support ECAs in a timely manner. This standardization also simplifies data updates and analyses for multiple plants.
    - SPAR models are specifically developed to support ECAs and include modeling conventions for common cause failure, AC power distribution, and support systems that allow quicker, more consistent, and more accurate risk assessments.
    - All SPAR models are designed to run with the SAPHIRE computer code, which provides enhanced features to support ECAs such as structured user workspaces (which adjusts functionality to the user's skill level) and advanced reporting capabilities (such as the Plant Risk Information eBooks).
    - The Agency has ability to adjust either SPAR modeling and/or the SAPHIRE code to provide new features and capabilities in the most optimal and cost effective manner.

SPAR Quality Assurance

- The SPAR Quality Assurance Plan and supporting QA requirements in RASP Handbook help ensure models represent the as-built, as-operated plant

- Model Maker Guidelines for external hazards, shutdown, and Level 2 ensure consistent use of modeling conventions
- Configuration controls are followed for model updates to ensure consistent and accurate model updates.
- Verification reviews include onsite verification (when appropriate) and comparison to licensee models. SPAR models are benchmarked to licensee PRA information after major SPAR updates (comparisons rely on the best available information provided by the licensee and include checks of CDF, CCDPs, and qualitative review of cutsets)
- Industry led ASME PRA Standard peer reviews of representative BWR and PWR models conducted in 2010 determined that SPAR models were efficient method to develop qualitative and quantitative insights for agency applications
- SAPHIRE is maintained under a NUREG/BR-0167 compliant QA program

SPAR Model Maintenance Activities

- Major updates are performed for approximately 8-12 models per year based on feedback from NRR and Regional SRAs
- Less significant model changes are performed as needed to support SDP and ASP activities (typically 20-30 models per year).
- Every 3-4 years, a major data update is performed for all SPAR models to reflect recent operational performance data and other model enhancements (currently in progress)

SPAR and SAPHIRE Annual Budget

- ~$2 million per year
- ~4 FTE per year
- Approximately 90% of resources from operating reactor business line, remainder from new reactors.

6. Non Responsive

7.

Non Responsive

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Non Responsive

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Non Responsive

Non Responsive.

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12. Non Responsive

Non Responsive

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-

Additional Background Information

Non Responsive

Non Responsive

Non Responsive

Non Responsive

Coyne, Kevin

From: Appignani, Peter
Sent: Thursday, September 03, 2015 10:41 AM
To: Correia, Richard; Coyne, Kevin
Subject: FW: Project Aim 2020

From: Kozak, Laura
Sent: Thursday, September 03, 2015 10:39 AM
To: Appignani, Peter <Peter.Appignani@nrc.gov>; Bernhard, Rudolph <Rudolph.Bernhard@nrc.gov>; Cahill, Christopher <Christopher.Cahill@nrc.gov>; Loveless, David <David.Loveless@nrc.gov>; Passehl, Dave <Dave.Passehl@nrc.gov>; Cook, William <William.Cook@nrc.gov>
Subject: RE: Project Aim 2020

Pete

Thanks for contacting us on this topic. We will not be able to perform any independent analysis without the SPAR models. It really is a non-starter to suggest that we can use the licensee's PRA or to allow the licensee to perform the SDP analysis. Also impacted would be MD8.3 and NOED, much less inspection planning and development of any risk insights.

It is much more efficient and objective to use our own analysis rather than review the licensee's model since we don't know their model and each issue is different. Also, licensees almost always determine on their own that a finding is green, even when we think it is yellow or red. This is because they use different assumptions and manipulate the base model as necessary to get their desired outcome.

Laura

From: Appignani, Peter
Sent: Wednesday, September 02, 2015 8:45 AM
To: Bernhard, Rudolph; Cahill, Christopher; Loveless, David; Kozak, Laura; Passehl, Dave; Cook, William
Subject: Fw: Project Aim 2020

All

If you happened to be listening in on the Project Aim 2020 public meeting yesterday you may have heard that the industry would like the NRC to do away with the SPAR models (see Fernando's insights below).

I was asked to obtain insights from the SRAs concerning this suggestion.

If you have a few minutes, please let me know how you feel about the SRAs using the licensee's PRA to perform the analysis, letting the licensee perform the SDP or other analysis using their PRA or doing away with the SDP or ROP. If I recall correctly, none of you were pleased with this when the industry suggested doing this a few years ago.

I'm working at home today, so if you would rather discuss this issue we can talk tomorrow or Friday. However, a simple email would probably suffice.

If the others SRAs you work with would like to comment on this subject they are welcome to do so, I just didn't want to pulse everyone.

Thanks

Pete

From: Ferrante, Fernando
Sent: Tuesday, September 1, 2015 3:06 PM
To: Coyne, Kevin; Appignani, Peter
Subject: Project Aim 2020

Pete, Kevin,

Just FYI. I listened in on this afternoon's public meeting on public stakeholder input on the Project Aim 2020 for a brief moment (for my health benefit, maybe I shouldn't have). As I expected, someone from industry suggested that the NRC get rid of SPAR models because "the licensee's models are so much better". I am not sure any of the NRC people in charge understands what this means. I also noted several NEI and other industry representatives involved in the meeting from other efforts I have participated in in NRR. They are clearly looking at this as another opportunity to get what they lobbied which they may not have gotten elsewhere. Aside from the SPAR comment, someone actually said that since the plants are safer than ever, there should be no reason for inspection resources at the NRC to increase and therefore the NRC should look into cutting inspection funding.

Thank you,
Fernando

Appignani, Peter

From: Coyne, Kevin
Sent: Tuesday, September 08, 2015 2:18 PM
To: Appignani, Peter; Correia, Richard
Subject: RE: Re: [External_Sender] Fwd: ACTION (due 9/18): Topics and Update of Action Items for RES/NRR Periodic

Thanks Pete – we were both there to hear the word in person... unfortunately...

From: Appignani, Peter
Sent: Tuesday, September 08, 2015 12:39 PM
To: Correia, Richard <Richard.Correia@nrc.gov>
Cc: Coyne, Kevin <Kevin.Coyne@nrc.gov>
Subject: RE: Re: [External_Sender] Fwd: ACTION (due 9/18): Topics and Update of Action Items for RES/NRR Periodic

You both may want to watch part of this mornings Commission briefing on Project AIM 2020 (9/8/2015)
http://video.nrc.gov/vPlayer.php?eventID=1069&type=JW

SPAR models discussed starting at 57:30 into the presentation

Pete

From: Correia, Richard
Sent: Tuesday, September 08, 2015 12:30 PM
To: Peter Appignani
Cc: Coyne, Kevin; Appignani, Peter
Subject: RE: Re: [External_Sender] Fwd: ACTION (due 9/18): Topics and Update of Action Items for RES/NRR Periodic

Many thanks Pete

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Peter Appignani [mailto:(b)(6)
Sent: Tuesday, September 08, 2015 9:21 AM
To: Correia, Richard <Richard.Correia@nrc.gov>
Cc: Coyne, Kevin <Kevin.Coyne@nrc.gov>; Appignani, Peter <Peter.Appignani@nrc.gov>
Subject: [External_Sender] Re: [External_Sender] Fwd: ACTION (due 9/18): Topics and Update of Action Items for RES/NRR Periodic

Changes attached

added

2.5. Technical basis for rule making

2.6. Generic issues (removed from section 7)

also added:

7.1.1. Abnormal occurrence report to Congress *(it's under ASP 7.1)*

7.2. Industry trends/operating experience programs

Pete

On Sep 8, 2015, at 9:04 AM, Correia, Richard <Richard.Correia@nrc.gov> wrote:

OK. Leave ASP where it is but add technical basis for rulemaking and generic issues to regulatory programs.

Thanks for your patience Pete!

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Peter Appignani [mailto:(b)(6)
Sent: Tuesday, September 08, 2015 8:40 AM
To: Correia, Richard <Richard.Correia@nrc.gov>
Cc: Coyne, Kevin <Kevin.Coyne@nrc.gov>; Appignani, Peter <Peter.Appignani@nrc.gov>
Subject: [External_Sender] Re: [External_Sender] Fwd: ACTION (due 9/18): Topics and Update of Action Items for RES/NRR Periodic

Rich

I can put them wherever you want

On Sep 8, 2015, at 6:42 AM, Correia, Richard <Richard.Correia@nrc.gov> wrote:

I did see item 7 Pete. I'm Ok with leaving ASP as another program but amplified to include ASP part of the abnormal occurrence report to Congress and Industry trends/operating experience programs. Using SPAR models for the development of tech basis for rulemaking is a regulatory process though.

Also, SPAR models used in the generic issues program to me is a regulatory process given the outcome could be a rule, generic communication (bulletin, IN...).

Call me a Monday morning quarterback!

Thx

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Peter Appignani [mailto (b)(6)
Sent: Monday, September 07, 2015 3:33 PM
To: Correia, Richard <Richard.Correia@nrc.gov>
Cc: Coyne, Kevin <Kevin.Coyne@nrc.gov>; Appignani, Peter <Peter.Appignani@nrc.gov>
Subject: [External_Sender] Re: [External_Sender] Fwd: ACTION (due 9/18): Topics and Update of Action Items for RES/NRR Periodic

Rich

Look at item 7. Effect on other NRC Programs

Pete

On Sep 7, 2015, at 1:12 PM, Correia, Richard <Richard.Correia@nrc.gov> wrote:

Pete. I didn't see ASP and tech basis/ reg analysis for rulemaking on the list of regulatory uses.
Rich
Send by BlackBerry

From: Peter Appignani [mailto (b)(6)
Sent: Sunday, September 06, 2015 01:18 PM
To: Correia, Richard
Cc: Coyne, Kevin; Appignani, Peter
Subject: [External_Sender] Fwd: ACTION (due 9/18): Topics and Update of Action Items for RES/NRR Periodic

Rich

Enclosed is a revised outline incorporating the SRA comments (as you requested, without revealing the source)
The outline contains everything that was in the previous presentation.
I believe the outline would be better than a presentation for Brian for use in this venue (4 pages versus 16-20)

Bottom line - there are a lot of important issues to consider here.

Pete

Begin forwarded message:

From: "Appignani, Peter" <Peter.Appignani@nrc.gov>
Subject: FW: ACTION (due 9/18): Topics and Update of Action Items for RES/NRR Periodic
Date: September 5, 2015 at 11:53:45 AM EDT
To: (b)(6) >

From: Correia, Richard
Sent: Friday, September 04, 2015 4:47 PM
To: Coyne, Kevin; Appignani, Peter
Subject: FW: ACTION (due 9/18): Topics and Update of Action Items for RES/NRR Periodic

Brian will likely want something on SPAR vs lic PRAs.

Pete...please send up whatever is the latest info on this topic including insights from SRAs but without revealing the source.

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Rini, Brett
Sent: Friday, September 04, 2015 2:49 PM
To: Correia, Richard <Richard.Correia@nrc.gov>; Coyne, Kevin <Kevin.Coyne@nrc.gov>; Case, Michael <Michael.Case@nrc.gov>; Coffin, Stephanie <Stephanie.Coffin@nrc.gov>; Thomas, Brian <Brian.Thomas@nrc.gov>; Brock, Kathryn <Kathryn.Brock@nrc.gov>; Landau, Mindy <Mindy.Landau@nrc.gov>
Cc: Armstrong, Kenneth <Kenneth.Armstrong@nrc.gov>; Schroer, Suzanne <Suzanne.Schroer@nrc.gov>; Chen, Yen-Ming <Yen-Ming.Chen@nrc.gov>; Martinez, Erick <Erick.Martinez@nrc.gov>; Rivera, Tammie <Tammie.Rivera@nrc.gov>
Subject: ACTION (due 9/18): Topics and Update of Action Items for RES/NRR Periodic

All,

The periodic RES and NRR Office Director counterparts meeting is scheduled for September 30. The agenda for the June meeting is below. Please find attached the updated list of action items under each agenda item.

By September 18, please send me the following:

- Proposed agenda topics for the September meeting (all divisions)
- Updates to any action items from the June meeting, shown in yellow on pages 1-3 of the attachment (DE only)

Agenda for June 23, 2015 Meeting

Non Responsive

1.
2.
3.
4.
5. SPAR models vs. licensee PRAs (RES/DRA)

Non Responsive

6.
7.
8.
9.
10.
11.
12.

Thanks,

Brett

Coyne, Kevin

From: Correia, Richard
Sent: Thursday, September 03, 2015 8:38 AM
To: Ferrante, Fernando; Coyne, Kevin; Appignani, Peter
Subject: RE: Daily: 5 New Items from Wednesday, September 2, 2015

No issue Fernando. I appreciate your insights especially since you were personally involved with ROP findings and outcomes of risk informed decisions.

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Ferrante, Fernando
Sent: Thursday, September 03, 2015 7:56 AM
To: Coyne, Kevin <Kevin.Coyne@nrc.gov>; Appignani, Peter <Peter.Appignani@nrc.gov>; Correia, Richard <Richard.Correia@nrc.gov>
Subject: RE: Daily: 5 New Items from Wednesday, September 2, 2015

I hope I didn't shoot down my chances to support the upcoming IAEA meetings with this email. ☺

More seriously, I needed to express my concern with this issue. I hope I did it tactfully. I apologize if it causes undue concerns or misunderstandings.

From: Ferrante, Fernando
Sent: Thursday, September 03, 2015 7:49 AM
To: Correia, Richard; Bamford, Lisa; Case, Michael; Coffin, Stephanie; Coyne, Kevin; Brock, Kathryn; Landau, Mindy; Lund, Louise; Lund, Louise; Thomas, Brian; Sheron, Brian; West, Steven; Appignani, Peter
Subject: RE: Daily: 5 New Items from Wednesday, September 2, 2015

Rich,

From my perspective, working very closely with SRAs from all Regions in the last 6 years before joining NRR, this is a misguided suggestion as stated. The idea that there are "improved risk tools" is a red herring, as the need for well-qualified, competent reactor analysts (underlined because they are reactor and not risk analysts as some people assume) is now more important than ever. Also, the idea that inspectors will be able to substitute the SRA expertise (even if risk tools become more disseminated) is unfounded in reality (I can give supporting examples of this). The SRAs are one of the few core groups at the NRC that truly experience day-to-day exposure to the realities of how PRA is used (and, sometimes, misused) by licensees and the NRC, as well as having direct experience on the impact our risk-informed decision-making process makes on reactor operations via our inspection and oversight process. Once a real issue is raised with PRA input from the licensees, the inspection resources directly rely on SRA expertise to come to a decision. This suggestion is not completely unrelated from the push to eliminate SPAR models (under the circular logic that, if we have less staff, we can perform less analysis; and if we perform less analysis, then we don't need the staff). I can give

several examples where SRAs were critical to reach decisions that were not always popular with management and/or licensees (both to impose specific actions or to pull back from spending resources on non-risk-significant activities) that I fully believe were the right decisions, usually made under very challenging circumstances. A small glimpse of this reality is the SRA Counterpart Meeting which both NRR and RES support heavily. This is the one forum within oversight where real issues (technical and programmatic) of significant safety impact to the Agency and industry are still discussed. In short, I think the intent of the suggestion is fully misplaced: the need is not to reduce the number of SRAs, but to ensure the ones that are selected are thoroughly qualified and are well-suited for the requirements of the position.

Thanks,
Fernando

From: Correia, Richard
Sent: Thursday, September 03, 2015 6:56 AM
To: Bamford, Lisa; Case, Michael; Coffin, Stephanie; Coyne, Kevin; Brock, Kathryn; Landau, Mindy; Lund, Louise; Lund, Louise; Thomas, Brian; Sheron, Brian; West, Steven; Appignani, Peter; Ferrante, Fernando
Subject: FW: Daily: 5 New Items from Wednesday, September 2, 2015

Interesting suggestion below on reducing the number of regional SRAs because: there are improved risk tools now available that reduce the overall SRA workload, (2) inspectors have the capability and training to perform simplified risk evaluations using available models in certain cases.

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: NRC Announcement [mailto:nrc.announcement@nrc.gov]
Sent: Wednesday, September 02, 2015 9:00 PM
To: NRC Announcement <NRC.Announcement@nrc.gov>
Subject: Daily: 5 New Items from Wednesday, September 2, 2015

Wednesday September 2, 2015 -- Headquarters Edition

- Non Responsive
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General Interest: Update: Seeking Staff Input Toward Agency Work Assessment

On August 17, 2015, an announcement was issued providing background on, and requesting staff input related to, the Project Aim initiative to assess work across the agency to identify activities that can be shed (stopped), performed with fewer resources, or performed with a different priority.

The purpose of this update is to (1) make you aware that thoughtful suggestions from co-workers who see potential areas for conducting agency work more effectively and efficiently are being received and will be reviewed by management, (2) share a few examples of ideas that have been provided, and (3) remind you that the opportunity to provide your ideas as part of this initiative is being solicited through **September 15, 2015**. We hope you will find the time to share your insights to help make the agency a more effective and efficient regulator.

Examples of suggestions that have been received include--

- Consider canceling or holding the Regulatory Information Conference every 2-3 years rather than annually. Typically, a number of the session topics already have been discussed in various public forums and other topics can be addressed in less costly venues.
- Consider reducing the number of senior reactor analysts (SRAs) positions in the regions from 3 to 2. The basis for the suggestion included a view that (1) there are improved risk tools now available that reduce the overall SRA workload, (2) inspectors have the capability and training to perform simplified risk evaluations using available models in certain cases, and (3) turnover of SRAs has decreased significantly.
- Many licensing assistants receive hardcopy deliveries of the *Federal Register* almost daily. To save resources and staff time sorting and delivering, the *Federal Register* could be delivered electronically, which would also be faster and save paper.
- EDO procedures for briefing packages for routine meetings with licensees result in relatively large briefing packages of 20-40 pages. For these types of meetings, by concentrating just on the topics likely to be discussed, the briefing package could be reduced to 2-5 pages.

If you have questions on this Project Aim 2020 initiative, please see the earlier announcement, accessible through the link above. If you have questions about this opportunity to share your views, please contact ProjectAim2020.Resource@nrc.gov.

Finally, a Commission briefing on the Project Aim 2020 implementation status will take place on September 8, 2015, and is open to the public.

Non Responsive

Non Responsive

Coyne, Kevin

From: Appignani, Peter
Sent: Wednesday, September 02, 2015 1:39 PM
To: Correia, Richard
Cc: Coyne, Kevin
Subject: Fw: Project Aim 2020

From: Cahill, Christopher
Sent: Wednesday, September 2, 2015 12:56 PM
To: Cook, William; Appignani, Peter; Passehl, Dave; Bernhard, Rudolph; Loveless, David; Kozak, Laura
Cc: Valos, Nicholas; Ferrante, Fernando
Subject: RE: Project Aim 2020

I largely agree with Dave. It is important to note that we do use, or are at least informed by the licensee's models. This is particularly true in cases where the licensee has external event or specific NFPA 805 modeling that is better than the tools we have at our disposal, such as the IPEEE (which was also developed by the licensee). The licensee tries to make the case that their models are peer reviewed against the standard and are therefore much better products. However for PD's > Green, the first thing they do is modify, or as they'd call it "better inform" the model. This is usually very selective and only results in changes in one direction.

We need an independent tool to implement the ROP. This can be the SPAR. Another at-power SDP could be developed, similar to the security or EP sdp in which components are grouped into perhaps 3 tiers of low, medium or high importance based on some importance measure. Also feeding into the mix can be items like exposure time, recovery credit and historical operator performance. Points are assigned and summed and the outcome is the color. Quick and predictable (aka the Ray Lorson 15 minute SDP)

From: Cook, William
Sent: Wednesday, September 02, 2015 12:20 PM
To: Appignani, Peter <Peter.Appignani@nrc.gov>; Passehl, Dave <Dave.Passehl@nrc.gov>; Bernhard, Rudolph <Rudolph.Bernhard@nrc.gov>; Cahill, Christopher <Christopher.Cahill@nrc.gov>; Loveless, David <David.Loveless@nrc.gov>; Kozak, Laura <Laura.Kozak@nrc.gov>
Cc: Valos, Nicholas <Nicholas.Valos@nrc.gov>; Ferrante, Fernando <Fernando.Ferrante@nrc.gov>
Subject: RE: Project Aim 2020

Pete,
I'll echo Dave's comments. Without the SPAR models we lose half the "trust, but verify" equation.
Bill

From: Appignani, Peter
Sent: Wednesday, September 02, 2015 12:13 PM
To: Passehl, Dave <Dave.Passehl@nrc.gov>; Bernhard, Rudolph <Rudolph.Bernhard@nrc.gov>; Cahill, Christopher <Christopher.Cahill@nrc.gov>; Loveless, David <David.Loveless@nrc.gov>; Kozak, Laura <Laura.Kozak@nrc.gov>; Cook, William <William.Cook@nrc.gov>
Cc: Valos, Nicholas <Nicholas.Valos@nrc.gov>; Ferrante, Fernando <Fernando.Ferrante@nrc.gov>
Subject: Re: Project Aim 2020

Dave

Thanks for taking the time to provide your comments, which by the way did not surprise me.
I'll share them with my management.

Pete

From: Passehl, Dave
Sent: Wednesday, September 2, 2015 11:43 AM
To: Appignani, Peter; Bernhard, Rudolph; Cahill, Christopher; Loveless, David; Kozak, Laura; Cook, William
Cc: Valos, Nicholas; Ferrante, Fernando
Subject: RE: Project Aim 2020

Pete
Thanks for letting us comment.

Here are a few of my immediate thoughts:

By getting rid of the SPAR Models we would be essentially turning over communications of initiating events or degraded plant conditions to the public and stakeholders to licensees. Also, we would be making reactive inspection decisions based on deterministic criteria alone. We may as well get rid of the risk assessment piece of that process because it events and conditions will rarely be risk significant according to licensees.

Our inspectors don't have the skill sets to rigorously challenge the licensee PRA folks on all the issues we receive in the Regions. To offset that and to handle the increased work load without the SPAR models we need to hire many more SRAs in the Regions, about one per plant would be good start.

Just to get a sense of what you can count on receiving from licensees if we do away with SPAR models, take a look at what is currently written in LERs, the "Safety Significance" Section. You will rarely get them to admit some issue as being significant. Almost always the issues are of little safety significance. (Compare that to the number of NRC >Green findings that also happened to be discussed in LERs and you will see my point.)

Our regulatory assessment activities will be eroded by not having a centralized system evaluating Generic Safety Issues, SBO/LOOP studies, etc.

Without more SRA resources our timeliness of getting "SERP Packages" written and processed with take a severe hit. Licensee's rarely give us what we need, to begin with. I imagine a series of RAIs going back and forth for many issues. If you need examples of the kinds of input we get from licensee's I can send some horrific examples.

David Passehl
Senior Reactor Analyst
Region III
630.829.9872

From: Appignani, Peter
Sent: Wednesday, September 02, 2015 8:45 AM

To: Bernhard, Rudolph <Rudolph.Bernhard@nrc.gov>; Cahill, Christopher <Christopher.Cahill@nrc.gov>; Loveless, David <David.Loveless@nrc.gov>; Kozak, Laura <Laura.Kozak@nrc.gov>; Passehl, Dave <Dave.Passehl@nrc.gov>; Cook, William <William.Cook@nrc.gov>
Subject: Fw: Project Aim 2020

All

If you happened to be listening in on the Project Aim 2020 public meeting yesterday you may have heard that the industry would like the NRC to do away with the SPAR models (see Fernando's insights below).

I was asked to obtain insights from the SRAs concerning this suggestion.

If you have a few minutes, please let me know how you feel about the SRAs using the licensee's PRA to perform the analysis, letting the licensee perform the SDP or other analysis using their PRA or doing away with the SDP or ROP. If I recall correctly, none of you were pleased with this when the industry suggested doing this a few years ago.

I'm working at home today, so if you would rather discuss this issue we can talk tomorrow or Friday. However, a simple email would probably suffice.

If the others SRAs you work with would like to comment on this subject they are welcome to do so, I just didn't want to pulse everyone.

Thanks

Pete

From: Ferrante, Fernando
Sent: Tuesday, September 1, 2015 3:06 PM
To: Coyne, Kevin; Appignani, Peter
Subject: Project Aim 2020

Pete, Kevin,

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Thank you,
Fernando

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Cc: Coyne, Kevin
Subject: Fw: Project Aim 2020

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To: Appignani, Peter; Passehl, Dave; Bernhard, Rudolph; Cahill, Christopher; Loveless, David; Kozak, Laura
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Cc: Valos, Nicholas <Nicholas.Valos@nrc.gov>; Ferrante, Fernando <Fernando.Ferrante@nrc.gov>
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From: Passehl, Dave
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Cc: Valos, Nicholas; Ferrante, Fernando
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David Passehl
Senior Reactor Analyst
Region III
630.829.9872

From: Appignani, Peter
Sent: Wednesday, September 02, 2015 8:45 AM
To: Bernhard, Rudolph <Rudolph.Bernhard@nrc.gov>; Cahill, Christopher <Christopher.Cahill@nrc.gov>; Loveless, David <David.Loveless@nrc.gov>; Kozak, Laura <Laura.Kozak@nrc.gov>; Passehl, Dave <Dave.Passehl@nrc.gov>; Cook, William <William.Cook@nrc.gov>
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Thanks

Pete

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Thank you,
Fernando

Coyne, Kevin

From: Correia, Richard
Sent: Wednesday, September 02, 2015 12:44 PM
To: Appignani, Peter
Cc: Coyne, Kevin
Subject: RE: Project Aim 2020

Thanks very much Pete. Dave provided insights I never considered. You're on the right track!

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Appignani, Peter
Sent: Wednesday, September 02, 2015 12:11 PM
To: Correia, Richard <Richard.Correia@nrc.gov>
Cc: Coyne, Kevin <Kevin.Coyne@nrc.gov>
Subject: Fw: Project Aim 2020

Rich

I have not been very successful contacting the SRAs. I have been reluctant to leave voicemails or send emails for obvious reasons. I used the Project AIM 2020 and Fernando's comments yesterday, as a sounding board, see below.

This is the first of what I hope to be several helpful comments from the SRAs

Pete

From: Passehl, Dave
Sent: Wednesday, September 2, 2015 11:43 AM
To: Appignani, Peter; Bernhard, Rudolph; Cahill, Christopher; Loveless, David; Kozak, Laura; Cook, William
Cc: Valos, Nicholas; Ferrante, Fernando
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Thank you,
Fernando

Kuritzky, Alan

From: Correia, Richard
Sent: Tuesday, August 25, 2015 6:41 AM
To: Coyne, Kevin; Kuritzky, Alan; Appignani, Peter
Subject: RE: FOR TICKETING..... Thanks - Shirley ....FW: ML15110A210. User Need Request for Support in the Development and Enhancement of NRC Risk Analysis Tools.

Good point Kevin. Has Sunil et al said anything to you about using the Vogtle PRA for ROP purposes?

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Coyne, Kevin
Sent: Monday, August 24, 2015 7:20 PM
To: Correia, Richard <Richard.Correia@nrc.gov>; Kuritzky, Alan <Alan.Kuritzky@nrc.gov>; Appignani, Peter <Peter.Appignani@nrc.gov>
Subject: RE: FOR TICKETING..... Thanks - Shirley ....FW: ML15110A210. User Need Request for Support in the Development and Enhancement of NRC Risk Analysis Tools.

And just to make sure we get this thought down, SNC would need to resubmit their PRA and supporting documentation to NRR in order for them to use the licensee's Vogtle PRA. NRR cannot use what we currently have in house as it would violate the terms of both our communication protocols with SNC and the basis of the withholding request that was submitted by SNC (since the PRA and supporting information would be then be supporting a regulatory use and the voluntary withholding provisions would no longer apply).

Kevin

From: Correia, Richard
Sent: Wednesday, August 19, 2015 1:09 PM
To: Kuritzky, Alan <Alan.Kuritzky@nrc.gov>; Coyne, Kevin <Kevin.Coyne@nrc.gov>; Appignani, Peter <Peter.Appignani@nrc.gov>
Subject: Re: FOR TICKETING..... Thanks - Shirley ....FW: ML15110A210. User Need Request for Support in the Development and Enhancement of NRC Risk Analysis Tools.

Thx Alan. SNC must see a benefit to them. But providing their PRA to NRC for ROP and other uses + maintenance/upkeep will cost them $
Rich
Send by BlackBerry

From: Kuritzky, Alan
Sent: Wednesday, August 19, 2015 09:08 AM
To: Correia, Richard; Coyne, Kevin; Appignani, Peter
Subject: RE: FOR TICKETING..... Thanks - Shirley ....FW: ML15110A210. User Need Request for Support in the Development and Enhancement of NRC Risk Analysis Tools.

I have not heard anything along those lines, but I don't find it wholly surprising given the level of effort SNC is putting into their Vogtle PRA, and its prominence at the heart of risk-informed submittals for 50.69 and tech spec initiative 4B. Using their PRA in lieu of a SPAR model for all regulatory programs probably fits nicely with Amir's vision of a risk-informed future for SNC's fleet (and the rest of the industry).

From: Correia, Richard
Sent: Wednesday, August 19, 2015 7:00 AM
To: Coyne, Kevin <Kevin.Coyne@nrc.gov>; Kuritzky, Alan <Alan.Kuritzky@nrc.gov>; Appignani, Peter <Peter.Appignani@nrc.gov>
Subject: FW: FOR TICKETING..... Thanks - Shirley ....FW: ML15110A210. User Need Request for Support in the Development and Enhancement of NRC Risk Analysis Tools.

Kevin, Alan, Pete,

See Jennifer U's response to Brian's question about the revised UNR for SPAR model work. Have you heard from SNC that NRR wants to pilot use of the Vogtle PRA instead of SPAR models? Please keep this quiet for now.

thx

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Sheron, Brian
Sent: Tuesday, August 18, 2015 5:23 PM
To: Correia, Richard <Richard.Correia@nrc.gov>
Cc: West, Steven <Steven.West@nrc.gov>
Subject: FW: FOR TICKETING..... Thanks - Shirley ....FW: ML15110A210. User Need Request for Support in the Development and Enhancement of NRC Risk Analysis Tools.

Does this make sense?

From: Uhle, Jennifer
Sent: Tuesday, August 18, 2015 5:04 PM
To: Sheron, Brian <Brian.Sheron@nrc.gov>
Subject: Re: FOR TICKETING..... Thanks - Shirley ....FW: ML15110A210. User Need Request for Support in the Development and Enhancement of NRC Risk Analysis Tools.

No we have not changed our mind. But we are going to pilot Vogtle's PRA in the next fiscal year. It is going to take a year or two to get to the point where we can rely on the licensees' models if it works. So I adjusted the user need and it certain places it says RES should contact NRR before initiating substantial development for internal events. A lot of the user need is to have INL available for support, small fixes to SPAR model and RASCAL to support SRAs work, support SDP. We do want them to continue working on external event development for the few plants so nrc has gone through it and because if it turns out we dont use licensees' PRAs we have some capabilities.

From: Sheron, Brian
Sent: Tuesday, August 18, 2015 04:38 PM
To: Uhle, Jennifer
Subject: FW: FOR TICKETING..... Thanks - Shirley ....FW: ML15110A210. User Need Request for Support in the Development and Enhancement of NRC Risk Analysis Tools.

I'm confused. Your boss has been making noises at recent budget meetings that he wants to kill the SPAR model program and rely on industry PRA models to do SDPs, etc. In fact, a few weeks ago he specifically added back in language to a budget reduction document the CFO was preparing for RES to specifically take reductions in risk assessment in FY18, which he said was targeted at the SPAR program.

Has he had a change of heart? I really don't want to spend a lot of time and money doing all this upgrading to the SPAR models if your boss plans on cutting it in a couple of years.

From: Flory, Shirley **On Behalf Of** RidsResOd Resource
Sent: Tuesday, August 18, 2015 3:08 PM
To: Sheron, Brian <Brian.Sheron@nrc.gov>; West, Steven <Steven.West@nrc.gov>; RidsResPmdaMail Resource <RidsResPmdaMail.Resource@nrc.gov>
Subject: FOR TICKETING..... Thanks - Shirley ....FW: ML15110A210. User Need Request for Support in the Development and Enhancement of NRC Risk Analysis Tools.

From: Chavarria, Jennifer
Sent: Monday, August 17, 2015 7:54 AM
To: RidsNrrOd Resource <RidsNrrOd.Resource@nrc.gov>; RidsNrrDra Resource <RidsNrrDra.Resource@nrc.gov>; RidsNrrDirs Resource <RidsNrrDirs.Resource@nrc.gov>; Lorson, Raymond <Raymond.Lorson@nrc.gov>; Munday, Joel <Joel.Munday@nrc.gov>; Boland, Anne <Anne.Boland@nrc.gov>; Vegel, Anton <Anton.Vegel@nrc.gov>; Correia, Richard <Richard.Correia@nrc.gov>; Hanna, John <John.Hanna@nrc.gov>; Cahill, Christopher <Christopher.Cahill@nrc.gov>; Cook, William <William.Cook@nrc.gov>; Arner, Frank <Frank.Arner@nrc.gov>; Bernhard, Rudolph <Rudolph.Bernhard@nrc.gov>; Loveless, David <David.Loveless@nrc.gov>; MacDonald, George <George.MacDonald@nrc.gov>; Freeman, Scott <Scott.Freeman@nrc.gov>; Kozak, Laura <Laura.Kozak@nrc.gov>; Passehl, Dave <Dave.Passehl@nrc.gov>; Valos, Nicholas <Nicholas.Valos@nrc.gov>; Marksberry, Don <Don.Marksberry@nrc.gov>; Replogle, George <George.Replogle@nrc.gov>; Gibbs, Russell <Russell.Gibbs@nrc.gov>; Perkins, Leslie <Leslie.Perkins@nrc.gov>; Coyne, Kevin <Kevin.Coyne@nrc.gov>; Nakoski, John <John.Nakoski@nrc.gov>; RidsResOd Resource <RidsResOd.Resource@nrc.gov>; RidsNrrDraAphb Resource <RidsNrrDraAphb.Resource@nrc.gov>
Subject: ML15110A210. User Need Request for Support in the Development and Enhancement of NRC Risk Analysis Tools.

Good Morning,

Document dated August 10, 2015, is now an official agency record.

View ADAMS P8 Properties ML15110A210

Open ADAMS P8 Document (User Need Request for Support in the Development and Enhancement of NRC Risk Analysis Tools.)

Sincerely,
Jennifer Chavarria

Contract Administrative Assistant
U.S. Nuclear Regulatory Commission
NRR/DRA, Location: O-10H4
Main: 301-415-2884 Direct: 301-415-1136
Jennifer.Chavarria@nrc.gov

Appignani, Peter

From: Schroer, Suzanne
Sent: Friday, August 21, 2015 12:39 PM
To: Appignani, Peter
Subject: RE: Draft presentation SPAR vs Licensee PRA

Thanks. ☺

From: Appignani, Peter
Sent: Friday, August 21, 2015 12:38 PM
To: Schroer, Suzanne
Subject: RE: Draft presentation SPAR vs Licensee PRA

I believe I already answered your question, but ...

The Regions (SRAs) do not call us very often and that is on purpose.

We have 2 ongoing contracts with INL to support the SPAR models and SPAR model users

1. SPAR Model technical Support contract and
2. A SPAR model Coordination and Integration contract

The first contract primarily provides technical support to the SRAs (see Task 1 Technical Assistance from the Tech Assistance contract with INL below)
Since the SRAs are time constrained in performing an SDP assessment, they call INL directly. Most requests for support are relatively minor and can be dealt with easily. Task 1.4 (see below) provides for a significant modeling change when required.

I understand that the SRAs are very satisfied with this approach, and we are here to support them.

The coordination and Integration activities assure that modeling changes are coordinated and properly integrated into the model with the appropriate documentation. It was necessary to control changes to the models since in the past multiple people were making changes at the same time – it was a mess. Also, when a change was made to the internal events model we needed to properly re-integrate any external event model, shutdown model or a model other than the internal events model into the revised model, since the other models use the internal events model as a foundation.

Task 1.0 Technical Assistance

1.1 This task provides technical support services for NRC (and NRC contractor) model users to answer help desk questions and investigate issues that arise from the use of the SPAR models by staff analysts.

1.2 This task also includes a workshop on use of the SPAR models to be given at each of the twice-yearly Senior Reactor Analyst (SRA) Counterparts Meetings. The workshop, which is being given at the request of NRR and the regional offices, will cover the use of the Revision 3 SPAR models in performing regulatory activities and related modeling issues that are of specific interest to the SRAs.

1.3 This task includes investigating, researching and resolving model technical issues before analysis of a given operational event/condition can be performed by the NRC staff. Examples of this in the past include development of generic test and maintenance data, development of common cause failures (CCF) parameters for auxiliary feed-water (AFW) pumps, and enhancements to the reactor coolant pump seal failure models. NRC PM approval is required prior to providing this technical support if significant effort (i.e., more than a few days) is required.

1.4 On an as-needed basis, the needs of a SPAR model user will be satisfied if he/she requires that significant modeling changes be incorporated into a specific SPAR model by INL so that the user can perform a risk assessment of an operational event or inspection finding or other issue. NRC PM Approval is required prior to providing this type of technical support if significant effort (i.e., more than a few days) is required.

From: Schroer, Suzanne
Sent: Friday, August 21, 2015 11:53 AM
To: Appignani, Peter <Peter.Appignani@nrc.gov>
Subject: RE: Draft presentation SPAR vs Licensee PRA

How often do they call us?

From: Appignani, Peter
Sent: Friday, August 21, 2015 11:52 AM
To: Schroer, Suzanne
Subject: RE: Draft presentation SPAR vs Licensee PRA

See page 15

From: Schroer, Suzanne
Sent: Friday, August 21, 2015 11:51 AM
To: Appignani, Peter <Peter.Appignani@nrc.gov>
Subject: RE: Draft presentation SPAR vs Licensee PRA

Pete,

Can you add something about how frequently the Regions call us/INL. That was something Brian specifically wanted to know. (I know this will probably take some detective work...no rush.)

Suzanne

From: Appignani, Peter
Sent: Friday, August 21, 2015 11:48 AM
To: Correia, Richard; Coyne, Kevin
Cc: Schroer, Suzanne
Subject: Draft presentation SPAR vs Licensee PRA

Appignani, Peter

From:	Appignani, Peter
Sent:	Friday, August 21, 2015 11:48 AM
To:	Correia, Richard (Richard.Correia@nrc.gov); Coyne, Kevin (Kevin.Coyne@nrc.gov)
Cc:	Schroer, Suzanne (Suzanne.Schroer@nrc.gov)
Subject:	Draft presentation SPAR vs Licensee PRA
Attachments:	Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models.pptx

U.S.NRC
UNITED STATES NUCLEAR REGULATORY COMMISSION
Protecting People and the Environment

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models

NAME, RES/DRA/PRAB
EMAIL ADDRESS
August XX, 2015

U.S.NRC

Considerations for using licensees' PRA Models

- Regulatory Processes
- Maintaining independence of NRC
- Standardization of modeling and assessment techniques
- Use by the NRC staff of licensees' PRA models
- Effect on other NRC Programs
- Costs

2

U.S.NRC

Regulatory Processes

- Reactor Oversight Process (ROP)
  - ROP is an NRC process
- Significance Determination Process (SDP)
- MD 8.3 - NRC Incident Investigation Program
- Notice of Enforcement Discretion (NOEDs)
- Other risk-informed licensing related activities

3

U.S.NRC

Significance Determination Process (SDP)

- Today's SDP outcomes using NRC versus licensee PRA
  - The PRA models are often in close agreement.
  - Differences in SDP outcomes between the NRC and the licensee are driven by factors other than the baseline PRA model
    - Engineering assumptions
    - Modeling assumptions
    - Human reliability assumptions
    - Other ...

4

U.S.NRC

Maintaining independence of NRC

- ROP provides for an independent regulatory assessment of licensee performance
- Conflict of interest issues
  - OGC will need to endorse use of licensee PRA and licensee performing the assessment
- Public confidence

5

U.S.NRC

Standardization of modeling and assessment techniques

- Efficiency of standardization
  - Modeling assumptions
  - Modeling conventions
  - Naming schemes
  - Post processing rule construction
  - Reporting functions (built into SAPHIRE)
  - Consistency in event tree/fault tree construction
  - Single Software platform
  - Uniformity of assessments (RASP Handbooks)

6

U.S.NRC

Standardization of modeling and assessment techniques

- Uniformity of assessments
  - Risk Assessment Standardization Project (RASP) Handbooks
  - Uniform because SPAR models are standardized
  - Software platform is standardized (SAPHIRE)

7

U.S.NRC

Use by the NRC staff of licensees' PRA models

- Additional logistical and resource requirements
  - Seventy (70) plus licensee PRAs
    - No standardization
  - Four (4) different commercial software platforms
    - CAFTA (EPRI)
    - WinNUPRA (Scientech)
    - Riskman (ABS Consulting)
      - Cutsets are problematic
    - RiskSpectrum (Lloyd's Register Consulting, Sweden)
    - All lack reporting features of SAPHIRE

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Use by the NRC staff of licensees' PRA models

- Additional NRC risk analysts
  - Additional staff training requirements
- Management and control of licensee models and model updates
  - Non-uniform assumptions and limitations
    - Each model will need to be examined and understood
  - Availability of PRA models and supporting documentation
    - Will the licensee formally submit their PRA to NRC?
      - Under oath and affirmation?
      - Subject to 10 CFR 50.9?
  - How will staff ensure NRC has the latest licensee model?

9

Effect on other NRC Programs

- Accident Sequence Precursor (ASP) program
- New Reactors (PRA & licensing)
- Use of SPAR models to support system and component studies
- Development of Plant Information Risk eBooks (PRIBS)
- SPAR Models used for other purposes

10

SPAR Models used for other purposes

- Answer Commission questions
- Generic issues
- Japan Lesson Learned related issues (flooding, vents, seismic)
  - SPAR model results (CDFs) used to assist in the resolution of Fukushima NTTF Rec. 5.2 (containment venting for plants other than BWR with Mark I and Mark II containments), and Rec. 6 (hydrogen control and mitigation).
  - SPAR model data (equipment failure rates) supported the risk evaluation of Fukushima NTTF Rec. 5.1 (containment venting in BWR Mark I and Mark II plants)

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SPAR Models used for other purposes

- SPAR-EE models supported GI-199 (updated seismic hazard curves for plants east of the Rocky Mountains)
- Gain understanding of key basic events in the SPAR fire PRA models
- SPAR models were used to identify the most likely core-damage sequences for SOARCA analysis.
- SPAR models and data (equipment failure rates) supported staff's analysis of containment accident pressure (CAP) credit in BWR plants.
- Gain understanding of CDFs as estimated by SPAR (supported work for Commissioner Apostolakis, 2013).
- NRR made heavy use of the SPAR models (event trees) while reviewing the Browns Ferry extended power uprate (EPU) license amendment request.

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U.S.NRC

Costs

- $$ to both
  - –NRC
  - –Industry

13

U.S.NRC

COSTS

- NRC
  - – Licensee model reviews
  - – Logistical requirements
  - – Training
  - – Commercial Software licenses
    - Commercial PRA software typically requires additional software (licenses) to be comparable to SAPHIRE (e.g. CAFTA/FTREX)
  - – Additional analyst staff
  - – Other

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U.S.NRC

Protecting People and the Environment

COSTS

- Industry
  - Cost for model standardization
  - Cost to implement a single RG 1.200 compliant standardized modeling approach on one analysis platform
    - Re-invent a RASP Handbook for uniformity of assessments
  - Cost for licensee to submit their PRA to NRC
  - Cost to implement SAPHIRE reporting features
  - How will industry provide support to NRC Analysts?
    - INL is currently responding to approximately 2 requests for assistance per day via the Technical Support contract
  - Other

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U.S.NRC

Protecting People and the Environment

16

Coyne, Kevin

From: Appignani, Peter
Sent: Thursday, August 20, 2015 4:02 PM
To: Correia, Richard; Coyne, Kevin; Schroer, Suzanne
Subject: SPAR vs Licensee PRA Outline - revised
Attachments: Outline SPAR vs Lic Model.docx

I revised the outline, attached, to add other uses of SPAR models as requested by Brian(input from Nathan and Marty) and made a few other changes.

Pete

OUTLINE

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models

1. Regulatory Processes
   - 1.1. Reactor Oversight Process (ROP)
     - 1.1.1. ROP is an NRC process
     - 1.1.2. Significance Determination Process (SDP)
       - 1.1.2.1. Today's SDP outcomes using NRC versus licensee
         - 1.1.2.1.1. The PRA models are often in close agreement.
         - 1.1.2.1.2. Differences in SDP outcomes between the NRC and the licensee are driven by factors other than the baseline PRA model
           - 1.1.2.1.2.1. Engineering assumptions
           - 1.1.2.1.2.2. Modeling assumptions
           - 1.1.2.1.2.3. Human reliability assumptions
           - 1.1.2.1.2.4. Other ...
     - 1.1.3. MD 8.3 - NRC Incident Investigation Program
     - 1.1.4. Notice of Enforcement Discretion (NOEDs) and other risk-informed licensing related activities
2. Maintaining the independence of the NRC
   - 2.1. ROP provides for an independent regulatory assessment of licensee performance
   - 2.2. Conflict of interest
     - 2.2.1. OGC endorsement for use of licensee PRA?
   - 2.3. Public confidence
3. Standardization of modeling and assessment techniques
   - 3.1. Efficiency of standardization
     - 3.1.1. Modeling assumptions
     - 3.1.2. Modeling conventions
     - 3.1.3. Naming schemes
     - 3.1.4. Post processing rule construction
     - 3.1.5. Reporting functions (built into SAPHIRE)
     - 3.1.6. Consistency in event tree/fault tree construction
     - 3.1.7. Software platforms
     - 3.1.8. Uniformity of assessments
       - 3.1.8.1. Risk Assessment Standardization Project (RASP) Handbooks
         - 3.1.8.1.1. Uniform because SPAR models are standardized
         - 3.1.8.1.2. Software platform is standardized (SAPHIRE)
4. Use by the NRC staff of licensees' PRA models

OUTLINE

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models

4.1. Additional logistical and resource requirements

4.1.1. Seventy (70) plus licensee PRAs

4.1.1.1. No standardization

4.1.1.1.1. See Standardization of modeling and assessment techniques above.

4.1.2. Four (4) different commercial software platforms

4.1.2.1. CAFTA (EPRI)

4.1.2.2. WinNUPRA (Scientech)

4.1.2.3. Riskman (ABS Consulting)

4.1.2.3.1. Cutsets are problematic

4.1.2.4. RiskSpectrum[1] (Lloyd's Register Consulting - Energy AB, Box 1288 (Street address: Landsvägen 50A, Sundbyberg) 172 25 Sundbyberg, Sweden)

4.1.2.5. All lack reporting features of SAPHIRE

4.1.3. Additional NRC risk analysts

4.1.3.1. Additional staff training requirements

4.1.4. Management and control of licensee models and model updates

4.1.4.1. Examine each model to understand modeling assumptions and limitations

4.1.4.2. Availability of PRA models and supporting documentation

4.1.4.2.1. Will the licensee formally submit their PRA to NRC?

4.1.4.2.1.1. Under oath and affirmation?

4.1.4.2.1.2. Subject to 10 CFR 50.9?

4.1.4.3. How will staff ensure NRC has the latest licensee model?

5. Effect on other NRC Programs

5.1. Accident Sequence Precursor (ASP) program

5.2. New Reactors (PRA & licensing)

5.3. Use of SPAR models to support system and component studies

5.4. Development of Plant Information Risk eBooks (PRIBS)

5.5. SPAR Models used for other purposes (examples)

5.5.1. Answer Commission questions

5.5.2. Generic issues

5.5.3. Japan Lesson Learned related issues (flooding, vents, seismic)

[1] Primarily used outside of the US

OUTLINE

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models

5.5.3.1. SPAR model results (CDFs) used to assist in the resolution of Fukushima NTTF Rec. 5.2 (containment venting for plants other than BWR with Mark I and Mark II containments), and Rec. 6 (hydrogen control and mitigation).

5.5.3.2. SPAR model data (equipment failure rates) supported the risk evaluation of Fukushima NTTF Rec. 5.1 (containment venting in BWR Mark I and Mark II plants)

5.5.4. SPAR-EE models supported GI-199 (updated seismic hazard curves for plants east of the Rocky Mountains)

5.5.5. Gain understanding of key basic events in the SPAR fire PRA models

5.5.6. SPAR models were used to identify the most likely core-damage sequences for SOARCA analysis.

5.5.7. SPAR models and data (equipment failure rates) supported staff's analysis of containment accident pressure (CAP) credit in BWR plants.

5.5.8. Gain understanding of CDFs as estimated by SPAR (supported work for Commissioner Apostolakis, 2013).

5.5.9. NRR made heavy use of the SPAR models (event trees) while reviewing the Browns Ferry extended power uprate (EPU) license amendment request.

6. Costs

6.1. NRC

6.1.1. Licensee model reviews

6.1.2. Logistical requirements

6.1.3. Training

6.1.4. Commercial Software licenses

6.1.4.1. Commercial PRA software (see above) typically requires additional software (licenses) to be comparable to SAPHIRE (e.g. CAFTA/FTREX)

6.1.5. Additional analyst staff

6.1.6. Other

6.2. Industry

6.2.1. Cost for model standardization

6.2.2. Cost to implement a single RG 1.200 compliant standardized modeling approach on one analysis platform

6.2.3. Cost to implement SAPHIRE reporting features

6.2.4. How will industry provide support to NRC Analysts?

6.2.4.1. INL is currently responding to approximately 2 requests for assistance per day via the Technical Support contract

6.2.5. Other

Stutzke, Martin

From: Appignani, Peter
Sent: Thursday, August 20, 2015 8:55 AM
To: Stutzke, Martin
Subject: RE: Uses of SPAR models

Thanks Marty

From: Stutzke, Martin
Sent: Thursday, August 20, 2015 8:40 AM
To: Siu, Nathan <Nathan.Siu@nrc.gov>; Appignani, Peter <Peter.Appignani@nrc.gov>
Subject: RE: Uses of SPAR models

Here's a rough list:

1. I am currently using the SPAR model results (CDFs) to help resolve Fukushima NTTF Rec. 5.2 (containment venting for plants other than BWR with Mark I and Mark II containments), and Rec. 6 (hydrogen control and mitigation).

2. Used SPAR model data (equipment failure rates) while working on the risk evaluation of Fukushima NTTF Rec. 5.1 (containment venting in BWR Mark I and Mark II plants)

3. Used the SPAR-EE models while working on GI-199 (updated seismic hazard curves for plants east of the Rocky Mountains)

4. SPAR models were used (Chris Hunter and Rick Sherry, later by me) in SOARCA to identify the most likely core-damage sequences for subsequent analysis.

5. Used SPAR model data (equipment failure rates) while working on the staff's analysis of containment accident pressure (CAP) credit in BWR plants.

6. While working at NRR, Steve Laur and I made heavy use of the SPAR models (event trees) while reviewing the Browns Ferry extended power uprate (EPU) license amendment request.

Marty

From: Siu, Nathan
Sent: Wednesday, August 19, 2015 2:39 PM
To: Appignani, Peter; Stutzke, Martin
Subject: RE: Uses of SPAR models

Pete,

I've only made two minor uses of the SPAR model results.

- Gain an understanding of CDFs as estimated by SPAR (supported my work during a rotation with Cmr A in 2013).
- Gain an understanding of key basic events in the SPAR fire PRA models (supported papers on fire PRA realism).

Nathan

From: Appignani, Peter
Sent: Wednesday, August 19, 2015 1:26 PM
To: Stutzke, Martin <Martin.Stutzke@nrc.gov>; Siu, Nathan <Nathan.Siu@nrc.gov>
Subject: Uses of SPAR models

Nathan, Marty

Would you please provide me a list of your past uses of SPAR models.
I don't need an explanation, just a list, but I do need need it soon.

thanks

Pete

Siu, Nathan

From: Appignani, Peter
Sent: Wednesday, August 19, 2015 4:04 PM
To: Siu, Nathan
Subject: Re: Uses of SPAR models

Thanks Nathan

From: Siu, Nathan
Sent: Wednesday, August 19, 2015 2:38 PM
To: Appignani, Peter; Stutzke, Martin
Subject: RE: Uses of SPAR models

Pete,

I've only made two minor uses of the SPAR model results.

- Gain an understanding of CDFs as estimated by SPAR (supported my work during a rotation with Cmr A in 2013).
- Gain an understanding of key basic events in the SPAR fire PRA models (supported papers on fire PRA realism).

Nathan

From: Appignani, Peter
Sent: Wednesday, August 19, 2015 1:26 PM
To: Stutzke, Martin <Martin.Stutzke@nrc.gov>; Siu, Nathan <Nathan.Siu@nrc.gov>
Subject: Uses of SPAR models

Nathan, Marty

Would you please provide me a list of your past uses of SPAR models.
I don't need an explanation, just a list, but I do need need it soon.

thanks

Pete

Appignani, Peter

From: Appignani, Peter
Sent: Wednesday, August 19, 2015 1:24 PM
To: Coyne, Kevin; Schroer, Suzanne; Nakoski, John
Subject: Fw: SPAR vs Lic PRA (Letter to NEI)
Attachments: Whitepaper on PRA use in SDP - Rev a.docx; Letter from NEI on August 2007 Commission Meeting.pdf; Ltr to NEI on SDP.docx; march0707.docx; ML070640567.pdf; NEI Letter 12-19-14 Industry Support and Use of PRA and Risk-Informed Regulation.pdf; NRC Response to NEI Letter of August 2007 Commission Meeting.pdf

FYI

meant to include you in the original distribution

From: Appignani, Peter
Sent: Wednesday, August 19, 2015 1:21 PM
To: Correia, Richard
Subject: Fw: SPAR vs Lic PRA (Letter to NEI)

Rich

The letter to NEI and a few other documents that I sent to Kevin earlier.

From: Appignani, Peter
Sent: Monday, July 27, 2015 3:17 PM
To: Coyne, Kevin (Kevin.Coyne@nrc.gov); Nakoski, John
Subject: SPAR vs Lic PRA

FYI

Although you may already have the attached documents

Pete

Dennis, Suzanne

From: Correia, Richard
Sent: Wednesday, August 19, 2015 1:02 PM
To: Schroer, Suzanne; Coyne, Kevin; Appignani, Peter; Nakoski, John; Hunter, Christopher; Lane, John; Marksberry, Don; Stutzke, Martin; Siu, Nathan
Subject: Re: SPAR Models...

Thx Suzanne. We need to capture any risk analysis we do beyond ASP for example, tech basis/rulemaking, special studies/requests, PRA training courses, grow your own training and quals....
Rich
Send by BlackBerry

From: Schroer, Suzanne
Sent: Wednesday, August 19, 2015 11:10 AM
To: Correia, Richard; Coyne, Kevin; Appignani, Peter
Subject: SPAR Models...

Today at the 8:15 (I went for Rich), Brian asked for a write-up on several SPAR Model-related items. I mentioned the plan we're working on, and he said it would be good to get all of it together. He also mentioned that he's not very interested in having RES maintain anything to do with licensee's PRAs; those would be up to NRR. Here's what he asked for:

- A comprehensive list of what we use SPAR models for that doesn't include oversight
- Examples of what kind of support we provide to the Regions
  - How frequently do they call us?
  - How frequently do they call INL?
- Examples of "every time, everywhere" we've used SPAR models outside of the inspection realm

He said it would be good to get this written down (and probably a briefing to accompany it) in the next couple weeks or so.

Suzanne

Suzanne Schroer
U.S. Nuclear Regulatory Commission
Office of Nuclear Regulatory Research
Division of Risk Assessment
TWFN-10A14
(301) 415-0752

Coyne, Kevin

From: Correia, Richard
Sent: Wednesday, August 19, 2015 12:40 PM
To: Coyne, Kevin; Schroer, Suzanne; Appignani, Peter
Subject: Fw: FOR TICKETING..... Thanks - Shirley ....FW: ML15110A210. User Need Request for Support in the Development and Enhancement of NRC Risk Analysis Tools.

Fyi...please. Pete, can you send me the letter NRC sent NEI on use of licensees PRAs. Brian and Steve need to have it. Thx Rich
Send by BlackBerry

From: West, Steven
Sent: Wednesday, August 19, 2015 11:31 AM
To: Sheron, Brian; Correia, Richard
Subject: RE: FOR TICKETING..... Thanks - Shirley ....FW: ML15110A210. User Need Request for Support in the Development and Enhancement of NRC Risk Analysis Tools.

I don't think you could either. But until there's an acceptable replacement, we need to keep them and keep and maintain them.

Steve

Steven West, Deputy Director
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission

301-415-1914
Steven.West@nrc.gov

From: Sheron, Brian
Sent: Wednesday, August 19, 2015 11:28 AM
To: West, Steven <Steven.West@nrc.gov>; Correia, Richard <Richard.Correia@nrc.gov>
Subject: RE: FOR TICKETING..... Thanks - Shirley ....FW: ML15110A210. User Need Request for Support in the Development and Enhancement of NRC Risk Analysis Tools.

I'm not sure I could justify maintaining SPAR models for all the operating plants if only RES is the customer.

From: West, Steven
Sent: Wednesday, August 19, 2015 11:25 AM
To: Sheron, Brian <Brian.Sheron@nrc.gov>; Correia, Richard <Richard.Correia@nrc.gov>
Subject: RE: FOR TICKETING..... Thanks - Shirley ....FW: ML15110A210. User Need Request for Support in the Development and Enhancement of NRC Risk Analysis Tools.

It's a request signed out by an office director. By definition, it makes sense.

Seriously, the ideas NRR is considering for replacing the SPAR models would take years to implement and there is some uncertainty as to whether or not they will be fully successful. In the meantime, the SPAR models are the agency's tool of choice for a number of important regulatory activities, including the SDP. Since we will continue to use the SPAR models for regulatory decisions for the foreseeable future, I think it is important to continue to maintain them to at least the same level as we have in the past. Moreover, NRR has identified that it would be beneficial to improve the use of the SPAR models by adding certain external events. Since they started down this path, they should continue on it. If an actual plan and schedule is ever developed (and approved) for phasing out the SPAR models, we can include in the plan any changes to how we would maintain or update the SPAR models from that point forward.

Finally, as we have discussed recently, NRR (and the regions) are not the only ones using the SPAR models. They should continue to be maintained for the other users.

Steve

Steven West, Deputy Director
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission

301-415-1914
Steven.West@nrc.gov

From: Sheron, Brian
Sent: Tuesday, August 18, 2015 5:23 PM
To: Correia, Richard <Richard.Correia@nrc.gov>
Cc: West, Steven <Steven.West@nrc.gov>
Subject: FW: FOR TICKETING..... Thanks - Shirley ....FW: ML15110A210. User Need Request for Support in the Development and Enhancement of NRC Risk Analysis Tools.

Does this make sense?

From: Uhle, Jennifer
Sent: Tuesday, August 18, 2015 5:04 PM
To: Sheron, Brian <Brian.Sheron@nrc.gov>
Subject: Re: FOR TICKETING..... Thanks - Shirley ....FW: ML15110A210. User Need Request for Support in the Development and Enhancement of NRC Risk Analysis Tools.

No we have not changed our mind. But we are going to pilot Vogtle's PRA in the next fiscal year. It is going to take a year or two to get to the point where we can rely on the licensees' models if it works. So I adjusted the user need and it certain places it says RES should contact NRR before initiating substantial development for internal events. A lot of the user need is to have INL available for support, small fixes to SPAR model and RASCAL to support SRAs work, support SDP. We do want them to continue working on external event development for the few plants so nrc has gone through it and because if it turns out we dont use licensees' PRAs we have some capabilities.

From: Sheron, Brian
Sent: Tuesday, August 18, 2015 04:38 PM
To: Uhle, Jennifer
Subject: FW: FOR TICKETING..... Thanks - Shirley ....FW: ML15110A210. User Need Request for Support in the

Development and Enhancement of NRC Risk Analysis Tools.

I'm confused. Your boss has been making noises at recent budget meetings that he wants to kill the SPAR model program and rely on industry PRA models to do SDPs, etc. In fact, a few weeks ago he specifically added back in language to a budget reduction document the CFO was preparing for RES to specifically take reductions in risk assessment in FY18, which he said was targeted at the SPAR program.

Has he had a change of heart? I really don't want to spend a lot of time and money doing all this upgrading to the SPAR models if your boss plans on cutting it in a couple of years.

From: Flory, Shirley **On Behalf Of** RidsResOd Resource
Sent: Tuesday, August 18, 2015 3:08 PM
To: Sheron, Brian <Brian.Sheron@nrc.gov>; West, Steven <Steven.West@nrc.gov>; RidsResPmdaMail Resource <RidsResPmdaMail.Resource@nrc.gov>
Subject: FOR TICKETING..... Thanks - Shirley ....FW: ML15110A210. User Need Request for Support in the Development and Enhancement of NRC Risk Analysis Tools.

From: Chavarria, Jennifer
Sent: Monday, August 17, 2015 7:54 AM
To: RidsNrrOd Resource <RidsNrrOd.Resource@nrc.gov>; RidsNrrDra Resource <RidsNrrDra.Resource@nrc.gov>; RidsNrrDirs Resource <RidsNrrDirs.Resource@nrc.gov>; Lorson, Raymond <Raymond.Lorson@nrc.gov>; Munday, Joel <Joel.Munday@nrc.gov>; Boland, Anne <Anne.Boland@nrc.gov>; Vegel, Anton <Anton.Vegel@nrc.gov>; Correia, Richard <Richard.Correia@nrc.gov>; Hanna, John <John.Hanna@nrc.gov>; Cahill, Christopher <Christopher.Cahill@nrc.gov>; Cook, William <William.Cook@nrc.gov>; Arner, Frank <Frank.Arner@nrc.gov>; Bernhard, Rudolph <Rudolph.Bernhard@nrc.gov>; Loveless, David <David.Loveless@nrc.gov>; MacDonald, George <George.MacDonald@nrc.gov>; Freeman, Scott <Scott.Freeman@nrc.gov>; Kozak, Laura <Laura.Kozak@nrc.gov>; Passehl, Dave <Dave.Passehl@nrc.gov>; Valos, Nicholas <Nicholas.Valos@nrc.gov>; Marksberry, Don <Don.Marksberry@nrc.gov>; Replogle, George <George.Replogle@nrc.gov>; Gibbs, Russell <Russell.Gibbs@nrc.gov>; Perkins, Leslie <Leslie.Perkins@nrc.gov>; Coyne, Kevin <Kevin.Coyne@nrc.gov>; Nakoski, John <John.Nakoski@nrc.gov>; RidsResOd Resource <RidsResOd.Resource@nrc.gov>; RidsNrrDraAphb Resource <RidsNrrDraAphb.Resource@nrc.gov>
Subject: ML15110A210. User Need Request for Support in the Development and Enhancement of NRC Risk Analysis Tools.

Good Morning,

Document dated August 10, 2015, is now an official agency record.

View ADAMS P8 Properties ML15110A210
Open ADAMS P8 Document (User Need Request for Support in the Development and Enhancement of NRC Risk Analysis Tools.)

Sincerely,
Jennifer Chavarria

Contract Administrative Assistant
U.S. Nuclear Regulatory Commission
NRR/DRA, Location: O-10H4
Main: 301-415-2884 Direct: 301-415-1136
Jennifer.Chavarria@nrc.gov

Dennis, Suzanne

From: Correia, Richard
Sent: Wednesday, August 19, 2015 11:00 AM
To: Schroer, Suzanne
Subject: Fw: SPAR Models

Fyi
Rich
Send by BlackBerry

From: Sheron, Brian
Sent: Monday, August 10, 2015 05:21 PM
To: Dean, Bill
Cc: Uhle, Jennifer; Evans, Michele; West, Steven
Subject: SPAR Models

Bill, at Friday's budget meeting, recall when I wanted to shorten the wording to the research cuts to just "reduce confirmatory research", rather than identify specific areas that would be reduced, you insisted that they keep the wording "...and risk assessment tools." You said your logic was that you wanted to eliminate the SPAR models, and move towards relying on using industry PRAS to do the risk significance calculations for the SDP.

I do not think this is the right way to go, but I recognize that you (and the Regions) are the primary customer for the SPAR models. What I think you may not be aware of is the extent to which the SPAR models are used by the agency, in addition to the SDP, and the amount of support that the Regions request in using them.

As an example, we have an annual $350K contract at INEL that provides routine support to the Regions on the use of the SPAR models. If the regions have questions on their use, need models to be tweaked, etc., they simply call up INEL and they get the help they need. If there are bigger issues (e.g., they need a new model developed to cover a unique situation), they call us and we work to resolve their issue. Kevin Coyne tells me we (RES) usually get one or two calls like that a month, and I think INEL gets calls for help much more frequently. Using licensee models will require the Regions to have to go back to the licensee every time they use the licensees model and it doesn't work right, or they have a question. Also, if the licensee's model doesn't model a unique situation, then they would have to ask the licensee to modify their model. We can't help them.

Kevin also told me that one of the major benefits of the SPAR models is that they are purposely standardized, so a model for one plant looks like a model another plant, and there are no unique difference that have to be dealt with. They told me that licensee's models are not standardized, so the Regions will have to deal with a different model for each plant.

I was also told that in the past, NRR has come to us for PRA analyses to support rulemakings, in which we used the SPAR models to provide the requested analyses. We also use the SPAR models for the ASP program.

If you want to go forward to terminate the SPAR models, I want to make sure you are fully aware of the potential increased burden this will likely put on the Regions and the industry, since RES and our contractor will no longer be able to provide the "service agreement" that comes with the SPAR model program, and as far as I can tell, this is a fairly big part of the Region's use of the SPAR models.

We also won't be able to provide support to you or the agency for other requests for which we relied on the SPAR models.

What I propose is that we provide you with a detailed briefing on the SPAR model program, and what the impact will likely be if we terminate it.

Let me know if you want the briefing and I will have my staff set it up. I'm thinking about in about a month or two.

Nakoski, John

From: Wong, See-Meng
Sent: Wednesday, August 12, 2015 9:08 AM
To: Coyne, Kevin; Marksberry, Don; Weerakkody, Sunil
Cc: Nakoski, John; Appignani, Peter; Gonzalez, Michelle; Correia, Richard
Subject: RE: RASP User Need Request

Kevin,

Thanks for your note on RES support for the NRR User Need. I agree with the continuing need for the work underway for the SPAR model update activities.

See Meng.

From: Coyne, Kevin
Sent: Wednesday, August 12, 2015 7:55 AM
To: Marksberry, Don <Don.Marksberry@nrc.gov>; Wong, See-Meng <See-Meng.Wong@nrc.gov>; Weerakkody, Sunil <Sunil.Weerakkody@nrc.gov>
Cc: Nakoski, John <John.Nakoski@nrc.gov>; Appignani, Peter <Peter.Appignani@nrc.gov>; Gonzalez, Michelle <Michelle.Gonzalez@nrc.gov>; Correia, Richard <Richard.Correia@nrc.gov>
Subject: Re: RASP User Need Request

I'll make this easy:

RES intends to continue to perform significant modeling updates to approximately 10-12 spar models per year. NRR is informed when we assemble the list of model updates and has an opportunity to provide input. Additionally, we update 30-40 models per year to support specific sdp/asp analysis as requested by sra's and asp analysts. Unless I hear differently, I am assuming that this email serves as the requested coordination with nrr as described in the user need for this level of continued spar model update activities.

Please also note that RES is also a model user and we also perform spar activities to support the asp program. The need to update models for asp will continue to be done at the discretion of the asp team.

Thank you -

Kevin

Sent from an NRC Blackberry
Kevin Coyne
(b)(6)

From: Marksberry, Don
Sent: Wednesday, August 12, 2015 07:22 AM
To: Wong, See-Meng; Weerakkody, Sunil
Cc: Nakoski, John; Appignani, Peter; Coyne, Kevin
Subject: RASP User Need Request

See-Meng and Sunil

Thanks for expediting UNR through the front office.

A question regarding the last sentence in the memo:

> In addition, in light of the uncertain budget environment and NRR's consideration of the use of licensees' PRA models in the future, NRR requests that RES coordinate with NRR before initiating significant updates to plant-specific SPAR models for internal events.

and the last sentence in task 2, Update SPAR Models for Internal Events

> Before initiating significant work on this task, RES should contact NRR.

The work items under task 2 are carryover from the current UNR and are continuing. Since this work is nearing completion (we will look at the proposed completion dates in our response), can we say that NRR has been informed of this ongoing work. Also, what subtask does NRR consider significant work?

We will continue to work with See-Meng to prepare our response, unless otherwise notified of a change?

Thanks.

Don

Nakoski, John

From: Nakoski, John
Sent: Wednesday, August 12, 2015 9:02 AM
To: Coyne, Kevin; Marksberry, Don; Wong, See-Meng; Weerakkody, Sunil
Cc: Appignani, Peter; Gonzalez, Michelle; Correia, Richard
Subject: Re: RASP User Need Request

Kevin,

Thank you for making it clear that RES will continue to update the SPAR models to meet agency needs, including the ASP program. I fully support your response.

Regards,

John Nakoski
Sent from my NRC Blackberry

From: Coyne, Kevin
Sent: Wednesday, August 12, 2015 01:54 PM
To: Marksberry, Don; Wong, See-Meng; Weerakkody, Sunil
Cc: Nakoski, John; Appignani, Peter; Gonzalez, Michelle; Correia, Richard
Subject: Re: RASP User Need Request

I'll make this easy:

RES intends to continue to perform significant modeling updates to approximately 10-12 spar models per year. NRR is informed when we assemble the list of model updates and has an opportunity to provide input. Additionally, we update 30-40 models per year to support specific sdp/asp analysis as requested by sra's and asp analysts. Unless I hear differently, I am assuming that this email serves as the requested coordination with nrr as described in the user need for this level of continued spar model update activities.

Please also note that RES is also a model user and we also perform spar activities to support the asp program. The need to update models for asp will continue to be done at the discretion of the asp team.

Thank you -

Kevin

Sent from an NRC Blackberry
Kevin Coyne
(b)(6)

From: Marksberry, Don
Sent: Wednesday, August 12, 2015 07:22 AM
To: Wong, See-Meng; Weerakkody, Sunil
Cc: Nakoski, John; Appignani, Peter; Coyne, Kevin
Subject: RASP User Need Request

See-Meng and Sunil

Thanks for expediting UNR through the front office.

A question regarding the last sentence in the memo:

> In addition, in light of the uncertain budget environment and NRR's consideration of the use of licensees' PRA models in the future, NRR requests that RES coordinate with NRR before initiating significant updates to plant-specific SPAR models for internal events.

and the last sentence in task 2, Update SPAR Models for Internal Events

> Before initiating significant work on this task, RES should contact NRR.

The work items under task 2 are carryover from the current UNR and are continuing. Since this work is nearing completion (we will look at the proposed completion dates in our response), can we say that NRR has been informed of this ongoing work. Also, what subtask does NRR consider significant work?

We will continue to work with See-Meng to prepare our response, unless otherwise notified of a change?

Thanks.

Don

Coyne, Kevin

From: Correia, Richard
Sent: Tuesday, August 11, 2015 7:05 AM
To: Coyne, Kevin; Stutzke, Martin
Cc: Appignani, Peter
Subject: RE: SPAR Models

Thx Kevin...a lot more uses than I realized.

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Coyne, Kevin
Sent: Tuesday, August 11, 2015 6:52 AM
To: Correia, Richard <Richard.Correia@nrc.gov>; Stutzke, Martin <Martin.Stutzke@nrc.gov>
Cc: Appignani, Peter <Peter.Appignani@nrc.gov>
Subject: Re: SPAR Models

Rich -

I'll let Marty speak to the cprr work, but here's a quick rundown of recent uses of spar models (beyond sdp/asp):

- Identification of risk significant accident sequences for soarca (peach bottom, surry and sequoyah)

- Establish technical basis for inclusion of fire risk under 50.65(a)(4) risk assessments

- Risk screening of downstream dam failure generic issue and seismic hazard re-evvaluation for eastern us.

- Support for nro tabletop exercises to determine appropriate policy for risk metrics/thresholds for new reactors

- Develop of plant information risk ebooks (pribs) that replaced the sdp phase 2 notebooks - the creation of these books heavily leveraged the standardization of the spar models to enable efficient compilation of customized reports for nrr.

- Evaluation of the risk benefit of "B.5.b" (50.54.hh) equipment on core damage risk.

- Supports training for pra staff (both formal and on the job)

- Support for system and component studies - the standardization of the models allows automated evaluation of risk sensitivity studies for a variety of conditions across all the plant types.

- Support for new reactor inspection planning and development of risk insights.

Kevin

Sent from an NRC Blackberry
Kevin Coyne
(b)(6)

From: Correia, Richard
Sent: Tuesday, August 11, 2015 06:37 AM
To: Coyne, Kevin; Stutzke, Martin
Subject: FW: SPAR Models

Kevin, Marty,

Do we(you) use SPAR models for tech basis work for rulemaking (CPRR)? Special studies (SOARCA even though it's a consequence study)? NRO for new reactor designs eventual inspections? I want Brian & Bill Dean to understand as best we can how we use SPAR models.

thx

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Sheron, Brian
Sent: Monday, August 10, 2015 5:22 PM
To: Dean, Bill <Bill.Dean@nrc.gov>
Cc: Uhle, Jennifer <Jennifer.Uhle@nrc.gov>; Evans, Michele <Michele.Evans@nrc.gov>; West, Steven <Steven.West@nrc.gov>
Subject: SPAR Models

Bill, at Friday's budget meeting, recall when I wanted to shorten the wording to the research cuts to just "reduce confirmatory research", rather than identify specific areas that would be reduced, you insisted that they keep the wording "...and risk assessment tools." You said your logic was that you wanted to eliminate the SPAR models, and move towards relying on using industry PRAS to do the risk significance calculations for the SDP.

I do not think this is the right way to go, but I recognize that you (and the Regions) are the primary customer for the SPAR models. What I think you may not be aware of is the extent to which the SPAR models are used by the agency, in addition to the SDP, and the amount of support that the Regions request in using them.

As an example, we have an annual $350K contract at INEL that provides routine support to the Regions on the use of the SPAR models. If the regions have questions on their use, need models to be tweaked, etc., they simply call up INEL and they get the help they need. If there are bigger issues (e.g., they need a new model developed to cover a unique situation), they call us and we work to resolve their issue. Kevin Coyne tells me

we (RES) usually get one or two calls like that a month, and I think INEL gets calls for help much more frequently. Using licensee models will require the Regions to have to go back to the licensee every time they use the licensees model and it doesn't work right, or they have a question. Also, if the licensee's model doesn't model a unique situation, then they would have to ask the licensee to modify their model. We can't help them.

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I was also told that in the past, NRR has come to us for PRA analyses to support rulemakings, in which we used the SPAR models to provide the requested analyses. We also use the SPAR models for the ASP program.

If you want to go forward to terminate the SPAR models, I want to make sure you are fully aware of the potential increased burden this will likely put on the Regions and the industry, since RES and our contractor will no longer be able to provide the "service agreement" that comes with the SPAR model program, and as far as I can tell, this is a fairly big part of the Region's use of the SPAR models.

We also won't be able to provide support to you or the agency for other requests for which we relied on the SPAR models.

What I propose is that we provide you with a detailed briefing on the SPAR model program, and what the impact will likely be if we terminate it.

Let me know if you want the briefing and I will have my staff set it up. I'm thinking about in about a month or two.

Coyne, Kevin

From: Appignani, Peter
Sent: Thursday, August 06, 2015 11:26 AM
To: Correia, Richard; Coyne, Kevin; Marksberry, Don; Wood, Jeffery; Ferrante, Fernando; Schroer, Suzanne
Cc: Stutzke, Martin; Siu, Nathan
Subject: RE: Draft "Notes" SPAR vs Lic PRA issue
Attachments: Outline SPAR vs Lic Model.docx

Rich

As you requested, attached is my first draft of an outline

Pete

From: Correia, Richard
Sent: Tuesday, August 04, 2015 6:48 AM
To: Appignani, Peter; Coyne, Kevin; Marksberry, Don; Wood, Jeffery; Ferrante, Fernando; Schroer, Suzanne
Subject: RE: Draft "Notes" SPAR vs Lic PRA issue

Great list of items we can use in our SPAR vs licensees PRAs Pete.

Next I'd like a plan outline of how the comparison would look using these items and who we would get information from to fill in needed information e.g., a couple of licensees, regional SRAs, NRO PRA experts, NRR PRA experts....

thx

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Appignani, Peter
Sent: Friday, July 31, 2015 9:06 AM
To: Correia, Richard; Coyne, Kevin; Marksberry, Don; Wood, Jeffery; Ferrante, Fernando
Subject: Draft "Notes" SPAR vs Lic PRA issue

First draft as requested.
It's kind of a conglomeration of everyone's thoughts
It is a little long, but then I find it easier to remove words than it is to create them

Pete

OUTLINE

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models

1. Regulatory Processes
   - 1.1. Reactor Oversight Process (ROP)
     - 1.1.1. ROP is an NRC process
     - 1.1.2. Significance Determination Process (SDP)
       - 1.1.2.1. Today's SDP outcomes using NRC versus licensee
         - 1.1.2.1.1. The PRA models are often in close agreement.
         - 1.1.2.1.2. Differences in SDP outcomes between the NRC and the licensee are driven by factors other than the baseline PRA model
           - 1.1.2.1.2.1. Engineering assumptions
           - 1.1.2.1.2.2. Modeling assumptions
           - 1.1.2.1.2.3. Human reliability assumptions
           - 1.1.2.1.2.4. Other ...
     - 1.1.3. MD 8.3 - NRC Incident Investigation Program
     - 1.1.4. Notice of Enforcement Discretion (NOEDs) and other risk-informed licensing related activities
2. Maintaining the independence of the NRC
   - 2.1. ROP provides for an independent regulatory assessment of licensee performance
   - 2.2. Conflict of interest
   - 2.3. Public confidence
3. Standardization of modeling and assessment techniques
   - 3.1. Efficiency of standardization
     - 3.1.1. Modeling assumptions
     - 3.1.2. Modeling conventions
     - 3.1.3. Naming schemes
     - 3.1.4. Post processing rule construction
     - 3.1.5. Reporting functions (built into SAPHIRE)
     - 3.1.6. Consistency in event tree/fault tree construction
     - 3.1.7. Software platforms
     - 3.1.8. Uniformity of assessments
       - 3.1.8.1. Risk Assessment Standardization Project (RASP) Handbooks
         - 3.1.8.1.1. Uniform because SPAR models are standardized
         - 3.1.8.1.2. Software platform is standardized (SAPHIRE)
4. Use by the NRC staff of licensees' PRA models
   - 4.1. Additional logistical and resource requirements
     - 4.1.1. Seventy (70) plus licensee PRAs
       - 4.1.1.1. No standardization

OUTLINE

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models

4.1.2. Four (4) different software platforms

4.1.2.1. Lack reporting features of SAPHIRE

4.1.3. Additional NRC risk analysts

4.1.3.1. Additional training requirements

4.1.4. Management and control of licensee models and model updates

4.1.4.1. Examine each model to understand modeling assumptions and limitations

4.1.4.2. Availability of PRA models and supporting documentation

4.1.4.2.1. Will they be formally submitted to NRC?

4.1.4.2.1.1. Under oath and affirmation?

4.1.4.2.1.2. Subject to 10 CFR 50.9?

4.1.4.3. How will staff ensure we have the latest model?

5. Effect on other NRC Programs

5.1. Accident Sequence Precursor (ASP) program

5.2. New Reactors (PRA & licensing)

5.3. Use of models to support system and component studies

5.4. Development of Plant Information Risk eBooks (PRIBS)

5.5. Models used for other purposes (examples)

5.5.1. Answer Commission questions

5.5.2. Generic issues

5.5.3. Japan Lesson Learned related issues (flooding, vents, seismic)

6. Costs

6.1. NRC

6.1.1. Licensee model reviews

6.1.2. Logistical requirements

6.1.3. Training

6.1.4. Commercial Software licenses

6.1.5. Additional analyst staff

6.2. Industry

6.2.1. Cost to implement a single RG 1.200 compliant standardized modeling approach on one analysis platform

From: Drouin, Mary
To: Coyne, Kevin
Subject: RE: Response: Scheduling Commission TA Meeting on Vogtle Site Level 3 PRA Project
Date: Tuesday, August 04, 2015 11:53:00 AM

Kevin,

An idea that occurred to me with all this idiocy happening with RMRF, PRA certification and notion of stopping the SPAR models. NRR has absolutely no idea of the cost if we were to start using industry's PRA models instead of our SPAR models. I had a recent discussion with an NRR staff person and he did not understand what I meant by if we were to use industry PRA models we would have to understand them and that was not a trivial process. They felt that that has been done because we have benchmarked our SPAR models against the industry model. I had to explain to them that was comparing the results and understanding why the results differed, that effort does not come anywhere close where we could say we understood their model and could easily manipulate it. I explained what it has taken on the Level 3 PRA project, and once I explained what that entailed, which is more than just benchmarking, they understood that we are better with using our SPAR models. Anyway, in our briefing to the Commissioner TAs, could we offer some insight with regard to this. I know we have told them that it has taken more time to "adopt" the Vogtle PRA model, but I am talking more about what it entails (keeping it as high level as possible). Anyway, I have not fully thought out this idea, but there are insights here that could be used to defend maintaining the SPA models.

Tks, mary

Non Responsive

Non Responsive

Non Responsive

Siu, Nathan

From: Correia, Richard
Sent: Monday, August 03, 2015 11:24 AM
To: Appignani, Peter; Coyne, Kevin; Schroer, Suzanne; Siu, Nathan; Ferrante, Fernando; Nakoski, John; Marksberry, Don
Subject: RE: Gap Between Licensee and NRC Risk Estimates (4-7-2015).docx

Thx Pete.

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Appignani, Peter
Sent: Monday, August 03, 2015 8:14 AM
To: Correia, Richard; Coyne, Kevin; Schroer, Suzanne; Siu, Nathan; Ferrante, Fernando; Nakoski, John; Marksberry, Don
Subject: RE: Gap Between Licensee and NRC Risk Estimates (4-7-2015).docx

Rich

What Chris has provided are very good examples of my item 2

> (2) The nature of the differences in the SDP outcomes using NRC versus licensee assessment methodologies.
>
> Many insights were shared and conclusions reached by these meetings. In summary, it was noted that differences in SDP outcomes between the NRC and the licensee are driven by factors other than the baseline PRA model used for the analysis; in fact, the PRA models are often in close agreement. The differences, however, are seen in the way engineering assumptions, human reliability analysis, and recovery are handled within the analysis. We recognize that licensees may have unique perspectives on the event or condition under agency review. Therefore, the SDP allows for input from licensees regarding such risk insights and we intend to encourage further engagement with the licensees on SDP findings.

I don't believe they add value to the short paper you requested, but the examples would be good to keep in our back pocket.

Pete

From: Correia, Richard
Sent: Monday, August 03, 2015 7:34 AM
To: Appignani, Peter; Coyne, Kevin; Schroer, Suzanne; Siu, Nathan; Ferrante, Fernando; Nakoski, John; Marksberry, Don
Subject: Gap Between Licensee and NRC Risk Estimates (4-7-2015).docx

Pete,

I've been reading your initial cut at "Items to consider for SPARs vs licensees' PRAs" and you touched on a couple of items that reminded me of Chris Hunter's review and analysis of a UCS letter that questioned the differences between NRCs and licensee risk analysis for SDP. Might find some additional items here for our consideration.

Rich

Stutzke, Martin

From: Appignani, Peter
Sent: Monday, August 03, 2015 9:25 AM
To: Siu, Nathan
Cc: Stutzke, Martin; Correia, Richard
Subject: FW: Draft "Notes" SPAR vs Lic PRA issue
Attachments: Items to consider for SPAR vs. Lic PRA.docx

Nathan

You and Marty were not included on the original distribution.
This stems from NRRs view on sun setting the SPAR models
I'll assume you are both aware of what has transpired.
If not, we can discuss when I return Wednesday
Any insights, suggestions would be appreciated

Pete

From: Appignani, Peter
Sent: Friday, July 31, 2015 9:06 AM
To: Correia, Richard (Richard.Correia@nrc.gov); Coyne, Kevin (Kevin.Coyne@nrc.gov); Marksberry, Don; Wood, Jeffery (Jeffery.Wood@nrc.gov); Ferrante, Fernando (Fernando.Ferrante@nrc.gov)
Subject: Draft "Notes" SPAR vs Lic PRA issue

First draft as requested.
It's kind of a conglomeration of everyone's thoughts
It is a little long, but then I find it easier to remove words than it is to create them

Pete

In thinking about items to consider for SPAR vs. Licensee models, here's a few points to get started...

> "It is truly a disgrace beyond excuse or obfuscation that the agency is still toying with the problem of how to use PRA, twenty full years after the publication of the Rasmussen Report. Staff studies about how to do it have occurred in profusion, and are still occurring, but there is in my view no possibility whatever-none-that they can lead to changes that effectively exploit the potential of PRA. *The reason is clear. The highest levels of the staff continue to believe that PRA is such a simple subject that they are all experts. That is plainly false,* but the consequence of this self-serving belief is that they continue to resist any recommendation to bring aboard real experts in PRA, let alone statisticians. Without the relevant expertise there is simply no way the job can be done well. People tend to denigrate what they do not understand. You know how long I've been pounding this one, with no visible effect. I regard it as a scandal, and I blame this *one on the Commission. Modern regulation of low-probability risks is at its core* statistical, and an agency that rejects that basic truth does so at its own, and the public's, peril. No, I have no statistician friends who are looking for jobs.[1]"

Staff conclusions from a previous examination[2]

(1) Maintaining the independence of the NRC and licensees' models.

The NRC staff has concluded that, because the NRC's Reactor Oversight Process (ROP) is intended to provide an independent regulatory assessment of licensee performance, it would be inappropriate for licensee risk analysts to take the lead in assessing the significance of performance deficiencies at their site. Such an arrangement would also minimize the NRC staff=s ability to ensure that issues are assessed in a timely manner. Maintaining the NRC's independent oversight of licensee performance is critical for effective NRC oversight and is an *important aspect of upholding public confidence in the process.*

(2) The nature of the differences in the SDP outcomes using NRC versus licensee assessment methodologies.

Many insights were shared and conclusions reached by these meetings. In summary, it was noted that differences in SDP outcomes between the NRC and the licensee are driven by *factors other than the baseline PRA model used for the analysis;* in fact, the PRA models are often in close agreement. The differences, however, are seen in the way engineering assumptions, human reliability analysis, and recovery are handled within the analysis. We recognize that licensees may have unique perspectives on the event or condition under agency review. Therefore, the SDP allows for input from licensees regarding *such risk insights and we* intend to encourage further engagement with the licensees on SDP findings.

---

[1] H.W. Lewis (ACRS 1979-1994) letter to Chairman Selin, June 2, 1994

[2] Letter to Marvin S. Fertel, Senior Vice-President and Chief Nuclear Officer Nuclear Energy Institute from Luis A. Reyes, Executive Director for Operations, October 15, 2007 (ML072490566)

(3) Standardization of modeling and assessment techniques used.

At present, the industry has not uniformly implemented a standardized approach to performing risk analysis that would ensure uniform application across the spectrum of industry PRA models. In this regard, the NRC=s use of the SPAR models, together with the ongoing development of guidance on conducting Phase 3 risk assessments, commonly referred to as the risk assessment standardization project (RASP), ensures greater uniformity in the agency's regulatory assessments. To aid licensees, we intend to make the RASP manual publicly available in the near future.

(4) Potential use by the NRC staff of licensees' PRA models.

We also considered an alternative to the current NRC staff use of SPAR models where the staff would be provided with the licensee PRA models. Under this option, the staff would perform the assessment of risk significance using the licensee model. We have concluded that the logistical and resource needs to maintain the 70-plus industry PRA models on some four software platforms would require the diversion of NRC staff efforts and the addition of risk analysts. These NRC resources would be more effectively used for other tasks. At present, this alternative is not a viable option unless the industry implemented a single RG 1.200 compliant modeling approach on one analysis platform facilitating efficient use of NRC resources.

General insights:

- The ROP is an NRC (regulatory) process, and not an industry process.
- Efficiency of model usage – standardization of modeling conventions, naming schemes, post processing rule construction, reporting functions, consistency in event tree/fault tree construction, software platforms
- Development of Plant Information Risk eBooks (PRIBS) – SPAR/SPAHIRE have enhanced capabilities to generate PRIB inputs in an automated fashion, development of similar capability for licensee models needs to be explored.
- Availability of help desk support for modeling questions and technical assistance for ECA modeling changes
- Conflict of interest issues with use of licensee generated model for regulatory decision-making (will probably need to engage OGC)
- Training costs associated with bringing staff up to speed on CAFTA, and other PRA codes currently in use
- Availability of PRA models and supporting documentation – will they be formally submitted to NRC? Under oath and affirmation? Subject to 10 CFR 50.9?
- Updating process for licensee models - how will models be managed and controlled? How will staff ensure we have the latest model?
- Technical adequacy of licensee models for certain modeling aspects important to event and condition assessments that may be more advanced in SPAR such as LOOP modeling, common cause failure modeling and support system initiators.

- Use of licensee models to support system and component studies (SPAR/SAPHIRE currently have capabilities to efficiently run multiple cases to perform sensitivity studies and derive risk insights across multiple models)
- Loss of hands-on critical capabilities in understanding and reviewing PRA information with overreliance on licensee models (a perfect example of this is the heavy use of SAPHIRE in the Grow Your Own PRA program). PRA would essentially become a black box to NRC reviewers, more so than it already is in licensing. This would also significantly reduce Regional support by NRC HQ on this critical area.
- Lack of a forcing function and impact on SDP timelines. Several SDPs (most notably the Catawba Consequential LOOP and the external flooding SDPs) highlighted the fact that even a peer-reviewed PRA will not have all the potential scenarios and models needed a priori for an SDP. Having the SPAR models and INL support allows for the development of an internal NRC model which then strongly prompts the licensee to perform their own analysis in specific timelines. Without this forcing function, it is highly questionable whether (1) licensees will feel the need to perform any meaningful effort to address completeness and PRA quality issues for challenging findings, and (2) the licensees will feel the need to meet SDP timelines, potentially dragging findings for a long time (even further than some findings take to complete currently).
- Loss of regulatory independence. Even a cursory look at SDP findings shows that licensees more often than not produce results that are an order of magnitude or more lower than NRC results. Usually, this is driven by the impact of specific SDPs in changing the status of a plant in the ROP action matrix and have little if anything to do with PRA quality. Having an independent model allows the NRC to address these issues according to our timelines and needs without dependence on industry actions, and would result in a significant loss of regulatory independence if eliminated.
- Loss of related PRA activities and programs. Several programs related to components of the SPAR models such as data collection, HRA modeling, CCF modeling, external events, and other activities would lack the integrating aspect provided by the SPAR models. This would eventually call into question the need to continue those programs as well, resulting in further erosion of PRA capabilities within the Agency at a time where PRA would be more heavily relied on.
- Cost effectiveness issues. Given the variety of software platforms (CAFTA, Riskman, WINUPRA, ...), modeling approaches (event tree-fault tree linking, large fault tree, large event tree), nomenclature (even plants within the same licensee's fleet sometimes have different naming schemes), and PRA technical content; any implementation of a PRA modeling "sharing" scheme would be most likely more costly than the SAPHIRE/SPAR program. Of course, this is not what the opponents of SAPHIRE/SPAR are looking for (the goal is to simply rely on the licensee results with a severely reduced regulatory footprint), but it still needs to be pointed out as indicated by Kevin. Given the industry's most likely strong pushback against a standardized fleet-wide approach, the only plausible solution would be a significantly neutered oversight process, which would highly reduce NRC capabilities.
- Impact to other programs such as ASP and new reactors PRA licensing. I'm aware of another strong push in NRR to get rid of ASP because it can highlight aspects and insights the SDP approach does not (especially with the partitioning of findings for single events, like the Robinson fire or the North Anna seismic event). There are opinions in NRR that the SDP should be the sole program for meeting oversight needs and the ASP

requirements. If SAPHIRE/SPAR models are done away with in SDP, the replacement may not meet ASP needs (not just technical, but programmatic). This is being severely overlooked in the NRR discussions with industry.

- As discussed in the RISC public meeting, the intent of "PRA Certification" is for the licensees to use PRA for both "licensing and oversight". This has been proposed multiple times before, most recently in the ill-fated Risk Prioritization Initiative. The Commission has forcefully pushed against the excessive transfer of regulatory authority to the licensees and, therefore, before we engage in a path to eliminate SAPHIRE/SPAR models, there should be a clear spelling out of what this entails (most likely a nonstarter for the Commission). The attempt by NRR has all the hallmarks of a slash-first/figure-out-what to- do later which has been thoroughly unsuccessful with multiple stakeholders in the Agency before. The SAPHIRE/SPAR capabilities should not be roadkill for ill-conceived projects.
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- The loss of National Lab capabilities. The elimination of SAPHIRE/SPAR would implicate a severe reduction in INL resources fully engaged in NRC activities. This should not be overlooked, in the same way the loss of capabilities at Southwest Research Institute is an obvious on-going concern for NRR and the Agency. The large body of expertise and knowledge would be lost and it is highly unlikely to be replaced by an industry entity that it's both highly competent and independent.

Appignani, Peter

From: Siu, Nathan
Sent: Monday, August 03, 2015 9:13 AM
To: Appignani, Peter
Cc: Correia, Richard; Coyne, Kevin
Subject: RE: Gap Between Licensee and NRC Risk Estimates (4-7-2015).docx
Attachments: C7-1 Uncertainties Full-Scope CDF.png

Pete,

FYI, the attached busy figure could be useful as backup to the point about large uncertainties. The Industry numbers (all PWRs) are from an old (1989) Garrick paper. I don't think he had full-scope numbers for BWRs in that paper.

Nathan

From: Appignani, Peter
Sent: Monday, August 03, 2015 8:14 AM
To: Correia, Richard; Coyne, Kevin; Schroer, Suzanne; Siu, Nathan; Ferrante, Fernando; Nakoski, John; Marksberry, Don
Subject: RE: Gap Between Licensee and NRC Risk Estimates (4-7-2015).docx

Rich

What Chris has provided are very good examples of my item 2

> (2) The nature of the differences in the SDP outcomes using NRC versus licensee assessment methodologies.
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I don't believe they add value to the short paper you requested, but the examples would be good to keep in our back pocket.

Pete

From: Correia, Richard
Sent: Monday, August 03, 2015 7:34 AM
To: Appignani, Peter; Coyne, Kevin; Schroer, Suzanne; Siu, Nathan; Ferrante, Fernando; Nakoski, John; Marksberry, Don
Subject: Gap Between Licensee and NRC Risk Estimates (4-7-2015).docx

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that questioned the differences between NRCs and licensee risk analysis for SDP. Might find some additional items here for our consideration.

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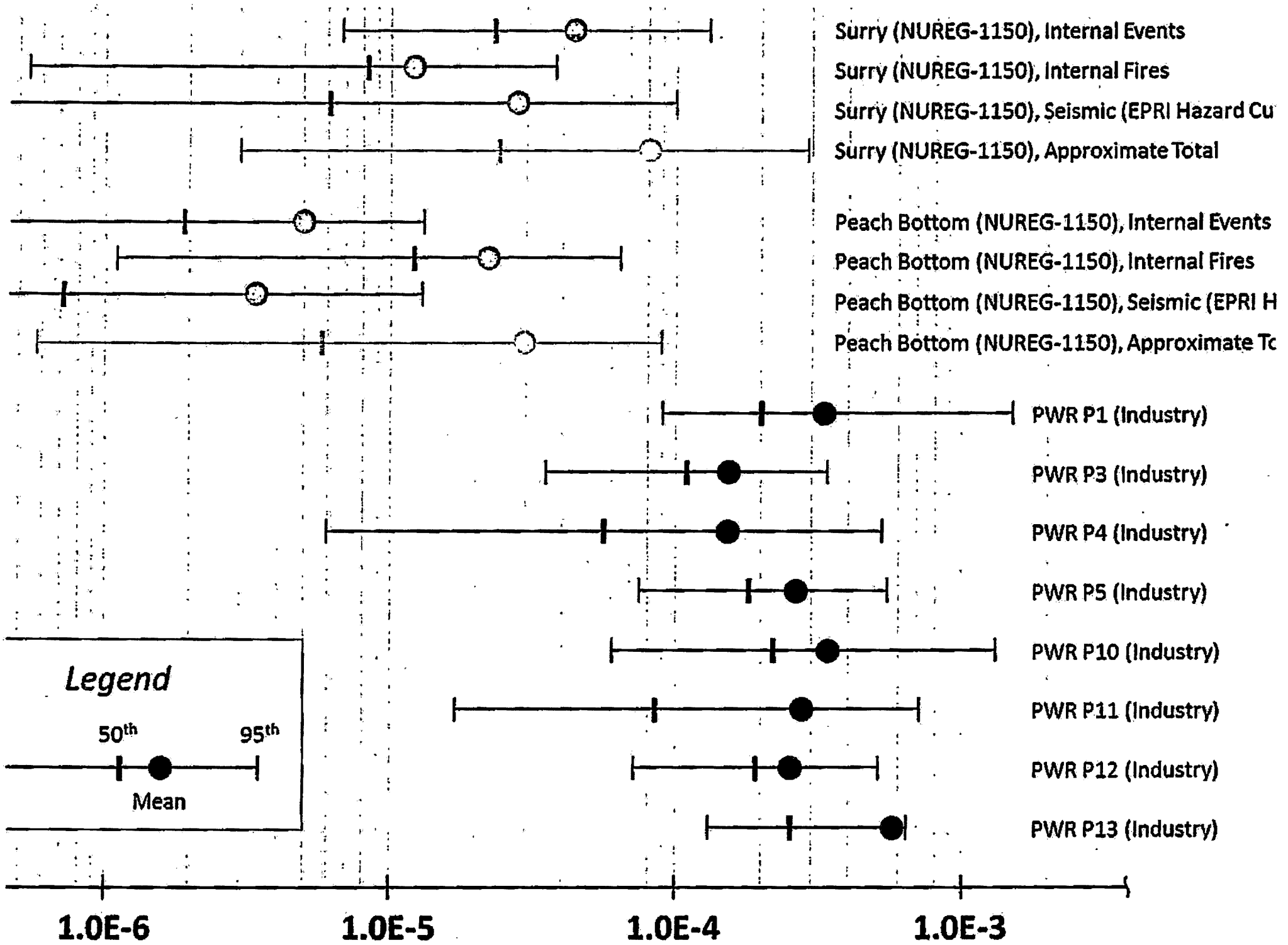
Surry (NUREG-1150), Internal Events
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Surry (NUREG-1150), Seismic (EPRI Hazard Cu
Surry (NUREG-1150), Approximate Total
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Peach Bottom (NUREG-1150), Internal Fires
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PWR P10 (Industry)
PWR P11 (Industry)
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PWR P13 (Industry)
Legend
50th
95th
Mean
1.0E-6
1.0E-5
1.0E-4
1.0E-3

Marksberry, Don

From: Appignani, Peter
Sent: Monday, August 03, 2015 8:14 AM
To: Correia, Richard; Coyne, Kevin; Schroer, Suzanne; Siu, Nathan; Ferrante, Fernando; Nakoski, John; Marksberry, Don
Subject: RE: Gap Between Licensee and NRC Risk Estimates (4-7-2015).docx

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Rich

Gaps between Licensee and NRC Risk Estimates within the Significance Determination Process

A letter to the NRC was received from David Lochbaum of the Union of Concerned Scientists (UCS) dated March 14, 2015. The letter provides a comparison (in Table 4) between NRC and licensee risk estimates for a sample of greater than Green findings that were performed as part of the Significance Determination Process (SDP). To better understand these differences RES/DRA performed a review of these findings to determine the key drivers for different results. Table 4 of the UCS letter has been recreated in this document with an additional column of notes highlighting key differences between the NRC and licensee analyses. Some of the key differences to why there are such large disparities between some of the NRC and licensee risk assessments for SDP evaluations are:

- ***The NRC CDF estimates include model changes based on discussions with the licensee, whereas the licensee estimate is typically the original value provided at the beginning of discussions.*** The process of how SDP evaluations are performed naturally causes the potential for large differences in the results. Specifically, the NRC refines its SDP evaluation throughout the process as additional information is gathered and when the licensee disputes the preliminary analysis modeling assumptions. The final SDP result accounts for these modeling changes in which the NRC agrees with (or partially agrees with) licensee comments on the preliminary SDP evaluation. However, the licensee does not typically refine its risk estimate in a similar manner. Unless the licensee makes changes to its initial modeling assumptions, the process itself tends to lead to large difference between the NRC and licensee risk estimates. In addition, sometimes the SDP color determination will not change even if some modeling assumptions are modified; therefore, there was no attempt by the NRC to provide a best estimate ΔCDF for these cases.
- ***Some of the NRC CDF estimates are conservative, bounding estimates.*** In some of the examples provided, the SDP utilizes Inspector Manual Chapter 0609, Appendix M, "Significance Determination Process Using Qualitative Criteria," which considers both qualitative and quantitative factors. As part of Appendix M evaluations, a bounding assessment is performed to (conservatively) factor in uncertainties. This is typically the only quantitative estimate that is calculated. Since it is a bounding estimate, when it is then compared to the licensee's assessment (which may not be a bounding assessment) there can be large differences. An example of this is the ANO Flood Protection Finding (EA-14-088). Table 4 provided the NRC ΔCDF as 1×10^{-4}, which was calculated from a bounding analysis and was not used as the final CDF due to conservatisms in the modeling assumptions. There was no attempt to determine a best estimate ΔCDF, but the event was determined to be Yellow. If there was an attempt to calculate the best estimate, it would have been likely to be closer to the risk estimate provided by the licensee which was based on 95th percentile flooding data.
- ***Large uncertainties [e.g., order-of-magnitude (> 1000%)] are not unusual when calculating CDF estimates in external events.*** In addition, there is the issue of the limited guidance on how to use data with large uncertainties (e.g., flooding data). For example for the ANO

Flood Protection Finding (EA-14-088) the licensee did a best estimate ΔCDF calculation based on the 84th percentile of the flooding curve while the NRC used the 95th percentile based on uncertainties with the data.

- ***Modeling assumptions outside of the PRA can lead to large differences in CDF estimates.*** The two examples of the largest differences provided in Table 4 are the Watts Bar Flood Protection Finding (EA-13-018) and the Browns Ferry Unit 1 RHR Suction Valve Finding (EA-11-018). Both of these large differences between risk estimates are due to modeling decisions outside the PRA. In the Watts Bar evaluation, the licensee could not meet the 27-hour time to complete the flood protection procedure required to support the modeling assumptions. After a few attempts, procedure refinements, and additional personnel the licensee was able to complete the procedure in the time assumed. However, none of the benefits of this optimization were present during the exposure period of the performance deficiency. The licensee still credited the success of the procedure based on its belief that the critical actions would still be done in time. However, NRC inspectors disagreed due to multiple factors (e.g., there were spool piece issues, the procedure does not outline critical steps that need to be done first, etc.). In the Browns Ferry evaluation, the RHR valve had disk-stem separation but the licensee still credited the valve to open as needed based on testing. The NRC inspectors disagreed with this assumption mainly because the testing parameters were not equivalent to expected plant conditions.

- Some other key differences that repeatedly drive differences in NRC and licensee risk assessments in the SDP are:
  - ***Credit for modeling unproceduralized operator actions.*** The licensee will typically not credit these actions in their base PRA, but in event assessment they often lobby for credit. The NRC typically does not credit operator actions that are not proceduralized or have not been trained upon. This is in accordance to RIS 2008-15, "NRC Staff Position on Crediting Mitigating Strategies Implemented in Response to Security Orders in Risk-Informed Licensing Actions and in the Significance Determination Process." Examples in Table 4 that included this issue are Browns Ferry RHR Suction Valve Finding (EA-11-018), Fort Calhoun Flood Protection Finding (EA-10-084), and Monticello Flood Protection (EA-13-096).
  - ***Common-cause failure (CCF) potential given observed failure(s) within a CCF group.*** Current NRC RASP manual guidance stated that CCF potential is tied to the performance deficiency. Licensee's typically argue that CCF probability should be kept to nominal if the key piece-part does share the same failure mechanism and/or would not fail within the mission time (e.g., 24 hours). This modeling philosophy difference can account for large changes in the CCF probability of affected components [e.g., Fort Calhoun RPS Relay Contact Finding (EA-11-025)].

Table 4: Comparison between Industry and NRC Risk Estimates

SDP Finding	Licensee ΔCDF	NRC ΔCDF	Difference	Notes
ANO Flood Protection (EA-14-088)	1.4×10^{-5}	1.0×10^{-4}	594%	Licensee ΔCDF is IMC 0609–Appendix M assessment presented at the Regulatory Conference. It is based on site specific upper 95% for PMP resulting in 354' site flood elevation. Presented overall results as 8E-7 (Unit 1) and 2E-6 (Unit 2). The NRC ΔCDF listed in this table is taken from preliminary IR and is not the final CDF. The preliminary IR states that "NRC risk analysts concluded, qualitatively, that the upper bound change in core damage frequency was less than 1E-4 per year." Appendix M was used; therefore, there was no specific CDF calculation. The NOV states that final result "was based on qualitative factors due to the high degree of uncertainty that is associated with the estimation of the frequency of an external flooding event."
ANO Stator Drop (EA-14-008)	4.8×10^{-6} (Unit 1)	6.0×10^{-5} (Unit 1)	1,150%	Unit 1 differences seem to be linked recovery credit. NRC did credit in the final analysis offsite power recovery credit (success rate of 0.9 compared to licensee's value 0.97). Licensee value also credited another means of recovery; however, the NRC determined that this was just another way of offsite power recovery so no credit was given. NRC analyses typically only provide credit for one recovery action per safety function.
	1.8×10^{-6} (Unit 2)	2.8×10^{-5} (Unit 2)	1,456%	Unit 2 difference had to do with amount of credit for recovery of power from the Startup Transformer and aligning the alternate EDG (which was damaged). Some credit was given for these actions, but not as optimistic as licensee assumptions.
Browns Ferry 1 RHR Suction Valve (EA-11-018)	1.0×10^{-6}	1.0×10^{-4}	9,900%	Licensee argued that the failure was not a PD. The licensee also believed (with a high degree of confidence) that the valve disk (separated from the stem) would have still opened; the NRC disagreed. There was also discussion of unproceduralized actions to provide an alternate method to provide core cooling. NRC sensitivity studies indicated that risk would be reduced, but the result would not change in color. The final assessment also factored in a MCR fire scenario that contributed 5E-5 to the final ΔCDF. Based in the internal event and fire, the final CDF was judged to be 1E-4 (no precise CDF was provided in the NOV).
Fort Calhoun Flood Protection (EA-10-084)	8.4×10^{-7}	3.2×10^{-5}	3,710%	NRC and licensee had several different assumptions: (1) Flood hazard curve data, (2) Base external flooding event CDPs (3) Credit for unproceduralized recovery actions including procuring non-supplied equipment.

SDP Finding	Licensee ΔCDF	NRC ΔCDF	Difference	Notes
Fort Calhoun RPS Relay Contact (EA-11-025)	1.0×10^{-6}	2.6×10^{-5}	2,500%	The NRC ΔCDF listed in this table is taken from preliminary IR. The final ΔCDF was determined to be 7.1E-6. Modeling differences between the analyses were: (1) Shorter exposure time (T/2 + repair vs. T + repair); (2) Lower failure probability for clutch power supply breaker; (3) CCF; and (4) Higher operator reliability in tripping the reactor (HRA). Largest difference appears to be the CCF evaluation, which results in a large difference in CCF probabilities of the RPS contacts (3.6E-2 vs. 2.4E-6).
Indian Point SG Tube Leak (EA-00-179)	6.6×10^{-6}	2.9×10^{-5}	332%	Finding was Red due to LERF. Largest difference was due to calculations of conditional rupture and corresponding leakage rates and which SG sequences result in LERF contribution.
Monticello Flood Protection (EA-13-096)	8.9×10^{-7}	3.6×10^{-5}	3,936%	Key differences had to do with flood hazard data (licensee use 84% as best estimate; whereas NRC used 90% and 95% values due to uncertainties) and key HRA differences (overly optimistic RCIC manual operation and hard pipe vent, lack of procedural guidance).
Oconee Safe Shutdown Facility (EA-10-094)	8.0×10^{-6}	1.6×10^{-5}	100%	There was an issue on whether it should be one PD or two. The quantitative difference is likely due to fire contribution that wasn't included in preliminary evaluation (and probably not in the licensee's estimate).
Palo Verde Voided ECCS Suction Line (EA-04-221)	7.0×10^{-6}	4.6×10^{-5}	557%	Differences were largely associated with uncertainties associated with HPI pump performance. Specifically, the licensee believed that HPI pumps would not be affected for larger break sizes (MLOCA and LLOCA); NRC agreed on LLOCA, but not MLOCA based on testing results.
Watts Bar Flood Protection (EA-13-018)	8.2×10^{-9}	6.4×10^{-6}	77,814%	The NRC ΔCDF of 6.4E-6 appears to be an error; per the final SERP package the NRC ΔCDF = 2.9E-5. Key issue was the determination of whether licensee could perform design basis flood protections within 27 hours. Initial demonstrations proved unsuccessful. Only after repeated procedure refinements and additional resource allocations (unknown and likely unavailable during the exposure period) did the licensee meet the 27 hour requirement. Even though complete procedure could not be performed, licensee assumed that key actions could be taken; even though procedure does not prioritize the key actions.

Appignani, Peter

From: Ferrante, Fernando
Sent: Tuesday, July 28, 2015 10:01 AM
To: Coyne, Kevin; Appignani, Peter
Cc: Schroer, Suzanne; Nakoski, John; Marksberry, Don
Subject: RE: SPAR vs Lic PRA

I would add the following (some cover the same issues raised in Kevin's email with additional nuances):

- Loss of hands-on critical capabilities in understanding and reviewing PRA information with overreliance on licensee models (a perfect example of this is the heavy use of SAPHIRE in the Grow Your Own PRA program). PRA would essentially become a black box to NRC reviewers, more so than it already is in licensing. This would also significantly reduce Regional support by NRC HQ on this critical area.

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- As discussed in the RISC public meeting, the intent of "PRA Certification" is for the licensees to use PRA for both "licensing and oversight". This has been proposed multiple times before, most recently in the ill-fated Risk Prioritization Initiative. The Commission has forcefully pushed against the excessive transfer of regulatory authority to the licensees and, therefore, before we engage in a path to eliminate SAPHIRE/SPAR models, there should be a clear spelling out of what this entails (most likely a non-starter for the Commission). The attempt by NRR has all the hallmarks of a slash-first/figure-out-what-to-do later which has been thoroughly unsuccessful with multiple stakeholders in the Agency before. The SAPHIRE/SPAR capabilities should not be roadkill for ill-conceived projects.

- Several licensees have had serious issues even with peer-reviewed PRAs used in regulatory activities. For example, several staff in NRR have stated that the Oconee PRA reviewed in the NFPA805 submittal is so deficient that it should never be used in any regulatory activity. It is unclear how a more stringent "PRA Certification" would resolve these issues or how the NRC would require such licensees to meet this requirement (absent rulemaking which is highly unlikely to be the part of the NRR push). Hence, an across the board elimination of the SAPHIRE/SPAR support would be counterproductive, if not altogether inappropriate.

- The loss of National Lab capabilities. The elimination of SAPHIRE/SPAR would implicate a severe reduction in INL resources fully engaged in NRC activities. This should not be overlooked, in the same way the loss of capabilities at Southwest Research Institute is an obvious on-going concern for NRR and the Agency. The large body of expertise and knowledge would be lost and it is highly unlikely to be replaced by an industry entity that it's both highly competent and independent.

From: Coyne, Kevin
Sent: Monday, July 27, 2015 4:50 PM
To: Appignani, Peter
Cc: Schroer, Suzanne; Nakoski, John; Marksberry, Don; Ferrante, Fernando
Subject: FW: SPAR vs Lic PRA

I had seen some of those before, but a couple are new to me and it's good to have them in one place!

In thinking about items to consider for SPAR vs. Licensee models, here's a few points to get started...

- Efficiency of model usage – standardization of modeling conventions, naming schemes, post processing rule construction, reporting functions, consistency in event tree/fault tree construction, software platforms

- Development of Plant Information Risk eBooks (PRIBS) – SPAR/SPAHIRE have enhanced capabilities to generate PRIB inputs in an automated fashion, development of similar capability for licensee models needs to be explored.

- Availability of help desk support for modeling questions and technical assistance for ECA modeling changes

- Conflict of interest issues with use of licensee generated model for regulatory decision-making (will probably need to engage OGC)

- Training costs associated with brining staff up to speed on CAFTA, and other PRA codes currently in use

- Availability of PRA models and supporting documentation – will they be formally submitted to NRC? Under oath and affirmation? Subject to 10 CFR 50.9?

- Updating process for licensee models -= how managed and controlled? How will staff ensure we have the latest model?

- Technical adequacy of licensee models for certain modeling aspects important to event and condition assessments that may be more advanced in SPAR such as LOOP modeling, common cause failure modeling and support system initiators.

- Use of licensee models to support system and component studies (SPAR/SAPHIRE currently have capabilities to efficiently run multiple cases to perform sensitivity studies and derive risk insights across multiple models)

Each of these items can be greatly expanded as needed...

Kevin

From: Appignani, Peter
Sent: Monday, July 27, 2015 3:17 PM
To: Coyne, Kevin; Nakoski, John
Subject: SPAR vs Lic PRA

FYI

Although you may already have the attached documents

Pete

ilbertson, Anders

rom: Marksberry, Don
ent: Monday, July 27, 2015 6:20 AM
o: Nicholson, Thomas; Gilbertson, Anders
ubject: RE: NRC staff to attend Workshop planning meeting, July 28th at NIST

Tom and Anders

I am unable to make it to NIST tomorrow due to some pressing issues. John N. will be out for the next 3 weeks starting Wednesday and we have to respond to NRR director's desire to cut the ASP and SPAR models programs. This is not the first time these topics came up, but today's managers are less informed about these programs than in the past.

Non Responsive

Don

From: Nicholson, Thomas
Sent: Monday, July 20, 2015 6:04 PM
To: Saidi, Kamel S.; Jacoff, Adam S.
Cc: Arrisueno, Gladys L; Wavering, Albert J.; Marksberry, Don; Gilbertson, Anders
Subject: NRC staff to attend Workshop planning meeting, July 28th at NIST

Non Responsive

Non Responsive

Marksberry, Don

From: Nakoski, John
Sent: Monday, July 27, 2015 3:25 PM
To: Marksberry, Don
Subject: FW: SPAR vs Lic PRA
Attachments: Whitepaper on PRA use in SDP - Rev a.docx; Letter from NEI on August 2007 Commission Meeting.pdf; Ltr to NEI on SDP.docx; march0707.docx; ML070640567.pdf; NEI Letter 12-19-14 Industry Support and Use of PRA and Risk-Informed Regulation.pdf; NRC Response to NEI Letter of August 2007 Commission Meeting.pdf

Attachments are publicly available as ML14106A571, ML070640567; ML070540208, ML070650221; ML072490566.

Don – FYI.

John

From: Appignani, Peter
Sent: Monday, July 27, 2015 3:17 PM
To: Coyne, Kevin; Nakoski, John
Subject: SPAR vs Lic PRA

FYI

Although you may already have the attached documents

Pete

Mr. Anthony Pietrangelo, Vice President
Regulatory Affairs
Nuclear Generation Division
Nuclear Energy Institute
1776 I Street NW, Suite 400
Washington, D.C. 20006-3708

Dear Mr. Pietrangelo:

The Nuclear Regulatory Commission (NRC) staff, together with the Nuclear Energy Institute (NEI), industry representatives, and other stakeholders, have held a series of public meetings to discuss whether and how licensee probabilistic risk assessment (PRA) models that are updated to meet Regulatory Guide (RG) 1.200 can be factored into the NRC=s significance determination process (SDP). This activity stems from an action item from the public meeting of September 28, 2006, between the NRC PRA Steering Committee and industry representatives. The action from the September 28, 2006 meeting was to form task groups to investigate various options for the use of the standardized plant analysis risk (SPAR) models in the SDP.

A number of options were developed and discussed with the industry during the public meetings. In particular, the industry has recommended that licensee risk analysts should assess the risk of performance deficiencies, and provide the results to the NRC for review and action. After careful consideration of the merits of all of the options developed as part of this effort, the staff concludes that none of the options are acceptable alternatives to the current process for the SDP.

The NRC=s Reactor Oversight Process (ROP) provides an independent assessment of licensee performance as such, it would be inappropriate for licensee risk analysts to take the lead in assessing the significance of licensee performance deficiencies. The staff recognizes that baseline PRA models that have undergone peer review and conform to the requirements of RG 1.200 are of relatively high quality. In many cases, the staff has found these baseline models to be superior in detail to its own SPAR models, particularly with regard to external event modeling. Nonetheless, the staff=s experience with the SDP is that the analysis outcome is not heavily influenced by differences between a licensee=s PRA model and the NRC SPAR model. Typically these differences are recognized and accounted for.

Our experience has been that differences in SDP outcomes between the NRC and the licensee are driven by factors other than the baseline PRA model used for the analysis. For example, virtually every event or degraded condition for which a phase III risk assessment is conducted requires engineering analysis and PRA model modifications to represent the performance deficiency or equipment degradation. Key assumptions regarding the extent and duration of equipment degradation are made, and human recovery actions and/or systems not modeled in the baseline PRA are often credited. The manner in which the risk analyst addresses these issues can significantly influence the risk estimate outcome. We note that to the extent that

licensees have unique perspectives on the event or condition under NRC staff evaluation, the SDP allows for input from licensees regarding such risk insights.

The staff has also concluded that allowing licensees to take the lead on risk assessments would minimize the NRC staff=s ability to ensure that issues are assessed in a timely manner.

Additionally, at present, the industry lacks a standardized approach to performing risk analysis that would ensure uniform application across the spectrum of industry PRA models. In this regard, the NRC=s use of the SPAR model together with the on-going development of guidance on conducting phase III risk assessments, commonly referred to as the risk assessment standardization process (RASP), ensures greater uniformity.

The staff also seriously considered the alternative to the current process whereby the staff would be provided with the licensee PRA models that meet RG 1.200. Under this option, the staff would perform the assessment of risk significance using a standardized approach. While this second option has merit, the staff has concluded that the logistical and resource needs to maintain the many licensee PRA models in-house is not feasible. Altogether, the 70-plus industry PRA models on some four software platforms would require significant NRC resources, including the addition of risk analysts, who might otherwise be more effectively utilized for other tasks. This alternative, while perhaps holding promise for the future as PRA software platform standardization advances, is not a viable solution for the near-term.

In summary, the staff believes that continued improvement to the standardization of PRA modeling methods in SPAR and industry PRA models is the most effective use of resources, commensurate with the need for the staff to maintain its own methods for confirmatory and independent analysis. The NRC independent oversight of licensee performance is also an important aspect of maintaining public confidence in the process.

We look forward to working with the industry to continue development of guidance for the standardized application of risk assessment models to operating event analysis.

Sincerely,

J. E. Dyer, Director
Office of Nuclear Reactor Regulation

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We look forward to working with the industry to continue development of guidance for the standardized application of risk assessment models to operating event analysis.

Sincerely,

J. E. Dyer, Director
Office of Nuclear Reactor Regulation

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OFFICE	NRR/DRA/APOB	NRR/DIRS/IRIB	NRR/DIRS
NAME	MFranovich	TReis	SRichards
DATE	07/24/2007	07/25/2007	07/26/2007
RES/DRASP	NRR/DRA	NRR/ADES	NRR/ADRO
PBaranowsky	MCunningham	JGrobe	BBoger
07/ /2007	07/ /2007	07/ /2007	07/ /2007

OFFICIAL RECORD COPY

Nakoski, John

From: Mary drouin <drouinmary22@gmail.com>
Sent: Wednesday, July 15, 2015 4:58 PM
To: Coyne, Kevin; Nakoski, John; Drouin, Mary
Subject: [External_Sender] cost comparison
Attachments: pra std etc cost comparison.docx

John, Kevin,

this is just a table that I am putting together to show some very rough estimates of what this new idea would cost

I am going to come into office around 11:30 tomorrow morning and I will finish this table, any comments please email me.

this table is not meant to share with NRR, etc,, just for our purposes when speaking with Steve to illustrate that mainitaining the SPAR models versus using licensee PRA and letting them use their models, is not cost effective!

tks, mary

	Dollars ($k)	FTEs
NRC COSTS		
INVESTED COSTS		
Standards – grants and contractors and NRC FTE	2,000k	15
RG 1.200 – contractors and NRC FTE	500k	3
SPAR Models – contractors and NRC FTE	90,000k	45
Develop Certification Criteria (assume same as std development)	2,000k	15
Certify licensee (50k and 1FTE per licensee)	3,750k	75
Review PRA	225k	75
MAINTENANCE COSTS		
Standards – grants and contractors and NRC FTE (needed for revised)	125k/yr	3/yr
RG 1.200 – contractors and NRC FTE (needed for revised)	75k/yr	.1/yr
SPAR Models – contractors and NRC FTE	3,000k/yr	1.5/yr
Update Certification Criteria	50/yr	.1/yr
Certify new and any updates (5k and 0.1FTE per licensee)	375k/yr	7.5/yr
Review PRA model per application (100k & 0.1 FTE per licensee)	75,000k/yr	7.5/yr
Current Process	92,500k 3,200k/yr	
Revised Process		
INDUSTRY COSTS		
INVESTED COSTS		
Standards (20 FTEs @ $250k/FTE)	5,000k	
PRA Models (5,000 per licensee)	375k	
Peer Reviews (3 pr @ $100k each)	225k	
Develop Certification Criteria (assume same as std development)	5,000k	
Take training (15 tech elements @ 6 wks per element – 5 per licensee)	2,250k	
Review PRA (3 million per licensee)	225k	
MAINTENANCE COSTS		
Standards (5FTE @ $250k/FTE)	1,250k/yr	
PRA Models (1 FTE per licensee @ $250k/FTE)	18,750k/yr	
Peer Reviews ($5k per year per licensee)	1,125k/yr	
Update Certification Criteria		
Update Training		

Coyne, Kevin

From: West, Steven
Sent: Tuesday, July 14, 2015 9:16 AM
To: Correia, Richard; Coyne, Kevin
Subject: RE: Please Review: NRR/RES ET Meeting Action Items 6-23-15

Expires: Wednesday, November 11, 2015 12:00 AM

Thanks, Rich. This is a timely and important initiative.

Steve

Steven West, Deputy Director
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission

301-415-1914
Steven.West@nrc.gov

From: Correia, Richard
Sent: Tuesday, July 14, 2015 9:13 AM
To: West, Steven; Coyne, Kevin
Subject: RE: Please Review: NRR/RES ET Meeting Action Items 6-23-15

I volunteered to lead a RES-NRO-NRR-region (and maybe licensee involved) effort to evaluate SPAR vs licensees PRAs. I'll keep you informed as plans develop. Thanks for the support.

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: West, Steven
Sent: Tuesday, July 14, 2015 8:00 AM
To: Correia, Richard; Coyne, Kevin
Subject: FW: Please Review: NRR/RES ET Meeting Action Items 6-23-15

See attached. I think Item 8 was more general than indicated in the summary and included the overall question about the need to continue the SPAR models (Item 5). I suggested that the RISC should be engaged to look at this but Brian and Bill decide that the NRR-RES group noted in the minutes should look into it. The minutes also mentions the SDP Phase 2 initiative (Item 9). I think NRR mentioned that it was underway for information, but there was no substantive discussion. Nevertheless, the NRR-RES group is our opportunity to flag any concerns we have with discontinuing or changing the SPAR program.

Steve

Steven West, Deputy Director
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission

301-415-1914
Steven.West@nrc.gov

From: Rini, Brett
Sent: Monday, June 29, 2015 10:02 AM
To: Sheron, Brian; West, Steven; Dean, Bill; Uhle, Jennifer; Evans, Michele; Howe, Allen; Ross-Lee, MaryJane; Kokajko, Lawrence; Weerakkody, Sunil; Shoop, Undine; Boyce, Tom (RES); Perkins, Leslie; Cruz, Holly; Proffitt, Andrew; Wertz, Trent
Cc: Thomas, Brian; Brock, Kathryn; Correia, Richard; Madden, Patrick; Lund, Louise; Case, Michael; Coffin, Stephanie; Coyne, Kevin
Subject: Please Review: NRR/RES ET Meeting Action Items 6-23-15

All,

Please find attached the list of attendees, action items, and the original background material from last week's periodic meeting of the NRR and RES Executive Teams (Office Directors and Deputies).

The action items are shown on the first three pages in highlighted text. Please send any corrections or updates to Brett Rini and Leslie Perkins, by July 8.

CCing RES SES management for awareness and for specific actions under items 3 and 4.

Thank you,

Brett

Brett A. Rini
Technical Assistant
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
(301)251-7615
Brett.Rini@nrc.gov

Coyne, Kevin

From: Marksberry, Don
Sent: Monday, July 13, 2015 8:25 AM
To: Coyne, Kevin; Nakoski, John; Appignani, Peter
Subject: Questions Concerning the Use of PRAs
Attachments: Questions (2015-07-13).docx

A brainstorming

I stopped after seeing it's getting messy.

Questions Concerning the Use of PRAs in SDP, ASP, and MD-8.3 Analyses

1. How will the SDP analyses be performed?
    a. Will the NRC perform its own analysis using the PRA instead of the SPAR model?
        i. What RASP guidance would be needed to assist in the use of the PRA in SDP/ASP/ MD-8.3 analyses?
        ii. What training would be needed?
    b. Will the NRC offer the licensee the opportunity to perform and submit the SDP analysis of record with NRC reviewing the analysis documentation?
        i. What will be the documentation requirements and how would it be conveyed to the licensees?
        ii. Can explicit RASP-like guidance to develop for licensee analysts? What should be the process for conducting an atypical analysis outside the established guidance?
        iii. What would be the process for licensees not wanting to submit an analysis?
        iv. Should the licensee analyst be qualified the same way as SRAs?
    c. Will the NRC perform confirmatory checks of licensee's analysis using the PRA?

2. Will NRC get a controlled copy of the PRAs and documentation?
    a. How will licensees submit their PRAs and documentation?
    b. How many controlled copies of the PRA are needed at the NRC (i.e., Regions, NRR, RES, contractor support)?

3. How will NRC-identified deficiencies and enhancements be handled?
    a. How long should the licensee take to correct or enhance the PRA in support of an SDP assessment?
    b. What will be the process for NRC handling PRA deficiency findings?
    c. What will be an acceptable wait period for returning a modified PRA?
    d. Will the NRC perform quality reviews of PRA changes or wait for the licensee to conduct theirs?

4. Will SPAR models/SAPHIRE be used for plants with no certified PRA (e.g., external hazards, low-power/shutdown)?

5. Should contractor support be available to the NRC?

6. What are the differences in modeling assumptions between SPAR models and PRAs? Would we apply ours or use the PRA's?

Nakoski, John

From: Marksberry, Don
Sent: Friday, July 10, 2015 12:23 PM
To: Coyne, Kevin; Nakoski, John; Appignani, Peter
Subject: RE: Discuss SPAR Models

NRR will need to come up with another ROP metric for the number of PRA deficiencies for a white. Also, licensees will need to enhance their corrective action programs to evaluate impacts of each deficiency to each risk-informed licensing submittal previously approved by NRR. However, to avoid double counting, the SDP finding for the deficien licensing action (using the corrected PRA) should override the input to the PRA deficiency metric.

Don

-----Original Appointment-----
From: Coyne, Kevin
Sent: Friday, July 10, 2015 11:23 AM
To: Correia, Richard; Nakoski, John; Marksberry, Don; Appignani, Peter
Subject: Discuss SPAR Models
When: Monday, July 13, 2015 11:00 AM-12:00 PM (UTC-05:00) Eastern Time (US & Canada).
Where: Rich's Office

Rich –

I wanted to get this in before the workshop on Tuesday – You have a soft conflict with HRMS certification, but this probably won't take the whole hour. I want to try to get aligned on a few key messages/issues for SPAR, in light of the RISC meeting yesterday. Notably:

- The decision to use or not use SPAR needs to be an agency wide decision, not one made by a single (albeit major) office. RES and the Regions need to be in the dialogue before the NRC goes public with statements about the program

- The decision to use or not use SPAR needs to consider how we address questions of: (1) independence of our risk assessments – particularly when assessing a licensee performance deficiency, (2) ability of our analysts to effectively utilize a licensee model without the need to rely on licensee assistance for the risk assessment (to avoid an obvious conflict of interest), (3) coping with non-standard modeling conventions across a wide range of models, (4) how the NRC will perform system and component studies with non-standard PRA models (currently use utilize the standardization of the models to efficiently run multiple case studies), and there's plenty of other issues I could add....

Coyne, Kevin

From: Correia, Richard
Sent: Friday, July 10, 2015 11:34 AM
To: Coyne, Kevin
Subject: Re: Discuss SPAR Models

This is important Kevin. Thx for arranging.
------Original Message------
From: Kevin A Coyne
To: Richard P Correia
To: John A Nakoski
To: Marksberry, Don
To: Appignani, Peter
Subject: Discuss SPAR Models
Sent: Jul 10, 2015 11:23 AM

Rich –

I wanted to get this in before the workshop on Tuesday – You have a soft conflict with HRMS certification, but this probably won't take the whole hour. I want to try to get aligned on a few key messages/issues for SPAR, in light of the RISC meeting yesterday. Notably:

- The decision to use or not use SPAR needs to be an agency wide decision, not one made by a single (albeit major) office. RES and the Regions need to be in the dialogue before the NRC goes public with statements about the program

- The decision to use or not use SPAR needs to consider how we address questions of: (1) independence of our risk assessments – particularly when assessing a licensee performance deficiency, (2) ability of our analysts to effectively utilize a licensee model without the need to rely on licensee assistance for the risk assessment (to avoid an obvious conflict of interest), (3) coping with non-standard modeling conventions across a wide range of models, (4) how the NRC will perform system and component studies with non-standard PRA models (currently use utilize the standardization of the models to efficiently run multiple case studies), and there's plenty of other issues I could add....

- The apparent breakdown in effective communication with NRR management on this issue.

- How NRR's position will impact the RASP user need and ongoing contract work.

Kevin

Rich
Send by BlackBerry

Nakoski, John

From: Drouin, Mary
Sent: Friday, July 10, 2015 12:04 PM
To: Correia, Richard; Coyne, Kevin; Nakoski, John
Cc: West, Steven
Subject: RE: PRA certification

I spoke with Shirley, and on Steve's calendar we are scheduled already for one hour, but she checked Rich's calendar and only ½ hour is scheduled. So please, everyone, revise your calendar for the meeting to be from 1:00 to 2:00 pm next Thursday. I sent out an update, but since I was not the originator, not sure what will happen. Jennene or Anita was the originator and I will send them an email asking them to send out an update.

On my cost estimate, I used the wrong word:

Developing criteria for certifying analysts – $5-10 million ~~conservatively~~ optimistically!

Tks, mary

From: Correia, Richard
Sent: Friday, July 10, 2015 11:44 AM
To: Drouin, Mary; Coyne, Kevin; Nakoski, John
Cc: West, Steven
Subject: Re: PRA certification

Great information Mary. Thx
Rich
Send by BlackBerry

From: Drouin, Mary
Sent: Friday, July 10, 2015 10:31 AM
To: Coyne, Kevin; Nakoski, John; Correia, Richard
Subject: PRA certification
I agree with everything that was said, in particular an NRC person putting something forward in a public meeting tha has had NO discussion.

Bill Dean talked about how he cannot afford to keep spending millions each year in developing the SPAR models. Well, wait until he hears the cost of Joe's proposal.

Phase 4 (which is described in SECY-04-0118) is proposal for the use of PRA way beyond the applications that NRC/industry has envisioned, it was close to being risk-based in that you were relying more on the numerical results So it required both a state-of-art PRA and a full-scope, detailed review.

Industry recently decided that there would never be the need for a state-of-the-art PRA and is systematically going thru the standard and deleting Capability Category III which are the requirements for a state-of-the art PRA. This is just one major issue. Putting aside the legalities, etc. and just look at the cost:

Upgrading the PRAs to a state-of-the-art, full-scope: 3-5 million per licensee -- $225-375 million
Time frame: at least 5 years

Performing a detailed full-scope review: 3 million per licensee -- $225 million
Time frame for one review at least 2 years

Developing criteria for certifying analysts – $5-10 million conservatively
Schedule for developing – 10 years

This is a quick cost view, the cost and schedule is probably worse!

Makes the money for the SPAR models look cheap!

Tks, mary

Mary Drouin
Senior Program Manager/Advisor
U.S. Nuclear Regulatory Commission
MS T10A12
Washington, D.C. 20555
(301) 415-2091 (phone)
(301) 415-6671 (fax)
mary.drouin@nrc.gov

Coyne, Kevin

From: Correia, Richard
Sent: Friday, July 10, 2015 10:28 AM
To: Coyne, Kevin
Subject: Re: RISC Public Meeting

Sorry the rest of the message wouldn't open. If this issue comes up at the workshop, we state that is the sole opinion of NRR that has not been coordinated with RES and the regions. I'd like to hear what the region SRAs have to say about using licensees' PRA.
Rich
Send by BlackBerry

From: Coyne, Kevin
Sent: Friday, July 10, 2015 09:14 AM
To: Correia, Richard; Nakoski, John
Cc: Drouin, Mary; Marksberry, Don
Subject: RE: RISC Public Meeting

Rich –

There is not a Commission SRM that mandates the use of the SPAR models. The only recent mention of SPAR in an SRM was in COMNJD-03-0002 in reference to the phased approach to PRA quality where we were asked to use SPAR as a comparison to licensee developed models during phase 2 (not sure if that was ever really done though). We obviously have been writing annual Commission papers on the status of ASP and SPAR so it would be inconceivable that the Commission would not be aware that SPAR is a critical part of the current oversight process for nuclear power plants.

I think it's important to note a few key aspects of this issue:

- Whether or not we continue to use SPAR models is a reasonable question to ask. However, it is wholly inappropriate for a single office to make public statements regarding the continued use of the models without first coordinating such comments internally with other stakeholders in the decision (e.g. the Regions and RES). This, in my opinion, is an egregious violation of our organizational values.

- NRR apparently made a number of misstatements and inaccuracies in their comments regarding SPAR yesterday – I am surprised that senior management would allow disinformation to be spread about a program that underpins one of our critical oversight mechanisms. But what has been done has been done. The question is how we correct the misstatements and restore confidence in one of our critical risk tools.

- This is a significant issue for the office. I believe that the development and maintenance of our risk tools is the single biggest project (in terms of both FTE and contract resources) within the office. Development of SPAR, SAPHIRE, and data needed to support these risk tools represents an annual budget of several million dollars, a non-trivial amount of FTE, and a significant commitment on the part of INL to support the program. We have struggled to get INL to hire adequate staff to meet current program needs and NRR making public statements that have not been vetted internally will cause much confusion regarding our continued commitment to the program and the need for future contract staff.

- The timing of this is very poor as we have a two day workshop starting Tuesday on the SPAR program – what do we tell industry representatives regarding this? NRR spoke out of school or worse, that we are not in the loop for the decision making process?

I'll set up an internal DRA meeting early next week so we can get on the same page –

Kevin

From: Correia, Richard
Sent: Friday, July 10, 2015 8:11 AM
To: Coyne, Kevin; Nakoski, John
Cc: Drouin, Mary
Subject: Re: RISC Public Meeting

The one that mandates use of SPAR models for NRC programs.
Rich
Send by BlackBerry

From: Coyne, Kevin
Sent: Friday, July 10, 2015 07:51 AM
To: Correia, Richard; Nakoski, John
Cc: Drouin, Mary
Subject: Re: RISC Public Meeting

Rich -

What secy paper srm are you referring to?

Kevin

Sent from an NRC Blackberry
Kevin Coyne
(b)(6)

From: Correia, Richard
Sent: Friday, July 10, 2015 07:22 AM
To: Nakoski, John; Coyne, Kevin
Cc: Drouin, Mary
Subject: Re: RISC Public Meeting

We will talk to Brian and Steve about this. Can someone resurrect the SECY paper SRM on SPAR models? Thx
Rich
Send by BlackBerry

From: Nakoski, John
Sent: Thursday, July 09, 2015 04:25 PM
To: Correia, Richard; Coyne, Kevin
Cc: Drouin, Mary
Subject: RISC Public Meeting

I had to hang up on the call as I could not listen to the discussion on doing away with the SPAR models anymore. There is a fundamental misunderstanding on the part of NRR management on why the SPAR models were developed – for the ASP program – then they were available for the ROP SDP process. Further,

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John A. Nakoski
Chief, Performance and Reliability Branch
Division of Risk Analysis
Office of Research
301-415-2480 (w)
(b)(6) (c)

Marksberry, Don

From: Correia, Richard
Sent: Friday, July 10, 2015 10:25 AM
To: Coyne, Kevin; Nakoski, John; West, Steven
Cc: Drouin, Mary; Marksberry, Don
Subject: Re: RISC Public Meeting

What concerns me the most is the one sided opinion/non-collaborated statements NRR has made, now publicly, about SPAR model use. All in the name of saving funds without any analysis of the costs of using licensees PRAs.
Rich
Send by BlackBerry

From: Coyne, Kevin
Sent: Friday, July 10, 2015 09:14 AM
To: Correia, Richard; Nakoski, John
Cc: Drouin, Mary; Marksberry, Don
Subject: RE: RISC Public Meeting

Rich –

There is not a Commission SRM that mandates the use of the SPAR models. The only recent mention of SPAR in an SRM was in COMNJD-03-0002 in reference to the phased approach to PRA quality where we were asked to use SPAR as a comparison to licensee developed models during phase 2 (not sure if that was ever really done though). We obviously have been writing annual Commission papers on the status of ASP and SPAR so it would be inconceivable that the Commission would not be aware that SPAR is a critical part of the current oversight process for nuclear power plants.

I think it's important to note a few key aspects of this issue:

- Whether or not we continue to use SPAR models is a reasonable question to ask. However, it is wholly inappropriate for a single office to make public statements regarding the continued use of the models without first coordinating such comments internally with other stakeholders in the decision (e.g. the Regions and RES). This, in my opinion, is an egregious violation of our organizational values.

- NRR apparently made a number of misstatements and inaccuracies in their comments regarding SPAR yesterday – I am surprised that senior management would allow disinformation to be spread about a program that underpins one of our critical oversight mechanisms. But what has been done has been done. The question is how we correct the misstatements and restore confidence in one of our critical risk tools.

- This is a significant issue for the office. I believe that the development and maintenance of our risk tools is the single biggest project (in terms of both FTE and contract resources) within the office. Development of SPAR, SAPHIRE, and data needed to support these risk tools represents an annual budget of several million dollars, a non-trivial amount of FTE, and a significant commitment on the part of INL to support the program. We have struggled to get INL to hire adequate staff to meet current program needs and NRR making public statements that have not been vetted internally will cause much confusion regarding our continued commitment to the program and the need for future contract staff.

- The timing of this is very poor as we have a two day workshop starting Tuesday on the SPAR program – what do we tell industry representatives regarding this? NRR spoke out of school or worse, that we are not in the loop for the decision making process?

I'll set up an internal DRA meeting early next week so we can get on the same page –

Kevin

From: Correia, Richard
Sent: Friday, July 10, 2015 8:11 AM
To: Coyne, Kevin; Nakoski, John
Cc: Drouin, Mary
Subject: Re: RISC Public Meeting

The one that mandates use of SPAR models for NRC programs.
Rich
Send by BlackBerry

From: Coyne, Kevin
Sent: Friday, July 10, 2015 07:51 AM
To: Correia, Richard; Nakoski, John
Cc: Drouin, Mary
Subject: Re: RISC Public Meeting

Rich -

What secy paper srm are you referring to?

Kevin

Sent from an NRC Blackberry
Kevin Coyne
(b)(6)

From: Correia, Richard
Sent: Friday, July 10, 2015 07:22 AM
To: Nakoski, John; Coyne, Kevin
Cc: Drouin, Mary
Subject: Re: RISC Public Meeting

We will talk to Brian and Steve about this. Can someone resurrect the SECY paper SRM on SPAR models? Thx
Rich
Send by BlackBerry

From: Nakoski, John
Sent: Thursday, July 09, 2015 04:25 PM
To: Correia, Richard; Coyne, Kevin
Cc: Drouin, Mary
Subject: RISC Public Meeting

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John A. Nakoski
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Division of Risk Analysis
Office of Research
301-415-2480 (w)
(b)(6) (c)

Nakoski, John

From: Drouin, Mary
Sent: Friday, July 10, 2015 10:18 AM
To: Coyne, Kevin; Correia, Richard; Nakoski, John
Subject: RE: RISC Public Meeting

Kevin,

See my earlier email, we have a meeting scheduled with Steve on Thursday, the purpose of this meeting was to discuss this new idea of NRR of using "certified" PRA models (of which Joe is using stopping the SPAR models as a hook to get industry to buy into this certification idea), earlier email I suggested that we expand that meeting to one hour. I think it would be a good idea for us to meet before the meeting with Steve. Could you please not schedule the meeting on Monday. I am out of the office next two weeks, but I will come in for these meetings.

Tks, mary

From: Coyne, Kevin
Sent: Friday, July 10, 2015 9:14 AM
To: Correia, Richard; Nakoski, John
Cc: Drouin, Mary; Marksberry, Don
Subject: RE: RISC Public Meeting
Importance: High

Rich –

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Nakoski, John

From: Ferrante, Fernando
Sent: Friday, July 10, 2015 9:56 AM
To: Nakoski, John
Subject: RE: RISC Discussion of SPAR Models

John,

It was worst sitting in the room. I was physically repulsed by the coziness between NRR and NEI.

Fernando Ferrante

From: Nakoski, John
Sent: Friday, July 10, 2015 9:47 AM
To: Ferrante, Fernando
Subject: RE: RISC Discussion of SPAR Models

Fernando,

I was on the phone listening in. I had to hang up while this was being discussed because I was so angry that I would have likely said something totally unprofessional if I had not. I am appalled by the complete capitulation of our regulatory independence to the licensees on this topic. I would rather tell the industry that the NRC is completely removing PRA and risk insight from our regulatory framework rather than be on the path that NRR has started down. This is so fundamentally counter to the way an independent regulatory should behave as to be boarder line unethical.

John Nakoski

From: Ferrante, Fernando
Sent: Thursday, July 09, 2015 9:03 PM
To: Nakoski, John
Subject: Fw: RISC Discussion of SPAR Models

FYI only, please do not share.

From: Ferrante, Fernando
Sent: Thursday, July 9, 2015 7:56 PM
To: Coyne, Kevin
Subject: RISC Discussion of SPAR Models

Kevin,

Much to my chagrin, I attended the RISC meeting this afternoon. I was hoping to hear about the sunset of WG2, which was obliquely mentioned.

Unfortunately, and as I predicted, the idea of getting rid of SPAR models took hold after being floated by NRR DRA t an ecstatic NEI. The strong impression given by NRR was that not only they are dead serious about this but they want it now. I won't mention all the distortions, factually wrong opinions, and cavalier statements that were made by several upper managers in front of industry about the SPAR program, but what disturbed me the most was the silence of those that know better. I was the lonely voice to intervene with an opposed view (probably to my

professional career detriment) to the almost jubilant celebration of going down this path . I think it is now high noon for intervention at the Office level.

While I have seen this before, and I'm trying not too sound too dramatic, I can't describe how disheartening it is to work on a project that the Agency appears to so desperately get rid of in such an uninformed way. I will keep plugging at it, but I just wanted to let you know how bad the meeting this afternoon was (Steve, Rich, Mary, and Anders were there too; I would strongly encourage that you hear their perspective in the off chance that I am wrong).

Thanks,
Fernando

Coyne, Kevin

From: Coyne, Kevin
Sent: Thursday, July 09, 2015 8:53 PM
To: Ferrante, Fernando
Subject: Fw: RISC Public Meeting

Fyi...

Sent from an NRC Blackberry
Kevin Coyne
(b)(6)

From: Correia, Richard
Sent: Thursday, July 09, 2015 06:26 PM
To: Coyne, Kevin
Cc: Nakoski, John
Subject: Re: RISC Public Meeting

Steve and I discussed. We'll meet next week with him to plan a strategy.
Rich
Send by BlackBerry

From: Coyne, Kevin
Sent: Thursday, July 09, 2015 05:54 PM
To: Correia, Richard
Cc: Nakoski, John
Subject: FW: RISC Public Meeting

Rich –

We need to discuss where NRR is heading with this...

Kevin

From: Nakoski, John
Sent: Thursday, July 09, 2015 4:26 PM
To: Correia, Richard; Coyne, Kevin
Cc: Drouin, Mary
Subject: RISC Public Meeting

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Coyne, Kevin

From: Coyne, Kevin
Sent: Thursday, July 02, 2015 9:03 AM
To: Appignani, Peter; Ferrante, Fernando
Subject: RE: Renewed Push Against SPAR Models

Thanks Pete –

Rich is working the issue (and the certification process definitely has Mary on the high speed limiter…).

Kevin

From: Appignani, Peter
Sent: Thursday, July 02, 2015 7:32 AM
To: Ferrante, Fernando; Coyne, Kevin
Subject: RE: Renewed Push Against SPAR Models

Kevin

For the time being I'll let you and Rich deal with this.
Let me know if you need my assistance.

Pete

From: Ferrante, Fernando
Sent: Wednesday, July 01, 2015 9:37 AM
To: Coyne, Kevin
Cc: Appignani, Peter
Subject: Renewed Push Against SPAR Models
Importance: High

Kevin,

Since you will be acting DD for DRA, I think this is an important issue to raise to you (really sorry to do this on your first day, however ☺):

Steve, Rich, Mary, and I attended an internal NRC meeting yesterday to brief the RISC on the final activities of the RISC WG2. The good news: the RISC appears strongly inclined to close out the WG activities.

The bad news: an unrelated item came up during the meeting from NRR DRA on a renewed effort to get rid of SPAR models by over relying on licensee PRAs only. Joe Giitter introduced an idea being floated around ("certified PRA") as a potential solution to the RMRF, NTTF Recommendation 1 debacle. This idea has all the hallmarks of previous attempts to lower the bar on PRA requirements while creating a path for licensees to use it for all kinds of regulatory actions (licensing and oversight) without NRC review or approval (similar to RPI, vetting panel, and countless other similar ideas stemming out of NRR DRA in the last few years). A major benefit being touted is getting rid of SPAR models. While I don't see this as anything more than another

attempt to cut through NRC requirements to give licensees quick relief in order to reduce pressure on activities such as NFPA805 and Fukushima Lessons Learned, I found it disturbing how casually getting rid of SPAR models was being thrown around by Bill Dean (not only as an easy thing to do but as a great positive incentive to move forward on this idea). I have seen this script before multiple times and I strongly believe this is misguided and can have significant negative impacts on the Agency, and as usual I believe this is being glossed over in communications with upper management. I'm not surprised by this as I am also well aware of the approaches NRR DRA uses to promote this idea (for example, by rolling it into a mild looking proposal and by controlling the communication chain tightly).

Rich was in attendance so I will leave it to him to give you more details. I just wanted to let you know that I deferred intervening because (1) the meeting wasn't about SPAR models, and (2) Rich noticed with concern the statements made but chose not to say anything at that stage (I did not feel it would be right for me to overstep him with the audience at hand). While I have seen these efforts come and go, and I expect this one to follow the same route, I think we need to take this seriously and engage early. Another tactic used in this arena is to put forward an idea at a high level without a lot of consultation with affected parties and then get buy in to move forward such that, once momentum is gained, the effort cannot be easily stopped (maybe this may be what some folks understand "strategic vision" to mean in SES training). Therefore, I am concerned that the RISC will be used to promote this concept maybe even by sharing it with the industry at a public meeting.

If you would like me to provide more details, please let me know.

Thanks,
Fernando

Coyne, Kevin

From: Marksberry, Don
Sent: Tuesday, June 02, 2015 1:01 PM
To: Coyne, Kevin; Appignani, Peter; Ferrante, Fernando; Wood, Jeffery; Helton, Donald; Hunter, Christopher
Cc: Nakoski, John
Subject: RE: One pager for Brian on SPAR models

Kevin

Some points to expand on

- Standardized SPAR models reduces staff's time to complete a risk assessment of an operational event. Atypical events typically require an enhancement of the SPAR/PRA to model the degraded component or action that may not be modeled or may be associated with cutsets below the model truncation level. Such enhancements require familiarity of the SPAR/PRA for the modification, QA reviews, and testing. Enhancements to SPAR models can take days to weeks of staff time. Enhancements to PRA would take longer and require an infrastructure of its own.

- Standardized SPAR models ensure consistency between programs, regions, analysts for similar assessments at different plants with deferring PRAs. License's occasionally spend vast amounts of resources to contest an SDP finding, which would require almost an equal amount of staff's resources to respond. Different results due to PRA differences would be a point of contention by the licensee and public stakeholder.

- Providing for independent modeling capability is an Agency policy (small "p" or preferred practice). Other agency modeling programs which could be considered redundant to industry capabilities include MELCOR, SCALE, etc.

From: Coyne, Kevin
Sent: Tuesday, June 02, 2015 10:27 AM
To: Appignani, Peter; Ferrante, Fernando; Wood, Jeffery; Helton, Donald; Hunter, Christopher; Marksberry, Don
Cc: Nakoski, John
Subject: One pager for Brian on SPAR models
Importance: High

We've been asked to provide Brian a one pager on why we use SPAR models (vs. licensee models). Please see attached write-up and background. Rich would like to get this to Brian ASAP, so if you can send me your comments today, I would very much appreciate it.

Thanks!

Kevin

Coyne, Kevin

From: Coyne, Kevin
Sent: Tuesday, June 02, 2015 12:48 PM
To: Appignani, Peter; Ferrante, Fernando; Wood, Jeffery; Helton, Donald; Hunter, Christopher; Marksberry, Don
Cc: Nakoski, John
Subject: RE: One pager for Brian on SPAR models
Attachments: SPAR One Pager_June 2015_Rev 1.docx; Letter to NEI on use of SPAR Models_ML072490540.pdf

Importance: High

Thanks to all for your comments – I've attached the latest update. Still fits on one page (front and back), but I couldn't work in everything, so I tried to keep with the highlights. But please let me know if you feel I left something out that needs to be added. And let me know if you have any other comments/revisions/feedback.

Thanks!

Kevin

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Thanks!

Kevin

Standardized Plant Analysis Risk (SPAR) Models

The SPAR models are standardized, plant-specific, PRA models that are used to support a variety of risk-informed regulatory programs, including the SDP (NRR & Regions), NOEDs (NRR & Regions), MD 8.3 Assessments (Regions), Generic Issues (RES), ASP analysis (RES), Regulatory Analysis (NRR & RES), risk-informing inspection activities (Regions), and special studies (RES & NRO). The SPAR models provide a tool that supports consistent risk-informed regulatory decision-making for a diverse range of issues.

Current Capabilities

- 76 SPAR models representing all operating plants – all include at-power models, internal hazards
- 20 models contain external hazard models (representing 25 operating plants)
- 8 models include shutdown template models
- 5 new reactor models (ABWR/GE, ABWR/Toshiba, APWR, AP1000, US EPR)

Advantages of SPAR Models Compared to Licensee Models

- Provides risk modeling capabilities that are independent of licensee models and analyses. This independence is critical in ensuring public confidence in our oversight programs (see attached letter from the EDO to NEI, October 2007, ML072490566).
- Modeling changes needed for event and condition assessments (ECAs), including those arising from plant-specific information provided by licensees, can be quickly and easily accomplished using the standardized conventions of the SPAR and SAPHIRE environment.
- Improves Efficiency of Agency Risk Analysts
  - SPAR models use standardized modeling and naming conventions to allow agency risk analysts to efficiently navigate the models and make changes to support ECAs in a timely manner. This standardization also simplifies data updates and analyses for multiple plants.
  - SPAR models are specifically developed to support ECAs and include modeling conventions for common cause failure, AC power distribution, and support systems that allow quicker, more consistent, and more accurate risk assessments.
  - All SPAR models are designed to run with the SAPHIRE computer code, which provides enhanced features to support ECAs such as structured user workspaces (which adjusts functionality to the user's skill level) and advanced reporting capabilities (such as the Plant Risk Information eBooks).
  - The Agency has ability to adjust either SPAR modeling and/or the SAPHIRE code to provide new features and capabilities in the most optimal and cost effective manner.

SPAR Quality Assurance

- The SPAR Quality Assurance Plan and supporting QA requirements in RASP Handbook help ensure models represent the as-built, as-operated plant
- Model Maker Guidelines for external hazards, shutdown, and Level 2 ensure consistent use of modeling conventions
- Configuration controls are followed for model updates to ensure consistent and accurate model updates.
- Verification reviews include onsite verification (when appropriate) and comparison to licensee models. SPAR models are benchmarked to licensee PRA information after major

SPAR updates (comparisons rely on the best available information provided by the licensee and include checks of CDF, CCDPs, and qualitative review of cutsets)

- Industry led ASME PRA Standard peer reviews of representative BWR and PWR models conducted in 2010 determined that SPAR models were efficient method to develop qualitative and quantitative insights for agency applications
- SAPHIRE is maintained under a NUREG/BR-0167 compliant QA program

SPAR Model Maintenance Activities

- Major updates are performed for approximately 8-12 models per year based on feedback from NRR and Regional SRAs
- Less significant model changes are performed as needed to support SDP and ASP activities (typically 20-30 models per year).
- Every 3-4 years, a major data update is performed for all SPAR models to reflect recent operational performance data and other model enhancements (currently in progress)

SPAR and SAPHIRE Annual Budget

- ~$2 million per year
- ~4 FTE per year
- Approximately 90% of resources from operating reactor business line, remainder from new reactors.

Key Messages

- SPAR models provide an independent and effective risk assessment tool and are fully capable of supporting the NRC's risk-informed regulatory activities. Use of a risk tool that is independent from the licensee's PRA fosters a more productive exchange of information with the licensee and reduces the potential for biasing risk results and insights.
- The use of a common software platform (SAPHIRE) and the standardized SPAR modeling approach improves the ability of the NRC to make consistent risk-informed decisions related to performance deficiencies and operating events; increases the efficiency of agency risk analysts; and permits the agency to make cost-effective improvements to our risk tools to meet emerging user needs.
- No PRA (SPAR or licensee) can accurately capture every nuance of an operational event or performance deficiency. Qualified risk analysts and an appropriate level of peer review ensure that SPAR results appropriately represent the as-built, as-operated plant.
- The NRC has not observed significant divergence in analysis results due to modeling differences between licensee and SPAR models. While divergence between licensee and NRC SDP assessments is sometimes noted, the reasons generally involve analysis-specific assumptions and boundary conditions (e.g., human reliability analysis, common cause failure assumptions, recovery credit) rather than baseline modeling differences
- For RES, the SPAR models and SAPHIRE code currently provide the only viable method for evaluating potential event precursors under the ASP Program (which provides input into the performance budget and abnormal occurrence report to Congress). NRC reliance on licensee PRA models would significantly adversely impact the efficient and effective implementation of the ASP Program.

Coyne, Kevin

From: Ferrante, Fernando
Sent: Tuesday, June 02, 2015 12:14 PM
To: Coyne, Kevin; Appignani, Peter; Wood, Jeffery; Helton, Donald; Hunter, Christopher; Marksberry, Don
Cc: Nakoski, John
Subject: RE: One pager for Brian on SPAR models
Attachments: SPAR One Pager_June 2015_FF.docx

Kevin,

I added some quick thoughts off the top of my head to counter some of the anti-SPAR positions I heard in NRR which are bound to come up. Feel free to use/change/delete as you see appropriate.

Thank you,
Fernando

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Advantages of SPAR Models Compared to Licensee Models

- Independent Modeling Capability
  - Provides agency risk assessment tool that is independent of licensee model and analysis. This independence helps to ensure that the agency has complete information when ~~assessment~~ assessing licensee performance issues and is a critical aspect in ensuring public confidence in our oversight programs (see attached letter from the EDO to NEI, October 2007, ML072490566).

- Ability to better represent as-built, as-operated, plant for event and condition assessments as modeling changes can be readily accomplished with the SPAR and SAPHIRE environment (which NRC can direct INL to implement, providing control for NRC needs).

- Improves Efficiency of Agency Risk Analysts
  - SPAR models use standardized modeling and naming conventions to allow agency risk analysts to efficiently navigate the models and make changes to support event and condition assessments (ECAs) in a timely manner with very short turn-around.
  - SPAR models are developed to support ECAs and include modeling conventions for common cause failure, AC power distribution, and support systems that allow quicker and more accurate risk assessments.
  - All models designed to run with SAPHIRE computer code, which provides enhanced features to support ECA analysis such as structured user workspaces (which adjusts functionality to the user's skill level) and advanced reporting capabilities (such as the Plant Risk Information eBooks).
  - Standardized modeling allows the agency to efficiently perform risk assessment studies for multiple plants and supports easier data updating.
  - Agency has ability to adjust either SPAR modeling and/or the SAPHIRE code to provide new features and capabilities in the most optimal and cost effective manner.
  - SAPHIRE/SPAR provides unique capabilities for NRC staff to develop much needed PRA skills (e.g., Grow Your Own PRA), as the current NRC training administered by INL

relies on the framework of SAPHIRE/SPAR to illustrate critical PRA concepts and implementation aspects. The reduction of SAPHIRE/SPAR model program could cause the Agency's risk analyst community capabilities to significantly diminish at a time when critical PRA expertise is essential for the Agency's aspirations towards a more risk-informed regulatory framework.

- Several SPAR models were shared with individual licensees during the development of SPAR All Hazards models in which they acknowledged an appropriate level of detail and correctness exists for the purposes of the NRC's use of PRA
- The application of PRA for oversight is distinct from licensing, namely (1) short timeframes are involved, (2) the introduction of performance deficiencies may shed light into different portions of the model, raising additional modeling aspects not considered in baseline PRAs, and (3) the alternative of relying on licensees models would significantly curtail the NRC staff's flexibility in performing sensitivity analyses challenging licensees assumptions in situations where meeting the PRA standard is neither an expectation nor a reasonable requirement.
- A lack of an independent NRC model would create a disincentive for licensees to clearly address inspections findings with solid information, as the NRC staff would become reliant on the licensee's interpretation of how to model changes in risk within a model that the NRC staff is unfamiliar with.
- Relying on licensee's models for SDP purposes may ultimately cause more inefficiency and expenditure of resources beyond the current SAPHIRE/SPAR framework, as each SRA would have to become more familiar with multiple software PRA packages, PRA nomenclature, and modeling approaches. Unless the NRC were to rely solely on the licensees information with minimal questioning, in which case, prior experience indicates most findings would disposition non-conservatively as GREEN under such a shift as there is no incentive for a licensee to accept another result that may impact their standing on the Action Matrix.
- As indicated by the NEI letter to the NRC on December 19, 2013, ML13354B997; there is significantly variability beyond internal events with respect to the peer-review of other hazards, as well as the fact that some licensees do not have models in specific areas that have become of significant importance in recent years (e.g., external events). Further reliance on licensee models as opposed to SPAR would question the timeliness of dispositioning findings for which the licensee model either does not exist or has not been peer-reviewed (or has potentially been developed in an ad hoc manner for a particular finding, as has been observed in the past). Again, the existence of an independent NRC tool at a minimum provides incentive for a concerted effort on the licensee's part to address the performance deficiency more fully.
- Despite industry statements to the contrary, the widespread availability of detailed PRA models that encompass the range of applicability and flexibility needed for SDP will take additional time to develop and may never be achieved without a forcing function such as the Agency's independent use of internal PRA models.

SPAR Quality Assurance

- Quality Assurance Plan and supporting QA requirements in RASP Handbook
- Model Maker Guidelines for external hazards, shutdown, and Level 2 ensure consistent use of modeling conventions
- Configuration controls for model updates
- Verification reviews include onsite verification (when appropriate) and comparison to licensee models. SPAR models are benchmarked to licensee PRA information after major SPAR updates (comparisons rely on the best available information provided by the licensee and include checks of CDF, CCDPs, and qualitative review of cutsets)
- Industry led ASME PRA Standard peer reviews of representative BWR and PWR models conducted in 2010 determined that SPAR models were efficient method to develop qualitative and quantitative insights for agency applications
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Key Messages

- SPAR models provide an independent and effective risk assessment tool and are fully capable of supporting the NRC's risk-informed regulatory activities.
- The use of a common software platform (SAPHIRE) and the standardized SPAR modeling approach increases the efficiency of agency risk analysts and permits the agency to make cost-effective improvements to our risk tools to meet emerging user needs.
- No PRA (SPAR or licensee) can accurately capture every nuance of an operational event. Qualified risk analysts and an appropriate level of peer review ensure that SPAR results appropriately represent the as-built, as-operated plant.
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Coyne, Kevin

From: Correia, Richard
Sent: Tuesday, June 02, 2015 12:00 PM
To: Coyne, Kevin; Madden, Patrick
Subject: RE: requesting your review in preparation for a briefing to Bill Dean (SPAR User NEED)

I spoke with Joe Giitter about your offer Kevin and our concerns WRT SPAR models and how they are used across the agency. Joe told me he fully understands and that he, Sunil and Bill Dean support the continued use of SPAR models. He said he wanted the meeting with Bill to be an NRR only meeting. I also told him that SPAR models were on the Bill-Brian meeting agenda so Bill will get Brian's perspectives.

Anyway, we can't force our way into the meeting with Bill so let's see what comes from it.

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Coyne, Kevin
Sent: Monday, June 01, 2015 7:14 AM
To: Correia, Richard; Madden, Patrick
Subject: Fw: requesting your review in preparation for a briefing to Bill Dean (SPAR User NEED)

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Sent from an NRC Blackberry
Kevin Coyne
(b)(6)

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Cc: Coyne, Kevin; Madden, Patrick
Subject: RE: requesting your review in preparation for a briefing to Bill Dean (SPAR User NEED)

When is Brian's next periodic (I want to try and brief Bill before that)?

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Thx Sunil,

Brian plans to bring this up at the next (June) periodic with Bill.

Rich

Richard Correia, PE
Director,
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Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

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Cc: Correia, Richard; Coyne, Kevin
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Importance: High

Joe/Sam,

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Kevin\Rich: This will be a NRR briefing. However, we welcome additional information that you may have.

Once I incorporate your comments, we (Joe/Sam and I) can meet with Bill (like I and Jeff Mitman did for flooding User Need).

Sunil D Weerakkody, Chief
PRA Operations & Human Factors Branch
Office of Nuclear Reactor Regulation
Nuclear Regulatory Commission

Address: Mail Stop O-10 C-15, US NRC, Washington DC 20005-0001

Tel: 301-415-2870

Coyne, Kevin

From: Nakoski, John
Sent: Tuesday, June 02, 2015 11:21 AM
To: Hunter, Christopher; Coyne, Kevin
Subject: RE: One pager for Brian on SPAR models

Kevin,

One additional comment on top of what I sent you earlier.

The SPAR models and SAPHIRE provide the only currently available viable method by which the NRC can evaluate operational events to determine whether there are precursors to more significant events under the ASP Program. The results of these evaluations are the input to the annual update to Congress on any significant precursors that may be identified. NRC reliance on licensee PRA models to support the ASP Program would require that the ASP Program Risk Analysts have access to and detailed knowledge of the licensees' models that is problematic and would significantly adversely impact the efficient and effective implementation of the ASP Program.

John

From: Hunter, Christopher
Sent: Tuesday, June 02, 2015 11:11 AM
To: Coyne, Kevin
Cc: Nakoski, John
Subject: RE: One pager for Brian on SPAR models

Kevin,

See my comments for what they are worth.

Chris

From: Coyne, Kevin
Sent: Tuesday, June 02, 2015 10:27 AM
To: Appignani, Peter; Ferrante, Fernando; Wood, Jeffery; Helton, Donald; Hunter, Christopher; Marksberry, Don
Cc: Nakoski, John
Subject: One pager for Brian on SPAR models
Importance: High

We've been asked to provide Brian a one pager on why we use SPAR models (vs. licensee models). Please see attached write-up and background. Rich would like to get this to Brian ASAP, so if you can send me your comments today, I would very much appreciate it.

Thanks!

Kevin

Standardized Plant Analysis Risk (SPAR) Models

The SPAR models are standardized, plant-specific, PRA models that are used to support a variety of risk-informed regulatory programs, including the SDP (NRR & Regions), NOEDs (NRR & Regions), MD 8.3 Assessments (Regions), Generic Issues (RES), ASP analysis (RES), Regulatory Analysis (NRR & RES), and special studies (RES & NRO).

Current Capabilities

- 76 SPAR models representing all operating plants – all include at-power, internal hazards ~~at power models~~
- 20 models contain external hazard models (representing 25 operating plants)
- 8 models include shutdown template models
- 5 new reactor models (ABWR/GE, ABWR/Toshiba, APWR, AP1000, US EPR)

Advantages of SPAR Models Compared to Licensee Models

- Independent Modeling Capability
  - Provides agency risk assessment tool that is independent of licensee model and analysis. This independence helps to ensure that the agency has complete information when ~~assessment~~ evaluating licensee performance issues and is a critical aspect in ensuring public confidence in our oversight programs (see attached letter from the EDO to NEI, October 2007, ML072490566).

- Ability to better represent as-built, as-operated, plants for event and condition assessments (ECA) as modeling changes can be readily accomplished with the SPAR and SAPHIRE environment.

- Improves Efficiency of Agency Risk Analysts
  - SPAR models use standardized modeling and naming conventions to allow agency risk analysts to efficiently navigate the models and make changes to support ~~event and condition assessments~~ (ECAs).
  - SPAR models are developed to support ECAs and include modeling conventions for common-cause failures, AC power distribution, and support systems that allow quicker and more accurate risk assessments.
  - All models are designed to run with SAPHIRE computer code, which provides enhanced features to support ECAs ~~analysis~~ such as structured user workspaces (which adjusts functionality to the user's skill level) and advanced reporting capabilities (such as the Plant Risk Information eBooks).
  - Standardized modeling allows the agency to efficiently perform risk assessment studies for multiple plants and supports easier data updatesing.
  - Agency has ability to adjust either SPAR modeling and/or the SAPHIRE code to provide new features and capabilities in the most optimal and cost effective manner.

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SPAR Quality Assurance

- Quality Assurance (QA) Plan and supporting QA requirements in RASP Handbook.
- Model Maker Guidelines for external hazards, shutdown, and Level 2 ensure consistent use of modeling conventions.
- Configuration controls for model updates.
- Verification reviews include onsite verification (when appropriate) and comparison to licensee models. SPAR models are benchmarked ~~to~~ against licensee PRA information after major SPAR updates (comparisons rely on the best available information provided by the licensee and include checks of CDF, CCDPs, and qualitative review of cut sets).
- Industry led ASME PRA Standard peer reviews of representative BWR and PWR models conducted in 2010 determined that SPAR models were efficient method to develop qualitative and quantitative insights for agency applications.
- SAPHIRE maintained under a NUREG/BR-0167 compliant QA program.

SPAR Model Maintenance Activities

- Major updates are performed for approximately 8—12 models per year based on feedback from NRR and Regional SRAs.
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Key Messages

- SPAR models provide an independent and effective risk assessment tool and are fully capable of supporting the NRC's risk-informed regulatory activities.
- The use of a common software platform (SAPHIRE) and the standardized SPAR modeling approach increases the efficiency of agency risk analysts and permits the agency to make cost-effective improvements to our risk tools to meet emerging user needs.
- No PRA (SPAR or licensee) can accurately capture every nuance of an operational event. Qualified risk analysts and an appropriate level of peer review ensure that SPAR results appropriately represent the as-built, as-operated plant.
- The NRC has not observed significant divergence in analysis results due to modeling differences between licensee and SPAR models. While divergence between licensee and NRC SDP assessments is sometimes noted, the reasons generally involve analysis-specific

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Commented [CSH1]: This bullet seems incomplete to me. Are you trying to state that there is a plan and requirements. Are both in the RASP handbook? It might be good to add the benefit of the QA plan.

Commented [CSH2]: Can we add that this helps to reduce errors or something like that?

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Coyne, Kevin

From: Nakoski, John
Sent: Tuesday, June 02, 2015 10:49 AM
To: Coyne, Kevin
Subject: SPAR One Pager_June 2015_jan1.docx
Attachments: SPAR One Pager_June 2015_jan1.docx

Kevin,

My comments on the one-pager for your consideration.

John

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Advantages of SPAR Models Compared to Licensee Models

- Independent Modeling Capability
  - Provides an agency risk assessment tool that is independent of licensee models and analysies that support consistent regulatory decision-making when addressing the risk significance of similar performance deficiencies or operating events at different sites. This independence helps to ensure that the agency has complete information when ~~assessment~~ assessing licensee performance issues and is a critical aspect in ensuring public confidence in our oversight programs (see attached letter from the EDO to NEI, October 2007, ML072490566).

- Modeling changes that affect multiple units can be quickly and easily accomplished using the standardized conventions of the SPAR and SAPHIRE environment, including the aAbility to better represent as-built, as-operated, plant for event and condition assessments using unit specific information provided by the licensee ~~as modeling changes can be readily accomplished with the SPAR and SAPHIRE environment~~.

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  - SPAR models are developed to support ECAs and include modeling conventions for common cause failure, AC power distribution, and support systems that allow quicker, more consistent, and more accurate risk assessments.
  - All the models are designed to run with the SAPHIRE computer code, which provides enhanced features to support ECA analysis such as structured user workspaces (which adjusts functionality to the user's skill level) and advanced reporting capabilities (such as the Plant Risk Information eBooks).
  - Standardized modeling provides common levels of detail and assumptions that allows the agency to efficiently perform risk assessment studies for multiple plants and supports easier data updating.

- The Agency has ability to adjust either SPAR modeling and/or the SAPHIRE code to provide new features and capabilities in the most optimal and cost effective manner.

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- The Quality Assurance Plan and supporting QA requirements are in RASP Handbook
- Model Maker Guidelines for external hazards, shutdown, and Level 2 ensure consistent use of modeling conventions
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- SPAR models provide an independent and effective risk assessment tool and are fully capable of supporting the NRC's risk-informed regulatory activities.
- The use of a common software platform (SAPHIRE) and the standardized SPAR modeling approach improves the ability of the NRC to make consistent risk-informed decisions related to performance deficiencies and operating events; and
- ~~The use of a common software platform (SAPHIRE) and the standardized SPAR modeling approach~~ increases the efficiency of agency risk analysts and permits the agency to make cost-effective improvements to our risk tools to meet emerging user needs.

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Appignani, Peter

From:	Coyne, Kevin
Sent:	Tuesday, June 02, 2015 10:27 AM
To:	Appignani, Peter; Ferrante, Fernando; Wood, Jeffery; Helton, Donald; Hunter, Christopher; Marksberry, Don
Cc:	Nakoski, John
Subject:	One pager for Brian on SPAR models
Attachments:	SPAR One Pager_June 2015.docx; Letter to NEI on use of SPAR Models_ML072490540.pdf
Importance:	High

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Sent: Monday, June 01, 2015 7:22 AM
To: Weerakkody, Sunil; Giitter, Joseph; Lee, Samson
Cc: Coyne, Kevin; Madden, Patrick
Subject: RE: requesting your review in preparation for a briefing to Bill Dean (SPAR User NEED)

Importance: High

It's currently scheduled for June 23.

Joe, Sunil,

I strongly recommend Kevin Coyne be part of the Bill briefing. SPAR models are used for many purposes and Kevin can answer Bills questions that go beyond NRR uses.

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Weerakkody, Sunil
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Office of Nuclear Reactor Regulation
Nuclear Regulatory Commission

Address: Mail Stop O-10 C-15, US NRC, Washington DC 20005-0001

Tel: 301-415-2870
Black Berry: (b)(6)

Coyne, Kevin

From: Correia, Richard
Sent: Monday, June 01, 2015 7:17 AM
To: Coyne, Kevin; Madden, Patrick
Subject: RE: requesting your review in preparation for a briefing to Bill Dean (SPAR User NEED)

Understand and agree Kevin which is why I had the SPAR program be on the agenda for the next Brian-Bill periodic. Any idea when Sunil plans to brief Bill? I'm pretty sure Bill is in Paris this week (with Brian & Steve) for the CNRA and CSNI meetings.

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

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Nuclear Regulatory Commission

Address: Mail Stop O-10 C-15, US NRC, Washington DC 20005-0001

Tel: 301-415-2870
Black Berry: (b)(6)

Ferrante, Fernando

From: Kozak, Laura
Sent: Wednesday, May 27, 2015 11:36 AM
To: Ferrante, Fernando
Subject: RE: NFPA805 SPAR Models

Fernando

I appreciate your thoughts on these issues and it seems you have even more insights than I developed in my support of the Duane Arnold triennial FP inspection. I view SPAR models as a benefit and would get involved in a future RIII plant – I would offer Duane Arnold, Prairie Island or Palisades.

The issues at hand are even larger than just understanding the risk models. In my mind there are questions about what constitutes a PD for an NFPA 805 plant and what do we do with identified deficiencies in the fire PRA – which represent a problem with the baseline risk calculation but are not a SDP-like delta risk of a degraded plant condition? When I briefly discussed these issues at the counterpart meeting, several SRAs looked at me like I was crazy and just kept repeating how everything is the same as it used to be. Most definitely, everything is not the same. I am going to submit some feedback forms on these issues.

In 805, the regulatory requirement is to meet the performance criteria, including DID and safety margin. What does not meeting the PC, DID, or SM look like? If you don't meet DID but do meet the numerical risk criteria – how should that finding be characterized? At DAEC, findings involving the CSR automatic suppression system, per the licensee's PRA would have no change in risk. We laugh at this, but the licensee will argue it when the time comes, and some will support their position. I would rather address how we are going to handle this issues before they come up rather than after then come up.

CJ Fong asked me a great question on the side at the meeting – What if we find that the licensee used an incorrect HRR in their fire modeling/risk calculations? Would that be a finding? We need some discussion on this. NRR/DRA – licensing would tell you that we don't look at that in inspection. I would say we do and we have to in order to understanding the licensing basis of the plant that we are inspecting against. If the HRR is wrong, then I believe, yes, there could be a finding/violation, but the problem is with the baseline PRA, it does not represent a degraded condition in the plant. This is very different than inspecting to FP programs that are not performance-based.

I appreciate your help and will support RES efforts to further develop the SPAR models.

Laura

From: Ferrante, Fernando
Sent: Friday, May 22, 2015 10:16 AM
To: Kozak, Laura
Subject: NFPA805 SPAR Models

Laura,

Hope you had a nice trip back home.

I took notice when you mentioned during the NFPA805 discussion the issue of how to deal with it in ROP space. When we first went out to Harris and DC Cook to get information to model in SPAR, a few years ago, I noticed the following issues which you may already know as well:

- The NFPA805 PRAs are extremely complex. Even with the licensees models, you need to run various modules of the R&R Workstation (CAFTA solver, FRANX, etc) to get a solution and understanding the results is far from trivial.
- Because NFPA805 is a licensing effort, the NFPA805 PRAs are loaded with sequences and information needed to meet licensing requirements (i.e., they provide limited to no value in PRA terms and saddle the PRA with useless information such as entries with zero values).
- Some values in NFPA805 are left intentionally conservative. For example, in one case, we saw big oil fires sequences from transformers leading to catastrophic loss of offsite power despite significant additional mitigations that were not accounted for and could have (i.e., the licensee did not want to spend additional resources to do so, since they could pass the regulatory requirements more easily this way). This is a problem, as you pointed out, since a performance deficiency on uncredited mitigation would artificially lead to the wrong conclusion of zero risk increase. I know some licensees refused to use their NFPA805 in SDP space, which has problems of its own. It will be even more interesting to see how other licensees react in the future. Without a tool of our own, I don't know how we would be able to check the licensees response.
- The NFPA805 PRA values represent a future plant state when all NFPA805 mods are included. For Harris, most of these were completed. For other plants, this is not the case. Hence, depending on the timing of a finding, both NRC and the licensee will need to extricate what is in the plant at the time of the finding and what is not completed in terms of NFPA805 mods to accurately reflect a delta risk.
- Some licensees were deeply involved with the NFPA805 PRA development, others were not. Given how complex the PRAs are, it is not clear to me how these licensees will deal with issues when they need to exercise their PRA. In one case, the licensee was very interested in our effort to translate the NFPA805 PRA model into something more usable as they were struggling to do the same for maintenance rule-purposes. They were surprised on how well the SPAR model could produce intelligible insights from their own model, since they needed to rely completely on a contractor to answer any question about their own PRA.
- Performing pre-processing manipulations in the NFPA805 PRA is not a trivial exercise, e.g., modifying non-suppression probabilities, in the licensees PRA model. Calculating a delta risk will require a very knowledgeable licensee PRA staff. Not sure how the NRC is going to be able to scrutinize the licensee's calculations.
- Understanding different internal events PRAs from licensee is already challenging given nomenclature and modeling differences. NFPA805 exacerbates this as you need to understanding fire zones/areas and cable tracing naming schemes, how hot shorts were included/identified in the model, control room abandonment methodology and other idiosyncrasies of each PRA organization. A lot of the SPAR development work was focused on understanding this and extricating the valuable information. While we did use the licensee's nomenclature for fire areas, the SPAR documentation will have information that translates the nomenclature into plain language.
- NFPA805 is a game-changer in fire PRA, e.g., deriving risk insights for issues such as inspection focus and others will be heavily tied to some understanding of the NFPA805 process and how the PRA is developed.

When I was in NRR, I raised some of the same issues you asked after getting exposed to the first NFPA805 model and the response back was a shrug of the shoulders. With all of these in mind, I would say that I just don't know how folks in the Regions or NRR will develop an understanding of NFPA805 without getting at least somewhat involved in the details. The only alternative is to take at face value any answers the licensee provides with complete faith (which does not give me a fuzzy, warm feeling, but there are those that advocate this approach). Having looked at 4 or 5 models, I think I have a working understanding of where the information is, what it means, and how to use it. I think both Dave and Nick saw value in the DC Cook effort. Unlike the portrayal during some of the comments at the SRA Counterpart meeting, this does include an effort to translate the model into a useable SPAR component that is based on the SPAR internal events model and follows the internal events success criteria, treatment of HRA and CCF, along with the SAPHIRE standard nomenclature. The goal never was to independently assess the fire modeling input since we would have gotten in a world of trouble with the licensing folks in NRR if we did this, so this is was not a realistic expectation to begin with although some folks keep bringing it up. The fact that we have the entire licensee model, to begin with, already allows the option to change and independently verify what a sensitivity analysis would produce so this capability is not lost or precluded by any means. Not sure how anyone would even begin to do anything in this

area otherwise. Without writing an even longer e-mail, I will say a lot of effort was spent by INL to work on modeling the fire component in SPAR with a reasonable level of rigor acknowledging that improvements can always be made (as will all SPAR modeling).

Having said all this, I am honestly not trying to do a shameless promotion of SPAR here, as I truly believe the effort is meaningful and could help with some of these issues. Ultimately, I want these models to be of value to more than just myself or Selim. So, if we can't achieve this, I would gladly work on something else. Hence, what I would like to suggest, if you are interested, is that we pursue in the future another plant of interest in Region III in which you could get more involved with. Alternatively, we could come out to the Region and present/discuss the DC Cook model in further detail so you can consider the value of the effort more directly. There are SRAs that will never be interested in getting into the details of the NFPA805 PRA (or any internal/external events PRA for that matter) and I can't really help there except to say it takes a big leap of faith to rely solely on licensee information in this area, maybe more so than others. But I think you are willing to make the effort to understand this given the concerns you expressed and I would like to think the SPAR effort can help. We do have a standing user need with NRR and we will continue to do models (we have Summer and Peach Bottom to work on right now) and I would like to work on models that provide benefit to the Regions. If you think I can help at all, just let me know.

Thanks,
Fernando

Coyne, Kevin

From: Weerakkody, Sunil
Sent: Tuesday, May 26, 2015 3:43 PM
To: Coyne, Kevin
Subject: do not forward - factsheetC.docx
Attachments: factsheetC.docx

Importance: High

Kevin,

I want to keep this at the level-of-detail provided here. Appreciate your thoughts/comments. The only reason that I request you not forward is (a) once you review, I don't think we'll miss any high-level issues, and (b) I don't undue expenditure of staff energy.

Once I incorporate your comments, I'll share with Joe/Rich.

Sunil D Weerakkody, Chief
PRA Operations & Human Factors Branch
Office of Nuclear Reactor Regulation
Nuclear Regulatory Commission

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Tel: 301-415-2870
Black Berry: (b)(6)

Background

NRR uses SPAR Models in support of various oversight, licensing, and rulemaking activities as articulated below:

Oversight:

- ROP: SPAR models support SDPs without relying on completely licensee's models.
- Incidence Response: Provides regional SRAs the capability to advice regional management on agency response (MD 8.3) without relying completely on licensee's models
- NOED: Enables agency staff to use make NOED decisions within a very short period without relying on risk assessment results provided by the licensee
- Provide technical bases for EGMs (e.g., tornado missile EGM)

Licensing:

- We do not (or rarely use) SPAR models to review risk-informed licensing actions.
    - Staff has the ability to rely on the RAI process and audits.
    - Staff requires that licensee meet standards established by RG 1.200 (on the contrary, for ROP related actions described above, staff does not require licensees to meet RG 1.200).

Rulemaking:

- Supports cost-benefit analysis when reg. analyses relies on cost-benefit analysis

Indirect

- Staff uses SPAR models to train NRC staff (e.g. Grow Your Own PRA Analysts).
    - Models that reflect actual plants are desired, but not-essential for this training.

Option 1: Continue with Status Quo

Under this option, NRC will be continuing to update about 8-12 internal event models and develop x-y external event models per year. Actual number of models updated during a given year depends upon the resources applied to these updates. Based on the past x years, NRC expended approximately x dollars and y FTEs to update internal event models and develop external event models.

Advantages:

- Provide a means to maintain an independent assessment tool from that of the licensees.
- Provides an enhanced public confidence in that the regulator will arrive at a conclusion based on a diverse path from that of the licensee.
- All plants will be assessed on a common basis, i.e., PRA methods used to estimate critical parameters such as common cause failures and human error probabilities will be identical (RG 1.200 compliance does not assure use of one method).

- Modeling techniques and data are standardized for each plant and run on the same software platform making it possible for trained NRC staff to efficiently make timely assessments.
- Will not rely on licensees' commitment to develop external event models or updates to internal events (e.g., flex equipment) to enhance NRC's understanding of risk profile of plants (See Attachment--- This is the spread sheet that Fernando generated).
- Enables NRR staff to support management efforts to risk-inform regulatory decisions on generic or plant specific basis.

Disadvantages

- Requires staff to expend additional resources to update models.
    - Requires additional staff resources in comparison to Option 2.
- Creates opportunities to perform unnecessary analysis and increase undue reliance on numerical values.

Option 2: Rely on results provided by licensee's models

Under this option NRC staff will rely on licensees to run their PRA models. Results will be provided to NRC staff in order to make a determination.

Advantages:

- Will not require staff to expend additional resources to update the models.
- May motivate licensee to develop and maintain PRA models that comply with RG 1.200.

Disadvantages:

- Inhibits staff's ability provide timely independent inputs to time-critical NRC decisions in support of NOEDs and MD 8.3s.

- NRC may have to impose additional standards (e.g. RG 1.200) on licensees' PRA models even when they support of licensees' ROP related efforts.
    - Despite having R.G. 1.200 compliance, licensee's models will still be unique and non-standard using since each licensee may use various modeling techniques and software platforms.

- The burden of performing screening and final assessments in support of SDPs, NOEDs, MD 8.3s and answering staff questions with respect to results in a timely manner will shift to the licensees increasing their workload.
    - Timeliness will be a significant challenge for licensees who rely on contractors.

- NRC staff resources will be required to become familiar in the various licensee models and platforms in order to effectively direct modifications required for assessments.

- May inhibit NRR's ability to effectively deal with "Aggregation" and "Integrated Risk-informed Decision Making," related challenges since staff's ability to enhance external events risk assessments will be affected.

Option 3: Staff relies on access and use of licensees' models

Under this option, NRC staff will be given access and training to run licensees' PRA models in support of various regulatory actions.

Advantages

- Will not require staff to expend additional resources to update the models.
- May motivate licensee to develop and maintain PRA models that comply with RG 1.200.

Disadvantages

- Will require the multiple NRC staff members train on running licensees' models. This may pose significant burdens since
  - Licensees use different software to develop PRA models
  - Each PRA models contain important switches\House Events that requires familiarity on the part of the analyst (i.e., there can be significant training burden).

- Licensee may not grant access of their models to NRC

Coyne, Kevin

From: Correia, Richard
Sent: Friday, April 24, 2015 10:02 AM
To: Coyne, Kevin; Madden, Patrick
Subject: RE: NRR is questioning the need for independent SPAR models (again...)

Thx Kevin

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Coyne, Kevin
Sent: Friday, April 24, 2015 9:40 AM
To: Correia, Richard; Madden, Patrick
Subject: RE: NRR is questioning the need for independent SPAR models (again...)

To borrow a quote from James Clapper, Director of National Intelligence, this issue has become a "hardy perennial". We have given NRR full ammo boxes on this in the past, just hope they know how to load it...

From: Correia, Richard
Sent: Friday, April 24, 2015 9:21 AM
To: Coyne, Kevin; Madden, Patrick
Subject: RE: NRR is questioning the need for independent SPAR models (again...)

Thanks for the heads up Kevin. Didn't we write up a justification for SPAR when this came up once before? And we also included in the ASP SECY paper SPAR, its uses etc., correct? Plus, all that you've learned about using a licensee PRA since the level 3 PRA project launched was eye opening in my view in that it's not just a matter of using licensee's PRA, its getting them, evaluating them (NRR Giitter knows this first had with all the not so positive experiences with the NFPA 805 LA/PRA reviews), changing them to suit our needs or that they were not correct/accurate and most importantly, SPARs are NRC models that are independent/separate from licensees.

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Coyne, Kevin
Sent: Friday, April 24, 2015 9:02 AM

To: Correia, Richard; Madden, Patrick
Subject: NRR is questioning the need for independent SPAR models (again...)

Rich, Pat –

Just got a call from Sunil – apparently Bill Dean wants a briefing on why independent SPAR models are needed for the SDP (or to put it another way, why can't we just use licensee models). This came up in the context of the new SPAR/SAPHIRE user need. So we continue to be operating on the proper 3 year clock on this question. More troubling is NRR wants to go it alone on explaining the program to Bill Dean – Joe Giitter evidently wants this to be an NRR only briefing. I explained to Sunil that SPAR supports more than NRR – the origin of the program is to support the ASP program (so RES is also a major consumer of the models) – and that it might be better to brief Brian and Bill at the same time. My view did not seem to be getting traction. Anyway, Joe will probably discuss with you in the near future.

Kevin

Coyne, Kevin

From: Coyne, Kevin
Sent: Tuesday, May 05, 2015 10:18 AM
To: Ferrante, Fernando; Marksberry, Don
Subject: Fw: Status of SPAR model discussion with Bill Dean

Fernando, Don -

And so the SPAR debate continues...

For what it's worth, this topic is on the agenda for the next periodic meeting between Brian and Bill. I've been asked to pull together a one pager for Brian by early June - I think I have most of what I need, but I will run it by you guys before it goes up. Brian is a big advocate for indendent spar models, so I think this will be put to bed relatively quickly. But I think the unr is being held in abeyance pending the resolution of this question.

Kevin

Sent from an NRC Blackberry
Kevin Coyne
(b)(6)

From: Weerakkody, Sunil
Sent: Tuesday, May 05, 2015 07:43 AM
To: Coyne, Kevin
Cc: Correia, Richard; Glitter, Joseph; Lee, Samson
Subject: RE: Status of SPAR model discussion with Bill Dean

Kevin,

I put this action in the backburner. Here is my plan.

1. Put a fact sheet together with options\complications and run it by everyone (including you). I plan to get this to every one sometime next week. I've got a lot of inputs (you thoughts articulated in your briefings to Joe, EDO memo on this subject in 2007 etc..)
2. Incorporate comments and share the revised version with everyone (you, Rich, Joe, Sam).
3. Then share the fact sheet with Bill Dean\Jennifer using the appropriate mechanism.

Unfortunately, this would delay the transmittal of the User Need to late May or early June.

Sunil D Weerakkody, Chief
PRA Operations & Human Factors Branch
Office of Nuclear Reactor Regulation
Nuclear Regulatory Commission

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Tel: 301-415-2870
Black Berry: (b)(6)

From: Coyne, Kevin
Sent: Monday, May 04, 2015 5:13 PM
To: Weerakkody, Sunil
Subject: Status of SPAR model discussion with Bill Dean

Sunil –

Was NRR able to answer Bill Dean's question on the SPAR program to his satisfaction? Do you need any additional support?

Kevin

Siu, Nathan

From:	Stutzke, Martin
Sent:	Friday, April 24, 2015 8:33 AM
To:	Correia, Richard; Coyne, Kevin; Nakoski, John; Siu, Nathan
Cc:	Madden, Patrick; Rivera, Tammie
Subject:	RE: Request Review and Response by April 27: Draft RIS - Crediting mitigating strategies implemented in response to orders EA-02-026 and EA-12-049 in risk-informed licensing actions and the SDP

Here are my comments on the draft RIS, which provides guidance on crediting mitigating strategies in risk-informed license amendments and SDP evaluations.

Comments Related to Concurrence

1. Case-by-case assessment vs. use of RG 1.200: Page 2, 3rd paragraph under Summary of Issue states that "Credit for these mitigating strategies will be determined on a case-by-case assessment of the licensee's associated technical justification and basis." In contrast, page 3, 1st paragraph under Risk-informed Licensing Actions states that "RG 1.200 offers guidance on PRA technical adequacy..." RG 1.200, 3rd paragraph under Introduction states that "When used in support of an application, this regulatory guide will obviate the need for an in-depth review of the base PRA by NRC reviewers [emphasis added], allowing them to focus their review on key assumptions and areas identified by peer reviewers as being of concern and relevant to the application." The guidance on page 2 the draft RIS (case-by-case assessment) seems inconsistent with the guidance on page 3 that invokes RG 1.200.

2. EOPs, SAMGs and EDMGs: Page 2, 3rd paragraph under Summary of Issues notes that "...in some cases related actions may even be incorporated into the plant's emergency operating procedures (EOPs). Page 3, 2nd paragraph under "Risk-informed Licensing Actions notes that "The associated procedures should be adequate to support confidence in successful completion of the manual action, but not necessarily incorporated into the plant's formal EOPs." Two related comments:

    a. The draft RIS should also allow credit for the severe accident management guidelines (SAMGs) and the extensive damage mitigation guidelines (EDMGs).
    b. The mitigation of beyond-design-basis rulemaking, which is nearing completion, addresses NTTF Rec. 8 by revising and adding new regulations governing the use and training requirements for EOPs, SAMGs, and EDMGs. The RIS does not discuss this rulemaking. Once this rule is finalized, the draft RIS may need revision in order to allow licensees to credit compliance with the mitigating strategies rule when assessing operator actions.

Comments Related to Implementation

1. HRA during severe accidents: Page 3, 2nd paragraph under Risk-informed Licensing Actions provides guidance on assessing operator actions related to mitigating strategies. However, there are no consensus HRA methods for assessing these types of operator actions. NRC should expect that a risk-informed license amendment or SDP evaluation which credits mitigating strategies would contain a thorough evaluation of modeling uncertainty related to HRA.

2. SPAR model revisions: Page 4, 2nd paragraph under SDP Evaluations notes that the NRC may incorporate mitigating strategies into its SPAR models. Interestingly, RIS 2008-015 (the predecessor for the draft RIS) uses stronger language, specifically "Licensees should also note that the NRC intends [emphasis added] to incorporate mitigating strategies into its plant-specific Standardized Plant Analysis Risk models." Do we have firm plans for revising the SPAR models to incorporate mitigating

strategies? In my view, this would be a worthwhile effort because the SPAR models should reflect the current licensing bases. I also acknowledge that revising the SPAR models would be a major effort. The point of my comment is that we should be careful to avoid embedding an IOU into the draft RIS that we cannot honor.

Marty

From: Stutzke, Martin
Sent: Thursday, April 23, 2015 9:22 AM
To: Correia, Richard; Coyne, Kevin; Nakoski, John; Siu, Nathan
Cc: Madden, Patrick; Rivera, Tammie
Subject: RE: Request Review and Response by April 27: Draft RIS - Crediting mitigating strategies implemented in response to orders EA-02-026 and EA-12-049 in risk-informed licensing actions and the SDP

I will review and provide comments to the PRAB lead.

Marty

From: Correia, Richard
Sent: Thursday, April 23, 2015 9:18 AM
To: Coyne, Kevin; Nakoski, John; Siu, Nathan; Stutzke, Martin
Cc: Madden, Patrick; Rivera, Tammie
Subject: FW: Request Review and Response by April 27: Draft RIS - Crediting mitigating strategies implemented in response to orders EA-02-026 and EA-12-049 in risk-informed licensing actions and the SDP

Kevin, Nathan, John and Marty,

NRR is asking RES for names of DRA staff that will be on concurrence for this draft RIS. It is related to the revised order on mitigating strategies. I only need one name but you are all welcome to review and align on any comments and advice for concurrence at the appropriate time. It involves both risk informed licensing actions and SDP.

My thoughts are PRAB lead with input from the others.

Let me know what you recommend.

Thx

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Rivera, Tammie
Sent: Thursday, April 23, 2015 8:27 AM
To: Correia, Richard; Madden, Patrick
Cc: Schroer, Suzanne

Subject: FW: Request Review and Response by April 27: Draft RIS - Crediting mitigating strategies implemented in response to orders EA-02-026 and EA-12-049 in risk-informed licensing actions and the SDP

Rich/Pat,

Please find attached a draft RIS from the office of NRR/DIRS/IPAB (Steven Vaughn). It is addressed to all holders of operating licenses for nuclear power reactors, except those that have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

RES/DRA need to provide names for concurrence to be included on the draft by April 27th. Please advise who should be included for concurrence.

Thanks,
Tammie

From: Armstrong, Kenneth
Sent: Thursday, April 23, 2015 07:11
To: Iyengar, Raj; Rivera, Tammie
Cc: Johnson, Kevin
Subject: RE: Request Review and Response by April 27: Draft RIS - Crediting mitigating strategies implemented in response to orders EA-02-026 and EA-12-049 in risk-informed licensing actions and the SDP

Raj and Tammie,

Please provide names (for concurrence) to Matt by April 27th.

Kevin, please track.

Thanks!

From: Humberstone, Matthew
Sent: Thursday, April 23, 2015 7:08 AM
To: Armstrong, Kenneth
Subject: RE: Request Review and Response by April 27: Draft RIS - Crediting mitigating strategies implemented in response to orders EA-02-026 and EA-12-049 in risk-informed licensing actions and the SDP

Hi Ken,

You are correct, I am not asking for concurrence at this time, just a list of people who would like to be on concurrence. Do have names of people to go along with the RES/DE and RES/DRA concurrences? I am not sure if you want concurrence at the DD level or not.

Thanks,

Matt

From: Armstrong, Kenneth
Sent: Thursday, April 23, 2015 7:01 AM
To: Humberstone, Matthew
Cc: Iyengar, Raj; Rivera, Tammie
Subject: RE: Request Review and Response by April 27: Draft RIS - Crediting mitigating strategies implemented in response to orders EA-02-026 and EA-12-049 in risk-informed licensing actions and the SDP

Good morning Matt,

I hope all is well! For this action, please confirm that you are not asking for concurrence at this time? Just an updated concurrence block (both RES/DE and RES/DRA are already on there) since RES doesn't have any licensees.

Thanks!

From: Rini, Brett
Sent: Friday, April 17, 2015 4:20 PM
To: Armstrong, Kenneth
Cc: Moore, Ross
Subject: FW: Request Review and Response by April 27: Draft RIS - Crediting mitigating strategies implemented in response to orders EA-02-026 and EA-12-049 in risk-informed licensing actions and the SDP

Ken,

Your action.

Brett

From: Humberstone, Matthew
Sent: Friday, April 17, 2015 1:59 PM
To: Gaslevic, James; McIntosh, Angela; Rini, Brett; Orf, Tracy; Schmitt, Ronald; Moore, Ross
Cc: Grigsby, Carl; Abrahams, Susan; Cozens, Ian; Rivera-Capella, Gretchen; Cupidon, Les; Burnell, Scott; McIntyre, David; Keene, Todd; Vaughn, Stephen
Subject: Request Review and Response by April 27: Draft RIS - Crediting mitigating strategies implemented in response to orders EA-02-026 and EA-12-049 in risk-informed licensing actions and the SDP

Generic Communications Coordinators and NRR TA's,

NRR/DIRS/IPAB (Steven Vaughn) has prepared the attached Draft RIS. It is addressed to all holders of operating licenses for nuclear power reactors, except those that have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

If you believe that your licensees will be impacted by issuance of this RIS please advise me so that you can be added on concurrence. Please e-mail (1) the sentences to add to the ADDRESSEES section, and (2) the names (and acronyms of their titles, for the concurrence block, i.e., NRR/DIRS/IRIB) of individuals in your office that would like to concur and/or co-sign. Request your input by COB on April 27, 2015.

OPA and CRGR are included for situational awareness.

ML15097A021

Thank you,

Matt

Matthew Humberstone, PhD
Project Manager
Generic Communications Branch
Division of Policy & Rulemaking
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission

Siu, Nathan

From: Correia, Richard
Sent: Wednesday, March 25, 2015 2:18 PM
To: Stutzke, Martin; Madden, Patrick
Cc: Schroer, Suzanne; Coyne, Kevin; Appignani, Peter; Siu, Nathan
Subject: RE: CPRR In the Congressional News (again)

Thanks Marty. Please do a reasonable search of applicable information (ASME/ANS PRA Std, etc.). Kevin, Nathan & Pete, your insights would be appreciated.

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Stutzke, Martin
Sent: Wednesday, March 25, 2015 10:51 AM
To: Correia, Richard; Madden, Patrick
Cc: Schroer, Suzanne; Coyne, Kevin; Appignani, Peter
Subject: RE: CPRR In the Congressional News (again)

Off the top of my head, the SPAR models do not model instrumentation (Kevin and Pete can confirm). The assumption is that instrumentation failure (random, CCF) is low probability, so that the operator should have enough indication to understand what is happening and take appropriate action. The SPAR models do include support system dependencies (e.g., loss of dc or vital ac power), which may partially capture some loss of instrumentation events. I'm unaware of any PRA that does a good job of addressing phenomenologically driven loss of instrumentation (e.g., reference leg flashing), which is mainly a concern after core damage (beyond the scope of the SAPR models).

It would relatively straightforward (but labor intensive) to incorporate instrumentation failures (remember that before the SPAR models were "standardized," they were first "simplified"). It's not clear that incorporating instrumentation failures is worth the effort – how many SDPs/ASPs do we get that concern instrumentation failures? Moreover, incorporating instrumentation failures only solves part of the problem. The HRA needs to consider how operators will react given loss of instrumentation (or worse, conflicting indications). SPAR-H, which is only an HFE quantification method, doesn't appear to have the capability to answer these types of questions.

I need to do some research to see what the ASME/ANS PRA Standard has to say – most likely, instrumentation modeling falls under Capability Category II or III.

Specific to the CPRR rulemaking, the BWR EPG/SAGs direct the operator to initiate containment flooding if reactor vessel water level cannot be determined, and also provide guidance on how to infer plant conditions using installed mechanical indications (e.g., pressure gages installed on ECCS pump discharges) or self-powered indications (e.g., core exit thermocouples).

Marty

From: Correia, Richard
Sent: Wednesday, March 25, 2015 10:22 AM
To: Stutzke, Martin; Madden, Patrick
Cc: Schroer, Suzanne
Subject: RE: CPRR In the Congressional News (again)
Importance: High

Thx Marty. Yes #12 generated a lot of discussion at the morning stand up. The FO TA (Ross) is working it but the question is how much detail do we need to provide especially the responses are due Friday. Apparently we answered a similar question last fall and we said then we do not risk rank (my term) our work.

Also, Brian has another question for us/you: do we model in our PRAs loss of instrumentation. It's essentially the same question he asked for the CPRR effort but that was Mark I/II specific. Now he's asking generically. And if we do model it, what change in risk do we see?

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Stutzke, Martin
Sent: Wednesday, March 25, 2015 9:28 AM
To: Correia, Richard; Madden, Patrick
Cc: Schroer, Suzanne
Subject: FW: CPRR In the Congressional News (again)

Not sure if you all had seen this. Check out Question #12!

Marty

From: Beall, Robert
Sent: Wednesday, March 25, 2015 7:41 AM
To: Reckley, William; Collins, Timothy; Dennig, Robert; Fuller, Edward; Stutzke, Martin; Esmaili, Hossein; Basu, Sudhamay; Barr, Jonathan; Ghosh, Tina; Clark, Sheldon
Subject: CPRR In the Congressional News (again)

Hi Team: In my continuing effort to keep everyone in the loop on CPRR issues, I have attached the latest letter from Senator Inhofe to the NRC. He likes to bring up our rulemaking when he talks about the low priority work being done by the NRC. While our rulemaking does not have any direct action from this letter it looks like RES will be involved (see item 12 on page 4) in the response.

Thanks.....

Robert (Bob) Beall
U.S. Nuclear Regulatory Commission / NRR / Rulemaking Branch
| E-mail: Robert.Beall@NRC.gov | Office: (301) 415-3874 | Fax: (301) 415-5947|

Siu, Nathan

From: Siu, Nathan
Sent: Friday, March 13, 2015 9:59 AM
To: Stutzke, Martin
Subject: RE: CER/RPI letter

Hmmm, interesting. "Mr. Watson come here I want you!"

From: Stutzke, Martin
Sent: Friday, March 13, 2015 9:56 AM
To: Correia, Richard; Coyne, Kevin; Madden, Patrick; Schroer, Suzanne; Siu, Nathan
Subject: RE: CER/RPI letter

Some quick thoughts:

1. Option 2 excludes minor inspection findings from the prioritization process because it is presumed that such findings will be addressed as part of a plant's routine corrective action program. This approach hinges on the definition of a "minor inspection finding." Would the SDP be revised to provide the definition? If not, how would we make the decision that an inspection finding is "minor?"
2. The use of an NRC expert panel to evaluate proposed regulatory issues and apply risk information as an input for agency decisions to prioritize issues seems to be a major revision to how NRR conducts business. When I worked in NRR, project managers reviewed licensee communications (e.g., license amendment requests, exemption requests, etc.) and determined if they needed input from risk analysis (see NRR Office Instruction LIC-101). It's not clear how the proposed expert panel will interface with this NRR practice. What would be the role of the SRA located in regional offices? Diverting staff effort to implement the expert panel may impact other regulatory activities.
3. Recall that PRA quality consists of scope, level-of-detail, and technical adequacy. Neither licensee PRAs or the staff's SPAR models have the scope and level-of-detail to address all possible inspection findings or issues that require prioritization (the most troublesome issues are the ones that aren't included in the PRA, necessitating modifications to the PRA to gain an understanding of the risk implications). Also, it seems important for the staff to have an independent capability to confirm prioritization done by licensees. This points to the need to expand our existing risk information (including SPAR models) and organize it so that it is readily available to support the prioritization process. Is there a role for Watson (content analytics)?

Marty

From: Correia, Richard
Sent: Friday, March 13, 2015 7:17 AM
To: Coyne, Kevin; Madden, Patrick; Schroer, Suzanne; Siu, Nathan; Stutzke, Martin
Subject: CER/RPI letter

See attached ACRS letter on CER/RPI. ACRS supports the initiative. My itch is what quality standard will PRAs need to meet? RG 1.200? will we need an PRA oversight function? i.e., trust but verify? I appreciate ACRS pushing for a reg guide asap. The concept is good but the implementation details and NRC staff expectations need to be spelled out so there are no mis communications.

Thoughts?

Richard Correia, PE

Nakoski, John

From: Wong, See-Meng
Sent: Tuesday, February 03, 2015 8:39 AM
To: Weerakkody, Sunil; Coyne, Kevin; Ferrante, Fernando
Cc: Marksberry, Don; Nakoski, John
Subject: RE: RMT Presentation and SPAR Models

The bullet on slide #14 of Ray Gallucci's RMT presentation has been revised to: "Support use of consistent PRA models between the NRC and licensees for SDP/ROP." The prior bullet was a holdover from some previous presentation that misstated our prevailing position on this subject. I have corrected Ray Gallucci's understanding on this point.

From: Weerakkody, Sunil
Sent: Monday, February 02, 2015 5:43 PM
To: Wong, See-Meng; Coyne, Kevin; Ferrante, Fernando
Cc: Marksberry, Don; Nakoski, John
Subject: Re: RMT Presentation and SPAR Models

Thanks See. Meng. My speculation is that this bullet is Ray's opinion. I am a bit curious about why Ray thinks this is an advantage

Sent from an NRC BlackBerry
Sunil Weerakkody
(b)(6)

From: Wong, See-Meng
Sent: Monday, February 02, 2015 04:06 PM
To: Coyne, Kevin; Weerakkody, Sunil; Ferrante, Fernando
Cc: Marksberry, Don; Nakoski, John
Subject: RE: RMT Presentation and SPAR Models

Kevin,

I have just talked to Ray Gallucci about the bullet on SPAR models in the RMT presentation, and he will get back to me on a possible revision.

See Meng.

From: Coyne, Kevin
Sent: Monday, February 02, 2015 1:48 PM
To: Weerakkody, Sunil; Ferrante, Fernando; Wong, See-Meng
Cc: Marksberry, Don; Nakoski, John
Subject: RMT Presentation and SPAR Models

Sunil, See-Meng and Fernando –

Putting aside for a moment the technical merits of the attached presentation for Wednesday's RMT meeting, please take a look at slide 14. The bullet that caught my eye was "Support transition from SPAR to licensee models for SDP/ROP".

Why are Ray Gallucci and Steve Laur resurrecting this tired issue? As we have been over many times, we use SPAR models for many reasons – independence, ease of use, ability to efficiently update, ability to provide technica support, and the list goes on. Just wanted to make sure you guys knew what's in this presentation.

Nakoski, John

From:	Nakoski, John
Sent:	Monday, February 02, 2015 3:54 PM
To:	Drouin, Mary; Correia, Richard (Richard.Correia@nrc.gov)
Cc:	Coyne, Kevin
Subject:	FW: RMT Presentation and SPAR Models
Attachments:	Peer Review for RMT.PPTX

Rich and Mary,

Attached is the presentation that Ray Gallucci is planning to make to the RMT on Wednesday, 4 February. I think the program they are describing is essentially an inspection program (ok – maybe like a vendor inspection program) – and seems to be a significant commitment of resources without a clear return on the investment for the NRC in terms of improvements in the technical acceptability of a PRA to support a specific licensing or regulatory decision.

John Nakoski

From: Coyne, Kevin
Sent: Monday, February 02, 2015 1:48 PM
To: Weerakkody, Sunil; Ferrante, Fernando; Wong, See-Meng
Cc: Marksberry, Don; Nakoski, John
Subject: RMT Presentation and SPAR Models

Sunil, See-Meng and Fernando –

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I'm sure both this point and the topic of the presentation will draw some good discussion at the next RMT...

Kevin

ESTABLISHING A "REGULATORY" FOOTPRINT TO DOCUMENT AND CLOSE LICENSEE RESOLUTIONS TO PEER REVIEW F&O'S, FINDINGS AND SUGGESTIONS

Ray Gallucci

Risk Management Team Meeting

February 4, 2015

ASSUMPTIONS

- Current Peer Review process is retained
  - "Drastic" alternatives, such as total restructuring possible, but not addressed
- NRC creates a "Peer Review Group" (PRG)
  - Dedicated team within a branch, with Team Leader (TL)
  - Branch unto itself with Branch Chief (BC)

PEER REVIEW GROUP (PRG)

- Each member, including TL/BC, meets requirements, as endorsed by RG 1.200 (latest revision), of Section 1-6.2, "Peer Review Team Composition and Personnel Qualifications," of ASME/ANS PRA Standard (latest revision)
  - Also meet NRC-endorsed industry guidance as applicable, e.g., NEI 05-04 (Internal Events) and NEI 07-12 (Fires)

PRG: EXPECTATIONS (1)

- Each member, including TL/BC, capable of serving a Industry Peer Review Team (IPRT) Leader of full- or focused-scope reviews
- At each peer review, two (but not more than three) PRG staff participate directly as "advisors" in all phases of a full-scope review (one, but not more than two, for focused scope)
  - Includes selection of IPRT Leader and reviewers, all pre-onsite, onsite and post-onsite activities

PRG: EXPECTATIONS (2)

- PRG staff have diverse expertise among the review elements, both internal and external events
- Second (or third) PRG staff member could be drawn from other parts of NRC, including Regions (e.g., SRAs), or NRC contractors
  - Must meet same qualification requirements as PRG staff

PRG: EXPECTATIONS (3)

- "Cradle to grave" participation per peer review for each assigned staff member
  - Even TL/BC would perform advisor duty on a limited but regular schedule to keep "current"
- Always one "lead advisor" per review from PRG staff
- Peer Review Report becomes public, no longer proprietary for licensee (although can be "de-sensitized" for public), docketed with NRC

REGULATORY "FOOTPRINTS" (1)

- At each phase of the peer review process, a regulatory footprint is established
- (1) Selection of the IPRT with NRC Advisors
  - As current, but with approval by licensee, IPRT Leader and NRC PRG
    - PRG TL/BC documents approval of the full IPRT, including resumes, as first regulatory footprint
- (2) Pre-Onsite Review of Licensee Material
  - As appropriate – no formal footprint

REGULATORY "FOOTPRINTS" (2)

- (3) Onsite Review and Issuance of Draft Report
  - Attend any "kick-off," and, individually or collectively, all IPRT group sessions and selected sub-group sessions
  - At IPRT Leader discretion, engage licensee directly or through IPRT member
  - IPRT retains control of F&Os, Findings, Suggestions, etc., for draft report, with PRG Lead Advisor documenting NRC perspective as draft footprint

REGULATORY "FOOTPRINTS" (3)

- (4) Preparation and Issuance of Final Report
  - IPRT and PRG advisors interact, with any PRG "dissents" resolved (or at least addressed)
  - PRG Lead Advisor finalizes NRC perspective, including any remaining dissents
  - Report formally signed-off by PRG TL/BC as next regulatory footprint
    - IPRT Leader retains right to rebut any part of NRC perspective in final report

REGULATORY "FOOTPRINTS" (4)

- (5) Licensee Initial Response, with Schedule
  - Traditional role of IPRT ends with final report
  - Within three months of receipt, licensee submits schedule to resolve and close F&Os, etc., to NRC
    - Majority to be closed within one year; minority in two years
      - Extreme exceptions could allow for a third year
  - Formal acceptance of the licensee schedule with PRG TL/BC sign-off constitutes next footprint

REGULATORY "FOOTPRINTS" (5)

- (6) Resolution and Closure of F&Os, etc.
  - As per schedule, licensee submits all necessary documentation to justify its resolutions and closures, etc.,
  - NRC reviews, with acceptance or RAIs within three months
    - Sign-off by PRG TL/BC constitutes next footprint
      - Added to docket with final report
  - ***Upon conclusion, the entire peer review process from "cradle" to "grave" will have been docketed to constitute a <u>definitive regulatory footprint that should significantly "obviate the need" for further investigation</u> of F&Os, etc., in subsequent applications***

NRC "OBSERVERS"

- Non-participatory "observers" may still attend, usually as training opportunities
  - Total number of NRC "advisors" and "observers" should not exceed four on a full-scope review
  - Unless assigned an IPRT "liaison" by the IPRT Leader, observers interact only through NRC advisors, but may attend same sessions as NRC advisors with mutual consent of advisors and IPRT

ADVANTAGES (1)

- Unlike current practice, NRC "control" of the final phases of the Peer Review process, (5) Licensee Initial Response, with Schedule, and (6) Resolution and Closure of F&Os, etc., coupled with active participation in the earlier four Phases, could truly "obviate the need for an in-depth review of the base PRA by NRC reviewers"
  - Individual risk-informed applications would need to provide minimal, if any, material on the Peer Reviews, expediting NRC staff reviews with less RAIs

ADVANTAGES (2)

- Further the use of risk-informed applications:
  - Improve efficiency of license reviews
  - Support transition from SPAR to licensee models for SDP/ROP
  - Support possible implementation of a risk prioritization methodology
  - Facilitate processing of NOEDs

Nakoski, John

From: Ferrante, Fernando
Sent: Monday, February 02, 2015 3:20 PM
To: Coyne, Kevin; Weerakkody, Sunil; Wong, See-Meng
Cc: Marksberry, Don; Nakoski, John
Subject: RE: RMT Presentation and SPAR Models

Kevin, Sunil,

This is the first time I hear about this bullet in the presentation. I am not aware of a renewed effort in this direction, so this may be Ray's opinion only (but I could be wrong, of course). I will try to attend the presentation via CSB if possible.

Thanks,
Fernando

From: Coyne, Kevin
Sent: Monday, February 02, 2015 1:48 PM
To: Weerakkody, Sunil; Ferrante, Fernando; Wong, See-Meng
Cc: Marksberry, Don; Nakoski, John
Subject: RMT Presentation and SPAR Models

Sunil, See-Meng and Fernando –

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I'm sure both this point and the topic of the presentation will draw some good discussion at the next RMT...

Kevin

Ferrante, Fernando

From: Appignani, Peter
Sent: Thursday, February 04, 2016 10:22 AM
To: Ferrante, Fernando
Subject: Internal RISC Meeting today at 11:00 AM
Attachments: Licensee PRA Use Internal RISC 02042016.pptx

Added call-in information below.

Dial in number: 888-635-7934
Passcode (b)(6)

Agenda:

1. Discussion on the use of licensee PRA models in regulatory processes
2. Uncertainty workshop results
3. Alternate approach to risk-informing GSI-191

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United States Nuclear Regulatory Commission
Protecting People and the Environment

Use of Licensee PRA Models in Regulatory Applications

Michael Montecalvo
PRA Operations & Human Factors Branch
Division of Risk Assessment

Office of Nuclear Reactor Regulation

February 4th, 2016

Why?

U.S.NRC
United States Nuclear Regulatory Commission
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- Cost to maintain and update SPAR models
  - Project AIM, increased budget pressure
- Perceived inefficiency in the maintenance of two models
- Agreement among stakeholders that the base models match and the issues encountered are with modeling of specific factors (e.g. HRA, Common Cause, etc.)

What's Changed

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- Last review of this issue was 2007
  - Focused on SDP
  - See letter to NEI from OEDO (ML072490566)
- More licensees now have RG 1.200 compliant models
- Many licensees have advanced detailed models that are used for daily decision making at the plants

Option 1

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- NRC staff uses licensee model for regulatory decision making:
  - **Pros:**
    - **Will not require staff to expend resources to update SPAR models**
    - **The most up to date, detailed model is used for regulatory decisions**
    - **Independence is maintained along with ability to run generic assessments, etc.**
  - **Cons**
    - **Significant resources to train and maintain NRC staff (NRR, NRO, Regions**
    - **The NRC will need to maintain commercial software licenses for multiple PRA codes (e.g., CAFTA, RISKMAN, FRANX, FTREX, etc.)**
    - **It is not likely that all licensees will give access to their models**

Option 2

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Protecting People and the Environment

- Licensees provide results from their models for regulatory decision making:
  - **Pros:**
    - **Will not require staff to expend resources to update SPAR models**
    - **The most up to date, detailed model is used for regulatory decisions**
    - **A "certified" PRA would allow the licensee PRA to be the model of record for all regulatory applications**
  - **Cons**
    - **Negative affect on public perception with respect to independence**
    - **Will inhibit staff's ability to perform generic assessments**
    - **May inhibit staff's ability to provide timely input to regulatory decisions**
    - **May inhibit NRR's ability to deal with future challenges**

What's Next

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United States Nuclear Regulatory Commission
Protecting People and the Environment

- RISC decision whether or not to pilot
  - What option?
- Form project team (NRR, NRO, RES, SRAs)
- Provide a plan to pilot with criteria to objectively evaluate:
  - True cost of maintaining SPAR models including impending upgrades
  - True cost of shifting to and using licensee PRA models including software, training, possible staff increases, changes to regulatory structure, etc.

Ferrante, Fernando

From: Appignani, Peter
Sent: Monday, February 08, 2016 3:41 PM
To: Ferrante, Fernando
Subject: FW: RESPONSE - CWS day

From: Weber, Michael
Sent: Friday, January 29, 2016 3:30 PM
To: Correia, Richard <Richard.Correia@nrc.gov>
Cc: Lund, Louise <Louise.Lund@nrc.gov>; Circle, Jeff <Jeff.Circle@nrc.gov>; Coyne, Kevin <Kevin.Coyne@nrc.gov>; Appignani, Peter <Peter.Appignani@nrc.gov>; Ning, Lauren (Killian) <LaurenKillian.Ning@nrc.gov>; West, Steven <Steven.West@nrc.gov>
Subject: RESPONSE - CWS day

You, too, Rich. Busy week next week. Rest up!

Thanks for the briefing today on the option of placing greater reliance on licensees' PRAs. You and your staff make a compelling case why we would be best served by continuing with the development and maintenance of SPAR models. Well done!

Best Regards,

Mike

Michael Weber
Director of Nuclear Regulatory Research
US Nuclear Regulatory Commission

301-415-1902
Mail Stop T-10B16

DELIVERING OUR FUTURE

From: Correia, Richard
Sent: Friday, January 29, 2016 3:25 PM

To: West, Steven <Steven.West@nrc.gov>; Weber, Michael <Michael.Weber@nrc.gov>
Subject: CWS day

Non Responsive

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

Ferrante, Fernando

From: Appignani, Peter
Sent: Thursday, February 04, 2016 2:59 PM
To: Ferrante, Fernando
Subject: briefing package
Attachments: Briefing to Weber-West Use of Licensee PRA in lieu of SPAR models r3a.pdf

Fernando

Please DO NOT distribute

Thanks

Pete

BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
Options for NRC Risk-Informed Regulatory Tools - A Perspective

BRIEFERS:

Rich Correia
Louise Lund
Jeff Circle
Peter Appignani
Lauren Ning

PURPOSE:

For office staff and DRA management to inform the OD/DOD of the various items to consider:

- Proposal to adopt the use of licensees' PRA models in lieu of SPAR models for regulatory applications and reporting activities.
- Areas of consideration and challenges faced in developing an NRC pilot program to adopt one or multiple licensee models to explore its feasibility.

EXPECTED OUTCOMES:

- Provide Senior RES management with key talking points pertaining to the use of licensee PRA models for SDP and other risk-informed regulatory activities.
- OD and DOD will have an understanding of the issues influencing the office and the agency during interactions with internal and external stakeholders (e.g., the Risk-Informed Steering Committee (RISC) meetings).

PROCESS:

- High-level summary discussion of the issues and concerns.
  - Budget and funding impacts
  - Impact on regulatory activities.
  - Internal and external stakeholders.
  - Challenges.
- Mid-level and background information is attached for convenience.

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Protecting People and the Environment

Options for NRC Risk-Informed Regulatory Tools - A Perspective

Probabilistic Risk Assessment Branch
Division of Risk Analysis
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission

U.S.NRC

Industry and NRC Use of PRA Today

- Industry Use of PRAs
  - PRA is used by the industry today primarily for risk-informed licensing basis and design basis changes.
    - Applications are submitted under 10 CFR § 50.9 Completeness and accuracy of information.
  - They are also used for specific NRC programs such as *Mitigating Systems Performance Index* (*MSPI*), where NRC has examined the information and the program was piloted to ensure accuracy.
  - When appropriate, the SRAs ask the licensee for their PRA results for Notice of Enforcement Discretion (NOEDs)

Industry and NRC Use of PRA Today

- NRC Use of PRAs (SPAR Models)
  - ROP – Reactor Oversight Process
  - SDP – Significant Determination Process
  - MD 8.3 - NRC Incident Investigation Program
  - Notice of Enforcement Discretion (NOEDs)
  - Technical basis for rulemaking
  - Generic Issues
  - Initial licensing activities (NRO)
  - ASP – Accident Sequence Precursor
  - Inspection Support and Resources
  - System and Component Studies
  - Other risk-informed related activities
    - Includes licensing activities

August 2007 NEI Commission Briefing on Risk-Informed Regulation

- Relevant Discussion Topics[1]
  - Using risk-informed approaches remains a priority for the industry
  - These methods have demonstrated improvements to both safety and operations
  - Reinforce desire to pursue improvements to the reactor oversight significance determination process
- NEI Proposals
  - use of licensee PRAs for SDP
  - focusing licensees on corrective action rather than further analysis of small risk impacts
- Lessons learned from development of an NRC-endorsed internal events PRA standard.
- Industry's near term priorities: develop internal events at power and fire PRAs meeting the technical adequacy requirements of consensus standards.
- These efforts, along with those related to addressing SDP activities, will essentially consume the existing PRA infrastructure for the next several years.
- It is not realistic to impose or achieve regulatory expectations relative to complete scope PRAs in this time frame.

1. Letter from NEI, Aug 4, 2007, Subject: August 2 Commission Briefing on Risk-Informed Regulation

Advantages Using Licensee PRA[1]

- **Advantages Licensee Performs Analysis:**
  - Will not require staff to expend additional resources to update the SPAR models.
  - Allowing licensees to use RG 1.200 compliant models for SDPs may motivate them to invest resources to advance the quality of their models.
  - A "certified" PRA (consistent with RMRF Option 2) would allow the licensees PRA to be the PRA of record for all regulatory actions—including SDP.

- **Advantages NRC Staff Uses Licensee PRA:**
  - Will not require staff to expend additional resources to update SPAR models.
  - The most up to date model will always be used.
  - May motivate licensees to develop and maintain PRA models that comply with RG 1.200.
  - Although NRC is using the licensee model, the independence is maintained.
  - The ability to assess generic and other fleet-wide issues will be maintained if NRC maintains a model of record.

1. Use of Licensee PRA Models RISC 01272016 (NRR Brief)

Budget and funding impacts

- Perceived cost savings versus real cost
  - Initial costs to use licensee PRAs: $7.8M
    - Used re-baselining cost assumptions provided by NRR
  - Annual ongoing costs to use licensee PRAs: $2.5M
  - Current comparable FY16 SPAR model costs: $800K
    - All SPAR model related cost for FY16: $1.9M
- Minimum resources necessary to support regulatory activities.
  - SPAR model costs are scalable
- Cost to all licensees to use their models
  - unknown at this time

Key Talking Points

Letter to NEI from OEDO on Use of SPAR models (2007, ML072490566)

- This letter addressed an NEI proposal to use licensee PRA models instead of SPAR models. A detailed review was conducted and concluded that SPAR was needed to:
  - Maintain **independence** of NRC analyses. Differences between NRC and Licensee assessments is not due to the base model, but by the assumptions for each specific event or condition analysis
  - Provide **standardized model framework** for efficient analyses - industry does not use a standardized modeling approach
  - **Avoid inefficiencies** in having agency risk analysts learn the conventions of over 70 licensee developed PRAs (utilizing up to four different software platforms)

The basis for the staff conclusion remains valid today.

Key Talking Points

Feedback from Regional SRAs on Potential Use of Licensee Models vice SPAR

- More efficient and objective to use SPAR models for risk assessments.
- It would take a significant increase in resources to use licensee models for event and condition assessment activities due to their lack of standardization and need for SRAs to understand unique modeling conventions and new code platforms.
- Use of licensee models would cause delays in the SDP process due to need to engage in additional requests for information to understand licensee PRA modeling assumptions.
- NRC's ability to perform independent regulatory assessment activities will be eroded by not having a centralized system evaluating Generic Safety Issues.

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Impact on Regulatory Activities

- Actual process is unknown at this time
  - Will NRC staff use licensee PRA?
  - Will licensee perform the analysis using their PRA model?
- Efficiency of model usage – standardization of modeling conventions, naming schemes and post processing rule construction; reporting functions; consistency in event tree/fault tree construction; single software platform.
- Development of Plant Information Risk eBooks (PRIBS) – SPAR/SAPHIRE have enhanced capabilities to generate PRIB inputs in an automated fashion, development of similar capability for licensee models needs to be explored. PRIBs replaced NRRs SDP notebooks.
- Availability of help desk support for modeling questions and technical assistance for Event and Condition Assessment modeling changes.
- Conflict of interest issues with use of licensee generated model for regulatory decision-making (will need to engage OGC for concurrence).

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Impact on Regulatory Activities

- Training costs associated with bringing staff up to speed on CAFTA, and other PRA codes currently in use.
- Availability of PRA models and supporting documentation – will they be formally submitted to NRC? Under oath and affirmation? Subject to 10 CFR 50.9? Will all licensees voluntarily submit their models?
- Updating process for licensee models - how to manage and control? How will staff ensure we have the latest model?
- Technical adequacy of SPAR models for certain modeling aspects important to event and condition assessments may be more advanced than licensee models such as LOOP modeling, common cause failure modeling and support system initiators.
- Use of licensee models to support system and component studies (SPAR/SAPHIRE currently have capabilities to efficiently run multiple cases to perform sensitivity studies and derive risk insights across multiple models).

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Impact on Regulatory Activities

- Risk analyses using a SPAR model or a licensee PRA model are often in close agreement when performing an SDP. Differences in SDP outcomes between the NRC and the licensee are driven by factors other than the baseline PRA model, typically engineering assumptions, modeling assumptions, human reliability assumptions or application of common cause.
- Although licensees have made progress in developing RG 1.200 compliant PRA models, these models lack the standardization and ROP-specific features that are essential to the agency's needs for performing event and condition analyses.

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Internal and external stakeholders

- Public
  - Use of licensee PRA or licensee performing analysis could erode public confidence
  - In effect the licensee is communicating events and degraded plant conditions to the public and other stakeholders if they perform the analysis
- NRR
  - ROP – Reactor Oversight Process
  - SDP – Significant Determination Process
  - MD 8.3 - NRC Incident Investigation Program
  - Notice of Enforcement Discretion (NOEDs)
  - Technical basis for rulemaking
  - Generic issues
  - Other risk-informed licensing related activities
- NRO
  - Initial licensing activities today
  - Same as NRR in the future

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Internal and external stakeholders

- Regions
  - ROP – Reactor Oversight Process
  - SDP – Significant Determination Process
  - MD 8.3 - NRC Incident Investigation Program
  - Notice of Enforcement Discretion (NOEDs)
- RES
  - ASP – Accident Sequence Precursor
  - Technical basis for rulemaking
  - Generic issues
  - Inspection Support
  - Other risk-informed licensing related activities
- Licensees
- NEI
- Owners Groups
- NGOs
- Others

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Challenges

- Erosion of Public confidence (Openness)
- Cost
- Impact on Regulatory Activities (Reliability)
- Loss of efficiency (Efficiency)
- Staff learning curve (Clarity)
- Model updates (Reliability/Clarity)
- Logistics and technical support (Independence)
- Licensee cooperation (Independence)

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Questions?

NRC's Principles of Good Regulation
Independence, Openness, Efficiency, Clarity, and Reliability

Current SPAR Model Costs	
	Per year costs
Base Resources (i.e., minimum requirements for the program):	
· SPAR Model Configuration/Quality Control and User Support Help Desk ~$500k/year	$500,000
– Help desk handles ~ 2 calls/day from SRAs	
– Ensures model version control and maintains INL Website	
– Performs model updates to support specific SDP/ASP activities (~30 models were updated to support a specific analysis in FY2015). These updates are often highly specific to the event/condition that occurred and would also need to be performed for a licensee PRA model	
· SAPHIRE QA and User Support ~$300k/year	$300,000
– Maintain NUREG/BR-0167 QA program	
– User help desk Support	
SUBTOTAL	**$800,000**
Resources needed to Support Specific User Enhancements:	
· Model Updates to Reflect Significant Plant Changes (~12 models/year) - ~$250k	$250,000
– Incorporate station blackout EDGs	
– Battery charging generators	
– Significant model upgrades	
· External Hazard and Fire Models - ~ $400k/year	$400,000
– Add NFPA 805 fire modeling	
– Add seismic and high wind model capabilities	
· SAPHIRE Enhancements ~$300k /year	$300,000
– New reporting features and code capabilities	
· Data Updates (performed every 3 years) - ~$500k (every three years)	$166,667
– Upgrade SPAR models to reflect most recent operating data	
– Update model documentation and Plant Risk Information eBooks (PRIBs)	
– General model cleanup/improvements	
SUBTOTAL	**$1,116,667**
TOTAL	**$1,916,667**

Cost Estimate Using Licensee Models
Cost Estimate Based on NRR Rebaselining Budget Values

Activities		Initial Costs (dollars)	Initial costs in FTE	Ongoing Annual costs in $	Ongoing Annual costs in FTE
1.Review Licensee PRAs (assumes 80 different PRAs) - A typical Level 1 industry peer review takes approximately 75 person/days (5 people for about 3 weeks)		$5,621,918	32.88		
	Staff will need to gain an in-depth understanding of each unique model, including				
	• Modeling assumptions				
	• Modeling conventions				
	• Naming schemes (basic events, fault trees, event tress, etc.)				
	• Post processing rule construction				
	• Other ...				
Note: loss of standardization may require additional SRAs - cost not included					
	Review updated/revised PRAs (assume 10%/year)			$562,192	3.29
2. Coordinate logistics with industry and staff		$974,466	5.70	$487,233	2.85
	Receive and process submittal (assumes the models will be proprietary)				
	Create and manage reference library (assumes both digital and hardcopy)				
	Coordinate review of revised PRA				
	Duplicate and distribute models and software				
	Industry User Groups (software, others)				
	Provide limited Technical Support to SRAs				
3. RASP Handbook Revisions- Provides for uniformity of assessments - based on the Standardized SPAR Models		$730,849	4.27	$365,425	2.14
4. Software Licenses					
	CAFTA (EPRI) - includes FTREX, actual current cost	$10,000		$10,000	
	WinNUPRA (Scientech) - estimated	$10,000		$10,000	
	Riskman (ABS Consulting) - estimated	$10,000		$10,000	
	RiskSpectrum (Lloyd's Register Consulting, Sweden) - estimated (may not be needed)	$10,000		$10,000	
			0.23		0.23
5. Training on new software (initial training assume 5 days each for 25 staff)					
	CAFTA (EPRI)	$117,123	0.68	$23,425	0.14
	WinNUPRA (Scientech)	$117,123	0.68	$23,425	0.14
	Riskman (ABS Consulting)	$117,123	0.68	$23,425	0.14
	RiskSpectrum (Lloyd's Register Consulting, Sweden) (may not be needed)	$117,123	0.68	$23,425	0.14
6. Loss of SAPHIRE reporting features and other automation tools (assume 36 in-depth SDPs/year)				$168,658	0.99
	Additional time required to perform and document each analyses (assumes 40 extra hours per evaluation)				
	Includes offline computation reviews				
7. Technical support - similar to current support provided by INL ** Too many unknowns to estimate — Currently spending about $500k/year				***$500,000***	
8. Support MD 8.3 - NRC Incident Investigation Program, Notice of Enforcement Discretion (NOEDs), technical basis for rulemaking, generic issues and other risk-informed licensing related activities (estimated 1.5 FTE)				$255,800	1.50
	TOTAL assuming no additional SRAs	**$7,835,726**	**45.82**	**$2,473,005**	**14.46**
		Assumptions;			
		$117.12	per hour		
		1460 hours = 1 FTE			
		From NRR Rebaselining assumptions			
		1 FTE =	$171,000		

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Key Talking Points for the Standardized Plant Analysis Risk (SPAR) Model Program

- Program provides **independent** risk analysis capability for NRC in support of reactor oversight process (ROP) and a variety of risk-informed technical applications
- Plant-specific SPAR models (99 operating plants are represented by 75 SPAR models) use **standardized** modeling and naming conventions. Standardization increases analyst efficiency and accuracy and supports cross comparison across models.
- SPAR models and the SAPHIRE PRA code are **designed to support event and condition analyses** by performing "delta-risk" analyses (e.g., change in CDF from base case to performance deficiency). Licensee developed models and supporting codes lack this capability (requiring additional calculations and manual sequence/cutset result comparisons)
- The program leverages available licensee PRA information to reduce program costs, but includes validation of licensee modeling assumptions and integrates licensee model conventions into standardized SPAR modeling framework. Although SPAR models use some simplifying assumptions compared to licensee models, in several areas most pertinent to ROP applications, the SPAR models are generally more detailed (e.g., CCF, LOOP, and support system initiators)
- All models run on a single code platform (SAPHIRE). SAPHIRE can be updated and configured to directly support NRC risk assessment activities through coding changes and customized reporting functions. Use of licensee models would require the NRC to maintain licensees and network environmental approval for multiple commercial software codes and eliminate the ability to revise these code to support NRC-specific applications.
- Although licensees have made progress in developing RG 1.200 compliant PRA models, these models lack the standardization and ROP-specific features that are essential to the agency's needs for performing event and condition analyses.

SPAR Model Uses

- Significance Determination Process (Reactor Oversight) - **Regions**
- Accident Sequence Precursor Program (used as an input metric to the performance budget process) - **RES**
- Evaluation of Notices of Enforcement Discretion – **Regions, NRR** *
- MD 8.3 Incident Investigation Program Risk Evolutions (e.g., determine level of inspection response to an event) – **Regions** *
- Establish technical basis for rulemaking – **RES, NRR**
- Evaluate generic issue safety significance - **RES**
- Perform system and component studies - **RES**
- Inspection Planning (e.g., risk insights from Plant Risk Information eBooks) - **Regions**

These applications typically are performed with limited time, highlighting the importance of model standardization for SPAR

SPAR Model Annual Budget

The SPAR/SAPHIRE annual budget for **FY2015 was ~$2.2 million**. This amount is scalable depending on agency needs and available resources. Major activities include:

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Base Resources (i.e., minimum requirements for the program):

- SPAR Model Configuration/Quality Control and User Support Help Desk ~$500k/year
  - Help desk handles ~ 2 calls/day from SRAs
  - Ensures model version control and maintains INL Website
  - Performs model updates to support specific SDP/ASP activities (~30 models were updated to support a specific analysis in FY2015). These updates are often highly specific to the event/condition that occurred and would also need to be performed for a licensee PRA model

- SAPHIRE QA and User Support ~$300k/year
  - Maintain NUREG/BR-0167 QA program
  - User help desk Support

Resources needed to Support Specific User Enhancements:

- Model Updates to Reflect Significant Plant Changes (~12 models/year) - ~$250k
  - Incorporate station blackout EDGs
  - Battery charging generators
  - Significant model upgrades

- External Hazard and Fire Models - ~ $400k/year
  - Add NFPA 805 fire modeling
  - Add seismic and high wind model capabilities

- SAPHIRE Enhancements ~$300k /year
  - New reporting features and code capabilities

- Data Updates (performed every 3 years) - ~$500k (every three years)
  - Upgrade SPAR models to reflect most recent operating data
  - Update model documentation and Plant Risk Information eBooks (PRIBs)
  - General model cleanup/improvements

Letter to NEI from OEDO on Use of SPAR models (2007, ML072490566)

This letter addressed an NEI proposal to use licensee PRA models instead of SPAR models. A detailed review was conducted and concluded that SPAR was needed to:

- Maintain **independence** of NRC analyses. Differences between NRC and Licensee assessments is not due to the base model, but by the assumptions for each specific event or condition analysis
- Provide **standardized model framework** for efficient analyses - industry does not use a standardized modeling approach
- Avoid inefficiencies in having agency risk analysts learn the conventions of over 70 licensee developed PRAs (utilizing up to four different software platforms)

The basis for the staff conclusion remains valid today.

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Feedback from Regional SRAs on Potential Use of Licensee Models vice SPAR

- More efficient and objective to use SPAR models for risk assessments.
- It would take a significant increase in resources to use licensee models for event and condition assessment activities due to their lack of standardization and need for SRAs to understand unique modeling conventions and new code platforms.
- Use of licensee models would cause delays in the SDP process due to need to engage in additional requests for information to understand licensee PRA modeling assumptions.
- NRC's ability to perform independent regulatory assessment activities will be eroded by not having a centralized system evaluating Generic Safety Issues.

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Letter to NEI from OEDO on Use of SPAR models (2007, ML072490566)

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Background Information

1. SPAR Level 1 Model Development.pptx
2. Relevant Inspection Manual Chapters
3. Use of Licensee PRA Models RISC 01272016
4. Letter from Don Dube (RES/DRA) to Michael D. Tschiltz, Deputy Director, NRR/DRA, Feb 28, 2007, Subject: Public Meeting Summary Regarding Use Of Standardized Plant Analysis Risk Models and Licensee Probabilistic Risk Assessment Models In The Reactor Oversight Process Held On February 22, 2007, ML070640567
5. Letter from J. E. Dyer, Director NRR, to NEI, July 2007, ML071990509
6. Letter from NEI, Aug 4, 2007, Subject: August 2 Commission Briefing on Risk-Informed Regulation
7. Letter from NEI, Dec 19, 2013, Subject: Subject: Industry Support and Use of PRA and Risk-Informed Regulation
8. NEI, Proposal for use of Licensee PRA Models in the Significance Determination Process, April, 2014
9. SPAR Model Philosophy Rev. 1.pptx
10. Outline Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models

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SPAR Level 1 Model Development.pptx

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UNITED STATES NUCLEAR REGULATORY COMMISSION
Protecting People and the Environment

SPAR Level 1 Model Development

- Feedback from ~50 ASP analyses per year
- Feedback from emergent SDP analyses
- Peer reviews from licensees (ASP/SDP analyses; MSPI reviews)
- Incorporation of information gathered during SDP
- Feedback to other models through use of standardized assumptions and methods
- Identification and resolution of generic industry modeling issues
- Resolution of Peer Review Comments

Rev. 1 Models
1995 – 1998

- Developed from "Daily Events Manual"
- Train level system modeling
- Limited number of event trees

Rev. 2/2QA Models
1998 - 2001

- Expanded modeling of event trees and front line systems based on NRC reviewed IPEs
- Detailed external review by SNL

Rev. 3i Models
Completed 11/02

- Expanded number of event trees
- Support system fault trees/initiators added
- SDP plant visit comments incorporated

Rev. 3 Models
Completed 12/04

- Detailed reviews (see review guideline, 3/14/05)
- Data updated and templates generated
- RCP seal LOCA and LOOP models updated

Rev. 3.x Models
Completed 12/09

- Detailed cut set level review against PRAs (see Rev 3P Review Process Guideline, 2/21/06)
- Model documentation expanded/updated

Rev. 8.x Models
Completed 2015
Additional Success Criteria enhancements in progress

- SAPHIRE version 8 enhancements
- SSIE Models (RES/EPRI MOU)
- Expanded LOOP/SBO models (RES/EPRI MOU)
- Resolve Peer Review Comments – phase 1
- Success Criteria Enhancements

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Options for NRC Risk-Informed Regulatory Tools - A Perspective

Relevant Inspection Manual Chapters

Relevant Inspection Manual Chapters

IMC 0306 Planning, Tracking and Reporting of the Reactor Oversight Process (ROP) 12/23/15 15-032 .docx

IMC 0307 Reactor Oversight Process Self-Assessment Program 11/23/15 15-025 .docx

IMC 0307 App A Reactor Oversight Process Self-Assessment Metrics 11/23/15 15-025 .docx

IMC 0307 App B Reactor Oversight Process Baseline Inspection Procedure Reviews 11/23/15 15-025 .docx

IMC 0308 Reactor Oversight Process Basis Document 09/04/14 14-020 .docx

IMC 0308 Att 1 Technical Basis for Performance Indicators 11/08/07 07-035 .doc

IMC 0308 Att 2 Technical Basis for Inspection Program 10/16/06 06-027 .doc

IMC 0308 Att 3 Significance Determination Process Basis Document 10/16/06 06-027 .doc

IMC 0308 Att 3, App A Technical Basis for the At-Power Significance Determination Process (SDP) 06/19/12 12-010 .doc

IMC 0308 Att 3, App B Technical Basis for Emergency Preparedness Significance Determination Process 12/19/12 12-029 .docx

IMC 0308 Att 3, App C Technical Basis for Occupational Radiation Safety Significance Determination Process 07/28/05 05-022 .doc

IMC 0308 Att 3, App D Technical Basis for Public Radiation Safety Significance Determination Process 06/25/04 04-020 .doc

IMC 0308 Att 3, App F Technical Basis for Fire Protection Significance Determination Process (II

IMC 0609, Appendix F) At Power Operations 02/28/05 05-007 .doc

IMC 0308 Att 3, App G Technical Basis for Shutdown Operations Significance Determination Process 02/28/05 05-007 .doc

IMC 0308 Att 3, App H Technical Basis for Containment Integrity Significance Determination Process 05/06/04 04-010 .doc

IMC 0308 Att 3, App I Technical Basis for Operator Requalification Human Performance Significance Determination Process 07/28/05 05-022 .doc

IMC 0308 Att 3, App J Technical Basis for Steam Generator Tube Integrity Findings 07/06/11 11-011 .doc

IMC 0308 Att 3, App K Technical Basis for Maintenance Risk Assessment and Risk Management SDP 05/19/05 05-014 .doc

IMC 0308 Att 3, App L Technical Basis for the B.5.b Significance Determination Process (SDP) 05/09/14 14-011 .doc

IMC 0308 Att 3, App M Technical Basis for the Significance Determination Process (SDP) Using Qualitative Criteria 06/11/14 14-012 .docx

IMC 0308 Att 4 Technical Basis for Assessment 07/28/05 05-022 .doc

IMC 0308 Att 5 Technical Basis for Enforcement 10/16/06 06-027 .doc

IMC 0309 Reactive Inspection Decision Basis for Reactors 10/28/11 11-023 .docx

IMC 0310 Aspects Within Cross Cutting Areas 12/04/14 14-029 .docx

IMC 0312 Technical Assistance for Radiation Safety Inspections at Nuclear Fuel Cycle Facilities and Materials Licensees' Sites 06/06/02 02-023 .doc

IMC 0313 Industry Trends Program 05/29/08 08-016 .doc

IMC 0320 Operating Reactor Security Assessment Program 06/13/12 12-009 .docx

IMC 0326 Operability Determinations & Functionality Assessments for Conditions Adverse to Quality or Safety 12/03/15 15-028 .docx FY2012-02 Rev 1

Relevant Inspection Manual Chapters

IMC 0330 Guidance for NRC Review of Licensee Draft Documents 07/8/96 96-015

IMC 0350 Oversight of Reactor Facilities in a Shutdown Condition Due to Significant Performance and/or Operational Concerns 12/15/06 06-035 .doc

IMC 0375 Implementation of the Reactor Oversight Process at Reactor Facilities in an Extended Shutdown Condition for Reasons Not Related to Performance 11/13/15 15-024 .docx

IMC 0410 Notices of Enforcement Discretion 03/13/13 13-009 .docx

IMC 0608 Performance Indicator Program 09/26/12 12-022 .docx

IMC 0609 Significance Determination Process 04/29/15 15-008 .docx

IMC 0609 Att 1 Significance and Enforcement Review Panel Process 04/29/15 15-008http://pbadupws.nrc.gov/docs/ML0735/ML073531868.pdf .docx

IMC 0609 Att 2 Process for Appealing NRC Characterization of Inspection Findings (SDP Appeal Process) 06/08/11 11-010 .doc

IMC 0609 Att 3 Senior Reactor Analyst Support Expectations 04/29/15 15-008 .docx

IMC 0609 Att 4 Initial Characterization of Findings 06/19/12 12-010 .doc

IMC 0609 App A The Significance Determination Process (SDP) for Findings At-Power 06/19/12 12-010 .docx

IMC 0609 App B Emergency Preparedness Significance Determination Process 09/22/15 15-017 .docx

IMC 0609 App C Occupational Radiation Safety Significance Determination Process 08/19/08 08-024 .doc

IMC 0609 App D Public Radiation Safety Significance Determination Process 02/12/08 08-007 .doc

IMC 0609 App F Fire Protection Significance Determination Process 09/20/13 13-022 .docx

IMC 0609 App F, Att 1 Attachment 1: Fire Protection Significance Determination Process Worksheet 09/20/13 13-022 .docx

IMC 0609, App F, Att 2 Attachment 2: Degradation Rating Guidance Specific to Various Fire Protection Program Elements 02/28/05 05-007 .doc

IMC 0609 App F, Att 3 Attachment 3: Guidance for Identifying Fire Growth and Damage Scenarios 02/28/05 05-007 .doc

IMC 0609 App F, Att 4 Attachment 4: Fire Ignition Source Mapping Information: Fire Frequency, Counting Instructions, Applicable Fire Severity Characteristics, and Applicable Manual Fire Suppression Curves 02/28/05 05-007 .doc

IMC 0609, App F, Att 5 Attachment 5: Characterizing Non-Simple Fire Ignition Sources 02/28/05 05-007 .doc

IMC 0609 App F, Att 6 Attachment 6: Guidance for the Identification of Targets and Their Ignition and Damage Criteria 02/28/05 05-007 .doc

IMC 0609 App F, Att 7 Attachment 7: Guidance for Fire Growth and Damage Time Analysis 02/28/05 05-007 .doc

IMC 0609 App F, Att 8 Attachment 8: Guidance for Fire Non-Suppression Probability Analysis 02/28/05 05-007 .doc

IMC 0609 App G Shutdown Operations Significance Determination Process 05/09/14 14-011 .docx

IMC 0609 App G, Att 1 Shutdown Operations Significance Determination Process Phase 1 Initial Screening and Characterization of Findings 05/09/14 14-011 .doc

IMC 0609 App G, Att 2 Phase 2 Significance Determination Process Template for PWR During Shutdown 02/28/05 05-007 .doc

IMC 0609 App G, Att 3 Phase 2 Significance Determination Process Template for BWR During Shutdown 02/28/05 05-007 .doc

Relevant Inspection Manual Chapters

IMC 0609 App H Containment Integrity Significance Determination Process 05/06/04 04-010 .doc

IMC 0609 App I Operator Requalification Human Performance Significance Determination Process [SDP] 12/06/11 11-040 .docx

IMC 0609 App J Steam Generator Tube Integrity Findings Significance Determination Process 07/06/11 11-011 .doc

IMC 0609 App K Maintenance Risk Assessment and Risk Management Significance Determination Process 05/19/05 05-014 .doc

IMC 0609 App L B.5.b Significance Determination Process 12/24/09 09-032 .doc

IMC 0609 App M Significance Determination Process Using Qualitative Criteria 04/12/12 12-005 .docx

IMC 0610 Nuclear Material Safety and Safeguards Inspection Reports 05/18/04 04-014 .doc

IMC 0612 Power Reactor Inspection Reports 01/24/13 13-003 .docx

IMC 0612 Exh 1 Standard Reactor Inspection Report Outline 02/07/14 14-005 .docx

IMC 0612 Exh 2 Inspection Report Documentation Matrix 09/04/14 14-020 .docx

IMC 0612 Exh 4 ROP Inspection Report Cover Letter Templates 09/13/13 13-021 .docx

IMC 0612 App A Acronyms Used in Inspection Manual Chapter 0612 12/04/08 08-034 .doc

IMC 0612 App B Issue Screening 09/07/12 12-020 .docx

IMC 0612 App C Guidance for Supplemental Inspection Reports 10/28/11 11-024 .docx

IMC 0612 App C Exh 1 Sample Supplemental Inspection Report for IP 95001 and IP 95002 10/28/11 11-024 .docx

IMC 0612 App D Documenting Problem Identification and Resolution Biennial Team Inspections (IP 71152) 08/13/13 13-017 .docx

IMC 0612 App E Examples of Minor Issues 08/11/09 09-020 .doc

IMC 0801 Reactor Oversight Process Feedback Program

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Use of Licensee PRA Models RISC 01272016

Option 1 – Status Quo – Continue to update about 8-12 SPAR models per year and develop new All Hazard (including fire and seismic hazards) SPAR models.

Advantages:

- Provide a means to maintain an independent assessment tool from that of the licensees.
- Provides an enhanced public confidence in that the regulator will arrive at a conclusion based on a diverse path from that of the licensee.
- Enables staff to assess risk-significance of various plants on a common basis.
- Enables NRR staff to support management efforts to risk-inform regulatory decisions on generic or plant specific basis.

Disadvantages:

- Requires staff to expend resources to update and/or develop models.

Discussion:

Annually, NRC expends approximately $1.5 million and 3 FTEs to update and maintain the SPAR models.

PRA methods used to estimate critical parameters such as common cause failures and human error probabilities are identical (RG 1.200 compliance does not assure use of one method).

Modeling techniques and data are standardized for each plant and run on the same software platform making it possible to train NRC practitioners and use trained NRC staff to efficiently make timely assessments.

Option 2 – Results will be provided to NRC staff in order to make regulatory decisions.

Advantages:

- Will not require staff to expend additional resources to update the models.
- Allowing licensees to use RG 1.200 compliant models for SDPs may motivate them to invest resources to advance the quality of their models.
- A "certified" PRA (consistent with RMRF Option 2) would allow the licensees PRA to be the PRA of record for all regulatory actions—including SDP.

Disadvantages:

- Inhibits staff's ability provide timely, independent inputs to time-critical NRC decisions in support of NOEDs and MD 8.3s.
- May inhibit NRR's ability to effectively deal with future challenges "Aggregation" and "Integrated Risk-informed Decision Making," related challenges since staff's ability to enhance external events risk assessments will be affected.
- Inhibits staff's ability to evaluate generic issues affecting the nuclear fleet.
- Inhibits staff's ability to provide input to regulatory basis documents for potential rulemaking efforts.
- May negatively affect public perception of the independence of our regulatory processes.

Discussion:

This is the option the industry would prefer. One key issue is what information they will provide us from their assessment to allow us to make a proper regulatory decision.

Option 3 – NRC staff will be given access and training to run licensees' PRA models in support of various regulatory actions.

3a – Licensees are required to give us their model of record at some established point in the regulatory process. NRC staff would then run the analysis using the licensee PRA model instead of using the SPAR model.

3b – NRC maintains a model of record for each plant with the requirement that if the licensee updates their model they have to send us the new model within a certain time frame.

Advantages:

- Will not require staff to expend additional resources to update SPAR models.
- The most up to date model will always be used.
- May motivate licensees to develop and maintain PRA models that comply with RG 1.200.
- Although NRC is using the licensee model, the independence is maintained.
- The ability to assess generic and other fleet-wide issues will be maintained if NRC maintains a model of record.

Disadvantages:

- Will require significant resources to train multiple NRC staff members (both in NRR, NRO, and the Regions) on running licensees' models.
- Each PRA model contains important switches\House Events that requires familiarity on the part of the analyst (i.e., there can be significant training burden).
- NRC will need to maintain commercial software licenses for multiple PRA codes (e.g., CAFTA, RISKMAN, FRANX, FTREX, etc.)
- It is not likely that all licensees will grant NRC staff access to their PRA models.
- Will need to establish infrastructure similar to the SPAR models to maintain a "model of record" for each plant that would be accessible to risk analysts.

Discussion:

The potential cost savings from this approach may be limited without *all* licensees agreeing to give access to their models for NRC use.

Next Steps:

- Form a project team with individuals from NRR, RES and NRO.
- Provide a plan to pilot (Vogtle) the use of licensee PRA models and criteria to objectively evaluate the pilot.
- Evaluate the true cost of maintaining SPAR models. This is to include an evaluation of lifetime costs and needed impending upgrades (i.e. seismic).
- Evaluate true cost of using licensee PRA models. This would include software required, training to current practitioners, possible staffing increases and changes to regulatory structure, etc.

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Letter from Don Dube (RES/DRA) to Michael D. Tschiltz, Deputy Director, NRR/DRA, Feb 28, 2007, Subject: Public Meeting Summary Regarding Use Of Standardized Plant Analysis Risk Models and Licensee Probabilistic Risk Assessment Models In The Reactor Oversight Process Held On February 22, 2007, ML070640567

February 28, 2007

MEMORANDUM TO: Michael D. Tschiltz, Deputy Director
Division of Risk Assessment
Office of Nuclear Reactor Regulation

FROM: Donald A. Dube, Senior Technical Advisor /RA/
Division of Risk Assessment
Office of Nuclear Reactor Regulation

SUBJECT: PUBLIC MEETING SUMMARY REGARDING USE OF STANDARDIZED PLANT ANALYSIS RISK MODELS AND LICENSEE PROBABILISTIC RISK ASSESSMENT MODELS IN THE REACTOR OVERSIGHT PROCESS HELD ON FEBRUARY 22, 2007

On February 22, 2007, a public meeting was held at the Nuclear Energy Institute (NEI) offices on 1776 I Street, Washington, DC, to discuss the use of the risk insights from standardized plant analysis risk (SPAR) models and the licensee probabilistic risk assessment (PRA) models to characterize the safety significance of inspection findings for the U.S. Nuclear Regulatory Commission (NRC) reactor oversight process (ROP). The agenda is provided as Enclosure 1, and a list of attendees is provided as Enclosure 2.

This meeting was held as follow-on to the December 13, 2006, kick-off meeting (see ADAMS Accession # ML063530303) of the industry and staff working groups. This activity stems from an action item from the public meeting of September 28, 2006 between the NRC PRA Steering Committee and industry representatives. The action from the September 28, 2006, meeting was to form a joint NRC/Industry task group to investigate various options to the use of the SPAR models in the significance determination process (SDP). The meeting of February 22nd focused on industry concerns, the status of the SPAR models, and options to the current process.

At the beginning of the meeting, NRC staff summarized the highlights of the December 13, 2006, meeting. The staff noted that the SPAR models are used in numerous applications other than SDP, including the accident sequence precursor program, incident investigation, generic issue prioritization, and independent review of license amendment submittals. As such, the staff would continue to maintain the SPAR models in the foreseeable future even if the decision were made not to rely upon them for SDP. In addition, the staff noted that there are large economies of scale with the SPAR program (e.g., methods, data), and even if SPAR models were not used for a large fraction of SDP evaluations there would be little resource savings to the staff in the near-term. There was consensus on the part of the staff and industry that the activity would be confined for the present to evaluating the use of licensee models only for the SDP.

CONTACT: Donald A. Dube, NRR/DRA
(301) 415-1483

The staff further noted that the SDP was a regulatory function, and that the staff reserved the final decision on whether to move forward with any recommendation coming from the activity. The industry noted that efforts are under way to upgrade a number of plant PRA models to conform to the requirements of Regulatory Guide (RG) 1.200, including training in March 2007. The industry further stated that should the NRC staff decide to move forward with whatever option is considered, it would be valuable to pilot the effort. The industry also provided a number of examples where they felt there were some form of deficiency in SDP evaluations using SPAR models (see Enclosure 3). The NRC staff acknowledged problems with the evaluations in several instances. The staff and industry agreed that areas to pay particular attention to include:

- human reliability analysis dependencies
- plant-specific initiator frequencies
- system success criteria
- incorporation of unique plant emergency operating procedures into the models
- use of historical individual plant examination of external events results.

The staff further acknowledged that as the industry makes major upgrades to models to meet RG 1.200, as well as to improve fire PRAs for National Fire Protection Association 805, the SPAR models could eventually lag the industry's models without adequate resources to keep the SPAR models up to date.

The staff did note recent initiatives to improve the quality of the SPAR models, including the SPAR model enhancement effort, quality assurance plan, and the use of the risk assessment standardization project handbook. The staff believes that many of the issues presented by the industry examples have been or are being addressed. The Office of Nuclear Regulatory Research (RES) provided a discussion of the status of the SPAR models, and noted the excellent agreement between SPAR models and licensee models following cut set level reviews, and after accounting for plant performance data differences (see Enclosure 4). The cut set level reviews are well underway with 41 models completed, another 20 models to be completed in 2007, and the remainder in 2008. RES staff highlighted the primary reasons for the model disparity, and noted that many of the technical issues are common not just to the SPAR models, but industry models as well. For example, the small loss of coolant accident frequencies for PWRs vary by some factor of 40 from low to high in the industry PRAs based on MSPI cross-comparisons.

The staff provided the results of General Accountability Office testimony on the ROP. Data for SDP findings for the period of 2001 through 2005 were presented (see Enclosure 5). The staff noted that the SPAR models have been used on a sizable fraction of the green findings as well as those greater than green, and that these need to be factored into the overall assessment of the performance of the SPAR models in the SDP. The NRC staff re-iterated its view that many of the examples presented by the industry during the meeting, as well as other cases, were the result of varying assumptions from the engineering analysis as to whether certain degraded conditions were actual failures, and for how long the condition existed, as opposed to major PRA modeling differences. Based on its experience from the four regions and headquarters, the staff was not entirely convinced that there has been an across-the-board problem with the use of the enhanced SPAR models for SDP.

The staff and industry reviewed and commented on a draft of the purpose of the working groups (see Enclosure 6). There was tentative agreement to re-phrase the purpose as follows:

> *To assess whether and how licensee PRA models that are updated to meet RG 1.200 can be factored in to the ROP.*

The industry and staff next outlined possible options (see Enclosure 7). Option 1 represents the status quo. Here, status quo represents the SDP as it is currently envisioned, that is, with continued enhancement of the SPAR models according to plan. It does not mean a static set of SPAR models. Options 2 through 4 present some alternatives to Option 1 for phase 3 SDP evaluations. Options 5 and 6 are with regard to phase 2 screening, with Option 6 the status quo (current plan). Option 7 was dismissed early on but is enclosed for completeness.

A set of 11 criteria was then established. Finally, each option was evaluated against how it would impact the criteria for consideration: either pro, con, neutral, or to be determined. The staff and industry reached general consensus on the pros and cons. (It is important to note that no weighting has been assigned to the criteria at this point.) No determination regarding the preferred option(s) has been made at this stage.

Actions for the industry and staff working groups include the following:

- provide comments on the objectives as drafted in Enclosure 6 by March 16
- better define the options, including the consideration of hybrid or mixed options
- begin to consider weights for the criteria.

The next meeting is tentatively planned for April 12, 2007, location to be determined.

Enclosures:
As stated

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Enclosures:
As stated

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BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
Options for NRC Risk-Informed Regulatory Tools - A Perspective

Letter from J. E. Dyer, Director NRR, to NEI, July 2007, ML071990509

Mr. Anthony Pietrangelo, Vice President
Regulatory Affairs
Nuclear Generation Division
Nuclear Energy Institute
1776 I Street NW, Suite 400
Washington, D.C. 20006-3708

Dear Mr. Pietrangelo:

The Nuclear Regulatory Commission (NRC) staff, together with the Nuclear Energy Institute (NEI), industry representatives, and other stakeholders, have held a series of public meetings to discuss whether and how licensee probabilistic risk assessment (PRA) models that are updated to meet Regulatory Guide (RG) 1.200 can be factored into the NRC=s significance determination process (SDP). This activity stems from an action item from the public meeting of September 28, 2006, between the NRC PRA Steering Committee and industry representatives. The action from the September 28, 2006 meeting was to form task groups to investigate various options for the use of the standardized plant analysis risk (SPAR) models in the SDP.

A number of options were developed and discussed with the industry during the public meetings. In particular, the industry has recommended that licensee risk analysts should assess the risk of performance deficiencies, and provide the results to the NRC for review and action. After careful consideration of the merits of all of the options developed as part of this effort, the staff concludes that none of the options are acceptable alternatives to the current process for the SDP.

The NRC=s Reactor Oversight Process (ROP) provides an independent assessment of licensee performance as such, it would be inappropriate for licensee risk analysts to take the lead in assessing the significance of licensee performance deficiencies. The staff recognizes that baseline PRA models that have undergone peer review and conform to the requirements of RG 1.200 are of relatively high quality. In many cases, the staff has found these baseline models to be superior in detail to its own SPAR models, particularly with regard to external event modeling. Nonetheless, the staff=s experience with the SDP is that the analysis outcome is not heavily influenced by differences between a licensee=s PRA model and the NRC SPAR model. Typically these differences are recognized and accounted for.

Our experience has been that differences in SDP outcomes between the NRC and the licensee are driven by factors other than the baseline PRA model used for the analysis. For example, virtually every event or degraded condition for which a phase III risk assessment is conducted requires engineering analysis and PRA model modifications to represent the performance deficiency or equipment degradation. Key assumptions regarding the extent and duration of equipment degradation are made, and human recovery actions and/or systems not modeled in the baseline PRA are often credited. The manner in which the risk analyst addresses these issues can significantly influence the risk estimate outcome. We note that to the extent that

licensees have unique perspectives on the event or condition under NRC staff evaluation, the SDP allows for input from licensees regarding such risk insights.

The staff has also concluded that allowing licensees to take the lead on risk assessments would minimize the NRC staff=s ability to ensure that issues are assessed in a timely manner.

Additionally, at present, the industry lacks a standardized approach to performing risk analysis that would ensure uniform application across the spectrum of industry PRA models. In this regard, the NRC=s use of the SPAR model together with the on-going development of guidance on conducting phase III risk assessments, commonly referred to as the risk assessment standardization process (RASP), ensures greater uniformity.

The staff also seriously considered the alternative to the current process whereby the staff would be provided with the licensee PRA models that meet RG 1.200. Under this option, the staff would perform the assessment of risk significance using a standardized approach. While this second option has merit, the staff has concluded that the logistical and resource needs to maintain the many licensee PRA models in-house is not feasible. Altogether, the 70-plus industry PRA models on some four software platforms would require significant NRC resources, including the addition of risk analysts, who might otherwise be more effectively utilized for other tasks. This alternative, while perhaps holding promise for the future as PRA software platform standardization advances, is not a viable solution for the near-term.

In summary, the staff believes that continued improvement to the standardization of PRA modeling methods in SPAR and industry PRA models is the most effective use of resources, commensurate with the need for the staff to maintain its own methods for confirmatory and independent analysis. The NRC independent oversight of licensee performance is also an important aspect of maintaining public confidence in the process.

We look forward to working with the industry to continue development of guidance for the standardized application of risk assessment models to operating event analysis.

Sincerely,

J. E. Dyer, Director
Office of Nuclear Reactor Regulation

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Sincerely,

J. E. Dyer, Director
Office of Nuclear Reactor Regulation

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PBaranowsky	MCunningham	JGrobe	BBoger
07/ /2007	07/ /2007	07/ /2007	07/ /2007

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BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
Options for NRC Risk-Informed Regulatory Tools - A Perspective

Letter from NEI, Aug 4, 2007, Subject: August 2 Commission Briefing on Risk-Informed Regulation

BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
Options for NRC Risk-Informed Regulatory Tools - A Perspective

Letter from NEI, Dec 19, 2013, Subject: Subject: Industry Support and Use of PRA and Risk-Informed Regulation

BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
Options for NRC Risk-Informed Regulatory Tools - A Perspective

NEI, Proposal for use of Licensee PRA Models in the Significance Determination Process, April 2014

BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
Options for NRC Risk-Informed Regulatory Tools - A Perspective

SPAR Model Philosophy Rev. 1.pptx

U.S.NRC
UNITED STATES NUCLEAR REGULATORY COMMISSION
Protecting People and the Environment

Standardized Plant Analysis Risk (SPAR) Model Philosophy

Kevin Coyne, Probabilistic Risk Assessment Branch
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Kevin.Coyne@nrc.gov
(301) 415-2478

July 15, 2015

U.S.NRC

Model Uses

- Reactor Oversight
  - Significance Determination Process (SDP)
  - Notices of Enforcement Discretion (NOEDs)
  - Management Directive MD 8.3 Incident Investigation Assessments
  - Accident Sequence Precursor Program
- System & Component Studies
- Generic Issue Screening
- Special Studies

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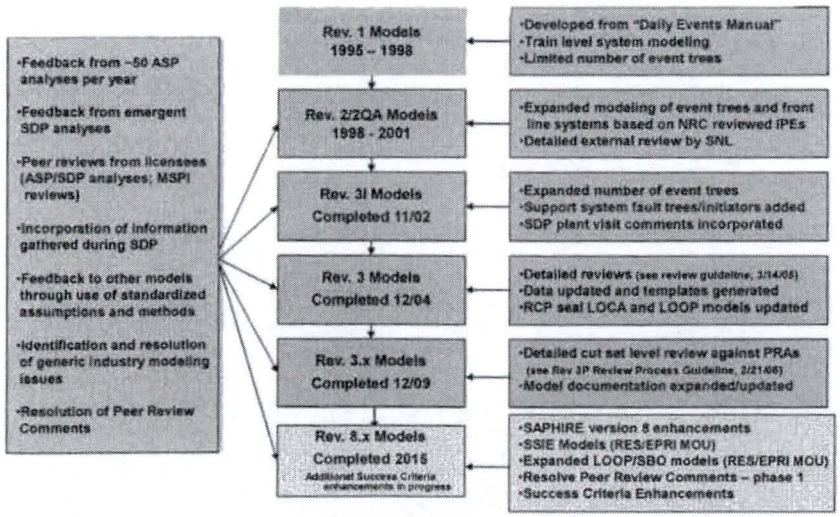
SPAR Technical Adequacy

- Unlike licensee PRA models that support risk-informed licensing actions, SPAR models are not required to minimum technical adequacy requirements (e.g., RG 1.200).
- SPAR QA program helps to ensure SPAR models reflect as-built, as-operated plant
- Process controls also help to ensure quality
  - Trained/certified analysts
  - Internal reviews
  - External reviews

3

U.S.NRC

SPAR Level 1 Model Development



Capabilities

- Operating Reactors
  - 75 full-power, internal events models representing all operating plants
  - 18 IPEEE-based external hazard models
  - 4 "All Hazard Models"
  - 8 Shutdown template models
  - 3 Level 2 feasibility models
  - 1 Integrated Capability Model
- New Reactors
  - ABWR – GE & Toshiba (SD)
  - APWR
  - AP1000 (seismic, flooding, fire, LPSD)
  - US EPR

Development Philosophy

- Provide independent, plant-specific PRA models for use by agency risk analysts
  - "[I]ndependent oversight of licensee performance is critical for effective NRC oversight and is an important aspect of upholding public confidence in the [SDP] process" (letter from EDO to NEI, October 2007, ML072490566)
- Use standardized modeling conventions
  - Standardization approach supports plant-specific modeling
  - Ease of use for agency analysts
  - Efficient model maintenance and updating

Development Philosophy

- Support event and condition assessment (ECA) activities
  - SAPHIRE user "workspaces" structured to support ROP
  - SPAR models designed to efficiently address typical ECA activities (e.g., CCF, LOOP modeling)
- Apply agency resources in a cost-effective manner
  - SPAR models generally not as detailed as licensee models (with some exceptions)
  - SPAR generally relies on licensee PRA modeling assumptions (supported with some independent analysis)

7

Quality Assurance

- SPAR Quality Assurance Plan
- SPAR Project Manager Handbook
- Risk Assessment of Operational Events (RASP) Handbook
  - Helps to ensure that the SPAR models are of adequate quality, reflect the as-built, as-operated plant for the problem being analyzed, and are used in a consistent manner.
- Model Maker Guidelines (MMGs)
  - All Hazard Models
  - Shutdown
  - Integrated Capability Modeling

8

Quality Assurance

- Onsite verification reviews
  - Onsite reviews conducted during MSPI benchmarking activities
  - Onsite reviews conducted for new modeling elements (e.g., shutdown, fire, external hazards)
- SPAR Configuration/Version Control
- SAPHIRE Quality Assurance Plan
  - Independent Verification and Validation for SAPHIRE 8
  - NUREG/BR-0167, "Software Quality Assurance Program and Guidelines" compliant QA program, including annual audits

Maintenance Program

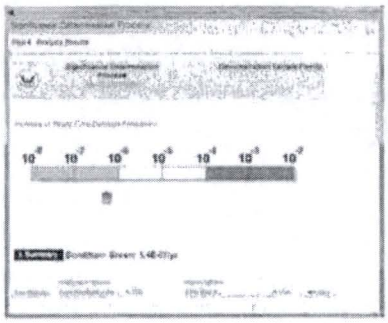
- Major updates are performed on approximately 8-12 SPAR models per year based on feedback from model users and licensees
  - Less significant model changes are performed on an additional 20-30 models per year to support risk assessments for specific regulatory applications
  - Approximately one half of the plant-specific SPAR models are typically updated in a given year

U.S.NRC

SAPHIRE

SAPHIRE (Systems Analysis Programs for Hands-on Integrated Reliability Evaluation)

- Performs logic solving and Boolean reduction to generate PRA cutsets from event tree/fault tree models
- NRC sponsored code developed at Idaho National Lab.
- Developed to Support Event and Condition and Analysis
  - Workspaces (SDP, ECA, GA)
  - CCF Module
  - Cut set editor
  - Reporting Capabilities
- NUREG/BR-0167 Compliant QA Program



11

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Questions?

12

BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
Options for NRC Risk-Informed Regulatory Tools - A Perspective

Outline

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models
Outline

1. **Summary of Key Considerations for using licensees' PRA Models**
   - 1.1. Regulatory Processes
   - 1.2. PRA Policy Statement
   - 1.3. Model Quality
   - 1.4. Maintain independence of NRC
   - 1.5. Standardization of modeling and assessment techniques
   - 1.6. Use by the NRC staff of licensees' PRA models
   - 1.7. Effect on other NRC Programs
   - 1.8. Costs

2. **Regulatory Processes**
   - 2.1. Reactor Oversight Process (ROP)
     - 2.1.1. ROP is an NRC process
   - 2.2. Significance Determination Process (SDP)
     - 2.2.1. Today's SDP outcomes using NRC versus licensee PRA
       - 2.2.1.1. The PRA models are often in close agreement.
       - 2.2.1.2. Differences in SDP outcomes between the NRC and the licensee are driven by factors other than the baseline PRA model
         - 2.2.1.2.1. Engineering assumptions
         - 2.2.1.2.2. Modeling assumptions
         - 2.2.1.2.3. Human reliability assumptions
         - 2.2.1.2.4. Other ...
       - 2.2.1.3. These issues are also applicable to the other regulatory processes and other risk-informed licensing related activities
   - 2.3. MD 8.3 - NRC Incident Investigation Program
   - 2.4. Notice of Enforcement Discretion (NOEDs)
   - 2.5. Technical basis for rulemaking
   - 2.6. Generic issues
   - 2.7. Other risk-informed licensing related activities

3. **PRA Policy Statement**
   - 3.1. The PRA Policy Statement encouraged the NRC to increase the use and application of PRA to the greatest extent practical.
   - 3.2. SPAR models are one of the key incarnations of that effort.

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models Outline

3.3. Eliminating SPAR models would violate the spirit of that policy because it could undermine confidence in PRA-based findings.

4. **Model Quality**

4.1. SPAR models have been peer reviewed by industry led peer review teams[1]

4.1.1. SPAR models were determined to be adequate for their intended application

4.1.2. Confidence on the part of staff and industry that the current generation of SPAR models accurately portray the plants that they model.

5. **Maintain independence of NRC**

5.1. ROP provides for an independent regulatory assessment of licensee performance

5.1.1. Staff may lose ability to verify - "trust but verify"

5.1.2. Licensee's initially indicate an event as low safety significance in LERs that are later established as a greater than Green finding

5.2. Conflict of interest issues

5.2.1. Since the ROP is an NRC process, how will the appropriate level of independence be established if the licensee's PRA is used?

5.2.1.1. Does the independent manipulation of the licensee's model by NRC staff/contractors establish an appropriate level of independence?

5.2.1.2. OGC may need to endorse use of licensee PRA

5.2.2. Will the licensee perform the assessment

5.2.2.1. OGC may need to endorse allowing the licensee to perform the assessment

5.3. Public confidence

5.3.1. Use of licensee PRA and/or allowing the licensee to perform the assessment could erode public confidence

5.3.2. In effect, the licensee is communicating events and degraded plant conditions to the public and other stakeholders if they perform the analysis.

6. **Standardization of modeling and assessment techniques**

6.1. Standardization provides for:

6.1.1. Efficiency

6.1.2. Consistency

6.1.3. Automation

---

[1] One typical BWR and one typical PWR SPAR model was peer reviewed since they are standardized. Recently completed a multi-year peer review resolution activity to address peer review findings across all SPAR models.

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models Outline

6.2. Efficiency of standardization

6.2.1. Modeling assumptions

6.2.2. Modeling conventions

6.2.3. Naming schemes (basic events, fault trees, event tress, etc.)

6.2.4. Post processing rule construction

6.2.5. Reporting functions (built into SAPHIRE)

6.2.6. Consistency in event tree/fault tree construction

6.2.7. Single Software platform

6.3. Consistency

6.3.1. Uniformity of assessments (RASP Handbooks)

6.3.1.1. Risk Assessment Standardization Project (RASP) Handbooks

6.3.1.2. Uniform because SPAR models are standardized

6.4. Automation

6.4.1. Software platform is standardized (SAPHIRE)

6.4.1.1. SAPHIRE was developed and modified specifically to support the regulatory processes

6.4.1.2. SAPHIRE has evolved over the years to meet the needs of the NRC analyst to help them better perform their tasks when utilizing the SPAR models. These features were built directly into SAPHIRE to eliminate the analyst performing offline calculations and then placing those calculated probabilities back into the SPAR model.

6.4.1.3. Reporting functions (built into SAPHIRE)

6.5. Experience indicates the use of NRC developed standardized models supports the principles of good regulation: independence, openness, efficiency, clarity, and reliability.

7. Use by the NRC staff of licensees' PRA models

7.1. Additional logistical and resource requirements

7.1.1. Seventy (70) plus licensee PRAs

7.1.1.1. No standardization

7.1.1.1.1. No Standard Modeling assumptions

7.1.1.1.2. No Standard Modeling conventions

7.1.1.1.3. No Standard Naming schemes (basic events, fault trees, event tress, etc.)

7.1.1.1.4. No Standard Post processing rule construction

7.1.1.2. NRC Staff/SRAs will need to learn nuances of each licensee PRA

7.1.2. Four (4) different commercial software platforms

7.1.2.1. CAFTA (EPRI)

7.1.2.2. WinNUPRA (Scientech)

7.1.2.3. Riskman (ABS Consulting)

7.1.2.3.1. Cutsets are problematic (used to gain understanding of risk insights)

7.1.2.4. RiskSpectrum (Lloyd's Register Consulting, Sweden)

7.1.3. All lack reporting features of SAPHIRE

7.1.4. All lack automation and easy to use analysis tools in SAPHIRE

7.2. Need for additional NRC risk analysts

7.2.1. Additional staff training requirements

7.3. Management and control of licensee models and model updates

7.3.1. Non-uniform modeling assumptions and limitations

7.3.1.1. Each model will need to be examined and understood

7.3.2. Availability of PRA models and supporting documentation

7.3.2.1. Will all of the licensees formally submit their PRA to NRC?

7.3.2.1.1. Under oath and affirmation?

7.3.2.1.2. Subject to 10 CFR 50.9?

7.3.3. How will staff ensure NRC has the latest licensee model?

7.3.4. RASP Handbook provides for uniformity of assessments

7.3.4.1. Assumes models are standardized and well understood

7.3.4.2. Will necessitate a complex revision

8. Effect on other NRC Programs that use SPAR models

8.1. Accident Sequence Precursor (ASP) program

8.1.1. Abnormal occurrence report to Congress

8.2. Industry trends/operating experience programs

8.3. New Reactors (PRA & licensing)

8.4. Inspection programs

8.4.1. Inspection resources

8.4.2. Inspection decisions will become reactive based on deterministic criteria alone

8.5. Use of SPAR models to support system and component studies

8.5.1. Would inhibit our ability to develop tailored models when new situations arise.

8.6. SPAR models are used to develop Plant Information Risk eBooks (PRIBS) – superseded the SDP Notebooks

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models Outline

8.7. SPAR Models used for other purposes

8.7.1. Answer Commission questions

8.7.2. Japan Lesson Learned related issues (flooding, vents, seismic)

8.7.2.1. SPAR model results (CDFs) used to assist in the resolution of Fukushima NTTF Rec. 5.2 (containment venting for plants other than BWR with Mark I and Mark II containments), and Rec. 6 (hydrogen control and mitigation).

8.7.2.2. SPAR model data (equipment failure rates) supported the risk evaluation of Fukushima NTTF Rec. 5.1 (containment venting in BWR Mark I and Mark II plants)

8.7.3. SPAR-EE models supported GI-199 (updated seismic hazard curves for plants east of the Rocky Mountains)

8.7.4. Gain understanding of key basic events in the SPAR fire PRA models

8.7.5. SPAR models used to identify the most likely core-damage sequences for SOARCA analysis, as well as other important input.

8.7.6. SPAR models and data (equipment failure rates) supported staff's analysis of containment accident pressure (CAP) credit in BWR plants.

8.7.7. Gain understanding of CDFs as estimated by SPAR (supported work for Commissioner Apostolakis, 2013).

8.7.8. NRR made heavy use of the SPAR models (event trees) while reviewing the Browns Ferry extended power uprate (EPU) license amendment request.

9. Costs

9.1. Costs to both NRC and Industry

9.2. NRC

9.2.1. Licensee model reviews

9.2.1.1. NRC Staff/SRAs will need to learn nuances of each licensee PRA

9.2.1.1.1. Continuing effort as plants make modifications and update/revise their PRA.

9.2.2. Logistical requirements

9.2.2.1. Control and distribution of licensee models

9.2.3. Training

9.2.3.1. Training on multiple software platforms

9.2.3.2. Potential impact on SRA qualifications

9.2.3.3. Potential impact on established NRC PRA and PRA related training programs

9.2.4. Commercial Software licenses

9.2.4.1. Multiple versions used by the industry

9.2.4.2. Commercial PRA software typically requires additional software (licenses) to be comparable to SAPHIRE (e.g. CAFTA/FTREX)

9.2.5. Additional analyst staff

9.2.6. Other

9.3. Industry

9.3.1. Cost for licensee to submit their PRA to NRC

9.3.1.1. Will ALL licensees voluntarily submit their PRA to NRC?

9.3.1.1.1. If not, we will need to maintain limited number of SPAR models.

9.3.1.2. Need for complete documentation of licensee PRA, could be extensive

9.3.2. Cost for a minimum of model standardization

9.3.3. Cost to implement a single RG 1.200 compliant standardized modeling approach across multiple analysis platform

9.3.3.1. Re-invent a RASP Handbook for uniformity of assessments

9.3.4. Cost to implement SAPHIRE reporting features and other automation tools

9.3.5. How will industry provide support to NRC Analysts?

9.3.5.1. INL is currently responding to approximately 2 requests for assistance per day via the Technical Support contract

9.3.6. Other

Appignani, Peter

From: Montecalvo, Michael
Sent: Thursday, February 04, 2016 9:54 AM
To: Appignani, Peter
Subject: RE: Use of Licensees' Models Presentation At The Internal RISC Meeting
Attachments: Licensee PRA Use Internal RISC 02042016.pptx

Pete,
No problem, I tried to keep it simple and hope it's more of a discussion between the RISC members.
Mike

From: Appignani, Peter
Sent: Thursday, February 04, 2016 9:30 AM
To: Montecalvo, Michael <Michael.Montecalvo@nrc.gov>
Subject: RE: Use of Licensees' Models Presentation At The Internal RISC Meeting

Mike

I'll need to attend today's Internal RISC meeting via teleconference. Can I get a copy of your brief via email?

Thanks

Pete

From: Montecalvo, Michael
Sent: Friday, January 29, 2016 11:45 AM
To: Circle, Jeff <Jeff.Circle@nrc.gov>; Humberstone, Matthew <Matthew.Humberstone@nrc.gov>
Cc: Correia, Richard <Richard.Correia@nrc.gov>; Lund, Louise <Louise.Lund@nrc.gov>; Giitter, Joseph <Joseph.Giitter@nrc.gov>; Weerakkody, Sunil <Sunil.Weerakkody@nrc.gov>; Appignani, Peter <Peter.Appignani@nrc.gov>; Ning, Lauren (Killian) <LaurenKillian.Ning@nrc.gov>; Coyne, Kevin <Kevin.Coyne@nrc.gov>
Subject: RE: Use of Licensees' Models Presentation At The Internal RISC Meeting

Jeff,
Sunil and I shared the same thought so I set up a meeting on Wednesday with Pete and Lauren to talk about this. The initial guidance I received from Bill was that he wanted to have a good discussion at the internal RISC, including benefits and challenges, of the different approaches. The path forward will be somewhat defined from that discussion, including any plans to pilot anything. Since the scope isn't really defined yet, I don't have anything developed as far as pilot program materials.

Looking forward to the meeting!
Mike

From: Circle, Jeff
Sent: Friday, January 29, 2016 11:07 AM
To: Montecalvo, Michael; Humberstone, Matthew
Cc: Correia, Richard; Lund, Louise; Giitter, Joseph; Weerakkody, Sunil; Appignani, Peter; Ning, Lauren (Killian); Coyne, Kevin
Subject: Use of Licensees' Models Presentation At The Internal RISC Meeting

Mike and Matt,

Today, Pete Appignani briefed the RES office management on issues regarding leveraging the use of licensees' models in lieu of SPAR. The package he used contained some of the financial material I showed you and Sunil on Wednesday. It is not intended to be an opinion piece but, one where we discuss the various issues that need to be addressed going forward. One request that came afterward from Steve West was that RES should team up with you to make a joint NRR-RES presentation at the next internal RISC meeting on Thursday, 2/4/16. I imagine that on Thursday, we will have an opportunity to discuss how we will handle presenting to the public meeting on 2/9/16.

I would appreciate it if you can get together with Pete to work out the logistics of the presentation. I realize that it's in its infancy but, can you send us any pilot program material that you can share?

Thanks,
Jeff.

Jeff A. Circle
Chief (acting)
Probabilistic Risk Assessment Branch
RES /Division of Risk Analysis
(301) 415-1152
BB (b)(6)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Use of Licensee PRA Models in Regulatory Applications

Michael Montecalvo
PRA Operations & Human Factors Branch
Division of Risk Assessment

Office of Nuclear Reactor Regulation

February 4th, 2016

Why?

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Cost to maintain and update SPAR models
  - Project AIM, increased budget pressure
- Perceived inefficiency in the maintenance of two models
- Agreement among stakeholders that the base models match and the issues encountered are with modeling of specific factors (e.g. HRA, Common Cause, etc.)

What's Changed

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Last review of this issue was 2007
  - Focused on SDP
  - See letter to NEI from OEDO (ML072490566)
- More licensees now have RG 1.200 compliant models
- Many licensees have advanced detailed models that are used for daily decision making at the plants

Option 1

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- NRC staff uses licensee model for regulatory decision making:
  - **Pros:**
    - **Will not require staff to expend resources to update SPAR models**
    - **The most up to date, detailed model is used for regulatory decisions**
    - **Independence is maintained along with ability to run generic assessments, etc.**
  - **Cons**
    - **Significant resources to train and maintain NRC staff (NRR, NRO, Regions**
    - **The NRC will need to maintain commercial software licenses for multiple PRA codes (e.g., CAFTA, RISKMAN, FRANX, FTREX, etc.)**
    - **It is not likely that all licensees will give access to their models**

Option 2

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Licensees provide results from their models for regulatory decision making:
  - **Pros:**
    - **Will not require staff to expend resources to update SPAR models**
    - **The most up to date, detailed model is used for regulatory decisions**
    - **A "certified" PRA would allow the licensee PRA to be the model of record for all regulatory applications**
  - **Cons**
    - **Negative affect on public perception with respect to independence**
    - **Will inhibit staff's ability to perform generic assessments**
    - **May inhibit staff's ability to provide timely input to regulatory decisions**
    - **May inhibit NRR's ability to deal with future challenges**

What's Next

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- RISC decision whether or not to pilot
  - What option?
- Form project team (NRR, NRO, RES, SRAs)
- Provide a plan to pilot with criteria to objectively evaluate:
  - True cost of maintaining SPAR models including impending upgrades
  - True cost of shifting to and using licensee PRA models including software, training, possible staff increases, changes to regulatory structure, etc.

Coyne, Kevin

From: Coyne, Kevin
Sent: Monday, February 02, 2015 1:48 PM
To: Weerakkody, Sunil; Ferrante, Fernando; Wong, See-Meng
Cc: Marksberry, Don; Nakoski, John
Subject: RMT Presentation and SPAR Models
Attachments: Peer Review for RMT.PPTX

Sunil, See-Meng and Fernando –

Putting aside for a moment the technical merits of the attached presentation for Wednesday's RMT meeting, please take a look at slide 14. The bullet that caught my eye was "Support transition from SPAR to licensee models for SDP/ROP".

Why are Ray Gallucci and Steve Laur resurrecting this tired issue? As we have been over many times, we use SPAR models for many reasons – independence, ease of use, ability to efficiently update, ability to provide technical support, and the list goes on. Just wanted to make sure you guys knew what's in this presentation.

I'm sure both this point and the topic of the presentation will draw some good discussion at the next RMT…

Kevin

ESTABLISHING A "REGULATORY" FOOTPRINT TO DOCUMENT AND CLOSE LICENSEE RESOLUTIONS TO PEER REVIEW F&O'S, FINDINGS AND SUGGESTIONS

Ray Gallucci

Risk Management Team Meeting

February 4, 2015

ASSUMPTIONS

- Current Peer Review process is retained
  - "Drastic" alternatives, such as total restructuring possible, but not addressed
- NRC creates a "Peer Review Group" (PRG)
  - Dedicated team within a branch, with Team Leader (TL)
  - Branch unto itself with Branch Chief (BC)

PEER REVIEW GROUP (PRG)

- Each member, including TL/BC, meets requirements, as endorsed by RG 1.200 (latest revision), of Section 1-6.2, "Peer Review Team Composition and Personnel Qualifications," of ASME/ANS PRA Standard (latest revision)
  - Also meet NRC-endorsed industry guidance as applicable, e.g., NEI 05-04 (Internal Events) and NEI 07-12 (Fires)

PRG: EXPECTATIONS (1)

- Each member, including TL/BC, capable of serving a Industry Peer Review Team (IPRT) Leader of full- or focused-scope reviews
- At each peer review, two (but not more than three) PRG staff participate directly as "advisors" in all phases of a full-scope review (one, but not more than two, for focused scope)
  - Includes selection of IPRT Leader and reviewers, all pre-onsite, onsite and post-onsite activities

PRG: EXPECTATIONS (2)

- PRG staff have diverse expertise among the review elements, both internal and external events
- Second (or third) PRG staff member could be drawn from other parts of NRC, including Regions (e.g., SRAs), or NRC contractors
  - Must meet same qualification requirements as PRG staff

PRG: EXPECTATIONS (3)

- "Cradle to grave" participation per peer review for each assigned staff member
  - Even TL/BC would perform advisor duty on a limited but regular schedule to keep "current"
- Always one "lead advisor" per review from PRG staff
- Peer Review Report becomes public, no longer proprietary for licensee (although can be "de-sensitized" for public), docketed with NRC

REGULATORY "FOOTPRINTS" (1)

- At each phase of the peer review process, a regulatory footprint is established
- (1) Selection of the IPRT with NRC Advisors
  - As current, but with approval by licensee, IPRT Leader and NRC PRG
    - PRG TL/BC documents approval of the full IPRT, including resumes, as first regulatory footprint
- (2) Pre-Onsite Review of Licensee Material
  - As appropriate – no formal footprint

REGULATORY "FOOTPRINTS" (2)

- (3) Onsite Review and Issuance of Draft Report
  - Attend any "kick-off," and, individually or collectively, all IPRT group sessions and selected sub-group sessions
  - At IPRT Leader discretion, engage licensee directly or through IPRT member
  - IPRT retains control of F&Os, Findings, Suggestions, etc., for draft report, with PRG Lead Advisor documenting NRC perspective as draft footprint

REGULATORY "FOOTPRINTS" (3)

- (4) Preparation and Issuance of Final Report
  - IPRT and PRG advisors interact, with any PRG "dissents" resolved (or at least addressed)
  - PRG Lead Advisor finalizes NRC perspective, including any remaining dissents
  - Report formally signed-off by PRG TL/BC as next regulatory footprint
    - IPRT Leader retains right to rebut any part of NRC perspective in final report

REGULATORY "FOOTPRINTS" (4)

- (5) Licensee Initial Response, with Schedule
  - Traditional role of IPRT ends with final report
  - Within three months of receipt, licensee submits schedule to resolve and close F&Os, etc., to NRC
    - Majority to be closed within one year; minority in two years
      - Extreme exceptions could allow for a third year
  - Formal acceptance of the licensee schedule with PRG TL/BC sign-off constitutes next footprint

REGULATORY "FOOTPRINTS" (5)

- (6) Resolution and Closure of F&Os, etc.
  - As per schedule, licensee submits all necessary documentation to justify its resolutions and closures, etc.,
  - NRC reviews, with acceptance or RAIs within three months
    - Sign-off by PRG TL/BC constitutes next footprint
      - Added to docket with final report
  - ***Upon conclusion, the entire peer review process from "cradle" to "grave" will have been docketed to constitute a <u>definitive regulatory footprint that should significantly "obviate the need" for further investigation</u> of F&Os, etc., in subsequent applications***

NRC "OBSERVERS"

- Non-participatory "observers" may still attend, usually as training opportunities
  - Total number of NRC "advisors" and "observers" should not exceed four on a full-scope review
  - Unless assigned an IPRT "liaison" by the IPRT Leader, observers interact only through NRC advisors, but may attend same sessions as NRC advisors with mutual consent of advisors and IPRT

ADVANTAGES (1)

- Unlike current practice, NRC "control" of the final phases of the Peer Review process, (5) Licensee Initial Response, with Schedule, and (6) Resolution and Closure of F&Os, etc., coupled with active participation in the earlier four Phases, could truly "obviate the need for an in-depth review of the base PRA by NRC reviewers"
  - Individual risk-informed applications would need to provide minimal, if any, material on the Peer Reviews, expediting NRC staff reviews with less RAIs

ADVANTAGES (2)

- Further the use of risk-informed applications:
  - Improve efficiency of license reviews
  - Support transition from SPAR to licensee models for SDP/ROP
  - Support possible implementation of a risk prioritization methodology
  - Facilitate processing of NOEDs

Marksberry, Don

From:	Weber, Michael
Sent:	Monday, February 01, 2016 5:25 PM
To:	RES Distribution
Cc:	Chen, Yen-Ju; Araguas, Christian; Adams, Darrell; Burnell, Scott
Subject:	FYI - COMMISSION PAPER TRANSMITTING REBASELINING RECOMMENDATIONS TO THE COMMISSION
Attachments:	RebaseliningSECYFinal.docx; RebaseliningCListEnc1Final.docx; RebaseliningRuleListEnc2Final.docx

Good afternoon. As expected, the staff completed over the weekend and delivered to the Commission today the recommendations on rebaselining. Vic McCree referenced these recommendations in his EDO Update today and discussed them in the all supervisory meeting this morning. Please find attached the Commission paper on rebaselining (SECY 16-0009), including the recommended shed list in Enclosure 1 and list of rulemakings in Enclosure 2. Note that this paper will be released publicly next Tuesday, 9 February, in accordance with agency procedures. Until then, please keep the information internal to the agency.

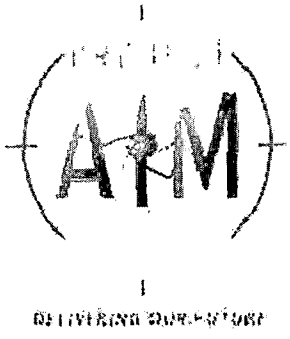
Tomorrow morning at 1100 in the TWFN Auditorium, Fred Brown will host a Town Hall meeting with NRC staff. Fred will also be joining the RES all staff meeting for an update briefing on Project Aim status, including rebaselining, on Thursday morning at 0930 in the TWFN Auditorium. I understand that you have had an opportunity to discuss the work being recommended for shedding, rescoping, or streamlining with your supervisors. If you have questions or comments, please discuss with your supervisors or at the Town Hall meeting or RES all staff meeting later this week.

Best Regards,

Mike

Michael Weber
Director of Nuclear Regulatory Research
US Nuclear Regulatory Commission

301-415-1902
Mail Stop T-10B16



Ferrante, Fernando

From:	Ferrante, Fernando
Sent:	Monday, February 01, 2016 2:17 PM
To:	Cahill, Christopher; Gibbs, Russell; Wong, See-Meng; Gulla, Gerald; Shuaibi, Mohammed; Kozak, Laura; Miller, Geoffrey; Walker, Shakur
Cc:	Kichline, Michelle; Hartle, Brandon; Waugh, Andrew; Sanfilippo, Nathan; Circle, Jeff
Subject:	RE: Brief Meeting Summary for January 14 Meeting with Industry
Attachments:	Perspectives from 14 January Public Meeting_FF.docx

Russ,

Since I understand this is supposed to be a summary meeting, I would suggest keeping the language more factual. See attached.

Thanks,
Fernando

From: Cahill, Christopher
Sent: Monday, February 01, 2016 1:28 PM
To: Gibbs, Russell <Russell.Gibbs@nrc.gov>; Ferrante, Fernando <Fernando.Ferrante@nrc.gov>; Wong, See-Meng <See-Meng.Wong@nrc.gov>; Gulla, Gerald <Gerald.Gulla@nrc.gov>; Shuaibi, Mohammed <Mohammed.Shuaibi@nrc.gov>; Kozak, Laura <Laura.Kozak@nrc.gov>; Miller, Geoffrey <Geoffrey.Miller@nrc.gov>; Walker, Shakur <Shakur.Walker@nrc.gov>
Cc: Kichline, Michelle <Michelle.Kichline@nrc.gov>; Hartle, Brandon <Brandon.Hartle@nrc.gov>; Waugh, Andrew <Andrew.Waugh@nrc.gov>; Sanfilippo, Nathan <Nathan.Sanfilippo@nrc.gov>
Subject: RE: Brief Meeting Summary for January 14 Meeting with Industry

Russ,

Here are the comments I previously sent on Jan 15. My comments are in Red

Chris

SDP Streamlining
Perspectives from 14 January Public Meeting with Industry

1. The industry is quite keen on the implementation of the IFRB. No surprise as this is a recognition that we are the problem. I'm not convinced entirely. But the notion to pilot the IFRB first with very few other changes needs further discussion.
2. There is some confusion on the use of an Integrated Approach to Decision-making using an enhanced App M. My honest reaction is that some folks such as the TVA rep, were not listening to what we were saying. I thought we made it clear but maybe not. Are we all clear ourselves? No. The communication from us tend to imply that App M will be used for most > Green issues. The majority of the current findings are handled in a timely fashion with App A/G/F and I would expect that to continue. Without seeing the enhanced App M, I can't be sure it will be predictable. We should also point to the majority of App M issues are dispositioned as Green, 23 of 28 (1/1/13 – present).
3. The industry believes by default that the possible increase in the use of App M means more preliminary GTG findings. This might happen but there is a good likelihood that these would be lowered to Green in the final decision. And this is okay! Is it? A Reg Conference is not a trivial matter for either us or the licensee. My experience is that it's 100's of NRC hrs and likely 1000's of licensee hrs expended. The

question is it better to be right or fast? If we end up walking back a lot of >Green issues, we will be criticized by our stakeholders as being lap dogs.

4. The industry thinks that the new SDP timeliness metric will be difficult to meet. Maybe so, but we need to establish a metric that measures performance and not something that guarantees success as is the current metric. Managers need to manage.
5. The discussion on balancing "getting it right" versus how long it takes was a very good one. Our work should mostly definitely balance these two. On communication, let's use "an appropriate regulatory decision" – versus getting it right. Agree
6. The industry thinks that the change from 2 to 3 whites for a degraded cornerstone will help with the Action Matrix woes, but is not enough. I agree. The idea to remove GTG issues from the matrix once the corrective actions are complete needs more attention. Agree
7. On the pilot, there was a great deal of anxiety with the proposals. This, we need to carefully rethink. Agree
8. There were comments on the need for more detailed review of the SDP to understand the delays. Other than reviewing the results of the regional lessons learned on findings that went well and those that did not, I mostly disagree. We reached out to our stakeholders and the results were compelling as we grouped them into major themes such as management oversight. I personally believe we have enough to make a substantive difference in the very near term. OK
9. The industry is fully supportive of the need to improve the front end inspection activities and the associated metric. They see this from a holistic oversight standpoint as important as the SDP issues. I believe that we all agree. Agree
10. The industry thinks that the increased use of App M is a policy change. I disagree. App M represents an integrated risk-informed approach fully consistent with our program. I don't believe it to be a policy change unless it becomes the preferred analysis tool.
11. Industry wants the information that is provided to the SERP for the preliminary decision. I believe this already a program requirement (abbreviated) that we might not be following. This is already presented in the 'Licensee's Analysis' section along with a discussion of substantial differences.
12. I was delighted to hear from one representative that placing a better metric in place will drive performance. Let's face it – give someone longer, they take longer.
13. A thoughtful and constructive comment made as we were discussing SPAR models - why is SDP different from other regulatory processes such as licensing. Why do we feel the need to perform an assessment versus review and judge the licensee's conclusions. My experience is that given the same assumptions and modeling approach (mainly with respect to CCF), the models are in agreement. Will they be providing this on the docket under oath and affirmation?

From: Gibbs, Russell
Sent: Monday, February 01, 2016 11:17 AM
To: Ferrante, Fernando <Fernando.Ferrante@nrc.gov>; Wong, See-Meng <See-Meng.Wong@nrc.gov>; Gulla, Gerald <Gerald.Gulla@nrc.gov>; Cahill, Christopher <Christopher.Cahill@nrc.gov>; Shuaibi, Mohammed <Mohammed.Shuaibi@nrc.gov>; Kozak, Laura <Laura.Kozak@nrc.gov>; Miller, Geoffrey <Geoffrey.Miller@nrc.gov>; Walker, Shakur <Shakur.Walker@nrc.gov>
Cc: Kichline, Michelle <Michelle.Kichline@nrc.gov>; Hartle, Brandon <Brandon.Hartle@nrc.gov>; Waugh, Andrew <Andrew.Waugh@nrc.gov>; Sanfilippo, Nathan <Nathan.Sanfilippo@nrc.gov>
Subject: Brief Meeting Summary for January 14 Meeting with Industry

Dear Team,

For every public meeting we conduct, we include a brief meeting summary in the meeting folder. The attached is for your quick review. If you have comments, please let me know by COB Tuesday 2 February as I must get the summary to the meeting organizer as quickly as possible. Recall that we discussed this during the last team meeting.

Many thanks.

SDP Streamlining

Perspectives from 14 January Public Meeting with Industry

1. The industry is quite keen on the implementation of the IFRB. ~~No surprise as this is a recognition that we are the problem. I'm not convinced entirely. But the notion to pilot the IFRB first with very few other changes needs further discussion.~~
2. There is some confusion on the use of an Integrated Approach to Decision-making using an enhanced App M. ~~My honest reaction is that some folks such as the TVA rep, were not listening to what we were saying. I thought we made it clear but maybe not. Are we all clear ourselves?~~
3. The industry believes by default that the possible increase in the use of App M means more preliminary GTG findings. ~~This might happen but there is a good likelihood that these would be lowered to Green in the final decision. And this is okay!~~
4. The industry thinks that the new SDP timeliness metric will be difficult to meet. Maybe ~~so, but we need to establish a metric that measures performance and not something that guarantees success as is the current metric.~~
5. ~~The discussion on balancing "getting it right" versus how long it takes was a very good one. Our work should mostly definitely balance these two. On communication, let's use "an appropriate regulatory decision" — versus getting it right.~~
6. The industry thinks that the change from 2 to 3 whites for a degraded cornerstone will help with the Action Matrix woes, but is not enough. ~~I agree. The idea to remove GTG issues from the matrix once the corrective actions are complete needs more attention.~~
7. On the pilot, there was a great deal of anxiety with the proposals. ~~This, we need to carefully rethink.~~
8. There were comments on the need for more detailed review of the SDP to understand the delays. ~~Other than reviewing the results of the regional lessons learned on findings that went well and those that did not, I mostly disagree. We reached out to our stakeholders and the results were compelling as we grouped them into major themes such as management oversight. I personally believe we have enough to make a substantive difference in the very near term.~~
9. The industry is fully supportive of the need to improve the front end inspection activities and the associated metric. ~~They see this from a holistic oversight standpoint as important as the SDP issues. I believe that we all agree.~~
10. The industry thinks that the increased use of App M is a policy change. ~~I disagree. App M represents an integrated risk-informed approach fully consistent with our program.~~
11. Industry wants the information that is provided to the SERP for the preliminary decision. ~~I believe this already a program requirement (abbreviated) that we might not be following.~~

~~12. I was delighted to hear from one representative that placing a better metric in place will drive performance. Let's face it — give someone longer, they take longer.~~

~~13.~~12. A ~~thoughtful and constructive~~ comment was made as we were discussing SPAR models - why is SDP different from other regulatory processes such as licensing. ~~Why do we feel the need to perform an assessment versus review and judge the licensee's conclusions.~~

Coyne, Kevin

From: West, Steven
Sent: Friday, January 29, 2016 4:51 PM
To: Coyne, Kevin
Subject: RE: email from Brian Sheron regarding SPAR model program

Thanks Kevin.

Steve

Steven West, Deputy Director
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission

301-415-1914
Steven.West@nrc.gov

From: Coyne, Kevin
Sent: Friday, January 29, 2016 11:37 AM
To: West, Steven <Steven.West@nrc.gov>
Cc: Correia, Richard <Richard.Correia@nrc.gov>; Lund, Louise <Louise.Lund@nrc.gov>; Appignani, Peter <Peter.Appignani@nrc.gov>; Circle, Jeff <Jeff.Circle@nrc.gov>
Subject: email from Brian Sheron regarding SPAR model program

Steve –

See attached email from Brian to Bill Dean on the SPAR program – He sent this back in August and to the best of my knowledge we never received a request to take Brian up on his offer of a briefing on the program.

Kevin

Appignani, Peter

From: Circle, Jeff
Sent: Friday, January 29, 2016 12:34 PM
To: Appignani, Peter; Coyne, Kevin; Lund, Louise; Ning, Lauren (Killian); Correia, Richard
Subject: RE: New Title for the presentation

Pete,

For what it's worth, I think that it's too general a title on risk-informed regulatory tools when we are focusing our efforts on one specific regulatory tool. I realize that I'm running outside of the herd but, I prefer a more direct approach to this. How about, "*Options for Consideration of Future NRC Use of industry Computer-based PRA Codes and Models.*"

Jeff.

Jeff A. Circle
Chief (acting)
Probabilistic Risk Assessment Branch
RES /Division of Risk Analysis
(301) 415-1152
BB (b)(6)

From: Appignani, Peter
Sent: Friday, January 29, 2016 10:48 AM
To: Coyne, Kevin <Kevin.Coyne@nrc.gov>; Circle, Jeff <Jeff.Circle@nrc.gov>; RobinsonII, Richard <Richard.RobinsonII@nrc.gov>; Lund, Louise <Louise.Lund@nrc.gov>; Ning, Lauren (Killian) <LaurenKillian.Ning@nrc.gov>
Subject: New Title for the presentation

As requested at this morning's meeting my suggestion for a new title for the presentation is:
Options for NRC Risk-Informed Regulatory Tools - A Perspective

Let me know if you have an objection and I am open to other suggestions.

Pete

Coyne, Kevin

From: Lund, Louise
Sent: Friday, January 29, 2016 11:43 AM
To: Appignani, Peter; Coyne, Kevin; Circle, Jeff; RobinsonII, Richard; Ning, Lauren (Killian)
Subject: RE: New Title for the presentation

I like it

From: Appignani, Peter
Sent: Friday, January 29, 2016 10:48 AM
To: Coyne, Kevin <Kevin.Coyne@nrc.gov>; Circle, Jeff <Jeff.Circle@nrc.gov>; RobinsonII, Richard <Richard.RobinsonII@nrc.gov>; Lund, Louise <Louise.Lund@nrc.gov>; Ning, Lauren (Killian) <LaurenKillian.Ning@nrc.gov>
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Pete

Appignani, Peter

From: Coyne, Kevin
Sent: Friday, January 29, 2016 11:17 AM
To: Appignani, Peter; Circle, Jeff; RobinsonII, Richard; Lund, Louise; Ning, Lauren (Killian)
Subject: RE: New Title for the presentation

Looks good to me Pete – thanks!

From: Appignani, Peter
Sent: Friday, January 29, 2016 10:48 AM
To: Coyne, Kevin <Kevin.Coyne@nrc.gov>; Circle, Jeff <Jeff.Circle@nrc.gov>; RobinsonII, Richard <Richard.RobinsonII@nrc.gov>; Lund, Louise <Louise.Lund@nrc.gov>; Ning, Lauren (Killian) <LaurenKillian.Ning@nrc.gov>
Subject: New Title for the presentation

As requested at this morning's meeting my suggestion for a new title for the presentation is:
Options for NRC Risk-Informed Regulatory Tools - A Perspective

Let me know if you have an objection and I am open to other suggestions.

Pete

Ning, Lauren (Killian)

Subject:	DISCUSSION WITH RES/DRA STAFF ON LEVERAGING LICENSEES' MODELS IN LIEU OF SPAR (Briefing Attached)
Location:	Huddle Room (T-10D40) [Bridgeline below]
Start:	Fri 01/29/2016 9:00 AM
End:	Fri 01/29/2016 10:00 AM
Recurrence:	(none)
Meeting Status:	Accepted
Organizer:	RESDRAAdmin Resource
Required Attendees:	Correia, Richard; Lund, Louise; Circle, Jeff; Ning, Lauren (Killian); Appignani, Peter; Weber, Michael; West, Steven
Optional Attendees:	AGmail, Pete

Briefing to Weber-West Use...

DRA Bridgeline: 877-950-6814
Leader Passcode (b)(6)
Participant Passcode (b)(6)

Circle, Jeff

From: Circle, Jeff
Sent: Thursday, January 28, 2016 4:21 PM
To: Aikins-Afful, Anita
Cc: Appignani, Peter
Subject: RE: Meeting with Mike Weber and Steve West

Thank you very much.

Jeff A. Circle
Chief (acting)
Probabilistic Risk Assessment Branch
RES /Division of Risk Analysis
(301) 415-1152
BB (b)(6)

From: Aikins-Afful, Anita
Sent: Thursday, January 28, 2016 4:00 PM
To: Circle, Jeff <Jeff.Circle@nrc.gov>
Cc: Appignani, Peter <Peter.Appignani@nrc.gov>
Subject: RE: Meeting with Mike Weber and Steve West

Jeff, you're on with Mike tomorrow morning at 9. I hope it goes well.
(Lauren accepted and will be in attendance).

Anita Aikins-Afful, M.O.S.
Administrative Assistant
U.S. Nuclear Regulatory Commission
Office of Nuclear Regulatory Research, Division of Risk Analysis
Main: 301-415-0452

Direct dial: 301-415-0423
Fax: 301-415-6671
Mail stop: TWFN-10A12
anita.aikins-afful@nrc.gov

From: Circle, Jeff
Sent: Thursday, January 28, 2016 8:29 AM
To: Aikins-Afful, Anita <Anita.Aikins-Afful@nrc.gov>; Littlejohn, Jennene <Jennene.Littlejohn@nrc.gov>
Subject: Meeting with Mike Weber and Steve West

Anita and Jennene,

Due to the snow, we haven't had a chance to brief Mike Weber and Steve West. Since Shirley is out of the office, hopefully sitting warmly at home, Rich suggested that you might be able to help get it on the RES calendar. Here is the information on the briefing:

Title: DISCUSSION WITH RES/DRA STAFF ON LEVERAGING LICENSEES' MODELS IN LIEU OF SPAR

Attendees: Pete Appignani, Rich Correia, Louise Lund, Lauren Ning, and Jeff Circle

Preferred Times: Monday (2/1/16) any time except 10AM-12N due to DRA and Management all-hands meetings.

Location: Mike or Steve's office

I took a quick look in Outlook and noticed that they were both booked however, for this, they might be able to work the schedule a bit.

Thanks,
Jeff.

Jeff A. Circle
Chief (acting)
Probabilistic Risk Assessment Branch
RES /Division of Risk Analysis
(301) 415-1152
BB (b)(6)

Circle, Jeff

From:	Appignani, Peter
Sent:	Thursday, January 28, 2016 7:48 AM
To:	Littlejohn, Jennene; Aikins-Afful, Anita
Cc:	Correia, Richard; Circle, Jeff
Subject:	FW: Revised Briefing to Weber/West on Use of Licensees' PRA Models in Lieu of SPAR Models
Attachments:	Briefing to Weber-West Use of Licensee PRA in lieu of SPAR models r2.pdf

Do either of you have the time today to print a copy of the attached for Mike Weber and Steve West?
If you do, I would like the different sections tabbed so they can more easily navigate the package.
The file is bookmarked with the different sections, and you can use that to identify where the tab sheets go.
Please print double sided on a color printer.

This is a briefing package and Rich wants to give them an opportunity to review the material before the briefing.

I'm working at home today, so please feel free to call me if you have any questions.

Thanks

Pete

Cell: (b)(6)
Home (b)(6)

-----Original Message-----
From: Peter Appignani [mailt (b)(6)
Sent: Wednesday, January 27, 2016 4:46 PM
To: Circle, Jeff; Correia, Richard; Lund, Louise
Cc: Coyne, Kevin; Appignani, Peter
Subject: [External_Sender] Revised Briefing to Weber/West on Use of Licensees' PRA Models in Lieu of SPAR Models

Please find attached the revised briefing, with all background material

Pete

Circle, Jeff

From:	Appignani, Peter
Sent:	Thursday, January 28, 2016 7:37 AM
To:	Correia, Richard; Peter Appignani; Circle, Jeff; Lund, Louise
Cc:	Coyne, Kevin
Subject:	RE: Revised Briefing to Weber/West on Use of Licensees' PRA Models in Lieu of SPAR Models

Also

Jeff scheduled the original meeting with Mike and Steve I'll work with him to reschedule

Pete

-----Original Message-----
From: Appignani, Peter
Sent: Thursday, January 28, 2016 7:35 AM
To: Correia, Richard; Peter Appignani; Circle, Jeff; Lund, Louise
Cc: Coyne, Kevin
Subject: RE: Revised Briefing to Weber/West on Use of Licensees' PRA Models in Lieu of SPAR Models

Rich

Are you okay with giving them the most recent revision?
If so, I'll find a way to get them a hardcopy today if Jennene or Anita can assist me

Pete

-----Original Message-----
From: Correia, Richard
Sent: Thursday, January 28, 2016 6:49 AM
To: Peter Appignani; Circle, Jeff; Lund, Louise
Cc: Coyne, Kevin; Appignani, Peter
Subject: RE: Revised Briefing to Weber/West on Use of Licensees' PRA Models in Lieu of SPAR Models

Also, as we discussed earlier, I want Mike and Steve to have hard copies of this material in advance of the briefing.

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

-----Original Message-----
From: Peter Appignani [mailto:(b)(6)
Sent: Wednesday, January 27, 2016 4:46 PM

To: Circle, Jeff <Jeff.Circle@nrc.gov>; Correia, Richard <Richard.Correia@nrc.gov>; Lund, Louise <Louise.Lund@nrc.gov>
Cc: Coyne, Kevin <Kevin.Coyne@nrc.gov>; Appignani, Peter <Peter.Appignani@nrc.gov>
Subject: [External_Sender] Revised Briefing to Weber/West on Use of Licensees' PRA Models in Lieu of SPAR Models

Please find attached the revised briefing, with all background material

Pete

BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
LEVERAGING THE USE OF LICENSEES' PRA MODELS IN LIEU OF SPAR MODELS

BRIEFERS:

Rich Correia
Louise Lund
Jeff Circle
Peter Appignani
Lauren Ning

PURPOSE:

For office staff and DRA management to inform the OD/DOD of the various issues associated with:

- Proposal to adopt the use of licensees' PRA models in lieu of SPAR models for oversight and Congressional reporting activities.
- Areas of consideration and challenges faced in developing an NRC pilot program to adopt one or multiple licensee models to explore its feasibility

EXPECTED OUTCOMES:

- Provide Senior RES management with key talking points pertaining to the use of licensee models for SDP and other risk-informed regulatory activities
- OD and DOD will have an understanding of the issues influencing the office and the agency when representing RES at the Risk-Informed Steering Committee (RISC) meetings on this subject.

PROCESS:

- High-level summary discussion of the issues and concerns.
  - Budget and funding impacts
  - Advantages and disadvantages to the agency.
  - Internal and external stakeholders.
  - Challenges.

- Mid-level and background information is attached for convenience.

BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
LEVERAGING THE USE OF LICENSEES' PRA MODELS IN LIEU OF SPAR MODELS

- Budget and funding impacts
  - Perceived cost savings versus real cost
    - Initial costs to use licensee PRAs $7.8M (using NRR re-baselining cost assumptions)
    - Annual ongoing costs to use licensee PRAs $2.5M
    - Current comparable FY16 SPAR model costs $800K
      - All SPAR model related cost for FY16: $1.9M
  - Minimum resources necessary to support regulatory activities.
    - SPAR model costs are scalable
  - Cost to all licensees to use their models – unknown at this time
- Key Talking Points - attached
- Advantages and disadvantages to the agency (regulatory activities).
  - Actual process is unknown at this time
    - Will NRC staff use licensee PRA?
    - Will licensee perform the analysis using their PRA model?
  - Efficiency of model usage – standardization of modeling conventions, naming schemes, post processing rule construction, reporting functions, consistency in event tree/fault tree construction, software platforms
  - Development of Plant Information Risk eBooks[1] (PRIBS) – SPAR/SAPHIRE have enhanced capabilities to generate PRIB inputs in an automated fashion, development of similar capability for licensee models needs to be explored.
  - Availability of help desk support for modeling questions and technical assistance for Event and Condition Assessment modeling changes
  - Conflict of interest issues with use of licensee generated model for regulatory decision-making (will need to engage OGC for concurrence)
  - Training costs associated with bringing staff up to speed on CAFTA, and other PRA codes currently in use
  - Availability of PRA models and supporting documentation – will they be formally submitted to NRC? Under oath and affirmation? Subject to 10 CFR 50.9? Will all licensees submit their models?
  - Updating process for licensee models - how to manage and control? How will staff ensure we have the latest model?
  - Technical adequacy of SPAR models for certain modeling aspects important to event and condition assessments may be more advanced than licensee models such as LOOP modeling, common cause failure modeling and support system initiators.

[1] PRIBs replaced NRRs SDP notebooks

- Use of licensee models to support system and component studies (SPAR/SAPHIRE currently have capabilities to efficiently run multiple cases to perform sensitivity studies and derive risk insights across multiple models)
- The SPAR model and licensee PRA model are often in close agreement when performing an SDP. Differences in SDP outcomes between the NRC and the licensee are driven by factors other than the baseline PRA model, typically engineering assumptions, modeling assumptions, human reliability assumptions or application of common cause.
- Although licensees have made progress in developing RG 1.200 compliant PRA models, these models lack the standardization and ROP-specific features that are essential to the agency's needs for performing event and condition analyses.

- Internal and external stakeholders.
  - Public
    - Use of licensee PRA or licensee performing analysis could erode public confidence
    - In effect the licensee is communicating events and degraded plant conditions to the public and other stakeholders if they perform the analysis
  - NRR
    - ROP – Reactor Oversight Process
    - SDP – Significant Determination Process
    - MD 8.3 - NRC Incident Investigation Program
    - Notice of Enforcement Discretion (NOEDs)
    - Technical basis for rulemaking
    - Generic issues
    - Other risk-informed licensing related activities
  - NRO
    - Licensing activities today
    - Same as NRR in the future
  - Regions
    - ROP – Reactor Oversight Process
    - SDP – Significant Determination Process
    - MD 8.3 - NRC Incident Investigation Program
    - Notice of Enforcement Discretion (NOEDs)
  - RES
    - ASP – Accident Sequence Precursor

        - Technical basis for rulemaking
        - Generic issues
        - Inspection Support
        - Other risk-informed licensing related activities
    - Licensees
    - NEI
    - Owners Groups
    - Others

- Challenges
    - Erosion of Public confidence
    - Cost?
    - Loss of efficiency
    - Staff learning curve
    - Model updates
    - Logistics and technical support
    - Licensee cooperation
    - Loss of current capabilities

INSERT COST Spreadsheet pages here

Key Talking Points for the Standardized Plant Analysis Risk (SPAR) Model Program

- Program provides **independent** risk analysis capability for NRC in support of reactor oversight process (ROP) and a variety of risk-informed technical applications
- Plant-specific SPAR models (99 operating plants are represented by 75 SPAR models) use **standardized** modeling and naming conventions. Standardization increases analyst efficiency and accuracy and supports cross comparison across models.
- SPAR models and the SAPHIRE PRA code are **designed to support event and condition analyses** by performing "delta-risk" analyses (e.g., change in CDF from base case to performance deficiency). Licensee developed models and supporting codes lack this capability (requiring additional calculations and manual sequence/cutset result comparisons)
- The program leverages available licensee PRA information to reduce program costs, but includes validation of licensee modeling assumptions and integrates licensee model conventions into standardized SPAR modeling framework. Although SPAR models use some simplifying assumptions compared to licensee models, in several areas most pertinent to ROP applications, the SPAR models are generally more detailed (e.g., CCF, LOOP, and support system initiators)
- All models run on a single code platform (SAPHIRE). SAPHIRE can be updated and configured to directly support NRC risk assessment activities through coding changes and customized reporting functions. Use of licensee models would require the NRC to maintain licensees and network environmental approval for multiple commercial software codes and eliminate the ability to revise these code to support NRC-specific applications.
- Although licensees have made progress in developing RG 1.200 compliant PRA models, these models lack the standardization and ROP-specific features that are essential to the agency's needs for performing event and condition analyses.

SPAR Model Uses

- Significance Determination Process (Reactor Oversight) - **Regions**
- Accident Sequence Precursor Program (used as an input metric to the performance budget process) - **RES**
- Evaluation of Notices of Enforcement Discretion – **Regions, NRR** *
- MD 8.3 Incident Investigation Program Risk Evolutions (e.g., determine level of inspection response to an event) – **Regions** *
- Establish technical basis for rulemaking – **RES, NRR**
- Evaluate generic issue safety significance - **RES**
- Perform system and component studies - **RES**
- Inspection Planning (e.g., risk insights from Plant Risk Information eBooks) - **Regions**

These applications typically are performed with limited time, highlighting the importance of model standardization for SPAR

SPAR Model Annual Budget

The SPAR/SAPHIRE annual budget for **FY2015 was ~$2.2 million**! This amount is scalable depending on agency needs and available resources. Major activities include:

Base Resources (i.e., minimum requirements for the program):

- SPAR Model Configuration/Quality Control and User Support Help Desk ~$500k/year
  - Help desk handles ~ 2 calls/day from SRAs
  - Ensures model version control and maintains INL Website
  - Performs model updates to support specific SDP/ASP activities (~30 models were updated to support a specific analysis in FY2015). These updates are often highly specific to the event/condition that occurred and would also need to be performed for a licensee PRA model

- SAPHIRE QA and User Support ~$300k/year
  - Maintain NUREG/BR-0167 QA program
  - User help desk Support

Resources needed to Support Specific User Enhancements:

- Model Updates to Reflect Significant Plant Changes (~12 models/year) ~$250k
  - Incorporate station blackout EDGs
  - Battery charging generators
  - Significant model upgrades

- External Hazard and Fire Models - ~ $400k/year
  - Add NFPA 805 fire modeling
  - Add seismic and high wind model capabilities

- SAPHIRE Enhancements ~$300k /year
  - New reporting features and code capabilities

- Data Updates (performed every 3 years) - ~$500k (every three years)
  - Upgrade SPAR models to reflect most recent operating data
  - Update model documentation and Plant Risk Information eBooks (PRIBs)
  - General model cleanup/improvements

Letter to NEI from OEDO on Use of SPAR models (2007, ML072490566)

This letter addressed an NEI proposal to use licensee PRA models instead of SPAR models. A detailed review was conducted and concluded that SPAR was needed to:

- Maintain **independence** of NRC analyses. Differences between NRC and Licensee assessments is not due to the base model, but by the assumptions for each specific event or condition analysis
- Provide **standardized model framework** for efficient analyses - industry does not use a standardized modeling approach
- Avoid inefficiencies in having agency risk analysts learn the conventions of over 70 licensee developed PRAs (utilizing up to four different software platforms)

The basis for the staff conclusion remains valid today.

Feedback from Regional SRAs on Potential Use of Licensee Models vice SPAR

- More efficient and objective to use SPAR models for risk assessments.
- It would take a significant increase in resources to use licensee models for event and condition assessment activities due to their lack of standardization and need for SRAs to understand unique modeling conventions and new code platforms.
- Use of licensee models would cause delays in the SDP process due to need to engage in additional requests for information to understand licensee PRA modeling assumptions.
- NRC's ability to perform independent regulatory assessment activities will be eroded by not having a centralized system evaluating Generic Safety Issues.

Letter to NEI from OEDO on Use of SPAR models (2007, ML072490566)

Background Information

1. SPAR Level 1 Model Development.pptx
2. Letter from Don Dube (RES/DRA) to Michael D. Tschiltz, Deputy Director, NRR/DRA, Feb 28, 2007, Subject: Public Meeting Summary Regarding Use Of Standardized Plant Analysis Risk Models and Licensee Probabilistic Risk Assessment Models In The Reactor Oversight Process Held On February 22, 2007, ML070640567
3. Letter from J. E. Dyer, Director NRR, to NEI, July 2007, ML071990509
4. Letter from NEI, Aug 4, 2007, Subject: August 2 Commission Briefing on Risk-Informed Regulation
5. Letter from NEI, Dec 19, 2013, Subject: Subject: Industry Support and Use of PRA and Risk-Informed Regulation
6. NEI, Proposal for use of Licensee PRA Models in the Significance Determination Process, April, 2014
7. SPAR Model Philosophy Rev. 1.pptx
8. Outline Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models

BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
LEVERAGING THE USE OF LICENSEES' PRA MODELS IN LIEU OF SPAR MODELS

SPAR Level 1 Model Development.pptx

BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
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Letter from NEI, Aug 4, 2007, Subject: August 2 Commission Briefing on Risk-Informed Regulation

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BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
LEVERAGING THE USE OF LICENSEES' PRA MODELS IN LIEU OF SPAR MODELS

NEI, Proposal for use of Licensee PRA Models in the Significance Determination Process, April 2014

BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
LEVERAGING THE USE OF LICENSEES' PRA MODELS IN LIEU OF SPAR MODELS

SPAR Model Philosophy Rev. 1.pptx

BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
LEVERAGING THE USE OF LICENSEES' PRA MODELS IN LIEU OF SPAR MODELS

Outline

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models

Current SPAR Model Costs	
	Per year costs
Base Resources (i.e., minimum requirements for the program):	
• SPAR Model Configuration/Quality Control and User Support Help Desk ~$500k/year	$500,000
– Help desk handles ~ 2 calls/day from SRAs	
– Ensures model version control and maintains INL Website	
– Performs model updates to support specific SDP/ASP activities (~30 models were updated to support a specific analysis in FY2015). These updates are often highly specific to the event/condition that occurred and would also need to be performed for a licensee PRA model	
• SAPHIRE QA and User Support ~$300k/year	$300,000
– Maintain NUREG/BR-0167 QA program	
– User help desk Support	
SUBTOTAL	$800,000
Resources needed to Support Specific User Enhancements:	
• Model Updates to Reflect Significant Plant Changes (~12 models/year) - ~$250k	$250,000
– Incorporate station blackout EDGs	
– Battery charging generators	
– Significant model upgrades	
• External Hazard and Fire Models ~ $400k/year	$400,000
– Add NFPA 805 fire modeling	
– Add seismic and high wind model capabilities	
• SAPHIRE Enhancements ~$300k /year	$300,000
– New reporting features ~~and code capabilities~~	
• Data Updates (performed every 3 years) ~ ~$500k (every three years)	$166,667
– Upgrade SPAR models to reflect most ~~recent operating data~~	
– Update model documentation and Plant Risk Information eBooks (PRIBs)	
– General model cleanup/improvements	
SUBTOTAL	$1,116,667
TOTAL	$1,916,667

Cost Estimate Using Licensee Models
Cost Estimate Based on NRR Rebaselining Budget Values

Activities	Initial Costs (dollars)	Initial costs in FTE	Ongoing Annual costs in $	Ongoing Annual costs in FTE
1.Review Licensee PRAs (assumes 80 different PRAs) - A typical Level 1 industry peer review takes approximately 75 person/days (5 people for about 3 weeks)	$5,621,918	32.88		
Staff will need to gain an in-depth understanding of each unique model, including				
• Modeling assumptions				
• Modeling conventions				
• Naming schemes (basic events, fault trees, event tress, etc.)				
• Post processing rule construction				
• Other ...				
Note: loss of standardization may require additional SRAs - cost not included				
Review updated/revised PRAs (assume 10%/year)			$562,192	3.
2. Coordinate logistics with industry and staff (assumes 4 FTE initially, then 2 FTE ongoing)	$974,466	5.70	$487,233	2.
Receive and process submittal (assumes the models will be proprietary)				
Create and manage reference library (assumes both digital and hardcopy)				
Coordinate review of revised PRA				
Duplicate and distribute models and software				
Industry User Groups (software, others)				
Provide limited Technical Support to SRAs				
3. RASP Handbook Revisions- Provides for uniformity of assessments - based on the Standardized SPAR Models	$730,849	4.27	$365,425	2.
Assumes 3 FTE for initial major revision and 1.5 FTE for at least the first few years				
4. Software Licensee's				
CAFTA (EPRI) - includes FTREX, actual current cost	$10,000		$10,000	
WinNUPRA (Scientech) - estimated	$10,000		$10,000	
Riskman (ABS Consulting) - estimated	$10,000		$10,000	
RiskSpectrum (Lloyd's Register Consulting, Sweden) - estimated (may not be needed)	$10,000		$10,000	
		0.23		0.
5. Training on new software (initial training assume 5 days each for 25 staff)				
CAFTA (EPRI)	$117,123	0.68	$23,425	0.
WinNUPRA (Scientech)	$117,123	0.68	$23,425	0.
Riskman (ABS Consulting)	$117,123	0.68	$23,425	0.
RiskSpectrum (Lloyd's Register Consulting, Sweden) (may not be needed)	$117,123	0.68	$23,425	0.
6. Loss of SAPHIRE reporting features and other automation tools (assume 36 in-depth SDPs/year)			$168,658	0.
Additional time required to perform and document each analyses (assumes 40 extra hours per evaluation)				
Includes offline computation reviews				
7. Technical support - similar to current support provided by INL ** Too many unknowns to estimate — Currently spending about $500k/year			***$500,000***	
8. Support MD 8.3 - NRC Incident Investigation Program, Notice of Enforcement Discretion (NOEDs), technical basis for rulemaking, generic issues and other risk-informed licensing related activities (estimated 1.5 FTE)			$255,800	1.
TOTAL assuming no additional SRAs	**$7,835,726**	**45.82**	**$2,473,005**	**14.**

Assumptions:		
	$117.12	per hour
1460 hours = 1 FTE		
From NRR Rebaselining assumptions		
1 FTE =	$171,000	

Appignani, Peter

From: Circle, Jeff
Sent: Thursday, January 28, 2016 9:06 AM
To: Correia, Richard; Peter Appignani; Lund, Louise
Cc: Coyne, Kevin; Appignani, Peter
Subject: RE: Revised Briefing to Weber/West on Use of Licensees' PRA Models in Lieu of SPAR Models

With weather conditions, my suggestion is that we try to get on the calendar by Monday.

Jeff A. Circle
Chief (acting)
Probabilistic Risk Assessment Branch
RES /Division of Risk Analysis
(301) 415-1152
BB (b)(6)

-----Original Message-----
From: Correia, Richard
Sent: Thursday, January 28, 2016 6:49 AM
To: Peter Appignani (b)(6) >; Circle, Jeff <Jeff.Circle@nrc.gov>; Lund, Louise <Louise.Lund@nrc.gov>
Cc: Coyne, Kevin <Kevin.Coyne@nrc.gov>; Appignani, Peter <Peter.Appignani@nrc.gov>
Subject: RE: Revised Briefing to Weber/West on Use of Licensees' PRA Models in Lieu of SPAR Models

Thanks Pete.

Have we rescheduled the briefing for Mike and Steve? The RISC plans to have another meeting to cover the agenda items that didn't get to yesterday including this one so we have an opportunity to get in front of Mike and Steve before that meeting.

Jeff..please keep in close contact with Mike Montecalvo on the date of the next RISC meeting and start discussions on the pilot so our parts are included.

Thanks again all

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

-----Original Message-----
From: Peter Appignani [mailto (b)(6)
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To: Circle, Jeff <Jeff.Circle@nrc.gov>; Correia, Richard <Richard.Correia@nrc.gov>; Lund, Louise <Louise.Lund@nrc.gov>
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Also, as we discussed earlier, I want Mike and Steve to have hard copies of this material in advance of the briefing.

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Richard Correia, PE
Director,
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BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
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BRIEFERS:

Rich Correia

Louise Lund

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Peter Appignani

Lauren Ning

PURPOSE:

For office staff and DRA management to inform the OD/DOD of the various items to consider:

- Proposal to adopt the use of licensees' PRA models in lieu of SPAR models for regulatory applications and reporting activities.
- Areas of consideration and challenges faced in developing an NRC pilot program to adopt one or multiple licensee models to explore its feasibility.

EXPECTED OUTCOMES:

- Provide Senior RES management with key talking points pertaining to the use of licensee PRA models for SDP and other risk-informed regulatory activities.
- OD and DOD will have an understanding of the issues influencing the office and the agency during interactions with internal and external stakeholders (e.g., the Risk-Informed Steering Committee (RISC) meetings).

PROCESS:

- High-level summary discussion of the issues and concerns.
  - Budget and funding impacts
  - Impact on regulatory activities.
  - Internal and external stakeholders.
  - Challenges.

- Mid-level and background information is attached for convenience.

U.S.NRC
UNITED STATES NUCLEAR REGULATORY COMMISSION
Protecting People and the Environment

LEVERAGING THE USE OF LICENSEES' PRA MODELS IN LIEU OF SPAR MODELS

Probabilistic Risk Assessment Branch
Division of Risk Analysis
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission

U.S.NRC

Industry and NRC Use of PRA Today

- Industry Use of PRAs
  - PRA is used by the industry today primarily for risk-informed licensing basis and design basis changes.
    - Applications are submitted under 10 CFR § 50.9 Completeness and accuracy of information.
  - They are also used for specific NRC programs such as *Mitigating Systems Performance Index* (*MSPI*), where NRC has examined the information and the program was piloted to ensure accuracy.
  - When appropriate, the SRAs use licensee PRAs for Notice of Enforcement Discretion (NOEDs)

Industry and NRC Use of PRA Today

- NRC Use of PRAs (SPAR Models)
  - ROP – Reactor Oversight Process
  - SDP – Significant Determination Process
  - MD 8.3 - NRC Incident Investigation Program
  - Notice of Enforcement Discretion (NOEDs)
  - Technical basis for rulemaking
  - Generic Issues
  - Initial licensing activities (NRO)
  - ASP – Accident Sequence Precursor
  - Inspection Support and Resources
  - System and Component Studies
  - Other risk-informed related activities
    - Includes licensing activities

August 2007 NEI Commission Briefing on Risk-Informed Regulation

- Relevant Discussion Topics[1]
  - Using risk-informed approaches remains a priority for the industry
  - These methods have demonstrated improvements to both safety and operations
  - Reinforce desire to pursue improvements to the reactor oversight significance determination process
- NEI Proposals
  - use of licensee PRAs for SDP
  - focusing licensees on corrective action rather than further analysis of small risk impacts
- Lessons learned from development of an NRC-endorsed internal events PRA standard.
- Industry's near term priorities: develop internal events at power and fire PRAs meeting the technical adequacy requirements of consensus standards.
- These efforts, along with those related to addressing SDP activities, will essentially consume the existing PRA infrastructure for the next several years.
- It is not realistic to impose or achieve regulatory expectations relative to complete scope PRAs in this time frame.

1. Letter from NEI, Aug 4, 2007, Subject: August 2 Commission Briefing on Risk-Informed Regulation

Advantages Using Licensee PRA[1]

- **Advantages Licensee Performs Analysis:**
  - Will not require staff to expend additional resources to update the SPAR models.
  - Allowing licensees to use RG 1.200 compliant models for SDPs may motivate them to invest resources to advance the quality of their models.
  - A "certified" PRA (consistent with RMRF Option 2) would allow the licensees PRA to be the PRA of record for all regulatory actions—including SDP.

- **Advantages NRC Staff Uses Licensee PRA:**
  - Will not require staff to expend additional resources to update SPAR models.
  - The most up to date model will always be used.
  - May motivate licensees to develop and maintain PRA models that comply with RG 1.200.
  - Although NRC is using the licensee model, the independence is maintained.
  - The ability to assess generic and other fleet-wide issues will be maintained if NRC maintains a model of record.

1.. Use of Licensee PRA Models RISC 01272016 (NRR Brief)

Budget and funding impacts

- Perceived cost savings versus real cost
  - Initial costs to use licensee PRAs: $7.8M
    - Used re-baselining cost assumptions provided by NRR
  - Annual ongoing costs to use licensee PRAs: $2.5M
  - Current comparable FY16 SPAR model costs: $800K
    - All SPAR model related cost for FY16: $1.9M
- Minimum resources necessary to support regulatory activities.
  - SPAR model costs are scalable
- Cost to all licensees to use their models
  - unknown at this time

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Key Talking Points

Letter to NEI from OEDO on Use of SPAR models (2007, ML072490566)

- This letter addressed an NEI proposal to use licensee PRA models instead of SPAR models. A detailed review was conducted and concluded that SPAR was needed to:
  - Maintain **independence** of NRC analyses. Differences between NRC and Licensee assessments is not due to the base model, but by the assumptions for each specific event or condition analysis
  - Provide **standardized model framework** for efficient analyses - industry does not use a standardized modeling approach
  - **Avoid inefficiencies** in having agency risk analysts learn the conventions of over 70 licensee developed PRAs (utilizing up to four different software platforms)

The basis for the staff conclusion remains valid today.

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Key Talking Points

Feedback from Regional SRAs on Potential Use of Licensee Models vice SPAR

- More efficient and objective to use SPAR models for risk assessments.
- It would take a significant increase in resources to use licensee models for event and condition assessment activities due to their lack of standardization and need for SRAs to understand unique modeling conventions and new code platforms.
- Use of licensee models would cause delays in the SDP process due to need to engage in additional requests for information to understand licensee PRA modeling assumptions.
- NRC's ability to perform independent regulatory assessment activities will be eroded by not having a centralized system evaluating Generic Safety Issues.

Impact on Regulatory Activities

- Actual process is unknown at this time
  - Will NRC staff use licensee PRA?
  - Will licensee perform the analysis using their PRA model?
- Efficiency of model usage – standardization of modeling conventions, naming schemes and post processing rule construction; reporting functions; consistency in event tree/fault tree construction; single software platform.
- Development of Plant Information Risk eBooks (PRIBS) – SPAR/SAPHIRE have enhanced capabilities to generate PRIB inputs in an automated fashion, development of similar capability for licensee models needs to be explored. PRIBs replaced NRRs SDP notebooks.
- Availability of help desk support for modeling questions and technical assistance for Event and Condition Assessment modeling changes.
- Conflict of interest issues with use of licensee generated model for regulatory decision-making (will need to engage OGC for concurrence).

Impact on Regulatory Activities

- Training costs associated with bringing staff up to speed on CAFTA, and other PRA codes currently in use.
- Availability of PRA models and supporting documentation – will they be formally submitted to NRC? Under oath and affirmation? Subject to 10 CFR 50.9? Will all licensees voluntarily submit their models?
- Updating process for licensee models - how to manage and control? How will staff ensure we have the latest model?
- Technical adequacy of SPAR models for certain modeling aspects important to event and condition assessments may be more advanced than licensee models such as LOOP modeling, common cause failure modeling and support system initiators.
- Use of licensee models to support system and component studies (SPAR/SAPHIRE currently have capabilities to efficiently run multiple cases to perform sensitivity studies and derive risk insights across multiple models).

Impact on Regulatory Activities

- Risk analyses using a SPAR model or a licensee PRA model are often in close agreement when performing an SDP. Differences in SDP outcomes between the NRC and the licensee are driven by factors other than the baseline PRA model, typically engineering assumptions, modeling assumptions, human reliability assumptions or application of common cause.
- Although licensees have made progress in developing RG 1.200 compliant PRA models, these models lack the standardization and ROP-specific features that are essential to the agency's needs for performing event and condition analyses.

Internal and external stakeholders

- Public
  - Use of licensee PRA or licensee performing analysis could erode public confidence
  - In effect the licensee is communicating events and degraded plant conditions to the public and other stakeholders if they perform the analysis
- NRR
  - ROP – Reactor Oversight Process
  - SDP – Significant Determination Process
  - MD 8.3 - NRC Incident Investigation Program
  - Notice of Enforcement Discretion (NOEDs)
  - Technical basis for rulemaking
  - Generic issues
  - Other risk-informed licensing related activities
- NRO
  - Initial licensing activities today
  - Same as NRR in the future

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Internal and external stakeholders

- Regions
  - ROP – Reactor Oversight Process
  - SDP – Significant Determination Process
  - MD 8.3 - NRC Incident Investigation Program
  - Notice of Enforcement Discretion (NOEDs)
- RES
  - ASP – Accident Sequence Precursor
  - Technical basis for rulemaking
  - Generic issues
  - Inspection Support
  - Other risk-informed licensing related activities
- Licensees
- NEI
- Owners Groups
- NGOs
- Others

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Challenges

- Erosion of Public confidence (Openness)
- Cost
- Impact on Regulatory Activities (Reliability)
- Loss of efficiency (Efficiency)
- Staff learning curve (Clarity)
- Model updates (Reliability/Clarity)
- Logistics and technical support (Independence)
- Licensee cooperation (Independence)

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Questions?

NRC's Principles of Good Regulation
Independence, Openness, Efficiency, Clarity, and Reliability

Current SPAR Model Costs	
	Per year costs
Base Resources (i.e., minimum requirements for the program):	
· SPAR Model Configuration/Quality Control and User Support Help Desk ~$500k/year	$500,000
– Help desk handles ~ 2 calls/day from SRAs	
– Ensures model version control and maintains INL Website	
– Performs model updates to support specific SDP/ASP activities (~30 models were updated to support a specific analysis in FY2015). These updates are often highly specific to the event/condition that occurred and would also need to be performed for a licensee PRA model	
· SAPHIRE QA and User Support ~$300k/year	$300,000
– Maintain NUREG/BR-0167 QA program	
– User help desk Support	
SUBTOTAL	$800,000
Resources needed to Support Specific User Enhancements:	
· Model Updates to Reflect Significant Plant Changes (~12 models/year) - ~$250k	$250,000
– Incorporate station blackout EDGs	
– Battery charging generators	
– Significant model upgrades	
· External Hazard and Fire Models - ~ $400k/year	$400,000
– Add NFPA 805 fire modeling	
– Add seismic and high wind model capabilities	
· SAPHIRE Enhancements ~$300k /year	$300,000
– New reporting features and code capabilities	
· Data Updates (performed every 3 years) - ~$500k (every three years)	$166,667
– Upgrade SPAR models to reflect most recent operating data	
– Update model documentation and Plant Risk Information eBooks (PRIBs)	
– General model cleanup/improvements	
SUBTOTAL	$1,116,667
TOTAL	$1,916,667

Cost Estimate Using Licensee Models
Cost Estimate Based on NRR Rebaselining Budget Values

Activities		Initial Costs (dollars)	Initial costs in FTE	Ongoing Annual costs in $	Ongoing Annual costs in FTE
1.Review Licensee PRAs (assumes 80 different PRAs) - A typical Level 1 industry peer review takes approximately 75 person/days (5 people for about 3 weeks)		$5,621,918	32.88		
	Staff will need to gain an in-depth understanding of each unique model, including				
	• Modeling assumptions				
	• Modeling conventions				
	• Naming schemes (basic events, fault trees, event tress, etc.)				
	• Post processing rule construction				
	• Other ...				
Note: loss of standardization may require additional SRAs - cost not included					
	Review updated/revised PRAs (assume 10%/year)			$562,192	3.29
2. Coordinate logistics with industry and staff (assumes 4 FTE initially, then 2 FTE ongoing)		$974,466	5.70	$487,233	2.85
	Receive and process submittal (assumes the models will be proprietary)				
	Create and manage reference library (assumes both digital and hardcopy)				
	Coordinate review of revised PRA				
	Duplicate and distribute models and software				
	Industry User Groups (software, others)				
	Provide limited Technical Support to SRAs				
3. RASP Handbook Revisions- Provides for uniformity of assessments - based on the Standardized SPAR Models		$730,849	4.27	$365,425	2.14
	Assumes 3 FTE for initial major revision and 1.5 FTE for at least the first few years				
4. Software Licensee's					
	CAFTA (EPRI) - includes FTREX, actual current cost	$10,000		$10,000	
	WinNUPRA (Scientech) - estimated	$10,000		$10,000	
	Riskman (ABS Consulting) - estimated	$10,000		$10,000	
	RiskSpectrum (Lloyd´s Register Consulting, Sweden) - estimated (may not be needed)	$10,000		$10,000	
			0.23		0.23
5. Training on new software (initial training assume 5 days each for 25 staff)					
	CAFTA (EPRI)	$117,123	0.68	$23,425	0.14
	WinNUPRA (Scientech)	$117,123	0.68	$23,425	0.14
	Riskman (ABS Consulting)	$117,123	0.68	$23,425	0.14
	RiskSpectrum (Lloyd´s Register Consulting, Sweden) (may not be needed)	$117,123	0.68	$23,425	0.14
6. Loss of SAPHIRE reporting features and other automation tools (assume 36 in-depth SDPs/year)				$168,658	0.99
	Additional time required to perform and document each analyses (assumes 40 extra hours per evaluation)				
	Includes offline computation reviews				
7. Technical support - similar to current support provided by INL ** Too many unknowns to estimate — Currently spending about $500k/year				***$500,000***	
8. Support MD 8.3 - NRC Incident Investigation Program, Notice of Enforcement Discretion (NOEDs), technical basis for rulemaking, generic issues and other risk-informed licensing related activities (estimated 1.5 FTE)				$255,800	1.50
	TOTAL assuming no additional SRAs	**$7,835,726**	**45.82**	**$2,473,005**	**14.46**
		Assumptions;			
		$117.12	per hour		
		1460 hours = 1 FTE			
		From NRR Rebaselining assumptions			
		1 FTE =	$171,000		

BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
LEVERAGING THE USE OF LICENSEES' PRA MODELS IN LIEU OF SPAR MODELS

Key Talking Points for the Standardized Plant Analysis Risk (SPAR) Model Program

- Program provides **independent** risk analysis capability for NRC in support of reactor oversight process (ROP) and a variety of risk-informed technical applications
- Plant-specific SPAR models (99 operating plants are represented by 75 SPAR models) use **standardized** modeling and naming conventions. Standardization increases analyst efficiency and accuracy and supports cross comparison across models.
- SPAR models and the SAPHIRE PRA code are **designed to support event and condition analyses** by performing "delta-risk" analyses (e.g., change in CDF from base case to performance deficiency). Licensee developed models and supporting codes lack this capability (requiring additional calculations and manual sequence/cutset result comparisons)
- The program leverages available licensee PRA information to reduce program costs, but includes validation of licensee modeling assumptions and integrates licensee model conventions into standardized SPAR modeling framework. Although SPAR models use some simplifying assumptions compared to licensee models, in several areas most pertinent to ROP applications, the SPAR models are generally more detailed (e.g., CCF, LOOP, and support system initiators)
- All models run on a single code platform (SAPHIRE). SAPHIRE can be updated and configured to directly support NRC risk assessment activities through coding changes and customized reporting functions. Use of licensee models would require the NRC to maintain licensees and network environmental approval for multiple commercial software codes and eliminate the ability to revise these code to support NRC-specific applications.
- Although licensees have made progress in developing RG 1.200 compliant PRA models, these models lack the standardization and ROP-specific features that are essential to the agency's needs for performing event and condition analyses.

SPAR Model Uses

- Significance Determination Process (Reactor Oversight) - **Regions**
- Accident Sequence Precursor Program (used as an input metric to the performance budget process) - **RES**
- Evaluation of Notices of Enforcement Discretion – **Regions, NRR** *
- MD 8.3 Incident Investigation Program Risk Evolutions (e.g., determine level of inspection response to an event) – **Regions** *
- Establish technical basis for rulemaking – **RES, NRR**
- Evaluate generic issue safety significance - **RES**
- Perform system and component studies - **RES**
- Inspection Planning (e.g., risk insights from Plant Risk Information eBooks) - **Regions**

These applications typically are performed with limited time, highlighting the importance of model standardization for SPAR

SPAR Model Annual Budget

The SPAR/SAPHIRE annual budget for **FY2015 was ~$2.2 million**. This amount is scalable depending on agency needs and available resources. Major activities include:

BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
LEVERAGING THE USE OF LICENSEES' PRA MODELS IN LIEU OF SPAR MODELS

Base Resources (i.e., minimum requirements for the program):

- SPAR Model Configuration/Quality Control and User Support Help Desk ~$500k/year
  - Help desk handles ~ 2 calls/day from SRAs
  - Ensures model version control and maintains INL Website
  - Performs model updates to support specific SDP/ASP activities (~30 models were updated to support a specific analysis in FY2015). These updates are often highly specific to the event/condition that occurred and would also need to be performed for a licensee PRA model

- SAPHIRE QA and User Support ~$300k/year
  - Maintain NUREG/BR-0167 QA program
  - User help desk Support

Resources needed to Support Specific User Enhancements:

- Model Updates to Reflect Significant Plant Changes (~12 models/year) - ~$250k
  - Incorporate station blackout EDGs
  - Battery charging generators
  - Significant model upgrades

- External Hazard and Fire Models - ~ $400k/year
  - Add NFPA 805 fire modeling
  - Add seismic and high wind model capabilities

- SAPHIRE Enhancements ~$300k /year
  - New reporting features and code capabilities

- Data Updates (performed every 3 years) - ~$500k (every three years)
  - Upgrade SPAR models to reflect most recent operating data
  - Update model documentation and Plant Risk Information eBooks (PRIBs)
  - General model cleanup/improvements

Letter to NEI from OEDO on Use of SPAR models (2007, ML072490566)

This letter addressed an NEI proposal to use licensee PRA models instead of SPAR models. A detailed review was conducted and concluded that SPAR was needed to:

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Background Information

1. SPAR Level 1 Model Development.pptx
2. Relevant Inspection Manual Chapters
3. Use of Licensee PRA Models RISC 01272016
4. Letter from Don Dube (RES/DRA) to Michael D. Tschiltz, Deputy Director, NRR/DRA, Feb 28, 2007, Subject: Public Meeting Summary Regarding Use Of Standardized Plant Analysis Risk Models and Licensee Probabilistic Risk Assessment Models In The Reactor Oversight Process Held On February 22, 2007, ML070640567
5. Letter from J. E. Dyer, Director NRR, to NEI, July 2007, ML071990509
6. Letter from NEI, Aug 4, 2007, Subject: August 2 Commission Briefing on Risk-Informed Regulation
7. Letter from NEI, Dec 19, 2013, Subject: Subject: Industry Support and Use of PRA and Risk-Informed Regulation
8. NEI, Proposal for use of Licensee PRA Models in the Significance Determination Process, April, 2014
9. SPAR Model Philosophy Rev. 1.pptx
10. Outline Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models

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SPAR Level 1 Model Development.pptx

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SPAR Level 1 Model Development

- Feedback from ~50 ASP analyses per year
- Feedback from emergent SDP analyses
- Peer reviews from licensees (ASP/SDP analyses; MSPI reviews)
- Incorporation of information gathered during SDP
- Feedback to other models through use of standardized assumptions and methods
- Identification and resolution of generic industry modeling issues
- Resolution of Peer Review Comments

Rev. 1 Models 1995 – 1998
- Developed from "Daily Events Manual"
- Train level system modeling
- Limited number of event trees

Rev. 2/2QA Models 1998 - 2001
- Expanded modeling of event trees and front line systems based on NRC reviewed IPEs
- Detailed external review by SNL

Rev. 3i Models Completed 11/02
- Expanded number of event trees
- Support system fault trees/initiators added
- SDP plant visit comments incorporated

Rev. 3 Models Completed 12/04
- Detailed reviews (see review guideline, 3/14/05)
- Data updated and templates generated
- RCP seal LOCA and LOOP models updated

Rev. 3.x Models Completed 12/09
- Detailed cut set level review against PRAs (see Rev 3P Review Process Guideline, 2/21/06)
- Model documentation expanded/updated

Rev. 8.x Models Completed 2015
Additional Success Criteria enhancements in progress
- SAPHIRE version 8 enhancements
- SSIE Models (RES/EPRI MOU)
- Expanded LOOP/SBO models (RES/EPRI MOU)
- Resolve Peer Review Comments – phase 1
- Success Criteria Enhancements

BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
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Relevant Inspection Manual Chapters

Relevant Inspection Manual Chapters

IMC 0306 Planning, Tracking and Reporting of the Reactor Oversight Process (ROP) 12/23/15 15-032 .docx

IMC 0307 Reactor Oversight Process Self-Assessment Program 11/23/15 15-025 .docx

IMC 0307 App A Reactor Oversight Process Self-Assessment Metrics 11/23/15 15-025 .docx

IMC 0307 App B Reactor Oversight Process Baseline Inspection Procedure Reviews 11/23/15 15-025 .docx

IMC 0308 Reactor Oversight Process Basis Document 09/04/14 14-020 .docx

IMC 0308 Att 1 Technical Basis for Performance Indicators 11/08/07 07-035 .doc

IMC 0308 Att 2 Technical Basis for Inspection Program 10/16/06 06-027 .doc

IMC 0308 Att 3 Significance Determination Process Basis Document 10/16/06 06-027 .doc

IMC 0308 Att 3, App A Technical Basis for the At-Power Significance Determination Process (SDP) 06/19/12 12-010 .doc

IMC 0308 Att 3, App B Technical Basis for Emergency Preparedness Significance Determination Process 12/19/12 12-029 .docx

IMC 0308 Att 3, App C Technical Basis for Occupational Radiation Safety Significance Determination Process 07/28/05 05-022 .doc

IMC 0308 Att 3, App D Technical Basis for Public Radiation Safety Significance Determination Process 06/25/04 04-020 .doc

IMC 0308 Att 3, App F Technical Basis for Fire Protection Significance Determination Process (II

IMC 0609, Appendix F) At Power Operations 02/28/05 05-007 .doc

IMC 0308 Att 3, App G Technical Basis for Shutdown Operations Significance Determination Process 02/28/05 05-007 .doc

IMC 0308 Att 3, App H Technical Basis for Containment Integrity Significance Determination Process 05/06/04 04-010 .doc

IMC 0308 Att 3, App I Technical Basis for Operator Requalification Human Performance Significance Determination Process 07/28/05 05-022 .doc

IMC 0308 Att 3, App J Technical Basis for Steam Generator Tube Integrity Findings 07/06/11 11-011 .doc

IMC 0308 Att 3, App K Technical Basis for Maintenance Risk Assessment and Risk Management SDP 05/19/05 05-014 .doc

IMC 0308 Att 3, App L Technical Basis for the B.5.b Significance Determination Process (SDP) 05/09/14 14-011 .doc

IMC 0308 Att 3, App M Technical Basis for the Significance Determination Process (SDP) Using Qualitative Criteria 06/11/14 14-012 .docx

IMC 0308 Att 4 Technical Basis for Assessment 07/28/05 05-022 .doc

IMC 0308 Att 5 Technical Basis for Enforcement 10/16/06 06-027 .doc

IMC 0309 Reactive Inspection Decision Basis for Reactors 10/28/11 11-023 .docx

IMC 0310 Aspects Within Cross Cutting Areas 12/04/14 14-029 .docx

IMC 0312 Technical Assistance for Radiation Safety Inspections at Nuclear Fuel Cycle Facilities and Materials Licensees' Sites 06/06/02 02-023 .doc

IMC 0313 Industry Trends Program 05/29/08 08-016 .doc

IMC 0320 Operating Reactor Security Assessment Program 06/13/12 12-009 .docx

IMC 0326 Operability Determinations & Functionality Assessments for Conditions Adverse to Quality or Safety 12/03/15 15-028 .docx FY2012-02 Rev 1

Relevant Inspection Manual Chapters

IMC 0330 Guidance for NRC Review of Licensee Draft Documents 07/8/96 96-015

IMC 0350 Oversight of Reactor Facilities in a Shutdown Condition Due to Significant Performance and/or Operational Concerns 12/15/06 06-035 .doc

IMC 0375 Implementation of the Reactor Oversight Process at Reactor Facilities in an Extended Shutdown Condition for Reasons Not Related to Performance 11/13/15 15-024 .docx

IMC 0410 Notices of Enforcement Discretion 03/13/13 13-009 .docx

IMC 0608 Performance Indicator Program 09/26/12 12-022 .docx

IMC 0609 Significance Determination Process 04/29/15 15-008 .docx

IMC 0609 Att 1 Significance and Enforcement Review Panel Process 04/29/15 15-008http://pbadupws.nrc.gov/docs/ML0735/ML073531868.pdf .docx

IMC 0609 Att 2 Process for Appealing NRC Characterization of Inspection Findings (SDP Appeal Process) 06/08/11 11-010 .doc

IMC 0609 Att 3 Senior Reactor Analyst Support Expectations 04/29/15 15-008 .docx

IMC 0609 Att 4 Initial Characterization of Findings 06/19/12 12-010 .doc

IMC 0609 App A The Significance Determination Process (SDP) for Findings At-Power 06/19/12 12-010 .docx

IMC 0609 App B Emergency Preparedness Significance Determination Process 09/22/15 15-017 .docx

IMC 0609 App C Occupational Radiation Safety Significance Determination Process 08/19/08 08-024 .doc

IMC 0609 App D Public Radiation Safety Significance Determination Process 02/12/08 08-007 .doc

IMC 0609 App F Fire Protection Significance Determination Process 09/20/13 13-022 .docx

IMC 0609 App F, Att 1 Attachment 1: Fire Protection Significance Determination Process Worksheet 09/20/13 13-022 .docx

IMC 0609, App F, Att 2 Attachment 2: Degradation Rating Guidance Specific to Various Fire Protection Program Elements 02/28/05 05-007 .doc

IMC 0609 App F, Att 3 Attachment 3: Guidance for Identifying Fire Growth and Damage Scenarios 02/28/05 05-007 .doc

IMC 0609 App F, Att 4 Attachment 4: Fire Ignition Source Mapping Information: Fire Frequency, Counting Instructions, Applicable Fire Severity Characteristics, and Applicable Manual Fire Suppression Curves 02/28/05 05-007 .doc

IMC 0609, App F, Att 5 Attachment 5: Characterizing Non-Simple Fire Ignition Sources 02/28/05 05-007 .doc

IMC 0609 App F, Att 6 Attachment 6: Guidance for the Identification of Targets and Their Ignition and Damage Criteria 02/28/05 05-007 .doc

IMC 0609 App F, Att 7 Attachment 7: Guidance for Fire Growth and Damage Time Analysis 02/28/05 05-007 .doc

IMC 0609 App F, Att 8 Attachment 8: Guidance for Fire Non-Suppression Probability Analysis 02/28/05 05-007 .doc

IMC 0609 App G Shutdown Operations Significance Determination Process 05/09/14 14-011 .docx

IMC 0609 App G, Att 1 Shutdown Operations Significance Determination Process Phase 1 Initial Screening and Characterization of Findings 05/09/14 14-011 .doc

IMC 0609 App G, Att 2 Phase 2 Significance Determination Process Template for PWR During Shutdown 02/28/05 05-007 .doc

IMC 0609 App G, Att 3 Phase 2 Significance Determination Process Template for BWR During Shutdown 02/28/05 05-007 .doc

Relevant Inspection Manual Chapters

IMC 0609 App H Containment Integrity Significance Determination Process 05/06/04 04-010 .doc

IMC 0609 App I Operator Requalification Human Performance Significance Determination Process [SDP] 12/06/11 11-040 .docx

IMC 0609 App J Steam Generator Tube Integrity Findings Significance Determination Process 07/06/11 11-011 .doc

IMC 0609 App K Maintenance Risk Assessment and Risk Management Significance Determination Process 05/19/05 05-014 .doc

IMC 0609 App L B.5.b Significance Determination Process 12/24/09 09-032 .doc

IMC 0609 App M Significance Determination Process Using Qualitative Criteria 04/12/12 12-005 .docx

IMC 0610 Nuclear Material Safety and Safeguards Inspection Reports 05/18/04 04-014 .doc

IMC 0612 Power Reactor Inspection Reports 01/24/13 13-003 .docx

IMC 0612 Exh 1 Standard Reactor Inspection Report Outline 02/07/14 14-005 .docx

IMC 0612 Exh 2 Inspection Report Documentation Matrix 09/04/14 14-020 .docx

IMC 0612 Exh 4 ROP Inspection Report Cover Letter Templates 09/13/13 13-021 .docx

IMC 0612 App A Acronyms Used in Inspection Manual Chapter 0612 12/04/08 08-034 .doc

IMC 0612 App B Issue Screening 09/07/12 12-020 .docx

IMC 0612 App C Guidance for Supplemental Inspection Reports 10/28/11 11-024 .docx

IMC 0612 App C Exh 1 Sample Supplemental Inspection Report for IP 95001 and IP 95002 10/28/11 11-024 .docx

IMC 0612 App D Documenting Problem Identification and Resolution Biennial Team Inspections (IP 71152) 08/13/13 13-017 .docx

IMC 0612 App E Examples of Minor Issues 08/11/09 09-020 .doc

IMC 0801 Reactor Oversight Process Feedback Program

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Letter from Don Dube (RES/DRA) to Michael D. Tschiltz, Deputy Director, NRR/DRA, Feb 28, 2007, Subject: Public Meeting Summary Regarding Use Of Standardized Plant Analysis Risk Models and Licensee Probabilistic Risk Assessment Models In The Reactor Oversight Process Held On February 22, 2007, ML070640567

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Letter from J. E. Dyer, Director NRR, to NEI, July 2007, ML071990509

Mr. Anthony Pietrangelo, Vice President
Regulatory Affairs
Nuclear Generation Division
Nuclear Energy Institute
1776 I Street NW, Suite 400
Washington, D.C. 20006-3708

Dear Mr. Pietrangelo:

The Nuclear Regulatory Commission (NRC) staff, together with the Nuclear Energy Institute (NEI), industry representatives, and other stakeholders, have held a series of public meetings to discuss whether and how licensee probabilistic risk assessment (PRA) models that are updated to meet Regulatory Guide (RG) 1.200 can be factored into the NRC=s significance determination process (SDP). This activity stems from an action item from the public meeting of September 28, 2006, between the NRC PRA Steering Committee and industry representatives. The action from the September 28, 2006 meeting was to form task groups to investigate various options for the use of the standardized plant analysis risk (SPAR) models in the SDP.

A number of options were developed and discussed with the industry during the public meetings. In particular, the industry has recommended that licensee risk analysts should assess the risk of performance deficiencies, and provide the results to the NRC for review and action. After careful consideration of the merits of all of the options developed as part of this effort, the staff concludes that none of the options are acceptable alternatives to the current process for the SDP.

The NRC=s Reactor Oversight Process (ROP) provides an independent assessment of licensee performance as such, it would be inappropriate for licensee risk analysts to take the lead in assessing the significance of licensee performance deficiencies. The staff recognizes that baseline PRA models that have undergone peer review and conform to the requirements of RG 1.200 are of relatively high quality. In many cases, the staff has found these baseline models to be superior in detail to its own SPAR models, particularly with regard to external event modeling. Nonetheless, the staff=s experience with the SDP is that the analysis outcome is not heavily influenced by differences between a licensee=s PRA model and the NRC SPAR model. Typically these differences are recognized and accounted for.

Our experience has been that differences in SDP outcomes between the NRC and the licensee are driven by factors other than the baseline PRA model used for the analysis. For example, virtually every event or degraded condition for which a phase III risk assessment is conducted requires engineering analysis and PRA model modifications to represent the performance deficiency or equipment degradation. Key assumptions regarding the extent and duration of equipment degradation are made, and human recovery actions and/or systems not modeled in the baseline PRA are often credited. The manner in which the risk analyst addresses these issues can significantly influence the risk estimate outcome. We note that to the extent that

licensees have unique perspectives on the event or condition under NRC staff evaluation, the SDP allows for input from licensees regarding such risk insights.

The staff has also concluded that allowing licensees to take the lead on risk assessments would minimize the NRC staff=s ability to ensure that issues are assessed in a timely manner.

Additionally, at present, the industry lacks a standardized approach to performing risk analysis that would ensure uniform application across the spectrum of industry PRA models. In this regard, the NRC=s use of the SPAR model together with the on-going development of guidance on conducting phase III risk assessments, commonly referred to as the risk assessment standardization process (RASP), ensures greater uniformity.

The staff also seriously considered the alternative to the current process whereby the staff would be provided with the licensee PRA models that meet RG 1.200. Under this option, the staff would perform the assessment of risk significance using a standardized approach. While this second option has merit, the staff has concluded that the logistical and resource needs to maintain the many licensee PRA models in-house is not feasible. Altogether, the 70-plus industry PRA models on some four software platforms would require significant NRC resources, including the addition of risk analysts, who might otherwise be more effectively utilized for other tasks. This alternative, while perhaps holding promise for the future as PRA software platform standardization advances, is not a viable solution for the near-term.

In summary, the staff believes that continued improvement to the standardization of PRA modeling methods in SPAR and industry PRA models is the most effective use of resources, commensurate with the need for the staff to maintain its own methods for confirmatory and independent analysis. The NRC independent oversight of licensee performance is also an important aspect of maintaining public confidence in the process.

We look forward to working with the industry to continue development of guidance for the standardized application of risk assessment models to operating event analysis.

Sincerely,

J. E. Dyer, Director
Office of Nuclear Reactor Regulation

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J. E. Dyer, Director
Office of Nuclear Reactor Regulation

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OFFICE	NRR/DRA/APOB	NRR/DIRS/IRIB	NRR/DIRS
NAME	MFranovich	TReis	SRichards
DATE	07/24/2007	07/25/2007	07/26/2007
RES/DRASP	NRR/DRA	NRR/ADES	NRR/ADRO
PBaranowsky	MCunningham	JGrobe	BBoger
07/ /2007	07/ /2007	07/ /2007	07/ /2007

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BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
LEVERAGING THE USE OF LICENSEES' PRA MODELS IN LIEU OF SPAR MODELS

Letter from NEI, Aug 4, 2007, Subject: August 2 Commission Briefing on Risk-Informed Regulation

BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
LEVERAGING THE USE OF LICENSEES' PRA MODELS IN LIEU OF SPAR MODELS

Letter from NEI, Dec 19, 2013, Subject: Subject: Industry Support and Use of PRA and Risk-Informed Regulation

BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
LEVERAGING THE USE OF LICENSEES' PRA MODELS IN LIEU OF SPAR MODELS

NEI, Proposal for use of Licensee PRA Models in the Significance Determination Process, April 2014

BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
LEVERAGING THE USE OF LICENSEES' PRA MODELS IN LIEU OF SPAR MODELS

SPAR Model Philosophy Rev. 1.pptx

BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
LEVERAGING THE USE OF LICENSEES' PRA MODELS IN LIEU OF SPAR MODELS

Outline

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models Outline

1. **Summary of Key Considerations for using licensees' PRA Models**
   - 1.1. Regulatory Processes
   - 1.2. PRA Policy Statement
   - 1.3. Model Quality
   - 1.4. Maintain independence of NRC
   - 1.5. Standardization of modeling and assessment techniques
   - 1.6. Use by the NRC staff of licensees' PRA models
   - 1.7. Effect on other NRC Programs
   - 1.8. Costs

2. **Regulatory Processes**
   - 2.1. Reactor Oversight Process (ROP)
     - 2.1.1. ROP is an NRC process
   - 2.2. Significance Determination Process (SDP)
     - 2.2.1. Today's SDP outcomes using NRC versus licensee PRA
       - 2.2.1.1. The PRA models are often in close agreement.
       - 2.2.1.2. Differences in SDP outcomes between the NRC and the licensee are driven by factors other than the baseline PRA model
         - 2.2.1.2.1. Engineering assumptions
         - 2.2.1.2.2. Modeling assumptions
         - 2.2.1.2.3. Human reliability assumptions
         - 2.2.1.2.4. Other ...
       - 2.2.1.3. These issues are also applicable to the other regulatory processes and other risk-informed licensing related activities
   - 2.3. MD 8.3 - NRC Incident Investigation Program
   - 2.4. Notice of Enforcement Discretion (NOEDs)
   - 2.5. Technical basis for rulemaking
   - 2.6. Generic issues
   - 2.7. Other risk-informed licensing related activities

3. **PRA Policy Statement**
   - 3.1. The PRA Policy Statement encouraged the NRC to increase the use and application of PRA to the greatest extent practical.
   - 3.2. SPAR models are one of the key incarnations of that effort.

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models Outline

3.3. Eliminating SPAR models would violate the spirit of that policy because it could undermine confidence in PRA-based findings.

4. **Model Quality**

4.1. SPAR models have been peer reviewed by industry led peer review teams[1]

4.1.1. SPAR models were determined to be adequate for their intended application

4.1.2. Confidence on the part of staff and industry that the current generation of SPAR models accurately portray the plants that they model.

5. **Maintain independence of NRC**

5.1. ROP provides for an independent regulatory assessment of licensee performance

5.1.1. Staff may lose ability to verify - "trust but verify"

5.1.2. Licensee's initially indicate an event as low safety significance in LERs that are later established as a greater than Green finding

5.2. Conflict of interest issues

5.2.1. Since the ROP is an NRC process, how will the appropriate level of independence be established if the licensee's PRA is used?

5.2.1.1. Does the independent manipulation of the licensee's model by NRC staff/contractors establish an appropriate level of independence?

5.2.1.2. OGC may need to endorse use of licensee PRA

5.2.2. Will the licensee perform the assessment

5.2.2.1. OGC may need to endorse allowing the licensee to perform the assessment

5.3. Public confidence

5.3.1. Use of licensee PRA and/or allowing the licensee to perform the assessment could erode public confidence

5.3.2. In effect, the licensee is communicating events and degraded plant conditions to the public and other stakeholders if they perform the analysis.

6. **Standardization of modeling and assessment techniques**

6.1. Standardization provides for:

6.1.1. Efficiency

6.1.2. Consistency

6.1.3. Automation

---

[1] One typical BWR and one typical PWR SPAR model was peer reviewed since they are standardized. Recently completed a multi-year peer review resolution activity to address peer review findings across all SPAR models.

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models Outline

6.2. Efficiency of standardization

6.2.1. Modeling assumptions

6.2.2. Modeling conventions

6.2.3. Naming schemes (basic events, fault trees, event tress, etc.)

6.2.4. Post processing rule construction

6.2.5. Reporting functions (built into SAPHIRE)

6.2.6. Consistency in event tree/fault tree construction

6.2.7. Single Software platform

6.3. Consistency

6.3.1. Uniformity of assessments (RASP Handbooks)

6.3.1.1. Risk Assessment Standardization Project (RASP) Handbooks

6.3.1.2. Uniform because SPAR models are standardized

6.4. Automation

6.4.1. Software platform is standardized (SAPHIRE)

6.4.1.1. SAPHIRE was developed and modified specifically to support the regulatory processes

6.4.1.2. SAPHIRE has evolved over the years to meet the needs of the NRC analyst to help them better perform their tasks when utilizing the SPAR models. These features were built directly into SAPHIRE to eliminate the analyst performing offline calculations and then placing those calculated probabilities back into the SPAR model.

6.4.1.3. Reporting functions (built into SAPHIRE)

6.5. Experience indicates the use of NRC developed standardized models supports the principles of good regulation: independence, openness, efficiency, clarity, and reliability.

7. Use by the NRC staff of licensees' PRA models

7.1. Additional logistical and resource requirements

7.1.1. Seventy (70) plus licensee PRAs

7.1.1.1. No standardization

7.1.1.1.1. No Standard Modeling assumptions

7.1.1.1.2. No Standard Modeling conventions

7.1.1.1.3. No Standard Naming schemes (basic events, fault trees, event tress, etc.)

7.1.1.1.4. No Standard Post processing rule construction

7.1.1.2. NRC Staff/SRAs will need to learn nuances of each licensee PRA

7.1.2. Four (4) different commercial software platforms

7.1.2.1. CAFTA (EPRI)

7.1.2.2. WinNUPRA (Scientech)

7.1.2.3. Riskman (ABS Consulting)

7.1.2.3.1. Cutsets are problematic (used to gain understanding of risk insights)

7.1.2.4. RiskSpectrum (Lloyd's Register Consulting, Sweden)

7.1.3. All lack reporting features of SAPHIRE

7.1.4. All lack automation and easy to use analysis tools in SAPHIRE

7.2. Need for additional NRC risk analysts

7.2.1. Additional staff training requirements

7.3. Management and control of licensee models and model updates

7.3.1. Non-uniform modeling assumptions and limitations

7.3.1.1. Each model will need to be examined and understood

7.3.2. Availability of PRA models and supporting documentation

7.3.2.1. Will all of the licensees formally submit their PRA to NRC?

7.3.2.1.1. Under oath and affirmation?

7.3.2.1.2. Subject to 10 CFR 50.9?

7.3.3. How will staff ensure NRC has the latest licensee model?

7.3.4. RASP Handbook provides for uniformity of assessments

7.3.4.1. Assumes models are standardized and well understood

7.3.4.2. Will necessitate a complex revision

8. Effect on other NRC Programs that use SPAR models

8.1. Accident Sequence Precursor (ASP) program

8.1.1. Abnormal occurrence report to Congress

8.2. Industry trends/operating experience programs

8.3. New Reactors (PRA & licensing)

8.4. Inspection programs

8.4.1. Inspection resources

8.4.2. Inspection decisions will become reactive based on deterministic criteria alone

8.5. Use of SPAR models to support system and component studies

8.5.1. Would inhibit our ability to develop tailored models when new situations arise.

8.6. SPAR models are used to develop Plant Information Risk eBooks (PRIBS) – superseded the SDP Notebooks

Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models Outline

8.7. SPAR Models used for other purposes

8.7.1. Answer Commission questions

8.7.2. Japan Lesson Learned related issues (flooding, vents, seismic)

8.7.2.1. SPAR model results (CDFs) used to assist in the resolution of Fukushima NTTF Rec. 5.2 (containment venting for plants other than BWR with Mark I and Mark II containments), and Rec. 6 (hydrogen control and mitigation).

8.7.2.2. SPAR model data (equipment failure rates) supported the risk evaluation of Fukushima NTTF Rec. 5.1 (containment venting in BWR Mark I and Mark II plants)

8.7.3. SPAR-EE models supported GI-199 (updated seismic hazard curves for plants east of the Rocky Mountains)

8.7.4. Gain understanding of key basic events in the SPAR fire PRA models

8.7.5. SPAR models used to identify the most likely core-damage sequences for SOARCA analysis, as well as other important input.

8.7.6. SPAR models and data (equipment failure rates) supported staff's analysis of containment accident pressure (CAP) credit in BWR plants.

8.7.7. Gain understanding of CDFs as estimated by SPAR (supported work for Commissioner Apostolakis, 2013).

8.7.8. NRR made heavy use of the SPAR models (event trees) while reviewing the Browns Ferry extended power uprate (EPU) license amendment request.

9. Costs

9.1. Costs to both NRC and Industry

9.2. NRC

9.2.1. Licensee model reviews

9.2.1.1. NRC Staff/SRAs will need to learn nuances of each licensee PRA

9.2.1.1.1. Continuing effort as plants make modifications and update/revise their PRA.

9.2.2. Logistical requirements

9.2.2.1. Control and distribution of licensee models

9.2.3. Training

9.2.3.1. Training on multiple software platforms

9.2.3.2. Potential impact on SRA qualifications

9.2.3.3. Potential impact on established NRC PRA and PRA related training programs

9.2.4. Commercial Software licenses

9.2.4.1. Multiple versions used by the industry

9.2.4.2. Commercial PRA software typically requires additional software (licenses) to be comparable to SAPHIRE (e.g. CAFTA/FTREX)

9.2.5. Additional analyst staff

9.2.6. Other

9.3. Industry

9.3.1. Cost for licensee to submit their PRA to NRC

9.3.1.1. Will ALL licensees voluntarily submit their PRA to NRC?

9.3.1.1.1. If not, we will need to maintain limited number of SPAR models.

9.3.1.2. Need for complete documentation of licensee PRA, could be extensive

9.3.2. Cost for a minimum of model standardization

9.3.3. Cost to implement a single RG 1.200 compliant standardized modeling approach across multiple analysis platform

9.3.3.1. Re-invent a RASP Handbook for uniformity of assessments

9.3.4. Cost to implement SAPHIRE reporting features and other automation tools

9.3.5. How will industry provide support to NRC Analysts?

9.3.5.1. INL is currently responding to approximately 2 requests for assistance per day via the Technical Support contract

9.3.6. Other

Marksberry, Don

From: Coyne, Kevin
Sent: Wednesday, January 27, 2016 10:23 AM
To: Marksberry, Don
Subject: RE: RISC Internal

Funny you brought this up - I spoke with Pete last night about the lack of an alternate SPAR option in the plan - it's either the status quo (w/ SPAR/SAPHIRE) or move to licensee models. If Bill Dean is going to fight the status quo on principle alone, then we need to offer something that moves the status quo but still retains the SPAR program Your point about licensees being unable to maintain proficiency is a good one - we need to work that into the discussion somehow...

-----Original Message-----
From: Marksberry, Don
Sent: Wednesday, January 27, 2016 10:20 AM
To: Coyne, Kevin <Kevin.Coyne@nrc.gov>
Subject: RE: RISC Internal

Most licensee won't have the proficiency and expertise to perform a risk analysis (except for Erin). About 40 plants had 0 or 1 precursor in the past 15 years.

Where is option 4? Like, risk inform the ROP without the use of PRAs. With 800+ precursors over the past 45 years and 200+ > green findings (4-reds, 14-yellows) over the past 15 years, we should be able to categorize, objectively, what SSCs are risk important (a smarter and simpler phase 2 notebook). Let INPO police the white-related unavailabilities (and maybe yellows with some NRC oversight), while eliminating the lucky recovery credits in return.

We can keep SPAR and SAPHIRE on life support for ASP, MD 8.3, AIT, IIT, AO, and GSI support, and to check licensee analyses of potential reds or whatever they throw at us. A very small team of 2-3 at HQ can maintain in-house proficiency and expertise.

I do realize that this 5-minute brainstorming session is no match against the AIM2020 team.

-----Original Message-----
From: Coyne, Kevin
Sent: Tuesday, January 26, 2016 6:27 PM
To: Marksberry, Don <Don.Marksberry@nrc.gov>
Subject: RE: RISC Internal

It is. See option 2 in the attachment...

-----Original Message-----
From: Marksberry, Don
Sent: Tuesday, January 26, 2016 1:15 PM
To: Coyne, Kevin
Subject: Re: RISC Internal

Is this going to be the beginning of the end as we know it?

From: Correia, Richard
Sent: Tuesday, January 26, 2016 9:40 AM

To: West, Steven; Nakoski, John; Circle, Jeff; Drouin, Mary; Lund, Louise; Marksberry, Don; Coyne, Kevin; Tregoning, Robert
Subject: Fw: RISC Internal

Fyi
Rich
Send by BlackBerry

----- Original Message -----
From: Montecalvo, Michael
Sent: Tuesday, January 26, 2016 08:53 AM
To: Correia, Richard
Subject: RE: RISC Internal

Rich,
Below is the agenda, I also resent the scheduler with the information.
Thanks,
Mike

1. Vision going forward for the Risk-Informed Steering Committee – Bill Dean

2. PRA Technical Adequacy Working Group update – Stacey Rosenberg

3. Brief on FLEX strategies in risk-informed decision making – Sunil Weerakkody

4. Discussion on the use of licensee PRA models in regulatory processes – Michael Montecalvo

5. Brief on aggregation of risk results and decision making – Jeff Mitman

6. Uncertainty workshop results – Mary Drouin

7. Alternate approach to risk-informing GSI-191 – CJ Fong

-----Original Message-----
From: Correia, Richard
Sent: Monday, January 25, 2016 4:13 PM
To: Montecalvo, Michael
Subject: RISC Internal

Mike. Do we have an agenda?

Thx

Rich
Rich
Send by BlackBerry

Coyne, Kevin

From: Circle, Jeff
Sent: Wednesday, January 27, 2016 6:40 AM
To: Correia, Richard; Appignani, Peter; Lund, Louise; Coyne, Kevin
Subject: RE: Licensee PRA models

It is a bit past the rumor state.

Jeff A. Circle
Chief (acting)
Probabilistic Risk Assessment Branch
RES /Division of Risk Analysis
(301) 415-1152
BB (b)(6)

From: Correia, Richard
Sent: Tuesday, January 26, 2016 11:18 AM
To: Appignani, Peter <Peter.Appignani@nrc.gov>; Lund, Louise <Louise.Lund@nrc.gov>; Coyne, Kevin <Kevin.Coyne@nrc.gov>; Circle, Jeff <Jeff.Circle@nrc.gov>
Subject: Re: Licensee PRA models

Many thanks Pete. Jeff heard rumors NRR was setting uP a pilot. I assume its a SNC plant given their CNO volunteered.
Rich
Send by BlackBerry

From: Appignani, Peter
Sent: Tuesday, January 26, 2016 10:31 AM
To: Correia, Richard; Lund, Louise; Coyne, Kevin; Circle, Jeff
Subject: Re: Licensee PRA models

Rich

It conforms many of the issues in our presentation to Weber/West
I'm working on your comments and this may help.

Pete

From: Correia, Richard
Sent: Tuesday, January 26, 2016 9:38 AM
To: Lund, Louise; Coyne, Kevin; Circle, Jeff; Appignani, Peter
Subject: Fw: Licensee PRA models

NRR is "piloting" the use of a licensee's PRA. I told Joe Giitter we were doing a cost benefit analysis. Collaboration is next.
Rich
Send by BlackBerry

From: Giitter, Joseph
Sent: Tuesday, January 26, 2016 09:34 AM
To: Correia, Richard
Subject: Fw: Licensee PRA models

FYI. I told Mike about your effort to do a cost-benefit and suggested that we work together. Thanks Rich.

From: Montecalvo, Michael
Sent: Tuesday, January 26, 2016 7:58 AM
To: Giitter, Joseph; Weerakkody, Sunil
Cc: Humberstone, Matthew; Felts, Russell
Subject: Licensee PRA models

Joe/Sunil,
This is what I plan to speak from concerning use of licensee PRA models at the internal RISC tomorrow. I put it together based on the POP that you used to brief Bill when the user need was going through approvals. Please let me know if you have any comments.
Thanks,
Mike

Coyne, Kevin

From: Krsek, Robert
Sent: Tuesday, January 26, 2016 7:47 PM
To: Coyne, Kevin
Subject: Re: Licensee PRA models

Speechless...

From: Coyne, Kevin
Sent: Tuesday, January 26, 2016 05:54 PM
To: Krsek, Robert
Subject: FW: Licensee PRA models

Take a look at Option 2... God help us...

From: Correia, Richard
Sent: Tuesday, January 26, 2016 9:38 AM
To: Lund, Louise; Coyne, Kevin; Circle, Jeff; Appignani, Peter
Subject: Fw: Licensee PRA models

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Send by BlackBerry

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To: Correia, Richard
Subject: Fw: Licensee PRA models

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Cc: Humberstone, Matthew; Felts, Russell
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Thanks,
Mike

Option 1 – Status Quo – Continue to update about 8-12 SPAR models per year and develop new All Hazard (including fire and seismic hazards) SPAR models.

Advantages:

- Provide a means to maintain an independent assessment tool from that of the licensees.
- Provides an enhanced public confidence in that the regulator will arrive at a conclusion based on a diverse path from that of the licensee.
- Enables staff to assess risk-significance of various plants on a common basis.
- Enables NRR staff to support management efforts to risk-inform regulatory decisions on generic or plant specific basis.

Disadvantages:

- Requires staff to expend resources to update and/or develop models.

Discussion:

Annually, NRC expends approximately $1.5 million and 3 FTEs to update and maintain the SPAR models.

PRA methods used to estimate critical parameters such as common cause failures and human error probabilities are identical (RG 1.200 compliance does not assure use of one method).

Modeling techniques and data are standardized for each plant and run on the same software platform making it possible to train NRC practitioners and use trained NRC staff to efficiently make timely assessments.

Option 2 – Results will be provided to NRC staff in order to make regulatory decisions.

Advantages:

- Will not require staff to expend additional resources to update the models.
- Allowing licensees to use RG 1.200 compliant models for SDPs may motivate them to invest resources to advance the quality of their models.
- A "certified" PRA (consistent with RMRF Option 2) would allow the licensees PRA to be the PRA of record for all regulatory actions—including SDP.

Disadvantages:

- Inhibits staff's ability provide timely, independent inputs to time-critical NRC decisions in support of NOEDs and MD 8.3s.
- May inhibit NRR's ability to effectively deal with future challenges "Aggregation" and "Integrated Risk-informed Decision Making," related challenges since staff's ability to enhance external events risk assessments will be affected.
- Inhibits staff's ability to evaluate generic issues affecting the nuclear fleet.
- Inhibits staff's ability to provide input to regulatory basis documents for potential rulemaking efforts.
- May negatively affect public perception of the independence of our regulatory processes.

Discussion:

This is the option the industry would prefer. One key issue is what information they will provide us from their assessment to allow us to make a proper regulatory decision.

Option 3 – NRC staff will be given access and training to run licensees' PRA models in support of various regulatory actions.

3a – Licensees are required to give us their model of record at some established point in the regulatory process. NRC staff would then run the analysis using the licensee PRA model instead of using the SPAR model.

3b – NRC maintains a model of record for each plant with the requirement that if the licensee updates their model they have to send us the new model within a certain time frame.

Advantages:

- Will not require staff to expend additional resources to update SPAR models.
- The most up to date model will always be used.
- May motivate licensees to develop and maintain PRA models that comply with RG 1.200.
- Although NRC is using the licensee model, the independence is maintained.
- The ability to assess generic and other fleet-wide issues will be maintained if NRC maintains a model of record.

Disadvantages:

- Will require significant resources to train multiple NRC staff members (both in NRR, NRO, and the Regions) on running licensees' models.
- Each PRA model contains important switches\House Events that requires familiarity on the part of the analyst (i.e., there can be significant training burden).
- NRC will need to maintain commercial software licenses for multiple PRA codes (e.g., CAFTA, RISKMAN, FRANX, FTREX, etc.)
- It is not likely that all licensees will grant NRC staff access to their PRA models.
- Will need to establish infrastructure similar to the SPAR models to maintain a "model of record" for each plant that would be accessible to risk analysts.

Discussion:

The potential cost savings from this approach may be limited without *all* licensees agreeing to give access to their models for NRC use.

Next Steps:

- Form a project team with individuals from NRR, RES and NRO.
- Provide a plan to pilot (Vogtle) the use of licensee PRA models and criteria to objectively evaluate the pilot.
- Evaluate the true cost of maintaining SPAR models. This is to include an evaluation of lifetime costs and needed impending upgrades (i.e. seismic).
- Evaluate true cost of using licensee PRA models. This would include software required, training to current practitioners, possible staffing increases and changes to regulatory structure, etc.

Coyne, Kevin

From: Coyne, Kevin
Sent: Tuesday, January 26, 2016 7:04 PM
To: 'Peter Appignani'
Cc: Appignani, Peter
Subject: RE: Re: [External_Sender] Re: Briefing - Using Licensee PRA models in Lieu of SPAR models

I was afraid you were going to ask for a recommendation ☺...

This is really about the path forward for the agency's risk tools – maybe focus on that. Something like – "Background and Options for NRC Risk-Informed Regulatory Tools" (not sure this quite gets there though). One other thought to ponder – we're setting up this "battle" to be the current SPAR status quo against a couple of options for use of licensee models (i.e., the patently ridiculous 'let the licensees guard' the henhouse and do the assessment and NRC access to licensee PRAs). But we've tied one hand behind our back by not offering another option for SPAR – we've left it with either we just keep the status quo or use licensee models (so if someone like Bill Dean doesn't ant the status quo, the only exit is using licensee models). I don't think we need to formalize an option for SPAR, but we should at least keep a talking point handy – I can think of a few things we could do with SPAR:

- Reduce level of effort to minimum required to maintain current model scope (with QA, help desk)
- Increase pace of all hazard model development
- Reach out to industry – maybe through the EPRI mou – to improve the coordination of SPAR updates with industry
- Others?

I just think we want to have something else on the table to offer as a SPAR option that isn't business as usual. Maybe this could be a discussion point with Mike Weber?

Keep me in the loop for the meeting rescheduling – I will do my best to attend.

Are you all dug out yet? We go a lot of snow (~3 feet – epic...).

Kevin

From: Peter Appignani [mailto:(b)(6)
Sent: Tuesday, January 26, 2016 6:47 PM
To: Coyne, Kevin
Subject: [External_Sender] Re: [External_Sender] Re: Briefing - Using Licensee PRA models in Lieu of SPAR models

Kevin

Thanks - I'm getting hit from all sides on this presentation - but not you. Thanks for that.
My saving grace this morning was NRRs brief which captured many of our cons and concerns.

I used the "name" of the meeting for the title of the slides, but that can be changed.
Any suggested titles?

The meeting was supposed to be today, hopefully you will be free when it is rescheduled.

Pete

On Jan 26, 2016, at 6:25 PM, Coyne, Kevin <Kevin.Coyne@nrc.gov> wrote:

Pete –

Really nice piece of work. Just an additional think to consider from a messaging perspective - the current presentation title ("LEVERAGING THE USE OF LICENSEES' PRA MODELS IN LIEU OF SPAR MODELS") has the implication that we do not currently leverage the licensee models. As you know very well, we make extensive use of the licensee models in building and maintaining SPAR models – and we provide ample opportunity for licensee interaction when building new SPAR modules (e.g., shutdown, all-hazard, etc). So, this isn't really a question of leveraging licensee models – we already do that quite extensively (and to the extent licensee's are willing to support that process) and as a result are able to run the SPAR program fairly efficiently. So, I would just use care to make sure that folks appreciate that we do provide licensees opportunities to be involved in the SPAR development process and utilize their PRA information when appropriate (and of course, there are times when we believe that what the licensee PRAs have is not appropriate for SPAR).

Kevin

From: Correia, Richard
Sent: Tuesday, January 26, 2016 3:07 PM
To: (b)(6) Lund, Louise; Circle, Jeff; Coyne, Kevin
Subject: Re: [External_Sender] Re: Briefing - Using Licensee PRA models in Lieu of SPAR models

Fantastic and thanks Pete. Messaging is critical here. NRR has some of the basic information, missing much IMO and I'm not sure they understand other parts. For example, "complying" with RG 1.200 will not assure consistency between licensees' PRA that way SPAR model do.
Rich
Send by BlackBerry

From: Peter Appignani [mailto (b)(6)
Sent: Tuesday, January 26, 2016 02:58 PM
To: Correia, Richard; Lund, Louise; Circle, Jeff; Coyne, Kevin
Subject: [External_Sender] Re: Briefing - Using Licensee PRA models in Lieu of SPAR models

Rich
I believe I made the changes you requested.
Changed the one page POP as indicated.
Made changes to the slides you requested.
Added an advantages slide – I just used the Advantages from NRRs brief to the RISC (you sent it to us today and is attached here) and will include it in the briefing package as background info
In place of your "Slide 3: we should have a few bullets on the contents of the 2007 NEI letter first", I added a slide on the 2007 NEI Letter – see: **August 2007 NEI Commission Briefing on Risk-Informed Regulation**
I also added an Industry and NRC Use of PRA Today slides – a starting point
Will be adding a list of Inspection Manual Chapters relevant to this discussion to the briefing package as background info – there are several
Answers to your 3 questions:
Slide 2: where did we get rebaselineing cost assumptions? **Ben Beasley, he is doing the rebaselineing cost estimates for NRR.**
Slide 3: did OGC concur/NLO on the EDO's letter to NEI in 2007? **OGC concurred 9/14/2007, see concurrence block and I verified it in ADAMS**

Slide 6: Last bullet: do licensee have capability to perform system and component studies? If so, would it take significant modifications to do so? I believe they (a global industry effort) could perform the studies. However, the issues range from "how will the study be managed" to logistics issues, consistency issues and others. Who will manage the study? NEI, the Owners Groups, INPO? All of the licensee's will need to agree on a schedule and provide resources to do so. The consistency of the licensee PRAs will be a challenge since the licensee's component and system boundaries are not consistent. Once the information is provided, then who pulls all of the information together and who does the statistical analysis? IMHO, this will make an already complex and costly process much more difficult, more time consuming and more costly. But if the licensee's are willing to take it on at their expense ...
I'm only attaching the POP, the Slides and your requested changes so you can easily review.

Pete

On Jan 25, 2016, at 2:15 PM, Appignani, Peter <Peter.Appignani@nrc.gov> wrote:

From: Correia, Richard
Sent: Monday, January 25, 2016 1:54 PM
To: Appignani, Peter; Circle, Jeff
Cc: Lund, Louise
Subject: Fw: Briefing - Using Licensee PRA models in Lieu of SPAR models

Pete. Jeff. These are the notes I sent louise to review. I didn't send them to you because I wanted her input too so we wouldn't send 2 sets. I haven't heard from Louise so you can consider my comments.
Rich
Send by BlackBerry

----- Original Message -----
From: Correia, Richard
Sent: Friday, January 22, 2016 04:35 PM
To: Lund, Louise
Subject: Fw: Briefing - Using Licensee PRA models in Lieu of SPAR models

Hi Louise. I read thru Pete's package and have a few thoughts that I prefer to get you input first. see attached. stay warm and safe.

rich

Richard P. Correia, PE
Director, Division of Risk Analysis
RES
US NRC

From: Appignani, Peter
Sent: Thursday, January 21, 2016 9:21 PM
To: Correia, Richard
Cc: Lund, Louise; Ning, Lauren (Killian); Circle, Jeff
Subject: Briefing - Using Licensee PRA models in Lieu of SPAR models

Rich

Please find attached the briefing package for the RES Office Director and Deputy Director. The changes discussed during the prebrief have been incorporated. The file has been bookmarked for ease of navigation and paginated to allow for tabs to be added for the presentation (blank pages).

For convenience, the contents of the briefing are listed below.

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Pete

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3. Letter from J. E. Dyer, Director NRR, to NEI, July 2007, ML071990509

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7. SPAR Model Philosophy Rev. 1.pptx

8. Outline Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models

<Briefing to Weber-West Use of Licensee PRA in lieu of SPAR models r1.pdf><BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR rcorreia comments jan 22.docx><BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR rcorreia comments jan 22.docx>

Lund, Louise

From: Correia, Richard
Sent: Monday, January 25, 2016 4:11 PM
To: Lund, Louise; Appignani, Peter; Circle, Jeff
Subject: Re: Briefing - Using Licensee PRA models in Lieu of SPAR models

Good points louise. IMHO, we need to continue to have independent capability for inspection and enforcement, ASP, Generic Issue and rulemaking analyses. Licensing may be different.
Rich
Send by BlackBerry

----- Original Message -----
From: Lund, Louise
Sent: Monday, January 25, 2016 03:34 PM
To: Correia, Richard; Appignani, Peter; Circle, Jeff
Subject: Re: Briefing - Using Licensee PRA models in Lieu of SPAR models

Some thoughts - We definitely make the case that using licensee PRA models in lieu of SPAR models introduces inconsistency and less independence, but we have to be ready to discuss what level of independence is really necessary (in contrast to many other areas where we don't provide this level of independent review and analysis) and the impact of varying levels of inconsistency. If, as we note in the slides, the inconsistency between the licensees models and the SPAR models comes from the inputs, etc., at some point would we be ok with just agreeing with these factors and not running the models ourselves. Or do the other regulatory needs that we list besides the SDP require that we still hang onto running the SPAR models nonetheless?

From: Correia, Richard
Sent: Monday, January 25, 2016 1:54 PM
To: Appignani, Peter; Circle, Jeff
Cc: Lund, Louise
Subject: Fw: Briefing - Using Licensee PRA models in Lieu of SPAR models

Pete. Jeff. These are the notes I sent louise to review. I didn't send them to you because I wanted her input too so we wouldn't send 2 sets. I haven't heard from Louise so you can consider my comments.
Rich
Send by BlackBerry

----- Original Message -----
From: Correia, Richard
Sent: Friday, January 22, 2016 04:35 PM
To: Lund, Louise
Subject: Fw: Briefing - Using Licensee PRA models in Lieu of SPAR models

Hi Louise. I read thru Pete's package and have a few thoughts that I prefer to get you input first. see attached. stay warm and safe.

rich

Richard P. Correia, PE
Director, Division of Risk Analysis

RES
US NRC

From: Appignani, Peter
Sent: Thursday, January 21, 2016 9:21 PM
To: Correia, Richard
Cc: Lund, Louise; Ning, Lauren (Killian); Circle, Jeff
Subject: Briefing - Using Licensee PRA models in Lieu of SPAR models

Rich

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BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
LEVERAGING THE USE OF LICENSEES' PRA MODELS IN LIEU OF SPAR MODELS

BRIEFERS:

Rich Correia General comment: it occurred to me that this presentation and information makes a case that there would be NO benefit to using licensees" PRAs. I know that's how we feel but can we say ANYTHING positive about using licensees' PRAs? We would "save" $1.9M/year??

Louise Lund

Jeff Circle

Peter Appignani Lauren Ning

PURPOSE:

For office staff and DRA management to inform the OD/DOD of the various items to consider:

- Proposal to adopt the use of licensees' PRA models in lieu of SPAR models for ~~oversight and Congressional~~ regulatory applications and reporting activities.
- Areas of consideration and challenges faced in developing an NRC pilot program to adopt one or multiple licensee models to explore its feasibility.

EXPECTED OUTCOMES:

- Provide Senior RES management with key talking points pertaining to the use of licensee PRA models for SDP and other risk-informed regulatory activities.
- OD and DOD will have an understanding of the issues influencing the office and the agency ~~when representing RES~~ during interactions with internal and external stakeholders ~~at~~ (e.g., the Risk-Informed Steering Committee (RISC) meetings) ~~on this subject~~.

PROCESS:

- High-level summary discussion of the issues and concerns.
  - Budget and funding impacts
  - Impact on regulatory activities
  - Internal and external stakeholders
  - Challenges

Comments on slides

Slide 2: where did we get rebaselineing cost assumptions?

Slide 3: we should have a few bullets on the contents of the 2007 NEI letter first

Slide 3: did OGC concur/NLO on the EDO's letter to NEI in 2007?

Slide 6: add "voluntary submittals" to the 2nd bullet

Last bullet: do licensee have capability to perform system and component studies? If so, would it take significant modifications to do so?

Slide 7, 1st bullet: start with "Risk analyses using a SPAR model or a licensee PRA model are often..."

Slide 9: add NGOs to the list of stakeholders

Appignani, Peter

From: Appignani, Peter
Sent: Monday, January 25, 2016 9:05 AM
To: Correia, Richard; Lund, Louise; Ning, Lauren (Killian); Circle, Jeff
Subject: Re: DISCUSSION WITH RES/DRA STAFF ON LEVERAGING LICENSEES' MODELS IN LIEU OF SPAR

Rich

Can we get your comments.

Pete

From: Correia, Richard
Sent: Sunday, January 24, 2016 5:10 PM
To: Lund, Louise; Appignani, Peter; Ning, Lauren (Killian); Circle, Jeff
Subject: DISCUSSION WITH RES/DRA STAFF ON LEVERAGING LICENSEES' MODELS IN LIEU OF SPAR

All. We may have to reschedule this meeting given the weather and travel situation and I sent Louise some comments that need to be resolved before we meeting with Mike and Steve.
Rich
Send by BlackBerry

Siu, Nathan

From: Correia, Richard
Sent: Friday, January 22, 2016 7:16 AM
To: Circle, Jeff; Coyne, Kevin; Lund, Louise; Nakoski, John; Nicholson, Thomas; Peters, Sean; Salley, MarkHenry; Schroer, Suzanne; Siu, Nathan; Stutzke, Martin
Cc: Appignani, Peter; Ferrante, Fernando; Gonzalez, Michelle; Helton, Donald; Hudson, Daniel; Kuritzky, Alan; Leschek, Walter; Li, Ming; Ning, Lauren (Killian); Sancaktar, Selim; Wessels, Steven; Wood, Jeffery
Subject: Re: NEW OpE COMM: Oconee Special Inspection for Startup Transformers Cable Degradation

Thanks Jeff. Wonder what the licensees rick analysis results were?
Rich
Send by BlackBerry

From: Circle, Jeff
Sent: Thursday, January 21, 2016 01:03 PM
To: Correia, Richard; Coyne, Kevin; Lund, Louise; Nakoski, John; Nicholson, Thomas; Peters, Sean; Salley, MarkHenry; Schroer, Suzanne; Siu, Nathan; Stutzke, Martin
Cc: Appignani, Peter; Ferrante, Fernando; Gonzalez, Michelle; Helton, Donald; Hudson, Daniel; Kuritzky, Alan; Leschek, Walter; Li, Ming; Ning, Lauren (Killian); Sancaktar, Selim; Wessels, Steven; Wood, Jeffery
Subject: FW: NEW OpE COMM: Oconee Special Inspection for Startup Transformers Cable Degradation

FYI. More cable problems with Oconee and another successful quick use of our SPAR models.

Jeff A. Circle
Chief (acting)
Probabilistic Risk Assessment Branch
RES /Division of Risk Analysis
(301) 415-1152
BB (b)(6)

From: Nolan, Catherine
Sent: Thursday, January 21, 2016 12:37 PM
To: OPECOMM_ALL <OPECOMM_ALL@nrc.gov>; OPECOMM_ELECTRPWRSYS <OPECOMM_ELECTRPWRSYS@nrc.gov>; OPECOMM_HUMANPERF <OPECOMM_HUMANPERF@nrc.gov>; OPECOMM_INSPECTIONPROG <OPECOMM_INSPECTIONPROG@nrc.gov>; OPECOMM_QAVENDOR <OPECOMM_QAVENDOR@nrc.gov>; OPECOMM_SITAIT <OPECOMM_SITAIT@nrc.gov>
Subject: NEW OpE COMM: Oconee Special Inspection for Startup Transformers Cable Degradation

This email is being sent to notify recipients of a new OpE COMM in ADAMS (ML16021A213)

Oconee Special Inspection for Startup Transformers Cable Degradation

Summary

On December 7, 2015, an auxiliary operator on rounds at Oconee discovered one of the phases of the Unit 3 safety-related startup transformer was disconnected at the phase bushing. After isolation and repair, the licensee sent the connector and wire to a laboratory for analysis. Initial verbal communication between the lab and Oconee indicates that cyclic fatigue was the potential cause of the failure. Additionally, the Unit 1 startup transformer showed damage at the connections as well. Moreover, the staff concluded that this event could involve repetitive failures or events involving safety-related equipment or deficiencies in operations. The conditional core damage probability (CCDP) for this event was in the overlap region between a Special Inspection and an Augmented Inspection; however, it was determined that the appropriate level of NRC response was a Special Inspection.

This OpE COMM is being distributed to the following groups: Electrical Power Systems; Human Performance; Inspection Programs; QA & Vendor Issues; SIT & AIT; All COMMs

To unsubscribe from this distribution list, or to subscribe to a different list in the OpE Community, please visit: http://nrr10.nrc.gov/rps/dyn/subscription1.cfm
For more information on the Reactor OpE Program, please visit our SharePoint site.

Thank you reviewing and using Operating Experience.

Appignani, Peter

From: Correia, Richard
Sent: Friday, January 22, 2016 7:01 AM
To: Appignani, Peter
Cc: Lund, Louise; Ning, Lauren (Killian); Circle, Jeff
Subject: Re: Briefing - Using Licensee PRA models in Lieu of SPAR models

Thanks Pete. Louise and I will review and get back to you should we suggest changes and then send them to Mike and Steve. Stay safe Rich Send by BlackBerry

----- Original Message -----
From: Appignani, Peter
Sent: Thursday, January 21, 2016 09:21 PM
To: Correia, Richard
Cc: Lund, Louise; Ning, Lauren (Killian); Circle, Jeff
Subject: Briefing - Using Licensee PRA models in Lieu of SPAR models

Rich

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8. Outline Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models

Appignani, Peter

From: Appignani, Peter
Sent: Thursday, January 21, 2016 9:22 PM
To: Coyne, Kevin
Subject: Fw: Briefing - Using Licensee PRA models in Lieu of SPAR models
Attachments: Briefing to Weber-West Use of Licensee PRA in lieu of SPAR models r1.pdf

Kevin

FYI

Pete

From: Appignani, Peter
Sent: Thursday, January 21, 2016 9:21 PM
To: Correia, Richard
Cc: Lund, Louise; Ning, Lauren (Killian); Circle, Jeff
Subject: Briefing - Using Licensee PRA models in Lieu of SPAR models

Rich

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Ning, Lauren (Killian)

From: Ning, Lauren (Killian)
Sent: Tuesday, January 19, 2016 6:36 PM
To: Circle, Jeff
Cc: Peter Appignani (Peter.Appignani@nrc.gov)
Subject: Graphic - comparing SPAR and licensee models RE: Far ey-2 AFW
Attachments: Examples-SPAR and licensee model structures_2.01.docx

Hi Jeff,

Based on our conversations, here is a graphic that may be useful in comparing SPAR and licensee model structures. (Note - I left some room at the top of page 3 to drop in an ET-type image from the Farley licensee model that you mentioned today you might want to find. Please send me the pdf of the Farley ET and I will put it in.) We can touch bases in the morning about it if you would like.

Lauren

From: Circle, Jeff
Sent: Wednesday, January 13, 2016 11:24 AM
To: Appignani, Peter <Peter.Appignani@nrc.gov>; Ning, Lauren (Killian) <LaurenKillian.Ning@nrc.gov>
Subject: Farley-2 AFW

Pete and Lauren,

For either of you who have CAFTA, here is AFW extracted out of the Farley-2 model that I had gotten about 8 years ago from the licensee. I also put it in PDF. Please take a look and see if you can use it for a graphical presentation to management on how different a licensee's model is despite conveying the same information.

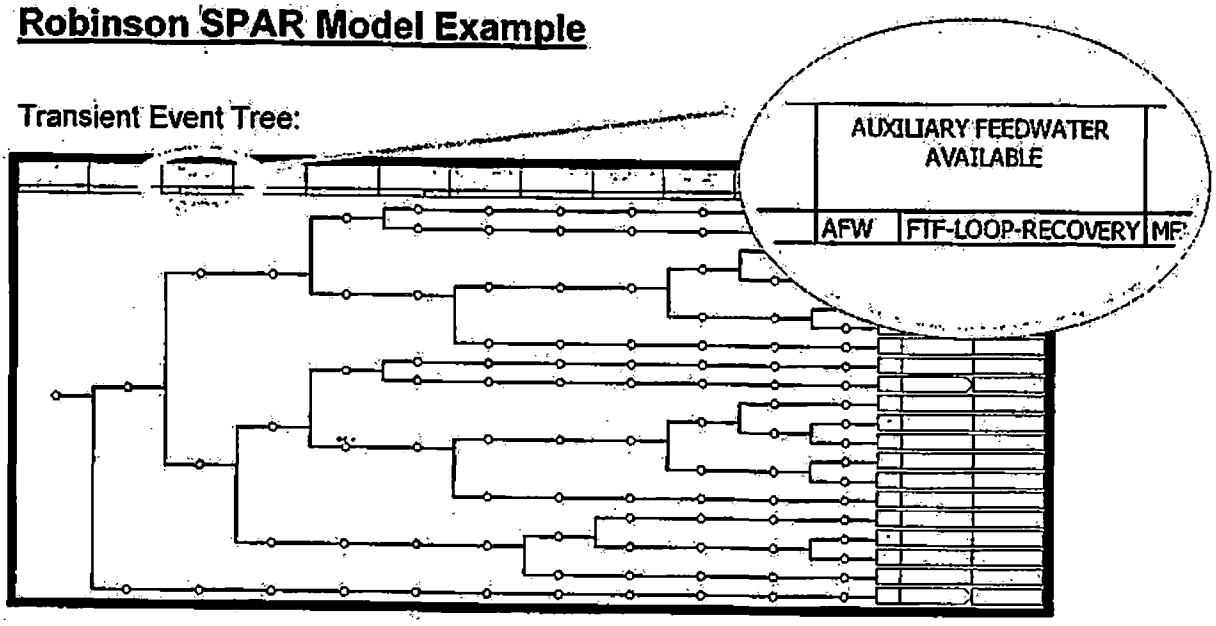
I realize that we need to schedule a briefing with Mike Weber/Steve West on this before they go to the RISC internal meeting on 1/27/16 so, I'd like to speak with both of you right after Pete's one-on-one with me.

Thanks,
Jeff.

Jeff A. Circle
Chief (acting)
Probabilistic Risk Assessment Branch
RES /Division of Risk Analysis
(301) 415-1152
BB (b)(6)

Robinson SPAR Model Example

Transient Event Tree:

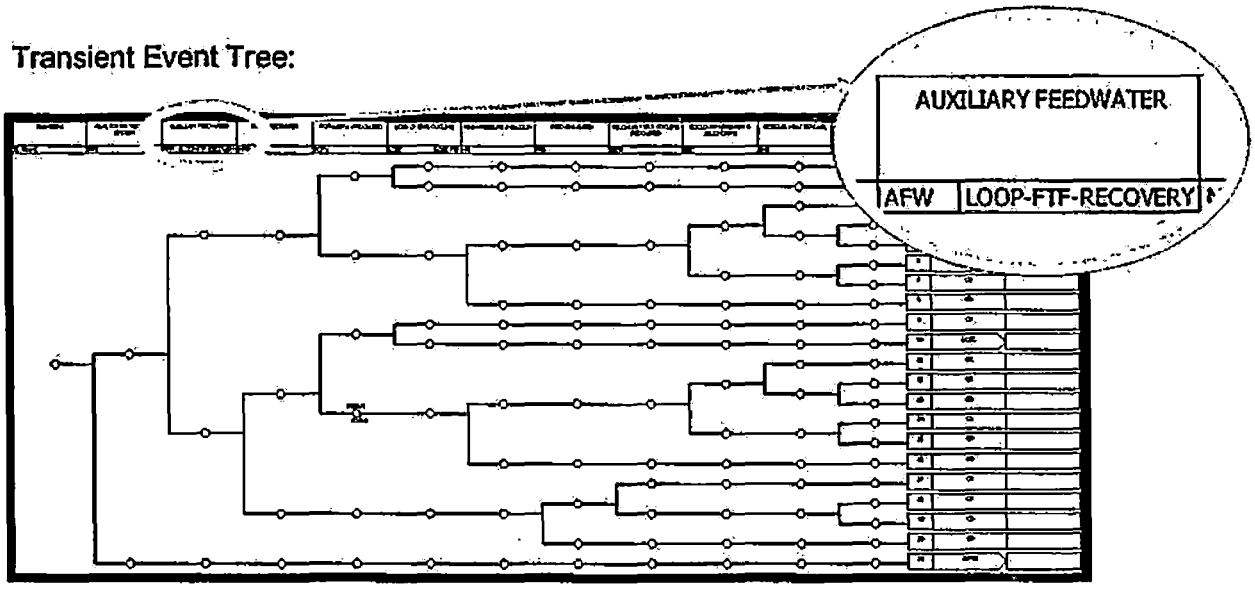


AWF Fault Tree:

(b)(4)

Harris SPAR Model Example

Transient Event Tree:



AWF Fault Tree:

(b)(4)

Licensee Model Example [Farley]

(b)(4)

Coyne, Kevin

From: Coyne, Kevin
Sent: Tuesday, January 19, 2016 5:22 PM
To: Appignani, Peter
Subject: RE: Briefing to Weber-West Use of Licensee PRA in lieu of SPAR models

Pete –

Your presentation materials looked great. Unfortunately, I will not be able to make it to the briefing (have another conflict), but I did want to make sure you highlighted a couple of items with your cost estimate:

- Inefficiencies with use of licensees models was not evaluated – this probably ok, but I think you need to make sure folks understand that this could be a significant expense and delays on what is a time critical agency program. Things like loss of the CCF module will cause a significant resource cost that should be noted.

- The costs of doing reg analysis and safety studies will also be impacted as we will not be able to automate the process using a consistent set of data templates.

- Licensee's PRAs do not always have the same capabilities that our models do – I think you other slides touch on this, but loss of these capabilities (like offsite power modeling, CCF, hra, etc.) will increase the costs of actually using licensee models since some things will need to be done "off-line".

Good luck...

From: Appignani, Peter
Sent: Tuesday, January 19, 2016 11:00 AM
To: Circle, Jeff <Jeff.Circle@nrc.gov>; Ning, Lauren (Killian) <LaurenKillian.Ning@nrc.gov>
Subject: RE: Briefing to Weber-West Use of Licensee PRA in lieu of SPAR models

As requested, a PowerPoint presentation is attached.
This is the same as pages 2 thru 4 of the previous package
Also attached the 1 page POP

From: Appignani, Peter
Sent: Friday, January 15, 2016 12:04 PM
To: Circle, Jeff (Jeff.Circle@nrc.gov) <Jeff.Circle@nrc.gov>; Ning, Lauren (Killian) (LaurenKillian.Ning@nrc.gov) <LaurenKillian.Ning@nrc.gov>
Subject: Briefing to Weber-West Use of Licensee PRA in lieu of SPAR models

All

The revised briefing is attached – in its entirety with all material as an Adobe Acrobat doc and the MS Word doc.
Please track changes using the MS Word doc

The cost estimate/comparison is also included as an Excel file

In addition to the short brief, Kevin's Key Talking points are included, along with a copy of the Letter to NEI from OEDO on Use of SPAR models (2007, ML072490566)

The following is also included as Background info (I bookmarked to file for easy navigation):

1. SPAR Level 1 Model Development.pptx
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8. Outline Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models

Not attached to the briefing, but enclosed here, is NEI's Industry recommendations for Project AIM 2020

Pete

Circle, Jeff

From: Circle, Jeff
Sent: Thursday, January 14, 2016 4:42 PM
To: Aikins-Afful, Anita
Subject: Schedule Meeting

Anita,

Please schedule a ½ hour meeting for Rich, Louise, Pete Appignani, Lauren Ning, and myself for 1/20/16 from 11:30AM to 12Noon. The topic is, "Pre-brief on Leveraging Licensees Models"

Thanks,
Jeff.

Jeff A. Circle
Chief (acting)
Probabilistic Risk Assessment Branch
RES/Division of Risk Analysis
(301) 415-1152
BB (b)(6)

Ning, Lauren (Killian)

From: Circle, Jeff
Sent: Thursday, January 14, 2016 8:29 AM
To: Appignani, Peter
Cc: Ning, Lauren (Killian)
Subject: RE: POP and other docs for todays meeting about SPAR vs Lic models
Attachments: Letter to NEI Marvin Fertel - ML072490540.pdf

You missed one. This was our response to the Aug 2007 commission meeting.

Jeff A. Circle
Chief (acting)
Probabilistic Risk Assessment Branch
RES /Division of Risk Analysis
(301) 415-1152
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From: Appignani, Peter
Sent: Thursday, January 14, 2016 8:24 AM
To: Circle, Jeff <Jeff.Circle@nrc.gov>
Cc: Ning, Lauren (Killian) <LaurenKillian.Ning@nrc.gov>
Subject: POP and other docs for todays meeting about SPAR vs Lic models

See attached

Cost Estimate Using Licensee Models
Cost Based on NRR Rebaselining Values

Initial costs in $	Initial costs in FTE	Ongoing Annual costs in $	Ongoing Annual costs in FTE	Activities	
$5,621,918	32.88			1.Review Licensee PRAs (assumes 80 different PRAs) - A typical Level 1 industry peer review takes approximately 75 person/days (5 people for about 3 weeks)	
					Staff will need to gain an in-depth understanding of each unique model, including
					• Modeling assumptions
					• Modeling conventions
					• Naming schemes (basic events, fault trees, event tress, etc.)
					• Post processing rule construction
					• Other ...
				Note: loss of standardization may require additional SRAs - see item 8 below	
		$562,192	3.29		Review updated/revised PRAs (assume 10%/year)
$974,466	5.70	$487,233	2.85	2. Coordinate logistics with industry and staff (assumes 4 FTE initially, then 2 FTE ongoing)	
					Receive and process submittal (assumes the models will be proprietary)
					Create and manage reference library (assumes both digital and hardcopy)
					Coordinate review of revised PRA
					Duplicate and distribute models and software
					Industry User Groups (software, others)
					Provide limited Technical Support to SRAs
$730,849	4.27	$365,425	2.14	3. RASP Handbook Revisions- Provides for uniformity of assessments - based on the Standardized SPAR Models	
					Assumes 3 FTE for initial major revision and 1.5 FTE for at least the first few years
				4. Software Licensee's	
$10,000		$10,000			CAFTA (EPRI) - Includes FTREX, actual current cost
$10,000		$10,000			WinNUPRA (Scientech) - estimated
$10,000		$10,000			Riskman (ABS Consulting) - estimated
$10,000		$10,000			RiskSpectrum (Lloyd's Register Consulting, Sweden) - estimated (may not be needed)
	0.23		0.23		
				5. Training on new software (initial training assume 5 days each for 25 staff)	
$117,123	0.68	$23,425	0.14		CAFTA (EPRI)
$117,123	0.68	$23,425	0.14		WinNUPRA (Scientech)
$117,123	0.68	$23,425	0.14		Riskman (ABS Consulting)
$117,123	0.68	$23,425	0.14		RiskSpectrum (Lloyd's Register Consulting, Sweden) (may not be needed)
		$168,658	0.99	6. Loss of SAPHIRE reporting features and other automation tools (assume 36 in-depth SDPs/year)	
					Additional time required to perform and document each analyses (assumes 40 extra hours per evaluation)
					Includes offline computation reviews
		$0		***7. Technical support - similar to current support provided by INL ** Too many unknowns to estimate*** ***Currently spending about $500k/year***	
		$255,800	1.50	8. Support MD 8.3 - NRC Incident Investigation Program, Notice of Enforcement Discretion (NOEDs), technical basis for rulemaking, generic issues and other risk-informed licensing related activities (estimated 1.5 FTE)	
$7,835,726	**45.82**	**$1,973,005**	**11.54**	**TOTAL assuming no additional SRAs**	
		$974,466	5.70	9. One additional SRA per Region	
$7,835,726	**45.82**	**$2,947,471**	**17.24**	**Total if additional SRAs are required**	
			17.24		
Assumptions:					
$117.12	per hour				
1460 hours = 1 FTE					
From NRR Rebaselining assumptions					
1 FTE =	$171,000				

Appignani, Peter

From:	Weber, Michael
Sent:	Monday, November 09, 2015 6:30 AM
To:	RES Distribution
Cc:	Tracy, Glenn; Chen, Yen-Ju; Vietti-Cook, Annette; Steger, Christine; Ficks, Ben
Subject:	FYI - DIRECTOR's GREETINGS FOR MONDAY, 9 NOVEMBER

WHY WASH-1400 IS IMPORTANT TO YOU

Good morning! I hope that you enjoyed your weekend and are returning to work invigorated. We celebrate this week National Radiation Protection Professionals Week (November 8 – 14). This weeklong observance is dedicated to recognizing radiation protection professionals for their contributions to public safety. Here in RES we have a solid team of radiation protection professionals, who join colleagues throughout the NRC in ensuring protection of the public safety and security on a daily basis. In fact, in DSA, we have the only branch in the agency called the Radiation Protection Branch. So join us this week in celebrating the work that you do to accomplish radiation safety!

We have a treat in store for you this morning with a seminar focused on "WASH-1400 and the Origins of Probabilistic Risk Analysis in the Nuclear Industry." The seminar features NRC Historian Tom Wellock and former Director of Nuclear Regulatory Research Bob Budnitz. Felix Gonzalez coordinated the seminar for RES, along with Christine Steger of OCHCO and SECY. The seminar begins at 10:00 in the TWFN Auditorium and should be lively and informative. If you are conducting PRAs, using the risk insights from them, and helping make them possible (should be just about everyone in the office), please join us for this seminar as part of the agency's KNOWvember celebration.

So why is WASH-1400 important to you? As we'll hear at the seminar, the Atomic Energy Commission initiated the Reactor Safety Study in 1972 to estimate the probability of a severe reactor accident. The AEC recruited Norman Rasmussen from MIT along with AEC staff to use fault tree analysis to estimate the likelihood of an accident. The NRC issued WASH-1400 (NUREG 75/014) in 1975 ten months after the Congress established the agency in January of that year. The NRC press release praised the report describing it as "a realistic assessment ...providing an objective and meaningful estimate of the present risks associated with the operation of present day light water reactors in the United States." The final version of the report concluded that the risks from nuclear power plants were very small in comparison to other risks, such as fires, plane crashes, earthquakes, and tornadoes. Although the report was hailed by some, other internal and external reviewers were critical of the report.

In response to the criticisms that continued for years following the release of the report, the Commission established a Risk Assessment Review Group in July 1977 to provide advice to the Commission on the final version of the Reactor Safety Study in WASH-1400. The Review Group was chaired by Professor Harold Lewis of the University of California – Santa Barbara. Bob Budnitz was a member of this group and contributed to the so-called "Lewis Report." Although the Review Group praised the general methodology used in the report and recognized its contribution to assessing nuclear power risks, the Group was particularly critical of the executive summary of WASH-1400 and how the final report was prepared, including the peer review process and the consideration of public comments on the report. The Review Group cited the following as major achievements of the report:

- "WASH-1400 was a substantial advance over previous attempts to estimate the risks of the nuclear option."
- "WASH-1400 was largely successful in...making the study of reactor safety more rational, in establishing the topology of many accident sequences, and in delineating procedures through which quantitative estimates of the risk can be derived for those sequences for which a data base exists."
- "Despite its shortcomings, WASH-1400 provides at this time the most complete single picture of accident probabilities associated with nuclear reactors."

The Commission ultimately issued a policy statement in January 1979 that you can read at http://pbadupws.nrc.gov/docs/ML1112/ML11129A163.pdf . In the policy statement, the Commission:

- Withdrew its endorsement of the study's executive summary,
- Agreed that proper peer review is "fundamental to making sound technical decisions" and endorsed effective peer review as an integral feature of the NRC's risk assessment program,
- Accepted that absolute values of the risks presented in WASH-1400 should not be used uncritically either in the regulatory process or for public policy purposes,
- Rejected as unreliable the Reactor Safety Study's numerical estimate of overall risk of a reactor accident
- Agreed to review and correct Commission correspondence and statements involving WASH-1400 to the Congress and public

The Commission concluded the policy statement by supporting the extended use of probabilistic risk assessment in regulatory decision making, which has continued to this day and is reflected in the Commission's policy statement of 1995 on the use of Probabilistic Risk Assessment in Nuclear Regulatory Activities (see http://www.nrc.gov/reading-rm/doc-collections/commission/policy/60fr42622.pdf). These early insights are also reflected in our Principles of Good Regulation, peer review processes, use of risk results in risk-informed regulation, processes to ensure the quality of research results, and our communication of risk results to public stakeholders. As you can see, today's seminar provides a lot of context for how we operate today 40 years after the release of WASH-1400. See you there!

Mike

Michael Weber
Director of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission

301-415-1902
Mail Stop T-10B16

Coyne, Kevin

From: Ferrante, Fernando
Sent: Tuesday, January 19, 2016 5:11 PM
To: Coyne, Kevin
Subject: RE: FYI: Project Lead to for the pilot study to evaluate the cost\benefits associate with the use of licensee's PRA models

I suspect they want to pursue this unilaterally (or at least ram it through before listening to any facts).

I had a very odd exchange with Sunil at the SRA Monthly call. He mentioned Mike Montecalvo is working on a pilot but then refused to say what the topic was (when I asked). In fact, some NRR folks on the call said this was not ready for prime time and then refused to talk further about it. When I asked again why so much secret, Sunil said "this is nothing you haven't seen before, Fernando" without any more details. Later, I received this email indirectly (the original email was also not sent to me) stating this was the topic. It was all very bizarre. Ironically, I attended the 25th year of NRC's Principles of Good Regulation seminar this morning and was surprised to hear the O in iCORE stands for Openness (I thought it had been changed to Opacity given recent events).

From: Coyne, Kevin
Sent: Tuesday, January 19, 2016 5:00 PM
To: Ferrante, Fernando <Fernando.Ferrante@nrc.gov>
Subject: RE: FYI: Project Lead to for the pilot study to evaluate the cost\benefits associate with the use of licensee's PRA models

Thanks for keeping me in the loop. Do you know why NRR is leading this charge? Rich had previously said he was going to lead the pilot. Just curious...

Kevin

From: Ferrante, Fernando
Sent: Tuesday, January 19, 2016 2:41 PM
To: Coyne, Kevin <Kevin.Coyne@nrc.gov>
Subject: FW: FYI: Project Lead to for the pilot study to evaluate the cost\benefits associate with the use of licensee's PRA models

FYI, you were not on the recipient list

From: Montecalvo, Michael
Sent: Thursday, January 14, 2016 10:29 AM
To: Weerakkody, Sunil <Sunil.Weerakkody@nrc.gov>; Arner, Frank <Frank.Arner@nrc.gov>; Bernhard, Rudolph <Rudolph.Bernhard@nrc.gov>; Cahill, Christopher <Christopher.Cahill@nrc.gov>; Cook, William <William.Cook@nrc.gov>; Deese, Rick <Rick.Deese@nrc.gov>; Freeman, Scott <Scott.Freeman@nrc.gov>; Hanna, John <John.Hanna@nrc.gov>; Kozak, Laura <Laura.Kozak@nrc.gov>; Loveless, David <David.Loveless@nrc.gov>; MacDonald, George <George.MacDonald@nrc.gov>; Valos, Nicholas <Nicholas.Valos@nrc.gov>; Wong, See-Meng <See-Meng.Wong@nrc.gov>; Circle, Jeff <Jeff.Circle@nrc.gov>; Gibbs, Russell <Russell.Gibbs@nrc.gov>; Nakoski, John <John.Nakoski@nrc.gov>; 'Replogle, George' <George.Replogle@nrc.gov>
Cc: Giitter, Joseph <Joseph.Giitter@nrc.gov>; Lee, Samson <Samson.Lee@nrc.gov>; Felts, Russell <Russell.Felts@nrc.gov>; Demers, Jerrod <Jerrod.Demers@nrc.gov>; Green, Brian <Brian.Green@nrc.gov>; Hartle, Brandon <Brandon.Hartle@nrc.gov>; Huckabay, Victoria <Victoria.Huckabay@nrc.gov>; Keefe, Molly

<Molly.Keefe@nrc.gov>; Kichline, Michelle <Michelle.Kichline@nrc.gov>; Leech, Matthew <Matthew.Leech@nrc.gov>; Lyons, Sara <Sara.Lyons@nrc.gov>; Martin, Kamishan <Kamishan.Martin@nrc.gov>; Mitman, Jeffrey <Jeffrey.Mitman@nrc.gov>; Ng, Ching <Ching.Ng@nrc.gov>; Spore, Candace <Candace.Spore@nrc.gov>
Subject: RE: FYI: Project Lead to for the pilot study to evaluate the cost\benefits associate with the use of licensee's PRA models

All,
This topic has been raised at previous internal and public Risk-Informed Steering Committee meetings, not necessarily as an agenda item, but in the discussions. This will be an agenda item at the next internal RISC meeting on 1/27 and the public RISC meeting on 2/9. The purpose of that discussion will be to introduce the project and have an open dialogue on some of the challenges and benefits from the NRC and industry, as well as the public, perspective. It is anticipated that the discussion will likely lead to further actions.
Mike

From: Weerakkody, Sunil
Sent: Thursday, January 14, 2016 9:40 AM
To: Arner, Frank <Frank.Arner@nrc.gov>; Bernhard, Rudolph <Rudolph.Bernhard@nrc.gov>; Cahill, Christopher <Christopher.Cahill@nrc.gov>; Cook, William <William.Cook@nrc.gov>; Deese, Rick <Rick.Deese@nrc.gov>; Freeman, Scott <Scott.Freeman@nrc.gov>; Hanna, John <John.Hanna@nrc.gov>; Kozak, Laura <Laura.Kozak@nrc.gov>; Loveless, David <David.Loveless@nrc.gov>; MacDonald, George <George.MacDonald@nrc.gov>; Replogle, George <George.Replogle@nrc.gov>; Valos, Nicholas <Nicholas.Valos@nrc.gov>; Wong, See-Meng <See-Meng.Wong@nrc.gov>; Circle, Jeff <Jeff.Circle@nrc.gov>; Gibbs, Russell <Russell.Gibbs@nrc.gov>; Nakoski, John <John.Nakoski@nrc.gov>
Cc: Giitter, Joseph <Joseph.Giitter@nrc.gov>; Lee, Samson <Samson.Lee@nrc.gov>; Felts, Russell <Russell.Felts@nrc.gov>; Demers, Jerrod <Jerrod.Demers@nrc.gov>; Green, Brian <Brian.Green@nrc.gov>; Hartle, Brandon <Brandon.Hartle@nrc.gov>; Huckabay, Victoria <Victoria.Huckabay@nrc.gov>; Keefe, Molly <Molly.Keefe@nrc.gov>; Kichline, Michelle <Michelle.Kichline@nrc.gov>; Leech, Matthew <Matthew.Leech@nrc.gov>; Lyons, Sara <Sara.Lyons@nrc.gov>; Martin, Kamishan <Kamishan.Martin@nrc.gov>; Mitman, Jeffrey <Jeffrey.Mitman@nrc.gov>; Montecalvo, Michael <Michael.Montecalvo@nrc.gov>; Ng, Ching <Ching.Ng@nrc.gov>; Spore, Candace <Candace.Spore@nrc.gov>
Subject: FYI: Project Lead to for the pilot study to evaluate the cost\benefits associate with the use of licensee's PRA models

All,

As you all know, there has been a renewed interest in exploring the use of licensee PRA models in our regulatory processes. Mike Montecalvo has agreed to lead the effort with Matt Humberstone, a new member of APHB, assisting. Please provide them the support they need to objectively assess the benefits and challenges of such an approach.

Mike will be reaching out to you to receive your inputs and seek your assistance as he leads this project. He will also keep you informed.

Sunil D Weerakkody, Chief
PRA Operations & Human Factors Branch
Office of Nuclear Reactor Regulation
Nuclear Regulatory Commission

Address: Mail Stop O-10 C-15, US NRC, Washington DC 20005-0001

Tel: 301-415-2870

Appignani, Peter

From: Appignani, Peter
Sent: Tuesday, January 19, 2016 11:00 AM
To: Circle, Jeff (Jeff.Circle@nrc.gov); Ning, Lauren (Killian) (LaurenKillian.Ning@nrc.gov)
Subject: RE: Briefing to Weber-West Use of Licensee PRA in lieu of SPAR models
Attachments: 1 page POP Briefing to Weber-West Use of Licensee PRA in lieu of SPAR models.pdf; LEVERAGING THE USE OF LICENSEES' PRA MODELS IN LIEU OF SPAR MODELS.pptx

As requested, a PowerPoint presentation is attached.
This is the same as pages 2 thru 4 of the previous package
Also attached the 1 page POP

From: Appignani, Peter
Sent: Friday, January 15, 2016 12:04 PM
To: Circle, Jeff (Jeff.Circle@nrc.gov) <Jeff.Circle@nrc.gov>; Ning, Lauren (Killian) (LaurenKillian.Ning@nrc.gov) <LaurenKillian.Ning@nrc.gov>
Subject: Briefing to Weber-West Use of Licensee PRA in lieu of SPAR models

All

The revised briefing is attached – in its entirety with all material as an Adobe Acrobat doc and the MS Word doc.
Please track changes using the MS Word doc

The cost estimate/comparison is also included as an Excel file

In addition to the short brief, Kevin's Key Talking points are included, along with a copy of the Letter to NEI from OEDO on Use of SPAR models (2007, ML072490566)

The following is also included as Background info (I bookmarked to file for easy navigation):

1. SPAR Level 1 Model Development.pptx
2. Letter from Don Dube (RES/DRA) to Michael D. Tschiltz, Deputy Director, NRR/DRA, Feb 28, 2007, Subject: Public Meeting Summary Regarding Use Of Standardized Plant Analysis Risk Models and Licensee Probabilistic Risk Assessment Models In The Reactor Oversight Process Held On February 22, 2007, ML070640567
3. Letter from J. E. Dyer, Director NRR, to NEI, July 2007, ML071990509
4. Letter from NEI, Aug 4, 2007, Subject: August 2 Commission Briefing on Risk-Informed Regulation
5. Letter from NEI, Dec 19, 2013, Subject: Subject: Industry Support and Use of PRA and Risk-Informed Regulation
6. NEI, Proposal for use of Licensee PRA Models in the Significance Determination Process, April, 2014
7. SPAR Model Philosophy Rev. 1.pptx
8. Outline Considerations for using other than the Standardized Plant Analysis Risk (SPAR) models

Not attached to the briefing, but enclosed here, is NEI's Industry recommendations for Project AIM 2020

Pete

Appignani, Peter

From: Circle, Jeff
Sent: Thursday, January 14, 2016 12:17 PM
To: Appignani, Peter; Ning, Lauren (Killian)
Subject: The December POP
Attachments: RES - Leveraging Licensees Models POP.docx

Jeff A. Circle
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BRIEFING TO RES OFFICE DIRECTOR AND DEPUTY DIRECTOR
LEVERAGING THE USE OF LICENSEES' PRA MODELS IN LIEU OF SPAR MODELS

Briefers: R. Correia (DRA)
P. Appignani (DRA/PRAB)
J. Circle (DRA/PRAB)

PURPOSES
For office staff and DRA management to inform the OD/DOD of the various issues associated with:

- Proposal to adopt the use of licensees' PRA models in lieu of SPAR models for oversight and Congressional reporting activities.
- Areas of consideration and challenges faced in developing an NRC pilot program to adopt one or multiple licensee models to explore its feasibility.

OUTCOMES

- Approval of the staff's plans/recommendations for providing support to NRR.
- OD and DOD will have an understanding of the issues impacting the office and the agency when representing RES at the Risk-Informed Steering Committee (RISC) meetings on this subject.

PROCESS

BACKGROUND

- The Standardized Plant Analysis Risk (SPAR) models were developed in order to produce independent and consistent individual PRA models which have fidelity to each modeled plant.
- By being developed on a standard framework, SPAR models allow for analysts and contractors to perform faster reviews when used for various oversight and operational issues.
- SPAR models and data are developed, maintained, and updated by contract to Idaho National Laboratory (INL) via NRR User Need Request (UNR). INL gathers input from licensees and NRC inspectors as well as provides technical support to HQ and regional office analysts.
- Although not a direct regulatory requirement for 10 CFR Part 50 licenses, all current operating fleet licensees have developed their own PRA models for use in various programs and initiatives.
- Over the years, some licensees along with NRR and regional senior management have questioned the necessity of using and maintaining SPAR models when licensees have developed their own. The staff addressed these questions over successive years citing several major issues.
- In light of Project AIM 2020, the NRR staff was requested to consider eliminating SPAR models due to their cost.
- After attending a September 1, 2015 public meeting on prioritization and re-baselining, NEI made the following recommendation on a September 15, 2015 letter to Fred Brown:

  "NRC should support a pilot that would evaluate how to better leverage licensee developed PRA models rather than NRC SPAR models in the Significance Determination Process (SDP).

  Considerable NRC time and resources are spent developing and maintaining Standardized Plant Analysis Risk (SPAR) models. Considerable industry time

and resources are also spent working to resolve differences between SPAR model results and site-specific PRA models. The industry models are more detailed, comprehensive and more up-to-date than SPAR models, therefore can yield more accurate insights. The NRC should support a pilot with the industry to evaluate the benefits of a Significance Determination Process that is more focused on the licensee developed model rather than the NRC SPAR model. This study would identify the steps needed to reduce cost, improve efficiency and the results of the process."

DISCUSSION

- RES staff will make a presentation to the OD and DOD on details which will address the following modeling issues:
  - SPAR model uses.
  - Consistency between SPAR and licensees' models.
  - Licensee model development and use.
  - Regulatory Guide 1.200 compliance.
  - Software platforms used.

- RES staff will discuss the various options:
  - The use of licensee models at NRC
    - Update.
    - Maintenance.
    - Technical support.
    - Cost comparisons.
  - Licensee runs model and provides NRC staff with results

- RES will discuss issues related to developing a pilot with industry and address:
  - Legal issues.
  - Selection of one or more pilot plants.
  - Licensee participation.

RECOMMENDATION/CONCLUSION

TBD.

Ferrante, Fernando

From: Circle, Jeff
Sent: Thursday, January 14, 2016 8:11 AM
To: Correia, Richard; Lund, Louise
Cc: Coyne, Kevin; Ferrante, Fernando
Subject: A Trip Down Memory Lane
Attachments: ROP Feedback with solutions R1.pptx; 2012-0081srm.pdf - Adobe Acrobat Pro.pdf; Fernando Ferrante Comments on SDP for Interview.docx; NEI Letter on ROP Comments - Jim Slider.pdf; Feedback on ROP for Joe Giitter Interview.docx; Memo for Public Mtg.pdf; ROP Independent Assessment Report.pdf; Charter for ROP Review.pdf

Colleagues,

I had mentioned yesterday that I will pull out the ROP independent assessment that was done by Brian McDermott and Dave Pelton via direction from SRM-SECY-12-0081. In my view, this is where Russ should have started off with. Dave Pelton was tasked with conducting interviews of various management and staff. I was chosen to represent our branch, APOB. Before my interview with Dave, I solicited and compiled comments from two SDP-cognizant branch members, Messrs. Mitman and Ferrante.

I went into the archives and pulled out various documents: comments from Joe Giitter, Jeff and Fernando; NEI comments from Jim Slider; my presentation to senior management; a group charter (something I wanted Russ Gibbs to see and use); and, the independent assessment report. If it will help, please feel free to forward this material.

Just for the record, I don't agree with one of the recommendations to modify the Action Matrix criteria for transition on White findings. Licensees are not concerned with the Action Matrix when they get a White finding, they are more concerned over the financial community's assessment of investment risk. That's why we hear the utility mantra, "green at any cost".

Jeff.

Jeff A. Circle
Chief (acting)
Probabilistic Risk Assessment Branch
RES /Division of Risk Analysis
(301) 415-1152
BB (b)(6)

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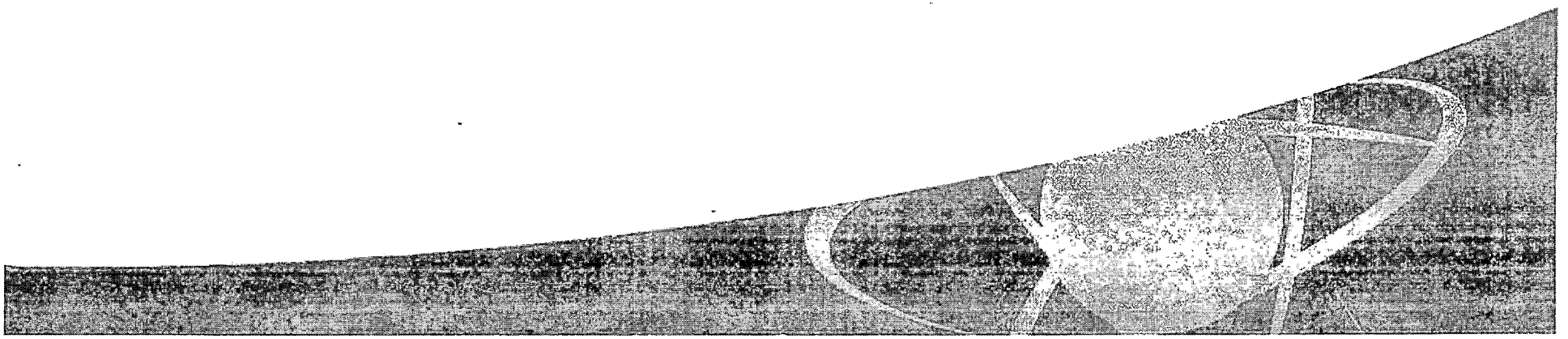
Protecting People and the Environment

ROP Feedback

With Suggested Recommendations



Purpose

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- To support management on interview with Brian McDermott on ROP assessment in response to SRM-SECY-12-0081.
- To brief management on the programmatic and technical comments obtained from stakeholders of the Significance Determination Process (SDP).

Background

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From SRM-SECY-12-081 :

- ***"The Commission would benefit from a fresh review of the practices and approaches the NRC has developed for the Reactor Oversight Program over the course of years."***
- *"The ACRS should undertake an independent review of the program's objectives and implementation, including the relative roles of headquarters and regional staff, our interactions with industry over performance indicator assessments, and the effectiveness of NRC's assessment of substantive cross-cutting issues."*
- *"Such an assessment would provide a reinforced foundation upon which the agency can plan for the operational review of new nuclear power plants based on Generation III+ reactor technology."[Chairman Macfarlane and Commissioner Magwood] .*

Information Reviewed

U.S.NRC
United States Nuclear Regulatory Commission
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- NEI Letter (J. Slider to C.Bladey, dated 1/13/12) in response to NRC 2011 solicitation questionnaire for public comments on implementation of the ROP.
- Discussions with the BC of APOB.
- Solicitation of comments and compiling them from APOB branch staff.

NEI Letter

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- NRC question 7
  - *"The Significance Determination Process* ***(SDP) results in an appropriate regulatory response to performance*** *issues. Respond 'Yes', 'No' or 'Unable to Answer' Can you recommend any improvements?"*
- NEI response identified nine areas for improvement
  - Seven of nine areas will be addressed either by revision to RASP handbook (public meeting with stakeholders scheduled in May 2013) or upcoming revised User Need Request with RES.
  - Two areas will be addressed by APLA after APOB responds to the other seven (APLA BC informed)

Discussion of Comments From APOB Staff

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- Summary of Areas of Concern
  - Potential Misunderstanding and Misuse of the Process
  - Technical Issues
  - Perception
- Areas are presented with possible staff solutions

Potential Misunderstanding and Misuse of the Process

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- The process was intended to be risk informed and not risk based.
  - Managers and staff have a tendency to be interested in hard thresholds of color assessments in lieu of using a balanced risk-informed approach.
- ***Possible solution:***
  - ***NRC stakeholders in the SDP should have training (either formal or independent study) made available and possibly required to cover concepts and expectations.***

Potential Misunderstanding and Misuse of the Process (Cont'd)

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- The "90 day clock" imposed on the regional offices and HQ to complete an SDP finding is manipulated.
  - Some regional offices will delay start of the clock to stay within the timeliness goal by "buying time" when resources are short to complete Phase 3 analyses.
- ***Possible solution:***
  - ***Review IMC-0612 to refine guidance on entry point to the 90-day period and review resource allocation.***

Misunderstanding and Misuse of the Process (Cont'd)

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- Some performance deficiencies are too narrowly focused
  - Can create a condition where one higher risk performance deficiency is broken into several individual lower risk performance deficiencies each with a lesser impact.
- ***Possible solution:***
  - ***Review and potentially revise guidance in IMC-0612 on assigning performance deficiencies.***

Technical Issues

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- Several SERP members lack technical understanding about the nature of PRA, probabilities and uncertainties.
  - This impacts decision making based on risk analysis results.
  - Crucial where differing opinions on the risk analysis results exist and the SERP panel must resolve prior to making a decision.
- ***Possible Solution:***
  - ***As an improvement to the process, there need to be better training for panel members on concepts of risk and the SDP. (See the suggested solution to "Misunderstanding and Misuse of the Process"). The technical staff (regional offices and HQ) in turn need to provide better communication to brief management panel members on the preparation and technical aspects of findings.***

Technical Issues (Cont'd)

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- Uncertainty of data and results is largely ignored.
  - SPAR models and SAPHIRE Software have the capability to quantify uncertainty and it should be factored into the decision.
- ***Possible solution:***
  - ***Better guidance and training should be made available to SRAs on uncertainty. Regional SRAs and HQ staff need to regularly communicate uncertainty insights to management panel members. Panel members need to understand the role of uncertainty in making a risk-informed decision on a finding.***

Perception

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- The process is not transparent to the public because the risk analysis is rarely made public.
- ***Possible solution:***
  - ***Some regional office do include the SERP package en masse as an attachment to the preliminary determination to the licensee, often a publicly available document. However, there is no consistency between regional offices. The recommendation is that a descriptive summary be written on how the risk increase was calculated and the rationale behind the color assessment.***

Perception (Cont'd)

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- The process was specifically written to not require the establishment of the root cause before final decision making.
  - The process rarely goes to SERP before the licensee's root cause analysis is complete which often takes many months.
- ***Possible solution:***
  - ***This is most likely the rationale for why some regional offices delay start of the timeliness goal (the 90-day clock). Guidance needs to be reviewed further.***

Perception (Cont'd)

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- Staff perception is that too much time is spent looking for conservatisms in the risk analysis and almost no time in looking for non-conservatisms.
  - The opposite has also been seen in some cases. The perception is that there is no consistency in what level of conservatism is to be used on assumptions made in the process.
- ***Possible solution:***
  - ***Development of a more structured risk-informed framework would help in qualitative decision-making.***

My two cents, since you told us not to hold back:

- There is an unhealthy excessive focus on meeting deadlines and metrics in ROP that is currently reducing the time to develop both the technical bases and a reasonable consensus on the quantitative/qualitative risk assessments between HQ and Regional Offices. There have been instances where most of the time is spent preparing the final inspection report (months) while the technical risk assessment is expected to be completed (weeks), and a consensus built (days) at lightening speed schedules . In many cases, the more complex issues were afforded an extremely limited time due to external issues unrelated to the technical complexity itself (e.g., Regional schedule pressure). The use of the "clock" and the meeting of metrics needs to be revisited to establish the actual time spent of specific portions of the inspection, risk assessment, and consensus building need to be reevaluated to shed light on the actual issues if the intent is to efficiently streamline the ROP without sacrificing the technical quality and the relationship between HQ and Regional Offices. While timeliness is important and should be continue to be collected/evaluated I am concerned that the technical analyses have been used in the past as a scapegoat for timeliness issues. If continued to be pursued aggressively, this will eventually reduce the efficiency of the Agency to appropriately support ROP risk evaluations and make the correct safety decisions.

- There is a misunderstanding among NRR and Regional Office's management of the usefulness of a properly vetted risk assessment of sufficient quality for ROP purposes. The benefits of performing more detailed/longer duration SDP analysis are more and more being contrasted against the additional inspection time that results from a specific SDP color finding with the conclusion that if the latter is higher than the former, then the technical analyses time was misspent without knowledge of the significant effort needed to characterize the risk in specific technical areas. This assumes zero benefit beyond the additional inspection time and heavily biases the "clock" against the more complex issues. If continued, this will have the impact of sending NRC staff with insufficient technical information to Regulatory Conferences to properly assess licensee information as well as potentially missing additional safety issues from carefully considering reasonably available information. In other words, the use of "best available information for ROP purposes" is being substituted for the most limited available information without discernment of what is impacted by radically reducing the amount of time to perform the technical analyses.

- From the above issues, there is also a general misconception about the use and quality of SPAR models in ROP. The SPAR models and SAPHIRE are currently the best tool available to the NRC risk community in terms of obtained the justification for independent oversight regulatory actions. While the models can always benefit from further improvement and expansion, too often SPAR models are viewed in a negative light (e.g., "too limited in details", "inaccurate") without the proper context or even without any experience in their use. There is a continuous effort to calibrate SPAR models to match the biggest risk contributors based on the licensee's PRA models and, in many cases, they contain information that is unmatched in industry models (e.g., certain external events, low power and shutdown). This is a point that should not be minimized. In the past, suggestions to rely solely on licensee models (based on PRA licensing experience) have been brought forward for budgetary reasons without consideration of the impact on (i) the independence of NRC decisions in oversight space, (ii) the consequential impoverishment of NRC technical expertise in PRA, and (iii) the lack of a credible/viable substitute vehicle for NRC risk analysts. The development of SPAR

models and their impact on the Agency's mission needs to be properly considered and supported by the Commission in ROP, including the appropriate allocation of funding and support for a reasonable, stable process to continue without the risk of continuously revisiting the existence of SPAR models and SAPHIRE project every time budgetary constraints arise.

- Despite 10+ years in existence, the use of risk information is still misunderstood in many internal discussions, especially by non-risk NRC technical staff. While the Agency has made significant strides in the use of PRA since the Commission's PRA policy statement; there is still a considerable portion on the Agency that does not understand basic risk concepts, despite having to deal with them on a regular basis through processes such as the ROP. There needs to be a continuous focus on this if the Agency plans to move forward in this area, especially in terms of risk education at the management level expected to make critical oversight decisions.

From: Circle, Jeff
Sent: Monday, March 18, 2013 2:42 PM
To: Chung, Donald; Ferrante, Fernando; Mitman, Jeffrey; Rotton, Jeff; Wong, See-Meng; Zoulis, Antonios
Cc: Weerakkody, Sunil
Subject: RE: example of an input that you could provide to Jeff Circle .....

APOBers,

Let me piggyback on to Sunil's original message to add that I appreciate your taking the time to sending me your thoughts. As if I need to say this but, don't hold back since this was an input that the Commissioners wanted to see. Please send what you have over to me by Friday, March 29, 2013. If you need more time, let me know. Afterward, I'll put all your thoughts together into one presentation of talking points for Joe in his interview with Brian. However, before that, my plan is to share the final product with all of you.

Jeff.

From: Weerakkody, Sunil
Sent: Monday, March 18, 2013 12:51 PM
To: Chung, Donald; Circle, Jeff; Ferrante, Fernando; Mitman, Jeffrey; Rotton, Jeff; Wong, See-Meng; Zoulis, Antonios
Subject: example of an input that you could provide to Jeff Circle .....

JTM Comments:

- The process was intended to be risk informed not risk based. For those analysis that are quantified (i.e., that are not based on IMC 0609 Appendix M) the decision making is strictly risk based: What is the delta CDF (or CCDP) and is it above or below a threshold?

- Many of the SERP panel members have a complete lack of understanding about probabilities and uncertainties. For example, a calculated core damage frequency of 1.01E-6 is taken by most SERP panel members to be clear indication that a threshold has been crossed and the risk level moved into a region of increased risk. While the reality is that numerically there is no distinction between 1.01E-6 and 0.99E-6 (or for that matter between 1.1E-6 and 0.9E-6 and possibly between 2E-6 and 0.5E-6).

- The "90 day clock" imposed on the Regions and HQ to complete an SDP is completely manipulated. For example there is a current example where an SDP has gone to SERP (and determined to be a performance deficiency with a risk level greater than green) and the clock had not started as of the time of the SERP. The 90 day requirement was completely managed to prevent the region from missing this metric.

- The SERP panel has one (of four) voting member that has a well-founded understanding of risk. Yet sometime the panel's decision making is based on the risk analysis where there are differing opinions on the risk analysis results which the SERP panel must resolve. In these cases the SERP panel does not have the technical knowledge to resolve differences in opinion that arise between the risk analysts that are advising the SERP.

- The SERP process spends too much time looking for conservatisms in the risk analysis and almost no time looking for non-conservatisms.

- The process is not transparent to the public because rarely is the risk analysis made public.

- The process was specifically written to not require the establishment of the root cause before final decision making. IMC 0308 clearly directs the process to focus only on the proximate cause and not to wait for the root cause. However, the process rarely goes to SERP before the licensee's root cause analysis is complete which often takes many months.

- Sometimes, the performance deficiencies are too narrowly focused such that when the risk analysis is performed on the individual PDs the risk results characterize the event or condition as a low risk. For example, with the Robinson fire event several years ago, several PDs were found and independently risk evaluated. While

composite risk to the public of the entire event was significantly higher than what the individual results indicated.

FF Comments:

I'll add one more while piggybacking on one of Jeff's comments:

- Despite significant discussion of the treatment and evaluation of uncertainty analysis in PRA within and outside the Agency in the past decades, quantitative SDP analysis are still mostly limited to mean or point estimate values and compared to the metrics in a mostly risk-based point-of-view, despite the well-known fact that that we are dealing with uncertainty ranges that can span multiple thresholds for regulatory decision-making. Current NRC PRA models (SPAR models in SAPHIRE) have been built with both the capability to input and assess uncertainty and yet this is seldom exercised, maintained or viewed as useful input information. There should be an effort to (1) assess the current uncertainty output based on the information already available in SPAR models, (2) evaluate the impact of uncertainty in both baseline CDF and ΔCDF results, and (3) consider the place of uncertainty information in the decision-making process (especially with respect to external events).

CHARTER FOR AN INDEPENDENT REVIEW

OF THE NUCLEAR REGULATORY COMMISSION'S

REACTOR OVERSIGHT PROGRAM

In the Staff Requirements Memorandum for SECY-2012-0081, "Risk-Informed Regulatory Framework for New Reactors," the Commission directed the staff to pursue an independent review of the Reactor Oversight Program to provide a reinforced foundation upon which the agency can plan for the operational review of new nuclear power plants based on Generation III+ reactor technology. The independent review will be conducted by U.S. Nuclear Regulatory Commission (NRC) staff, independent of the present stewards of the Reactor Oversight Process (ROP) in the Office of Nuclear Reactor Regulation (NRR) and the NRC staff members that initially developed the program.

Objective

Conduct an independent assessment of the ROP's objectives and implementation, including the relative roles of headquarters and regional staff, interactions with industry over performance indicator assessments, and the effectiveness of NRC's assessment of substantive cross-cutting issues.

Scope

The independent review will include the following activities:

a. Reviews of existing documentation assessing the effectiveness of the ROP in achieving its stated objectives. Examples of available products include:
   - Self-assessments by NRR
   - Inspector General audits
   - External stakeholder feedback and reviews

b. Interviews with current ROP practitioners and stakeholders. Representative interviews would include individuals such as:
   - NRC headquarters and regional staff
   - NRC headquarters and regional management
   - Non-Governmental Organization representatives
   - Industry representatives (licensee management and Nuclear Energy Institute)

c. Observations of a sample of ROP-related process interactions between NRC staff and industry.

d. Assessment of common issues and programmatic themes.

e. Development of recommendations, as appropriate, for enhancements or areas for further review.

Coordination and Communications

The independent team review will:

a. Solicit input from the ROP program office stewards, the implementers, and stakeholders

b. Remain independent of the existing ROP Enhancement[1] initiative

c. Keep the program office informed of the team's efforts

d. Develop a communications plan

Expected Product and Schedule

The independent team review will provide its observations, conclusions, and recommendations in the form of a written report to the Deputy Executive Director for Reactor and Preparedness Programs in June 2013.

Staffing

The independent review team will consist of the following members:

Leader Brian McDermott, Office of Federal and State Materials and Environmental Management Programs

Managers Eric Benner, Office of Nuclear Materials Safety and Safeguards
David Pelton, Office of Nuclear Reactor Regulation

Staff TBD

Additional team members will be added as needed to support the project's objective and elements of the review. The estimated resources for this project include part time support from an Senior Executive Service team leader, two Branch Chiefs, and four staff, over a period of five months. Staff will be added to the project following approval of the Charter and development of the data collection framework.

[1] In November 2012, NRR began a broad initiative to enhance the ROP baseline inspection program. Portions of the NRR initiative have been placed on hold pending completion of the ROP Independent Assessment, to avoid any duplication of effort.

Appignani, Peter

From: Circle, Jeff
Sent: Wednesday, January 13, 2016 2:27 PM
To: Appignani, Peter; Ning, Lauren (Killian)
Subject: POP for Meeting with Mike/Steve
Attachments: POP Template for Meeting with Mike Weber.docx

Pete, Lauren:

Please put a POP together for our briefing on 1/26. Here's a template that we've used in the past. When we sit down tomorrow, we can discuss it in more detail.

Thanks,
Jeff.

Jeff A. Circle
Chief (acting)
Probabilistic Risk Assessment Branch
RES /Division of Risk Analysis
(301) 415-1152
BB (b)(6)

RES Office Director Briefing with Division Branch Chiefs and Senior Staff

BRIEFER: <Branch Chief>

PURPOSE(S):

- Introduce OD to DRA branch chiefs and senior level staff.
- Brief OD on various branch activities and topics of interest.
- Discuss any challenges encountered with possible solutions.

EXPECTED OUTCOMES:

- OD is apprised of various branch activities.
- Enables OD to make decisions and brief the OEDO.

PROCESS:

- High level summary discussion of branch duties (charter) by the BC.
- Discussion of all branch members and their responsibilities
- Budget and funding overview of each branch.
- Introduction of individual senior level staff members.
    - Each staff member will provide a brief but more detailed technical summary of individual areas of responsibility (contracts and projects).
    - Areas to cover are:
        - Overview of the project.
        - Budgets and funding for the project.
        - Advantages to the agency.
        - Internal and external stakeholders for each project.
        - Technical challenges with possible solutions.
- Summary
    - Questions and/or requests.

Circle, Jeff

From: Circle, Jeff
Sent: Wednesday, January 13, 2016 12:35 PM
To: Flory, Shirley
Subject: Meeting with Mike Weber and Steve West

Shirley,

As we discussed here is the information for the meeting we need to have with Mike and Steve:

Topic: Discussion with RES/DRA Staff on Leveraging Licensees' Models in Lieu of SPAR

Deadline: Have this meeting prior to Steve's attendance of Risk-informed Steering Committee Meeting on 1/27/16

Proposed Date of Meeting: Tuesday, 1/26/16

Proposed Time of Meeting: 1PM-2PM

Attendees: Mike Weber
Steve West
Rich Correia
Louise Lund
Peter Appignani
Lauren Ning
Jeff Circle

Location: Mike's office

Thank you for getting this on the calendar for us.

Jeff.

Jeff A. Circle
Chief (acting)
Probabilistic Risk Assessment Branch
RES /Division of Risk Analysis
(301) 415-1152
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Circle, Jeff

From:	Circle, Jeff
Sent:	Wednesday, January 13, 2016 11:11 AM
To:	Montecalvo, Michael
Subject:	Agenda for 1-27-16 Internal RISC Meeting

Tracking:	**Recipient**	**Read**
	Montecalvo, Michael	Read: 01/13/2016 11:13 AM

Mike,

Will leveraging licensees' PRA models be on the agenda for the internal RISC meeting?

Jeff.

Jeff A. Circle
Chief (acting)
Probabilistic Risk Assessment Branch
RES /Division of Risk Analysis
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Coyne, Kevin

From: Correia, Richard
Sent: Tuesday, January 12, 2016 7:03 AM
To: Ferrante, Fernando; Coyne, Kevin
Subject: RE: Possible SPAR Replacement Pilot

Thanks Fernando for the heads up. PRAB/Jeff C and Pete A. are putting together a briefing for the RISC on this very topic. We will present a balanced perspective on SPAR and Licensees PRAs. We bring to the table a lot of experiences from the Vogtle level 3 PRA that I feel will be very insightful for the RISC.

Best

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Ferrante, Fernando
Sent: Monday, January 11, 2016 3:40 PM
To: Coyne, Kevin <Kevin.Coyne@nrc.gov>; Correia, Richard <Richard.Correia@nrc.gov>
Subject: Possible SPAR Replacement Pilot

Rich, Kevin,

Just wanted to give you a heads up of something that was discussed in the SRA Counterpart Call this afternoon. Sunil mentioned a project that Mike Montecalvo is working on towards the end but, when I asked, he refused to even give the topic of the project, let alone any details. I suspect the project is on the idea of using licensee's models in lieu of SPAR (I would be happy to be wrong here, but the only thing Sunil ventured to tell me is that "this is nothing that you haven't seen before", which is exactly what I'm worried about). My experience is that pilots in NRR are picked and implemented with a pre-determined objective as to what the insights will be (i.e., this project will be managed by folks that want to get rid of SPAR models and therefore the pilot will be predisposed to present that alternative as a smashing panacea, regardless of reality); so it's critical to interject in the embryonic stages of development as much as possible to try to prevent the damage this setup can cause. Maybe you know more about this than I do and have been involved in its inception; but I just wanted to let you know this happened today.

Thanks,
Fernando

Lee, Samson

From:	Coyne, Kevin
Sent:	Tuesday, January 07, 2014 5:48 PM
To:	Weerakkody, Sunil; Wong, See-Meng
Cc:	Marksberry, Don; Helton, Donald; Nakoski, John; Appignani, Peter; Gonzalez, Michelle; Correia, Richard; Madden, Patrick; Coe, Doug; Kozak, Laura; Giitter, Joseph; Lee, Samson
Subject:	Slides for Discussion with NRR/DRA on SPAR Model Quality
Attachments:	SPAR Quality_Jan 2014_Rev 1.pptx

Sunil, See-Meng –

Please see attached slides for tomorrow's discussion with Joe on SPAR model quality. I very much appreciate all the feedback received from folks and made some changes that reflect these comments and insights. Please let me know if you have any questions or additional comments –

Kevin

Kevin Coyne, P.E., Ph.D.
Chief, Probabilistic Risk Assessment Branch
Division of Risk Analysis, Office of Nuclear Regulatory Research
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(b)(6) *(cell)*

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Standardized Plant Analysis Risk (SPAR) Model Quality

(Briefing for NRR/DRA)

Kevin Coyne, RES/DRA/PRAB

January 8, 2014

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Briefing Objectives

- Inform NRR/DRA Division Director about quality-related activities for the SPAR model program.
- Provide background information to support future engagement with Regional counterparts

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Outline

- SPAR Uses
- SPAR Modeling Philosophy & Limitations
- Quality Activities & Guidance
  - Background
  - QA Process
  - End User Responsibilities
- Recent feedback (DAEC SPAR)
- Key Messages

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SPAR Model Uses

- Significance Determination Process, NOEDS, MD 8.3 (NRR & Regions)
- Accident Sequence Precursor Program (RES)
- System & component studies (RES)
- Generic Issue Screening (RES)
- Special Studies (all)

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SPAR Philosophy

- Provide independent, plant-specific PRA models for use by agency risk analysts
  - SPAR program relies on licensee information, but application of models is independent of the licensee
- Use standardized modeling conventions
  - Ease of use for agency analysts
  - Efficient model maintenance and updating
- SPAR models (and SAPHIRE code) were primarily developed to support event and condition assessment (ECA) activities
  - SAPHIRE user interface structured to support ROP
  - SPAR/SAPHIRE designed to handle ECA activities (e.g., CCF, LOOP modeling)

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SPAR Philosophy

- Budget resources place limits on program (e.g., staffing, funds, travel)
  - SPAR models generally not as detailed as licensee models
  - SPAR generally relies on licensee PRA modeling assumptions
    - Licensees requested to provide information voluntarily
    - However, some independent analysis has been done (e.g., NUREG-1953 success criteria) and models are cross-compared against similar plants

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SPAR Philosophy

- SPAR benchmarked against licensee baseline model
  - Impractical to benchmark against every possible event/condition combination
  - Risk significant sequences in an ECA may not be risk significant in the baseline model
- Failed equipment recovery generally not modeled in baseline model (with some exceptions)

No PRA model (SPAR or licensee) can accurately capture the nuances of a real operational event without some modifications

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SPAR QA - Background

- Recommendations from 2006 OIG Audit, "Evaluation of the NRC's Use of PRA in Regulating the Commercial Nuclear Power Industry, (OIG-06-A-24)"
  - Develop and implement a formal, written process for maintaining PRA models that is sufficiently representative of the as-built, as-operated plant to support model uses.
  - Develop and implement a fully documented process to conduct and maintain configuration control of PRA software.
  - Conduct a full verification and validation of SAPHIRE Version 7

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SPAR QA - Process

- SPAR Quality Assurance Plan (Revision 1, ML13141A333)
- RASP Handbook
  - Volume 3 – SPAR Model Reviews
- Model Maker Guidelines (MMGs)
  - SPAR-AHZ Model Maker's Guideline, Revision 1.4a, April 24, 2013 (ML11291A172)
  - SPAR-SD Model Maker's Guideline, Revision 2.3, September 2012 (ML092160242)
  - SPAR-ICM Model Makers Guideline, Revision 0, November 2012 (ML13219A311)

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SPAR QA - Process

- SPAR PM Handbook (ML12307A427)
- Onsite verification reviews
  - Onsite reviews conducted during MSPI benchmarking activities
  - Onsite reviews conducted for new modeling elements (e.g., shutdown, fire, external hazards)
- SPAR Configuration/Version Control
- SAPHIRE Quality Assurance Plan (ADAMS ML101190497)
  - Independent Verification and Validation for SAPHIRE 8
  - NUREG/BR-0167, "Software Quality Assurance Program and Guidelines" compliant QA program, including annual audits

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SPAR QA - Process

- SPAR benchmarking includes the following baseline model checks:
  - SPAR core damage frequency (CDF) less than 1E-4/yr
  - Difference between SPAR and PRA CDF less than a factor of 3
  - Difference between initiator specific CCDPs less than factor of 10
  - Difference in CDF of top 25 cut sets less than a factor of 5
- Licensees are provided their SPAR models upon request
  - Models are non-public and licensees are expected to protect the models against inadvertent release (using controls consistent with RIS 2005-026)
  - With each distribution, we request feedback on unresolved differences between the models
  - Ideally, differences between SPAR and licensee models could be reconciled <u>before</u> an SDP, but this is difficult in practice

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SPAR QA - Process

- 2009 ASME PRA Standard Peer Reviews
  - BWROG and PWROG led peer reviews of the Peach Bottom and Comanche Peak models (ML093421138 and ML100550481)
  - Peer review team consisted of industry experts and experienced agency risk analysts (HQ and SRAs)
  - The Peer Review noted the following SPAR model strengths:
    - Model structure is robust and well developed.
    - Fault trees are streamlined with an appropriate level of detail for its intended uses.
    - Model structure and the SAPHIRE computer software are at the state of the technology.
    - Models are an efficient method to develop qualitative and quantitative insights for applications, SDP evaluations, inspections, event assessments, and model evaluations.

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SPAR QA – End Users

- RES/INL implements QA plan for SPAR "model of record," but agency risk analysts are responsible for any temporary model changes needed for a specific application
  - RES or INL Help Desk are available to support changes, but this does not relieve the analyst from ensuring the technical adequacy of the change
  - All temporary changes should be fully documented to support review (e.g., SERP panel, ASP review, etc.)

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SPAR QA – End Users

- All risk analysts are expected to:
  - enter errors or improvements to a model using the SPAR Model Change request process (INL can help with this process as needed)
  - help ensure that the SPAR model represents the as-built, as operated plant when performing an analysis and providing feedback to the model development process when errors or changes to the model are identified

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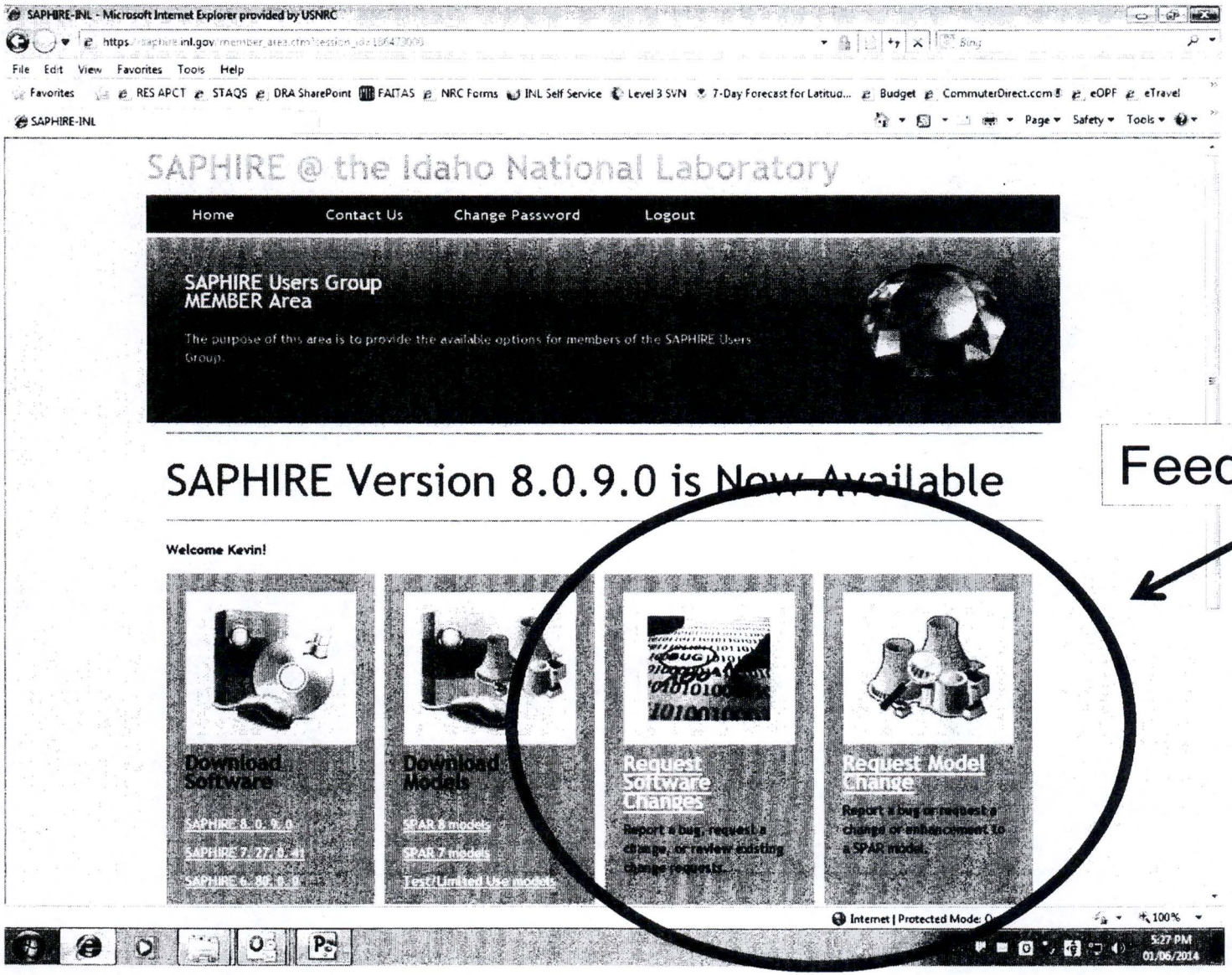
SPAR QA – End Users



Feedback Forms

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Duane Arnold SPAR Issues

- NEXTera recently noted two issues associated with the DAEC SPAR Model:
  - No credit given in SPAR for manually throttling RCIC stop valve following failure of governor
  - SPAR model does not credit Control Rod Drive pumps for high pressure makeup following a LOF

- NEXTera claimed that these issues resulted in significant overestimate of risk and failure of the SPAR model to represent the as-built, as-operated plant.

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Duane Arnold SPAR Issues

- RCIC Stop Valve – In general, SPAR models do not credit equipment recovery after failure since the generic estimation of a recovery probability is often not practical (RASP Handbook, Volume 1, Section 6.2)
  - SPAR equipment recovery is generally limited to EDGs and offsite power
  - For cases where equipment recovery credit is appropriate (and the circumstances regarding the failure are known), the analyst has the option to apply credit within the analysis

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Duane Arnold SPAR Issues

- CRD Pumps – SPAR model does credit CRD pumps for long term cooling (following success of HPCI or RCIC)
  - Early CRD success criteria specifically studied in NUREG-1953 (IORV) and SPAR-ICM (LOF), using Peach Bottom MELCOR model; conscious decision not to change Mark 1/2 models to credit this based on RES/NRR/INL discussions due to plant-by-plant operational and design variations
  - SPAR success criteria balances several information sources including licensee PRA model and associated MAAP results, FSAR, results from similar plants
  - The specific circumstances of an event may warrant model changes that are otherwise not appropriate in the baseline model. However, analysts have the ability to modify success criteria when appropriate

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Duane Arnold SPAR Issues

- These issues are <u>not</u> SPAR model "errors", but instead are the result of the independent SPAR modeling approach and philosophy
  - NRC analysts have the ability to adjust SPAR model logic and data when there is sufficient technical justification
  - However, even appropriate changes for a specific event or condition, may not be appropriate for the base model
- Exchange of technical PRA information between the NRC and licensees is an expected part of the significance determination process
  - Model differences between the licensee and SPAR models can be very difficult to identify in the baseline model (in the absence of a specific operational event)
  - Focused technical discussion regarding a specific operational event is more efficient than attempting to make more generic changes to the base model

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Key Messages

- No PRA (SPAR or licensee) can accurately capture every nuance of an operational event
  - Experienced risk analysts must make modeling decisions for each specific event
  - Recovery credit and success criteria may be unique to the operational event
  - Process controls include peer reviews of model results
- RES maintains an active Quality Assurance Programs for SPAR and SAPHIRE
  - Process controls include issue reporting and resolution
  - Actively seek feedback on models to ensure they represent the as-built, as-operated plant

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UNITED STATES NUCLEAR REGULATORY COMMISSION
Protecting People and the Environment

Key Messages

- Agency risk analysts are part of the quality process, not just end-users
  - Agency risk analysts are expected to identify and formally report model issues and needed changes
  - SPAR models are intended to be used by knowledgeable and experienced users
  - RES and INL staff are available to provide assistance
- Exchange of technical information between the NRC and licensees is an expected part of the significance determination process
- SPAR models provide an independent risk assessment tool and are fully capable of supporting ROP activities.

Lubinski, John

From:	Lubinski, John
Sent:	Thursday, December 17, 2015 11:02 AM
To:	Correia, Richard
Cc:	Giitter, Joseph; Lund, Louise; Shoop, Undine; Roberts (Bettis), Ashley; Gavrilas, Mirela
Subject:	FW: redefining the items in bin c
Attachments:	Copy of Copy of OR-Research 12 14 15 US_DRAcomments2.xlsx
Categories:	SPAR FOIA

Note: Nothing in attachment references SPAR Models, so it is nonresponsive.

Rich,

Thanks. Based on the OD meeting earlier this week, we did plan to reach out to RES and discuss more. We will work with our folks working this project and try to meet with you to discuss next Monday or Tuesday to ensure we are all aligned.

Thanks

From: Correia, Richard
Sent: Thursday, December 17, 2015 10:45 AM
To: Lubinski, John; Giitter, Joseph
Cc: Lund, Louise
Subject: FW: redefining the items in bin c

John, Joe,

Undine Shoop sent over to RES a different version of Bin C, requesting our review. The version we had develop was reviewed, discussed in length and agreed to by the deputy office directors and at least a cursory review/approval by the Project AIM steering committee. RES/DRA has reviewed and edited the Bin C items as appropriate, in accordance with Mike Weber's direction based on our discussions with him on these items. We understand the BL leads have "ownership" of these items, but we were not aware that some of the items were revised from the previous table we developed.

If NRR feels further revisions need to be made, please let us know in advance so we can discuss first to assure the information is accurate for the OEDO, OCFO and Commissioners budget decisions.

Best

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Schroer, Suzanne
Sent: Thursday, December 17, 2015 10:27 AM
To: Shoop, Undine <Undine.Shoop@nrc.gov>
Cc: Iyengar, Raj <Raj.Iyengar@nrc.gov>; Armstrong, Kenneth <Kenneth.Armstrong@nrc.gov>; Correia, Richard <Richard.Correia@nrc.gov>; Lund, Louise <Louise.Lund@nrc.gov>; Lemoncelli, Mauri <Mauri.Lemoncelli@nrc.gov>
Subject: RE: redefining the items in bin c

Undine,

One quick update for ETB.

Thanks!
Suzanne

From: Schroer, Suzanne
Sent: Wednesday, December 16, 2015 2:16 PM
To: Shoop, Undine
Cc: Iyengar, Raj; Armstrong, Kenneth; Correia, Richard; Lund, Louise; Lemoncelli, Mauri
Subject: RE: redefining the items in bin c

Hi Undine,

Attached are DRA's edit (in red text).

Suzanne

From: Armstrong, Kenneth
Sent: Wednesday, December 16, 2015 11:28 AM
To: Shoop, Undine
Cc: Schroer, Suzanne; Iyengar, Raj
Subject: FW: redefining the items in bin c

Undine,

Small edits highlighted in attached.

Thanks!!

From: Schroer, Suzanne
Sent: Wednesday, December 16, 2015 9:58 AM
To: Armstrong, Kenneth <Kenneth.Armstrong@nrc.gov>
Subject: FW: redefining the items in bin c

She sent it to the wrong Kenneth....just realized...

From: Shoop, Undine
Sent: Tuesday, December 15, 2015 5:45 PM
To: Erwin, Kenneth; Schroer, Suzanne; Iyengar, Raj
Subject: redefining the items in bin c

All,

I have discussed most of the impacts of the items in bin c with NRR staff and have updated the chart based on the information. Please review my edits and provide any feedback.

Thanks,
Undine

Undine Shoop
Chief, Radiation Protection and Consequence Branch
Division of Risk Assessment
Office of Nuclear Reactor Regulation
301-415-2063

Dean, Bill

From: Dean, Bill
Sent: Thursday, December 03, 2015 5:36 PM
To: Holahan, Gary
Subject: Re: SPAR models

Thanks gary

Bill Dean
Director
Office of Nuclear Reactor Regulation

On: 03 December 2015 17:56, "Holahan, Gary" <Gary.Holahan@nrc.gov> wrote:
Bill,

I see the SPAR question as "not so simple", so I support the idea of a multi-office working group. Southern Company would be an interesting volunteer for a pilot activity since they have both operating and new reactors (under construction). I will discuss with Jennifer on her return from travel.

Gary

From: Dean, Bill
Sent: Thursday, December 03, 2015 5:36 AM
To: Weber, Michael <Michael.Weber@nrc.gov>; West, Steven <Steven.West@nrc.gov>
Cc: Johnson, Michael <Michael.Johnson@nrc.gov>; Tracy, Glenn <Glenn.Tracy@nrc.gov>; Lubinski, John <John.Lubinski@nrc.gov>; Giitter, Joseph <Joseph.Giitter@nrc.gov>; Evans, Michele <Michele.Evans@nrc.gov>; Uhle, Jennifer <Jennifer.Uhle@nrc.gov>; Holahan, Gary <Gary.Holahan@nrc.gov>
Subject: SPAR models

Mike
I saw an email that I was not on distribution for from you indicating some rancor in the RES ranks over NRR's consideration of no longer sustaining the large infrastructure and expenses involved in our SPAR model program.

In the spirit of Project AIM I have targeted this as a possible efficiency gain in our long term plans. I also know there is a lot of staff who are resistant to this potential move. In order to move from a concept to an actuality will require some strategic thinking from many corners of the agency and in the final analysis may or may not be an appropriate approach to take. But we won't know unless we evaluate it.

I saw in your email your intent for RES to lead an effort to assess the efficacy of such an approach. I would offer that a better approach would be that NRR and NRO as the primary users of the SPAR models would form a working group, including RES and regional representation to develop the Pros and cons, barriers and opportunities, and strategies to address any barriers and challenges sometime after the beginning of the new year.

I have already reached out to southern company as to their interest in piloting an approach whereby we would use their PRA model in lieu of the SPAR model for one of their sights thru my interactions with Danny Bost on

the Risk Informed Steering Committee. I see this "proof of concept" activity as vital to understanding if this makes sense or not. They are amenable to doing such a pilot.

I am back in the office next Monday and we can certainly talk at length about this then.

Bill Dean
Director
Office of Nuclear Reactor Regulation

Richards, Karen

From:	Morris, Scott
Sent:	Thursday, December 03, 2015 12:07 PM
To:	Gibbs, Russell; Weerakkody, Sunil; Sanfilippo, Nathan
Cc:	Lee, Samson; Wong, See-Meng; Kichline, Michelle; Giitter, Joseph; Howe, Allen; Johnson, Clay
Subject:	RE: Actions from biweekly with Michele wrt SDP streamlining efforts

I agree with Russ. SPAR model issue is not directly related to the SDP streamlining effort and will serve as a distraction to the DIRS-led initiative if we let it.

From: Gibbs, Russell
Sent: Thursday, December 03, 2015 10:28 AM
To: Weerakkody, Sunil; Sanfilippo, Nathan
Cc: Lee, Samson; Wong, See-Meng; Kichline, Michelle; Giitter, Joseph; Howe, Allen; Morris, Scott; Johnson, Clay
Subject: RE: Actions from biweekly with Michele wrt SDP streamlining efforts

There are two issues here. The first is the whole SPAR model issue. I suggest that DRA working with RES and the regions pull the information together which I presume will be mostly anecdotal. It seems that this topic is an entirely different but related from the SDP Streamlining initiative.

DIRS will arrange a meeting to discuss SDP Streamlining but suggest that a separate meeting take place on the SPAR models.

Thoughts?

Russell

From: Weerakkody, Sunil
Sent: Thursday, December 03, 2015 7:16 AM
To: Sanfilippo, Nathan <Nathan.Sanfilippo@nrc.gov>; Gibbs, Russell <Russell.Gibbs@nrc.gov>
Cc: Lee, Samson <Samson.Lee@nrc.gov>; Wong, See-Meng <See-Meng.Wong@nrc.gov>; Kichline, Michelle <Michelle.Kichline@nrc.gov>; Giitter, Joseph <Joseph.Giitter@nrc.gov>
Subject: FW: Actions from biweekly with Michele wrt SDP streamlining efforts

Nate\Russ,

I assume you'd take the lead and we (DRA) support. I'll discuss with See-Meng. My suggestion would be to have Michelle take the lead on supporting you on this activity with See-Meng performing a review role.

Sunil D Weerakkody, Chief
PRA Operations & Human Factors Branch
Office of Nuclear Reactor Regulation
Nuclear Regulatory Commission

Address: Mail Stop O-10 C-15, US NRC, Washington DC 20005-0001

Tel: 301-415-2870
Black Berry (b)(6) [redacted]

From: Morris, Scott
Sent: Wednesday, December 02, 2015 5:24 PM
To: Howe, Allen; Sanfilippo, Nathan; Gibbs, Russell
Cc: Schmitt, Ronald; Johnson, Clay
Subject: RE: Actions from biweekly with Michele wrt SDP streamlining efforts

We'll need to include DRA in these conversations at some point soon.

From: Howe, Allen
Sent: Wednesday, December 02, 2015 5:21 PM
To: Sanfilippo, Nathan; Gibbs, Russell
Cc: Schmitt, Ronald; Johnson, Clay; Morris, Scott
Subject: Actions from biweekly with Michele wrt SDP streamlining efforts

Nathan/Russ – Michele related a Duke drop in meeting with Mike Johnson and got Mike's attention on the idea of NRC using licensee models and significance results for the SDP.

1. Mike would like to know if we have any info on comparison of NRC results and licensee results from SDP analyses. (I told her we would check. I also told her that at the public meeting the expert from Exelon said that the results from the models are virtually the same - - that the differences came from variance in inputs, assumptions, credit for response actions, and manipulation of the models.) We will need to close the loop on that – but see 2 and 3 below.
2. Michele wants to get a lot smarter in this area since Scott and I are leaving. I told her that we wanted to modify staff and management behavior to not spend weeks of time perfecting a PRA model, gathering data, doing site checks, etc. That we wanted to get to a more timely result and evaluate the strengths, weaknesses, and uncertainties of the results and decide if we should look at other things like safety margin, defense in depth etc. as a part of our decision making process, perhaps in the direction of a MD 8.3 approach. She also wanted to understand Appendix M. Bottom line is we need to get her up to speed on what we are doing and then keep her there. Please set up an initial briefing.
3. At the briefing we should also discuss Mike's questions and what we have. We will need to decide whether we need to brief Mike.

Thanks - Allen

Richards, Karen

From: Lubinski, John
Sent: Thursday, December 03, 2015 10:48 AM
To: Giitter, Joseph
Subject: FW: SPAR models

Joe,

When you get a chance, can you please update me on this activity.

Thanks

From: Dean, Bill
Sent: Thursday, December 03, 2015 6:15 AM
To: West, Steven; Weber, Michael
Cc: Johnson, Michael; Tracy, Glenn; Lubinski, John; Giitter, Joseph; Evans, Michele; Uhle, Jennifer; Holahan, Gary
Subject: Re: SPAR models

Bingo!

Bill Dean
Director
Office of Nuclear Reactor Regulation

On: 03 December 2015 11:52, "West, Steven" <Steven.West@nrc.gov> wrote:
If my memory is correct, Bill also suggested his approach (multi-office NRC working group and industry input) at the last internal Risk-Informed Steering Committee (RISC) meeting, with a promise to explore further at future internal and external RISC meetings. The NRC RISC members (myself included) agreed with Bill's proposal.

Presumably, building on this, the RISC would be involved in directing the working group and assessing its work, as well as any industry input. Thus, appropriate and cross-cutting senior management involvement would be assured.

Steve

Steven West, Deputy Director
Office of Nuclear Regulatory Research
U.S. NRC

From: Dean, Bill
Sent: Thursday, December 03, 2015 11:36 AM
To: Weber, Michael; West, Steven
Cc: Johnson, Michael; Tracy, Glenn; Lubinski, John; Giitter, Joseph; Evans, Michele; Uhle, Jennifer; Holahan, Gary
Subject: SPAR models

Mike

I saw an email that I was not on distribution for from you indicating some rancor in the RES ranks over NRR's consideration of no longer sustaining the large infrastructure and expenses involved in our SPAR model program.

In the spirit of Project AIM I have targeted this as a possible efficiency gain in our long term plans. I also know there is a lot of staff who are resistant to this potential move. In order to move from a concept to an actuality will require some strategic thinking from many corners of the agency and in the final analysis may or may not be an appropriate approach to take. But we won't know unless we evaluate it.

I saw in your email your intent for RES to lead an effort to assess the efficacy of such an approach. I would offer that a better approach would be that NRR and NRO as the primary users of the SPAR models would form a working group, including RES and regional representation to develop the Pros and cons, barriers and opportunities, and strategies to address any barriers and challenges sometime after the beginning of the new year.

I have already reached out to southern company as to their interest in piloting an approach whereby we would use their PRA model in lieu of the SPAR model for one of their sights thru my interactions with Danny Bost on the Risk Informed Steering Committee. I see this "proof of concept" activity as vital to understanding if this makes sense or not. They are amenable to doing such a pilot.

I am back in the office next Monday and we can certainly talk at length about this then.

Bill Dean
Director
Office of Nuclear Reactor Regulation

Lee, Samson

From: Morris, Scott
Sent: Thursday, December 03, 2015 12:28 PM
To: Giitter, Joseph
Cc: Lee, Samson
Subject: FW: SPAR models

FYI

From: Evans, Michele
Sent: Thursday, December 03, 2015 7:10 AM
To: Howe, Allen; Morris, Scott; Johnson, Clay
Subject: FW: SPAR models

DIRS,

For your awareness. I will send you some other emails also.

Michele

From: Johnson, Michael
Sent: Thursday, December 03, 2015 7:05 AM
To: Dean, Bill <Bill.Dean@nrc.gov>; Weber, Michael <Michael.Weber@nrc.gov>; West, Steven <Steven.West@nrc.gov>
Cc: Tracy, Glenn <Glenn.Tracy@nrc.gov>; Lubinski, John <John.Lubinski@nrc.gov>; Giitter, Joseph <Joseph.Giitter@nrc.gov>; Evans, Michele <Michele.Evans@nrc.gov>; Uhle, Jennifer <Jennifer.Uhle@nrc.gov>; Holahan, Gary <Gary.Holahan@nrc.gov>
Subject: RE: SPAR models

Thanks Bill. I have high interest in this topic as well. I see the pilot as answering only a part of the question. Looking forward to the continued work on this.

Mike

From: Dean, Bill
Sent: Thursday, December 03, 2015 5:36 AM
To: Weber, Michael <Michael.Weber@nrc.gov>; West, Steven <Steven.West@nrc.gov>
Cc: Johnson, Michael <Michael.Johnson@nrc.gov>; Tracy, Glenn <Glenn.Tracy@nrc.gov>; Lubinski, John <John.Lubinski@nrc.gov>; Giitter, Joseph <Joseph.Giitter@nrc.gov>; Evans, Michele <Michele.Evans@nrc.gov>; Uhle, Jennifer <Jennifer.Uhle@nrc.gov>; Holahan, Gary <Gary.Holahan@nrc.gov>
Subject: SPAR models

Mike
I saw an email that I was not on distribution for from you indicating some rancor in the RES ranks over NRR's consideration of no longer sustaining the large infrastructure and expenses involved in our SPAR model program.

In the spirit of Project AIM I have targeted this as a possible efficiency gain in our long term plans. I also know there is a lot of staff who are resistant to this potential move. In order to move from a concept to an actuality

will require some strategic thinking from many corners of the agency and in the final analysis may or may not be an appropriate approach to take. But we won't know unless we evaluate it.

I saw in your email your intent for RES to lead an effort to assess the efficacy of such an approach. I would offer that a better approach would be that NRR and NRO as the primary users of the SPAR models would form a working group, including RES and regional representation to develop the Pros and cons, barriers and opportunities, and strategies to address any barriers and challenges sometime after the beginning of the new year.

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I am back in the office next Monday and we can certainly talk at length about this then.

Bill Dean
Director
Office of Nuclear Reactor Regulation

Lee, Samson

From: Morris, Scott
Sent: Thursday, December 03, 2015 12:28 PM
To: Giitter, Joseph
Cc: Lee, Samson
Subject: FW: FYI - Information Only: NRC SPAR models
Attachments: Notes for EDO on NRC SPAR Models.docx

More ....

From: Evans, Michele
Sent: Thursday, December 03, 2015 7:14 AM
To: Morris, Scott; Howe, Allen; Johnson, Clay
Subject: FW: FYI - Information Only: NRC SPAR models

For awareness. Here is the other email I wanted you to see that lead to Bill sending his email.

Michele

From: Johnson, Michael
Sent: Wednesday, December 02, 2015 8:27 PM
To: Dean, Bill <Bill.Dean@nrc.gov>; Lubinski, John <John.Lubinski@nrc.gov>; Evans, Michele <Michele.Evans@nrc.gov>
Subject: FW: FYI - Information Only: NRC SPAR models

FYI.

From: Weber, Michael
Sent: Wednesday, December 02, 2015 6:32 PM
To: Tracy, Glenn; Johnson, Michael
Cc: Chen, Yen-Ju; Evans, Michele; Lubinski, John; Uhle, Jennifer; Holahan, Gary; West, Steven; Lund, Louise
Subject: FYI - Information Only: NRC SPAR models

Good evening, Gents. Following Monday morning's RES all staff meeting, our internal risk community has been a buzz about perceived misunderstandings about the use of risk information, the value of SPAR models maintained and developed by NRC in support of the ROP, and potential shift to place greater reliance on licensee PRAs. There is a concern that senior management has already decided the issue and that such a decision has not been based on a complete understanding of the issue and alternatives. On Tuesday, one of the SRAs emailed Vic regarding these concerns about reliance on licensee PRA models. That message is the original one at the end of the chain below. I am forwarding for your awareness only. The email chain also confirms our discussion yesterday that the Charlie item on SPAR models identified on the Common Prioritization table has limited impact on the agency's ability to maintain and refine the SPAR models, as we discussed at the Aim Steering Committee yesterday afternoon.

RES is initiating an effort to pull together the various NRC internal stakeholders to discuss the merits on placing greater reliance on licensee PRA or continued maintenance and development of NRC's SPAR models. We expect the SRAs and Regions will be involved in this dialogue, as well as RES, NRR, OGC, and others. We expect that this will help inform the discussions and could ultimately support on agency decision on how we should proceed.

From: Circle, Jeff
Sent: Wednesday, December 02, 2015 9:46 AM
To: Coyne, Kevin <Kevin.Coyne@nrc.gov>
Cc: Correia, Richard <Richard.Correia@nrc.gov>; Lund, Louise <Louise.Lund@nrc.gov>
Subject: RE: Information Only: NRC SPAR models

Kevin,

Thanks for the info. I agree that slowing down the rate of update will not create an unmanageably large information gap between SPAR and licensees' models. What I am concerned over - and you correctly noticed this as well - is the assumption that SRAs are very familiar with licensees' models. Call it paranoia on my part but, I see in it the formation of the logic that we can use their models in lieu of SPAR since our SRAs already know them so well.

Jeff.

Jeff A. Circle
Chief (acting)
Probabilistic Risk Assessment Branch
RES /Division of Risk Analysis
(301) 415-1152
BB (b)(6)

From: Coyne, Kevin
Sent: Wednesday, December 02, 2015 8:53 AM
To: Circle, Jeff <Jeff.Circle@nrc.gov>
Cc: Correia, Richard <Richard.Correia@nrc.gov>; Lund, Louise <Louise.Lund@nrc.gov>
Subject: RE: Information Only: NRC SPAR models

Jeff –

You need to be aware that we did offer up a modest reduction in funding for routine updates to SPAR – this was a relatively small amount of funding placed in the rebaselining category "c" to go from doing 12 updates a year to 6. As you are aware, you maintain a help desk and can make a wide variety changes when needed to deal with a specific assessment. So, it is likely that the move to reduce the number of routine updates each year would result in some inefficiencies, but I generally agree with Vic's assessment that it would not result in a significant handicap since we would still ensure that the SPAR model reflects the as-built, as-operated plant each time we use them for an assessment (and that is why it was offered up as part of the AIM rebaselining cuts – in fact, this was a proposed reduction that was essentially non-negotiable with NRR/DRA) –the reasons are different than what Viccited (i.e., the assistance INL can help with updating a SPAR model when needed, not the SRAs familiarity with licensee models).

Obviously this is a different animal than simply cutting the program (as has also been kicked around), but keep in mind that this particular proposed reduction for routine updates has been vetted through the RES organization.

Kevin

From: Circle, Jeff
Sent: Wednesday, December 02, 2015 8:30 AM
To: Appignani, Peter <Peter.Appignani@nrc.gov>; Ferrante, Fernando <Fernando.Ferrante@nrc.gov>; Gonzalez, Michelle <Michelle.Gonzalez@nrc.gov>; Helton, Donald <Donald.Helton@nrc.gov>; Hudson, Daniel <Daniel.Hudson@nrc.gov>; Kuritzky, Alan <Alan.Kuritzky@nrc.gov>; Leschek, Walter <Walter.Leschek@nrc.gov>; Li,

Ming <Ming.Li@nrc.gov>; Ning, Lauren (Killian) <LaurenKillian.Ning@nrc.gov>; Sancaktar, Selim <Selim.Sancaktar@nrc.gov>; Wessels, Steven <Steven.Wessels@nrc.gov>; Wood, Jeffery <Jeffery.Wood@nrc.gov>
Cc: Correia, Richard <Richard.Correia@nrc.gov>; Lund, Louise <Louise.Lund@nrc.gov>; Nakoski, John <John.Nakoski@nrc.gov>
Subject: FW: Information Only: NRC SPAR models

PRABers,

FYI.

In reference to what we heard on Monday, I had a conversation this morning with George MacDonald (R-II) and one yesterday with Laura Kozak (R-III) who both feel that we need to retain SPAR models. Checking the email thread below, Vic feels that there can be a reduction in funding for SPAR model updates. He is basing this opinion that regional SRAs have an intimate knowledge of licensees' models, which is not necessarily true. I'm assuming that the term SPAR model "inaccuracies" refers to lag in performing model updates due to reduced funding.

We need to put together documentation in support for a meeting with NRR on this subject and it should also cover the proposed development of a pilot project. I would appreciate it if any of you can forward Pete Appignani information that you feel can help us with our meeting. There will be more to follow on this topic.

Thanks,
Jeff.

Jeff A. Circle
Chief (acting)
Probabilistic Risk Assessment Branch
RES /Division of Risk Analysis
(301) 415-1152
BB (b)(6)

From: McCree, Victor
Sent: Tuesday, December 01, 2015 7:11 PM
To: Hanna, John <John.Hanna@nrc.gov>
Cc: Bernhard, Rudolph <Rudolph.Bernhard@nrc.gov>; MacDonald, George <George.MacDonald@nrc.gov>
Subject: Re: Information Only: NRC SPAR models

Hi John!

It's great to hear from you and I appreciate your timely insights.

During a very free flowing discussion today, we debated the wisdom of accepting a recommended cost reduction that could delay (not eliminate) updates to SPAR models. I opined that some reasonable delay in updating SPAR models would likely not represent a significant handicap due to Regional SRA familiarity with licensee risk models (and their strengths and limitations) relative to the SPAR. I offered that this could mitigate the impact of SPAR model "inaccuracies."

Your thoughts?

Vic

On: 01 December 2015 15:07, "Hanna, John" <John.Hanna@nrc.gov> wrote:

Vic,

The purpose of this e-mail is to provide you some background about NRC SPAR models and hopefully address some inaccurate information that may be circulating in HQ.

We had recently heard anecdotally that some views are being shared at your level that assert that the SRAs are in favor of eliminating the SPAR models and using the licensee's CAFTA models. This is not the opinion of the Region II SRAs. George MacDonald will be polling some of the other SRAs in different regions and sending you a separate e-mail, but we strongly suspect that they are also not in favor of eliminating SPAR models. If we are actively considering eliminating the SPAR models as a cost savings measure, I would recommend that we have a panel to discuss this option and all of the positives and negatives.

I have attached some additional information to this e-mail regarding this topic. (I developed this outline in support of some risk training for SES managers.) If you desire a bit more detail and why moving towards only using the licensee models would have some adverse effects, please read the attached document. The **highlights and key messages** are in **bolded type** so you can scan it quickly.

I normally would not send an e-mail like this directly to you and would follow the normal protocol for communicating up the chain. However I thought the topic was significant enough and urgent enough that you should hear the "unfiltered" message promptly. I have not vetted this message with Region II management and am only representing the views of the SRAs.

Thanks. Hope all is well with you in Headquarters and that the transition up there went smoothly...

John

John David Hanna
Senior Reactor Analyst
US NRC, Region II Office
John.Hanna@nrc.gov
404-997-4552

From: Morris, Scott
To: Johnson, Clay; Howe, Allen
Subject: FW: SPAR Models
Date: Wednesday, December 02, 2015 2:23:22 PM

From: Gibbs, Russell
Sent: Wednesday, December 02, 2015 11:49 AM
To: Dean, Bill
Cc: Sanfilippo, Nathan; Morris, Scott
Subject: RE: SPAR Models

Thanks Bill - I'll share your thoughts to the involved BC's.

From: Dean, Bill
Sent: Wednesday, December 02, 2015 4:40 AM
To: Gibbs, Russell <Russell.Gibbs@nrc.gov>
Cc: Sanfilippo, Nathan <Nathan.Sanfilippo@nrc.gov>; Morris, Scott <Scott.Morris@nrc.gov>
Subject: Re: SPAR Models

We should probably have a strategy session on this but I would offer that after the new year is a good time. Too much else going on right now and too little time to focus. I understand the independence issue but it is not the tool as much as how one uses it that is the meaningful independence in my mind.

Bill Dean
Director
Office of Nuclear Reactor Regulation

On: 01 December 2015 15:14, "Gibbs, Russell" <Russell.Gibbs@nrc.gov> wrote:

Maybe Vic mispoke or was misheard. I'll speak with Sunil and Kevin C./Jeff C. about some possible next steps to get this more out in the open with concerned staff. As in the past on this quite familiar issue, staff are concerned about maintaining independence not necessarily being influenced by the added cost.

Russell

On: 01 December 2015 02:51, "Dean, Bill" <Bill.Dean@nrc.gov> wrote:

I like a good revolution. I have never conveyed that SRAs are in favor of this approach and know that we need to explore pros and cons. Hence the need to do a pilot. What would be beneficial is to establish the business case for doing this - ie what do we expend on an annual basis in SPAR model maintenance and what would it "cost" us to become facile in using licensee models.

Bill Dean
Director
Office of Nuclear Reactor Regulation

On: 30 November 2015 21:25, "Gibbs, Russell" <Russell.Gibbs@nrc.gov> wrote:
Hi Bill,

FYI that a fairly large storm is brewing with the risk community on the notion of walking away from SPAR models and only using licensee models. Some folks are not even aware that this is a possibility. It was mentioned in the email train that Vic had said at an RES meeting that SRAs were in favor of such a move and they are not at all. Hmmm....

I suggested that RES in conjunction with NRR/DRA and the regions get an all hands meeting arranged with NRC leadership to get this more out in the open before there's a revolution!

Russell

Lee, Samson

From: Tetter, Keith
Sent: Thursday, October 01, 2015 5:19 PM
To: Circle, Jeff; Nakoski, John
Cc: Uhle, Jennifer; Giitter, Joseph; Wood, Jeffery; Coyne, Kevin; Correia, Richard; Kichline, Michelle; Lee, Samson; Weerakkody, Sunil
Subject: RE: Agreed to changes to ASP/SPAR SECY based on NRR Comments

Welcome. Thank you also.

From: Circle, Jeff
Sent: Thursday, October 01, 2015 5:04 PM
To: Tetter, Keith <Keith.Tetter@nrc.gov>; Nakoski, John <John.Nakoski@nrc.gov>
Cc: Uhle, Jennifer <Jennifer.Uhle@nrc.gov>; Giitter, Joseph <Joseph.Giitter@nrc.gov>; Wood, Jeffery <Jeffery.Wood@nrc.gov>; Coyne, Kevin <Kevin.Coyne@nrc.gov>; Correia, Richard <Richard.Correia@nrc.gov>; Kichline, Michelle <Michelle.Kichline@nrc.gov>; Lee, Samson <Samson.Lee@nrc.gov>; Weerakkody, Sunil <Sunil.Weerakkody@nrc.gov>
Subject: Re: Agreed to changes to ASP/SPAR SECY based on NRR Comments

Thanks Keith for taking care of this. We appreciate it.

From: Tetter, Keith
Sent: Thursday, October 01, 2015 04:52 PM
To: Circle, Jeff; Nakoski, John
Cc: Uhle, Jennifer; Giitter, Joseph; Wood, Jeffery; Coyne, Kevin; Correia, Richard; Kichline, Michelle; Lee, Samson
Subject: RE: Agreed to changes to ASP/SPAR SECY based on NRR Comments

Jeff,
I stopped by, but you were away from your desk so I stopped by Bill's office and he signed it. Thank you,
Keith

From: Circle, Jeff
Sent: Thursday, October 01, 2015 3:37 PM
To: Nakoski, John <John.Nakoski@nrc.gov>
Cc: Uhle, Jennifer <Jennifer.Uhle@nrc.gov>; Giitter, Joseph <Joseph.Giitter@nrc.gov>; Wood, Jeffery <Jeffery.Wood@nrc.gov>; Coyne, Kevin <Kevin.Coyne@nrc.gov>; Correia, Richard <Richard.Correia@nrc.gov>; Tetter, Keith <Keith.Tetter@nrc.gov>; Kichline, Michelle <Michelle.Kichline@nrc.gov>; Lee, Samson <Samson.Lee@nrc.gov>
Subject: RE: Agreed to changes to ASP/SPAR SECY based on NRR Comments

John,

With respect to the concurrence chain, we checked on past versions of this paper and it's been concurred by the office directors. So, I gave Bill a one-minute briefing this afternoon on the resolution of our comments. He said that he's OK with it and either he or Jen will concur. So, please let us know when the official version is ready.

Thanks,
Jeff.

From: Nakoski, John
Sent: Thursday, October 01, 2015 2:21 PM
To: Lee, Samson <Samson.Lee@nrc.gov>; Circle, Jeff <Jeff.Circle@nrc.gov>
Cc: Wood, Jeffery <Jeffery.Wood@nrc.gov>; Coyne, Kevin <Kevin.Coyne@nrc.gov>; Correia, Richard <Richard.Correia@nrc.gov>; Tetter, Keith <Keith.Tetter@nrc.gov>; Kichline, Michelle <Michelle.Kichline@nrc.gov>
Subject: Agreed to changes to ASP/SPAR SECY based on NRR Comments

Sam and Jeff,

Attached are the redline/strikeout versions of the ASP/SPAR Status SECY that has incorporated the comment resolutions as we agreed. Thanks for your support. The concurrence package with these changes incorporated into ADAMS should be ready for NRR concurrence later this afternoon.

Best regards,

John A. Nakoski

Chief, Performance and Reliability Branch
Division of Risk Analysis
Office of Research
301-415-2480 (w)
(b)(6) (c)

FOR: The Commissioners

FROM: Brian W. Sheron, Director
Office of Nuclear Regulatory Research

SUBJECT: STATUS OF THE ACCIDENT SEQUENCE PRECURSOR PROGRAM AND THE STANDARDIZED PLANT ANALYSIS RISK MODELS

PURPOSE:

To inform the Commission of the status, accomplishments, and results of the Accident Sequence Precursor (ASP) Program, including quantitative ASP results, and to communicate the status of the development and maintenance of the Standardized Plant Analysis Risk (SPAR) models. This paper does not address any new commitments or resource implications.

BACKGROUND:

In a memorandum to the Chairman dated April 24, 1992, the staff of the U.S. Nuclear Regulatory Commission (NRC) committed to report periodically to the Commission on the status of the ASP Program. Subsequently, in SECY-02-0041, "Status of Accident Sequence Precursor and SPAR Model Development Programs," dated March 8, 2002, the staff expanded the annual ASP status report to include: (1) an expanded evaluation of precursor data trends and insights, and (2) the development of associated probabilistic risk assessment (PRA) models (e.g., SPAR models).

CONTACT: Keith M. Tetter, RES/DRA
301-415-2407

The ASP Program systematically evaluates U.S. nuclear power plant (NPP) operating experience to identify, document, and rank the operating events most likely to lead to inadequate reactor core cooling and severe core damage (i.e., precursors).[1] The ASP Program provides a comprehensive and integrated assessment of plant risk associated with ~~important~~ operating events. The ASP Program provides insights into the NRC's risk-informed and performance-based regulatory programs; ~~monitors~~evaluates performance against performance indicators in the agency's Congressional Budget Justification[2] and Industry Trends Program;[3] and reports to Congress events of high safety significance in accordance with "abnormal occurrence" criteria.[4] As part of the rebaselining work being conducted under the Project AIM 2020 initiative, the staff plans to evaluate the different programs and determine how best to further reduce the duplication of effort and potentially propose to the Commission modifications to the criteria used in the Congressional Budget Justification as a means of improving efficiency.

Under the SPAR Model Program, the staff develops and maintains independent risk-analysis tools and capabilities to support NPP-related risk-informed regulatory activities. The staff uses SPAR models for the Reactor Oversight Process (ROP) Significance Determination Process (SDP); the ASP Program; the Management Directive (MD) 8.3, "NRC Incident Investigation Program," event assessment process; and the MD 6.4, "Generic Issues Program," resolution process. In addition, the staff uses the SPAR models to risk inform NRC inspection activities, to gain risk insights in support of reactor-related rule-making, and to support other risk assessment studies, such as system and component reliability studies.

DISCUSSION:

This section summarizes the status, accomplishments, and results of the ASP Program and SPAR Model Program since the previous status report, SECY-14-0107, "Status of the Accident Sequence Precursor Program and the Standardized Plant Analysis Risk Models," dated October 6, 2014.

ASP Program

Program Scope. The ASP Program is one of three agency programs that assess the risk significance of events. The other two programs are the ~~Significance Determination Process (SDP)~~ and the event-response evaluation process, as defined in MD 8.3. Currently, the ASP Program provides integrated analyses of complex operating events not evaluated by the SDP or finalized by MD 8.3 evaluations. The SDP evaluates the risk significance of a single licensee performance deficiency, while risk assessments performed under MD 8.3 are used to determine, in part, the appropriate level of reactive inspection in response to an event. An SDP assessment has the benefit of information obtained from the inspection, whereas the MD 8.3 assessment is expected to be performed within a day or two after the event notification. In contrast to the other two programs, a comprehensive and integrated risk analysis under the

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1 Enclosure 1 provides background on the process used by the staff to identify precursors.

2 See NUREG-1100, Volume 31, "2016 Congressional Budget Justification," issued January 2015.

3 See SECY-15-0061, "Fiscal Year 2014 Results of the Industry Trends Program for Operating Power Reactors," dated April 8, 2015.

4 See Appendix A of NUREG-0090, Volume 37, "Report to Congress on Abnormal Occurrences—Fiscal Year 2014," issued May 2015.

ASP Program includes all anomalies[5] observed at the time of the event or discovered after the event.

There are similarities in the risk assessments conducted by the three programs. All programs use SPAR models, the same documented methods and guidance, and similar analysis assumptions, except where program objectives deviate from one another. To minimize overlap and improve efficiency, ~~S~~since 2006, SDP results have been used in lieu of independent ASP analyses, to the extent practical and consistent with the overall objectives of both programs ~~if the SDP analyses considered all concurrent degraded conditions or equipment unavailabilities that existed during the time period of the condition~~. Typically the SDP analyses are used in the ASP Program when the analysis performed addresses the major contributors to risk for the event based on a review conducted by an ASP Program risk analyst. Typically for initiating events, many of the modeling assumptions made for MD 8.3 analyses can be adopted by ASP analyses. However, some modeling assumptions are revised as detailed information about the event becomes available when inspection activities are completed. These key similarities provide opportunities for significant ASP Program efficiencies. For a potential *significant* precursor (defined below), analysts from the three programs work together to provide a timely determination of plant risk. As such, duplication between programs is minimized to the extent practical within program objectives.

Status and Results. The staff continues to review operational events from licensee event reports (LERs) and NRC inspection reports (IRs) to identify potential precursors to a reactor core damage event. Operational events that exceed the ASP thresholds, mentioned in the Background section of Enclosure 1, are considered precursors in the ASP Program. *Significant* precursors have a conditional core damage probability (CCDP)[6] or a change in core damage probability (ΔCDP)[7] greater than or equal to 1×10^{-3}. The staff has identified 16 precursor events for fiscal year (FY) 2014. The staff did not identify any *significant* precursors for FY 2014 and has not identified any potentially *significant* precursors for FY 2015 to date, although the reporting of FY 2015 events in LERs and NRC IRs are still in progress.

In addition to the identification of precursor events, the staff performs trend analyses on precursors for additional insights. Trend analyses are performed on the following precursor groups:

- all precursors
- precursors with a CCDP or ΔCDP greater than or equal to 1×10^{-4}
- precursors involving an initiating event
- precursors involving degraded conditions
- precursors involving a complete loss of offsite power (LOOP)
- precursors that occurred at boiling-water reactors (BWRs)
- precursors that occurred at pressurized-water reactors (PWRs)

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5 These anomalies or conditions may include unavailable and degraded plant structures, systems, and components (SSCs); human errors; and an initiating event (reactor trip). In addition, an unavailable or degraded SSC does not have to be a performance deficiency or an analyzed condition in the plant's licensed design basis.

6 The term CCDP is the probability of the occurrence of core damage given that an initiating event has occurred.

7 The term ΔCDP is the increase in probability of core damage (from the baseline core damage probability) due to a failure of plant equipment or an identified deficiency during the time the failure or deficiency existed.

For the period of FY 2005 through FY 2014, the staff found a statistically significant increasing trend in the mean occurrence rate of precursors resulting from a LOOP initiating event. This increasing trend resulted from the occurrence of 20 LOOP precursor events in the last 4 years after 7 precursor occurrences in the previous 6 years.

In the FY 2012 and FY 2013 annual report, statistically significant increasing trends were identified in the mean occurrence rate of precursors with a CCDP or ΔCDP greater than or equal to 1×10^{-4}. However, with no additional precursor observed in this group in FY 2013 and FY 2014, the trend is no longer statistically significant. As reported in last year's status report (SECY-14-0107), six of the seven precursors in this group were caused by multiple electrical failures during a 3-year period. Based, in part, on the observed increases in electrical- and LOOP-related precursors over the past few years, the staff initiated a detailed study in FY 2014 to better understand the contribution of electrical system and associated component failures on risk at NPPs. Results for this study should be available in FY 2017.

The staff found no statistically significant trends for any of the other precursor groups during the FY 2005 through FY 2014 period. Enclosure 1, "Results, Trends, and Insights of the Accident Sequence Precursor Program," provides additional details on results and trends of the ASP Program.

SPAR Model Program

The SPAR models provide agency risk analysts with an independent risk assessment tool to support a variety of risk-informed agency programs, including the ROP and the ASP program. SPAR models are built with a standard modeling approach, using consistent modeling conventions, that enables staff to easily use the models across a variety of U.S. NPP designs. Unlike industry PRA models, SPAR models are run on a single software platform, the Systems Analysis Programs for Hands-on Integrated Reliability Evaluations (SAPHIRE) computer code. The staff currently maintains and updates ~~the~~ 75 SPAR models representing 99 commercial NPPs.[8] The scope of every SPAR model includes logic modeling covering internal initiating events at power through core damage (i.e., Level-1 PRA model). In FY 2015, the staff modified all SPAR models to take advantage of new SAPHIRE features and to improve the usability of ~~make~~ the models ~~more understandable to users~~. In addition to these global changes, approximately 30 models were updated to support specific SDP or ASP activities. The staff also performed~~e~~ more comprehensive updates to selected SPAR models to reflect recent plant modifications and to incorporate significant modeling updates. In FY 2015, the staff performed significant updates to six SPAR models to reflect changes such as the addition of logic for new station blackout generators, battery charging generators, and expansion of electrical power distribution modeling. During FY 2015, the staff continued to perform a comprehensive data update to all 75 SPAR models to reflect recent operating experience and implement other enhancements to improve the usability and functionality of the models.

In addition, the staff continued to expand SPAR model capability beyond internal events at full-power operation. For example, 22 of the SPAR models, representing 28 nuclear power

[8] The SPAR models associated with NPPs that have recently permanently shut down (Kewaunee, San Onofre Units 2 and 3, Crystal River Unit 3, and Vermont Yankee) are no longer being updated, but remain available for agency use.

reactors, include other hazard groups and are referred to as SPAR All-Hazard (SPAR-AHZ) models.[9] Currently, 18 of the SPAR-AHZ models include hazards such as fires, internal floods, and seismic events based on assessments conducted for Supplement 5, "Individual Plant Examination of External Events for Severe Accident Vulnerabilities," to Generic Letter 88-20, "Individual Plant Examination for Severe Accident Vulnerabilities—10 CFR 50.54(f)" (dated September 8, 1995), and other readily available information. The staff ~~has~~ also ~~completed~~ incorporated~~ion of~~ internal fire scenarios from the fire PRAs done in compliance with National Fire Protection Association (NFPA) 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," for the Shearon Harris Nuclear Power Plant, the Donald C. Cook Nuclear Power Plant, and the Virgil C. Summer Nuclear Generating Station. In addition to more detailed fire PRA modeling, the SPAR models for these NPPs include improved external hazard modeling and model validation. The staff has also leveraged the ongoing Level-3 PRA project for the Vogtle Electric Generating Plant, Units 1 and 2, to develop improved external hazard and fire modeling for the Vogtle SPAR model. In FY 2015, a new SPAR-AHZ model for the Point Beach site was created, and the SPAR-AHZ model for the Sequoyah site underwent~~has undergone~~ a major revision.

In the new reactor area, the staff has developed SPAR models for the AP1000 Advanced Boiling-Water Reactor (ABWR) (for both the Toshiba and General Electric-Hitachi designs), U.S. Advanced Pressurized-Water Reactor (US-APWR), and the U.S. Evolutionary Power Reactor (U.S. EPR). The staff has expanded the capability of the AP1000 SPAR model to include hazards such as seismic, fire, flooding, and low-power shutdown events. A post-core damage severe accident logic model (i.e., Level-2 PRA model) is also being developed for the AP1000 SPAR model.

The Office of Nuclear Regulatory Research (RES) staff continues to work with the Regions, the Office of Nuclear Reactor Regulation (NRR), and the Office of New Reactors (NRO) to identify future enhancements to the SPAR models, including continuing the development of new SPAR-AHZ models. Further, NRR is considering how it can improve the efficiency and effectiveness of the SDP process. These improvements may include pilot activities to assess the use of alternatives to the SPAR models. The use of alternatives to the SPAR models has other implications that will need to be assessed and addressed in support of any pilot activity that may be undertaken. ~~NRR will address its plans to pilot alternatives to the SPAR model in a separate paper to the Commission.~~

In FY 2010, the staff completed PRA standard-based peer reviews of a representative BWR SPAR model and a representative PWR SPAR model. It performed these peer reviews in accordance with American Society of Mechanical Engineers (ASME)/ American Nuclear Society (ANS) RA-S-2008, "Standard for Level-1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications," and Regulatory Guide 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities." The peer-review teams concluded that, within the constraints of the program, the SPAR model is an efficient method to offer qualitative and quantitative insights for applications, SDP evaluations, inspections, event assessments, and model evaluations. The peer review teams also noted that the SPAR model structure was robust and well

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[9] These models were formerly named SPAR external event (SPAR-EE) models, but have been renamed SPAR-AHZ to reflect recent improvements in external hazard modeling efforts and for consistency with the ASME PRA Standard model scope.

developed, model fault trees were streamlined with an appropriate level of detail for the model's intended users, and the model structure and the SAPHIRE computer software are at the state of the technology. The teams also identified a number of enhancements for the SPAR models and supporting documentation. Major activities undertaken to address the high priorityse--peer-review items include the following:

- Structuring the SPAR model documentation to more closely align with the structure of ASME/ANS PRA standard. A majority of the peer review comments were related to documentation issues.

- Incorporating improved LOOP modeling and support system initiating events modeling into the SPAR models (e.g., loss of service water or component cooling water).

- Expanding the SAPHIRE Web site to better log and track model change requests.

The staff completed these PWR and BWR SPAR Model peer-review enhancements in August 2015.

On July 14–15, 2015, RES, in collaboration with Idaho National Laboratory staff, held a 2-day public workshop on the agency's SPAR model program. Workshop discussions included the objectives of the SPAR model program; data collection and analysis; human reliability analysis; LOOP modeling; and SPAR model maintenance and quality assurance. The workshop participants included representatives from NPPs, industry contractors, international partners, and public interest groups. In addition, NRC staff from NRR, NRO, and the Regions attended. A meeting summary of the workshop can be found in Agencywide Documents Access and Management System (ADAMS) at Accession No. ML15198A191.

The staff continues to maintain and improve the SAPHIRE software to support the SPAR Model Program. SAPHIRE is a personal-computer-based software application used to develop PRA models and perform analyses with SPAR models. During FY 2015, significant SAPHIRE activities included the following:

- Oversight of the SAPHIRE software quality-assurance program, including performance of an annual audit of software quality-assurance activities, tools, and documents in accordance with NUREG/BR-0167, "Software Quality Assurance Program and Guidelines."

- Implementation of new SAPHIRE features, including the capability to easily sort model results by their contribution to different accident sequences and improvements to the reporting functions for external hazard model results.

- Evaluation ofResearch on code infrastructure improvements necessary to support a multi-user Webserver-based platform for SAPHIRE.

Enclosure 2, "Status of the Standardized Plant Analysis Risk Models," provides a detailed status of SPAR models and related activities.

Planned ASP and SPAR Model Activities

- The staff will continue the screening, review, and analysis (preliminary and final) of

potential precursors for FY 2015 and FY 2016 events.

- The staff will continue the detailed study of electrical system and component failure contribution to the risk at operating NPPs.

- The staff will continue to implement enhancements to the internal event SPAR models for full-power operations. Planned enhancements include model updates based on insights from ongoing thermal-hydraulic analyses and a comprehensive update of all SPAR models to reflect recent operating experience.

- The staff will continue quality-assurance activities for both the agency SPAR models and the SAPHIRE code. This will ensure that agency risk tools continue to be of sufficient quality for performing SDP, ASP, and MD 8.3 event assessments in support of the staff's risk-informed regulatory activities.

- The staff will continue to evaluate the need for additional SPAR model capability (beyond full-power internal events) based on experience gained from risk assessment activities and feedback from users. In addition, the staff intends to continue to develop new external hazard capabilities with new SPAR-AHZ models.

SUMMARY:

Under the ASP Program, the staff continues to evaluate the safety significance of operating events at NPPs and to provide insights into the NRC's risk-informed and performance-based regulatory programs. The staff identified no *significant* precursors in FY 2014 and in the FY 2015 events evaluated to date. The staff identified one statistically significant increasing trend involving the occurrence rate of LOOP precursor events for the period FY 2005 through FY 2014. The SPAR Model Program is continuing to develop and improve independent risk-analysis tools and capabilities to support the use of PRA in the agency's risk-informed regulatory activities.

COORDINATION:

The Office of the General Counsel reviewed this Commission paper and has no legal objection.

Brian W. Sheron, Director
Office of Nuclear Regulatory Research

Enclosures:
1. Results, Trends, and Insights of the ASP Program
2. Status of the SPAR Models

Results, Trends, and Insights of the Accident Sequence Precursor Program

1.0 Introduction

This enclosure discusses the results of accident sequence precursor (ASP) analyses conducted by the U.S. Nuclear Regulatory Commission (NRC) staff as they relate to events that occurred during fiscal years (FYs) 2014 and 2015. Based on those results, this document also discusses the staff's analysis of historical ASP trends and the evaluation of the related insights.

2.0 Background

The NRC established the ASP Program in 1979 in response to recommendations made in NUREG/CR-0400, "Risk Assessment Review Group Report," issued September 1978 (Ref. 1).[1] The ASP Program systematically evaluates U.S. nuclear power plant (NPP) operating experience to identify, document, and rank the operational events that have a conditional core damage probability (CCDP) or an increase in core damage probability (ΔCDP) greater than or equal to 1×10^{-6}. That is, for any given operational event analyzed, the likelihood of inadequate core cooling and severe core damage was greater than or equal to one in one million.

Program Process. To identify potential precursors, the staff reviews operational events, including the impact of external events (e.g., fires, floods, and seismic events), from licensee event reports (LERs) and inspection reports (IRs) on a plant unit basis (i.e., a single event that affects a multiunit site is counted as a precursor for each unit). The staff then analyzes any identified potential precursors by calculating the probability of an event leading to a core damage state. The analyses of operational events are conducted using the NRC's Standardized Plant Analysis Risk (SPAR) models and the Systems Analysis Programs for Hands-on Integrated Reliability Evaluations (SAPHIRE) software. The SPAR models are a plant-specific set of risk models that rely on a set of standardized modeling conventions (e.g., naming scheme, modeling approaches, and logic structure). Figure 1 illustrates the complete ASP analysis process.

Program Metrics. An operational event can be one of two types: (1) an occurrence of an initiating event, such as a reactor trip or a loss of offsite power (LOOP), with or without any subsequent equipment unavailability or degradation, or (2) a degraded plant condition characterized by the unavailability or degradation of equipment without the occurrence of an initiating event.

For the first type of event, the staff calculates a CCDP. This metric represents a conditional probability that a core damage state is reached given the occurrence of the observed initiating event (and any subsequent equipment failure or degradation). For the second type of event, the staff calculates a ΔCDP. This metric represents the increase in core damage probability for the

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[1] The NRC formed the Risk Assessment Review Group (commonly referred to as the Lewis Committee) in 1977 to perform an independent evaluation of the Reactor Safety Study (WASH-1400) that was completed 3 years earlier. That committee made a number of recommendations in 1978, including that more use be made of operational data to assess the risk from nuclear power plants. The review group's report stated, "It is important, in our view, that potentially significant (accident) sequences, and precursors, as they occur, be subjected to the kind of analysis contained in WASH-1400." The first major report of the ASP program, "Precursors to Potential Severe Core Damage Accidents: 1969–1979, A Status Report" (NUREG/CR-2497, Volume 1), was formally released in June 1982.

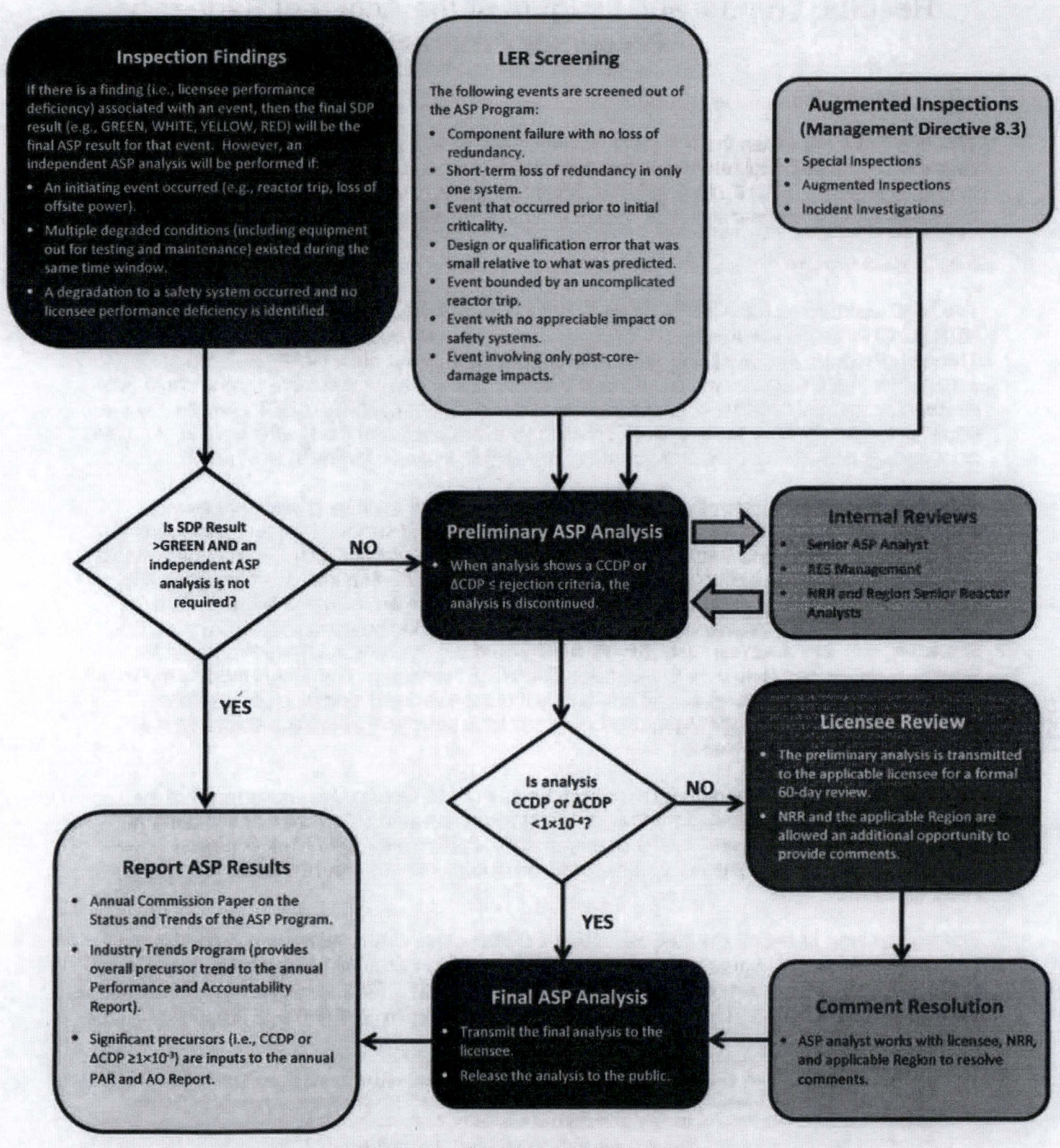

Figure 1. ASP Process Flowchart.

time period during which a component or multiple components were deemed unavailable or degraded.

Program Thresholds. The ASP Program defines an event with a CCDP or a ΔCDP greater than or equal to 1×10^{-6} to be a precursor. ~~For initiating event analyses, and to focus analyses on the more safety-significant events, the ASP Program excludes as precursors reactor transients whose results would be similar to or less significant than the nonrecoverable loss of feedwater and condenser heat sink, with no degradation of safety-related equipment. Therefore, t~~The ASP Program uses the plant-specific CCDP for the nonrecoverable loss of feedwater and condenser heat sink, with no degradation of safety-related equipment, as the~~an~~ initiating-event precursor threshold if it is greater than~~of a CCDP of~~ 1×10^{-6} ~~or the plant-specific CCDP for the nonrecoverable loss of feedwater and condenser heat sink, whichever is greater.[2]~~ This ensures the more safety-significant events are analyzed. Since 1988, this initiating-event precursor threshold has screened out uncomplicated trips (reactor trips with no losses of safety-system equipment) from being precursors because of their relatively low risk significance. The ASP Program defines a *significant* precursor as an event with a CCDP or ΔCDP greater than or equal to 1×10^{-3}.

Program Objectives. The ASP Program has the following objectives:

- Provide a comprehensive, risk-informed view of NPP operating experience and a measure for trending core damage risk.
- Provide a partial validation of the adequacy of current ~~state-of-practice in~~probabilistic risk assessment (PRA) standards and guidance.
- Provide feedback to regulatory activities.

The NRC also uses the ASP Program results to monitor performance against performance indicators in the agency's Congressional Budget Justification (Ref. 2) and Industry Trends Program (ITP) (Ref. 3), as well as in reports to Congress on events of high safety significance in accordance with "abnormal occurrence" criteria (Ref. 4). Specially, the ASP Program provides the following inputs to programs and reports:

- Number of *significant* precursor events for the annual Congressional Budget Justification. ASP Program results are used as one of several inputs to the performance indicator "Number of malfunctions, deficiencies, events, or conditions at commercial nuclear power plants (operating or under construction) that meet or exceed abnormal occurrence (AO) criteria II.A though II.D."
- Trend of all precursor events for the ITP.
- Number of precursor events with a CCDP or ΔCDP greater than or equal to 1×10^{-5} for the ITP. ASP program results are used, along with other inputs from other programs, in the ITP to evaluate the trend of the "significant events" industry-level indicator.
- Description of *significant* precursor events for the annual abnormal occurrence report to Congress in accordance with Criterion II.C of NUREG-0090, "Report to Congress on Abnormal Occurrences Fiscal Year 2014," Volume 37 (Ref. 4).

~~[2] The plant-specific CCDP is determined using the SPAR models to analyze the nonrecoverable loss of the main feedwater and condenser heat sink initiating events for each plant. If the results from either of these analyses are greater than 1×10^{-6}, the highest value is used as the precursor threshold for the subject plant.~~

Program Scope. The ASP Program is one of three agency programs that assess the risk significance of events at operating NPPs. The other two programs are the Significance Determination Process (SDP) (Ref. 5) and the event-response evaluation process, as defined in Management Directive (MD) 8.3, "NRC Incident Investigation Program" (Ref. 6). The SDP evaluates the risk significance of a single licensee performance deficiency, while the risk assessments performed under MD 8.3 are used to determine, in part, the appropriate level of reactive inspection in response to an event. An SDP assessment has the benefit of information obtained from the inspection, whereas the MD 8.3 assessment is expected to be performed within a day or two after the event notification.

In contrast to the other two programs, a comprehensive and integrated risk analysis under the ASP Program includes all anomalies observed at the time of the event or discovered after the event. These anomalies may include unavailable and degraded plant structures, systems, and components (SSCs); human errors; and an initiating event (reactor trip). In addition, an unavailable or degraded SSC does not have to be a performance deficiency (e.g., SSCs out for test and maintenance) or an analyzed condition in the plant design basis. The ASP Program has time to complete an analysis of a complex issue and thus produces a more refined estimate of risk. Analyses schedules provide time so that NRC or licensee engineering evaluations can be made available for review. State-of-the-art methods can be developed or current techniques can be refined for unique conditions when necessary. In addition, the SPAR model can be modified for special considerations (e.g., seismic, internal fires, flooding).

There are similarities in the risk assessments conducted by the three programs. All programs use SPAR models, the same documented methods and guidance, and similar analysis assumptions, except where program objectives deviate from one another. ASP and SDP analyses assumptions are typically the same for single performance deficiencies. To minimize overlap and improve efficiency, Ssince 2006, SDP results have been used in lieu of independent ASP analyses to the extent practical and consistent with the overall objectives of both programs, ~~if the SDP analyses considered all concurrent degraded conditions or equipment unavailabilities that existed during the time period of the condition.~~ Typically the SDP analyses are used in the ASP Program when the analysis performed addresses the major contributors to risk for the event based on a review conducted by an ASP Program risk analyst. Typically for initiating events, many of the modeling assumptions made for MD 8.3 analyses can be adopted by ASP analyses. However, some modeling assumptions are revised as detailed information about the event becomes available when inspection activities are completed. In addition, there are program differences on how certain modeling aspects are incorporated (e.g., SSCs out for testing or maintenance). These key similarities provide opportunities for significant ASP Program efficiencies. For a potential *significant* precursor, analysts from the three programs work together to provide a timely determination of plant risk. As such, duplication between programs is minimized to the extent practical within the program objectives.

In additionCurrently, the ASP Program provides integrated analyses of complex operating events that are not evaluated by the SDP or finalized by MD 8.3 evaluations. Two notable examples include the degraded reactor vessel head with multiple degraded conditions at Davis-Besse in FY 2003 (LERs 346/02-002, 346/02-005, and 346/03-002) and the complicated LOOP event at Byron Unit 2 in FY 2012 (LER 454/12-001).

The Davis-Besse precursor event involved (1) a potential loss-of-coolant accident (LOCA) due to reactor pressure vessel head erosion from the leakage of a circumferential cracked control rod drive mechanism nozzle, (2) the potential unavailability of sump recirculation due to screen plugging following a postulated LOCA from unqualified containment coatings and other debris

(e.g., insulation) inside containment, and (3) the potential unavailability of high-pressure safety injection pumps during the recirculation phase of a postulated LOCA due to potential debris generated by certain postulated LOCAs and entrained in pumped fluid. The SDP cited three licensee performance deficiencies. Analyzed separately, the equivalent ΔCDP for the three deficiencies were 4×10^{-4}, 3×10^{-5}, and 3×10^{-6}, respectively. The ASP Program analysis integrated these deficiencies and aggregated the risk which resulted in a ΔCDP of 6×10^{-3} identifying this as a significant precursor that was reportable to Congress. The ASP analysis result confirmed the risk significance of this event following a systematic and repeatable process that, in part, undergirded the substantial regulatory response that was undertaken. The regulatory response included issuance of Order EA-03-009 requiring all licensees with plants susceptible to reactor pressure vessel head degradation to perform visual inspections for indications of degradation or boric acid leakage, worked with the American Society of Mechanical Engineers (ASME) to incorporate reactor pressure vessel head inspections into the ASME code, adopted a new operating experience program, and enhanced the NRC's ability to detect declining plant performance by changing several NRC inspection and management programs.

The Byron Unit 2 precursor event resulted from a LOOP and unprotected under-voltage conditions on safety-related electrical buses for eight minutes. The loss of one of three phases (Phase "C") of 345 kilovolts offsite power to the two unit station auxiliary transformers (SATs) did not result in an automatic under-voltage protection signal, because the under-voltage protection scheme did not provide adequate protection from a single loss of Phases "A" and "C". As a result, all running safety equipment powered by the safety buses had tripped on over-current conditions. These conditions existed until operators manually opened (from the main control room) the SAT feeder breakers about eight minutes after the event had initiated. Following the opening of the SAT feeder breakers, both emergency diesel generators started and loaded supplying power to the safety buses, as designed. The MD 8.3 risk assessment of the event that was performed on the day of the event occurrence resulted in a CCDP of 7×10^{-6}. The assessment did not include the aspects of the under-voltage condition of the safety buses that was identified as the result of a special inspection. The inspection identified no performance deficiencies; therefore, no SDP assessment was required. The ASP analysis of this complicated LOOP event resulted in an aggregated plant risk ~~of~~ CCDP of 1×10^{-4}. This realization contributed to the basis for the ongoing staff efforts on the system study of electrical system and component failures to risk. In addition, the NRC staff issued Bulletin 2012-01, "Design Vulnerability in Electric Power System," and Information Notice (IN) 2012-03, "Design Vulnerability in Electric Power System" highlighting the potential significance of a single-phase open circuit condition.

3.0 ASP Program Status

The following subsections summarize the status and results of the ASP Program (as of September 30, 2015).

FY 2014 Analyses. The staff completed its screening and review of 501 LERs and their associated inspection findings for FY 2014. On the basis of that review, 36 events were selected and analyzed for potential precursors. Of these, the ASP analyses have identified 6 precursors (initiating events) and the SDP identified 10 precursors (degraded conditions). For 10 of the 16 precursors, the performance deficiency identified under the Reactor Oversight Process documented the risk-significant aspects of the event completely. In these cases, the SDP significance category (i.e., the "color" of the finding) is reported in the ASP Program. For the remaining events, an independent ASP analysis was performed to determine the risk

significance of three LOOP initiating events, two electrical transformer failures, and a 13 kilovolts bus failure.

Table 1 presents the results of the staff's ASP analyses for FY 2014 precursors that involved initiating events. Table 2 presents the analysis results for FY 2014 precursors that involved degraded conditions.

FY 2015 Analyses. The staff performs an initial review of all events to determine if they have the potential to be *significant* precursors. Specifically, the staff reviews LERs (reported by licensees in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.73, "Licensee Event Report System") and daily event-notification reports (reported by licensees in accordance with 10 CFR 50.72, "Immediate Notification Requirements for Operating Nuclear Power Reactors") to identify potential *significant* precursors. The staff has completed the initial review of FY 2015 events and identified no potentially *significant* precursors (as of September 30, 2015). The staff will inform the Commission if a *significant* precursor is identified during the more detailed evaluations of events.

Table 1. FY 2014 Precursors Involving Initiating Events

Event Date	Plant	Description	CCDP
10/14/13	Pilgrim	LOOP and Reactor Scram. ***LER 293/13-009***	3×10^{-5}
12/9/13	Arkansas Nuclear One, Unit 2	Fire and Explosion of the Unit Auxiliary Transformer. ***LER 368/13-004***	2×10^{-6}
1/18/14	Shearon Harris	Manual Reactor Trip due to Indications of a Fire. ***LER 400/14-001***	6×10^{-6}
1/21/14	Calvert Cliffs 2	Reactor Trip due to Inadequate Protection Against Weather-Related Water Intrusion. ***LER 318/14-001***	5×10^{-6}
5/25/14	Millstone 2	Dual Unit LOOP and Reactor Scram. ***LER 336/14-006***	1×10^{-5}
5/25/14	Millstone 3	Dual Unit LOOP and Reactor Scram. ***LER 336/14-006***	2×10^{-5}

Table 2. FY 2014 Precursors Involving Degraded Conditions

Condition Duration	Plant	Description	ΔCDP/ SDP Color
39 years[5]	Fort Calhoun	Harsh Environment Due to Postulated High-Energy Line Breaks Could Lead to the Failure of Equipment Needed to Safely Shutdown the Plant. ***Enforcement Action (EA)-14-187***	WHITE[3]
31 years[5,6]	Ginna	Unanalyzed Condition for Potential Floodwater Intrusion into Vital Battery Rooms. ***EA-13-247***	WHITE
10 years[5]	Oconee 1	High Cycle Fatigue Resulted in Reactor Coolant Leak and Unit Shutdown. ***EA-14-091***	WHITE

3 A WHITE finding corresponds to a licensee performance deficiency of low–to–moderate safety significance and has an increase in core damage frequency in the range of greater than 10^{-6} to 10^{-5} per reactor year.

Condition Duration	Plant	Description	ΔCDP/ SDP Color
36 years[5,6]	St. Lucie 1	Internal Reactor Auxiliary Building Flooding During Heavy Rain Due to Degraded Conduits Lacking Internal Flood Barriers. ***EA-14-131***	WHITE
40 years[5,6]	Arkansas Nuclear One, Unit 1	Inadequate External Flood Protection for Safety-Related Equipment Located Below the Design Basis Flood Elevation. ***EA-14-088***	YELLOW[4]
40 years[5,6]	Arkansas Nuclear One, Unit 2	Inadequate External Flood Protection for Safety-Related Equipment Located Below the Design Basis Flood Elevation. ***EA-14-088***	YELLOW
1 year	Millstone 3	Turbine Driven Auxiliary Feedwater Pump Operability Impacted by Incorrect Bearing. ***EA-14-092***	WHITE
23 years[5]	Oyster Creek	Technical Specification Prohibited Condition Caused by Two Electromagnetic Relief Valves Inoperable for Greater Than Allowed Outage Time. ***EA-14-178***	YELLOW
9 years[5]	Oyster Creek	Technical Specification Prohibited Condition Caused by Emergency Diesel Generator Inoperable for Greater than Allowed Outage Time. ***EA-14-186***	WHITE
109 days	Clinton	Failure of a Shutdown Cooling Water Pump Due to Damaged Bushing. ***EA-15-064***	WHITE

4.0 Trends and Insights

This section defines a statistically significant trend, defines the data period used in trending analyses, and discusses the results of trending analyses and insights for all precursors and *significant* precursors.

Statistically Significant Trend. Statistically significant is defined in terms of the "p-value." A p-value is a probability indicating whether to accept or reject the null hypothesis that no trend exists in the data.[7] A p-value less than or equal to 0.05 indicates that there is 95 percent confidence that a trend exists in the data (i.e., leading to a rejection of the null hypothesis that there is no trend).

Data Coverage. The data period for the ASP trending analyses is a rolling 10-year period which is aligned with thea rolling 10-year period used in the ITP.

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4 A YELLOW finding corresponds to a licensee performance deficiency of moderate-to-high safety significance and has an increase in core damage frequency in the range of greater than 10^{-5} to 10^{-4} per reactor year.

5 Note that although these degraded conditions lasted for many years, ASP and SDP analyses limit the exposure period to 1 year.

6 These four events were identified from the efforts undertaken by licensees and NRC inspectors as part of the Fukushima Near-Term Task Force Recommendation 2.3 walkdown inspections (Ref. 7).

7 For the purposes of this analysis, the null hypothesis is based on a constant-rate Poisson process producing the observed data set. A lower p-value indicates a lower likelihood that the observed data could be produced by this constant-rate process.

4.1 Occurrence Rate of All Precursors

The NRC's ITP ~~monitors~~evaluates trends in licensee safety performance using industry-level indicators. The mean occurrence rate of all precursors identified by the ASP Program is one indicator used by the ITP to assess industry performance.[8]

Results. The mean occurrence rate of all precursors does not exhibit a statistically significant trend (p-value = 0.59) for the 10-year period from FY 2005 through FY 2014 (see Figure 2).

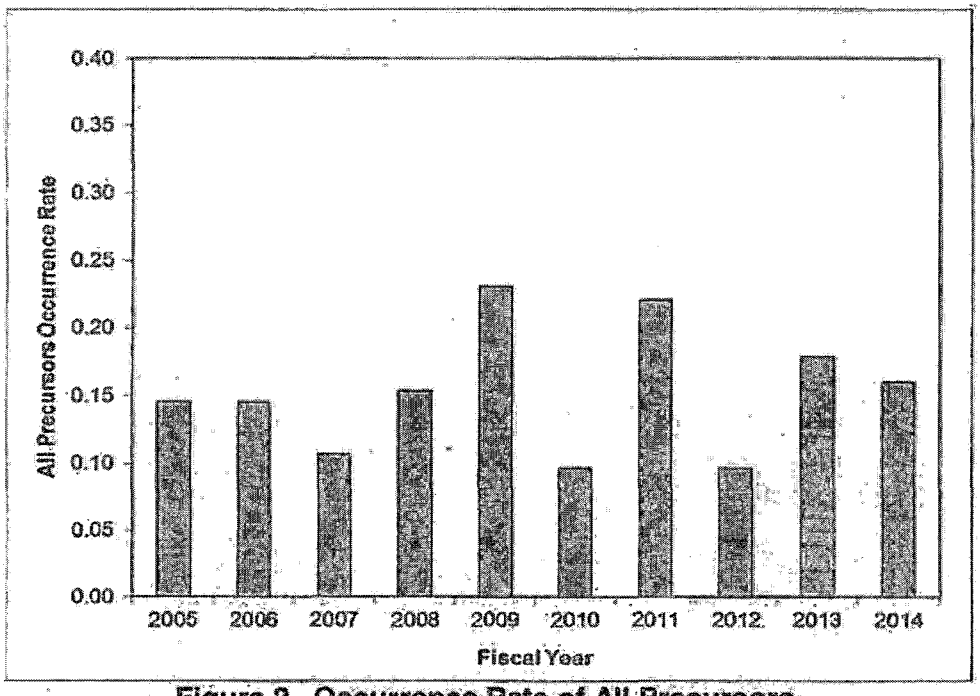

Figure 2. Occurrence Rate of All Precursors.

4.2 *Significant* Precursors

The NRC's Congressional Budget Justification (NUREG-1100, Volume 31) provides performance indicators used to measure and evaluate~~monitor~~ performance as part of the NRC's planning, budget, and performance management process. The number of *significant* precursors identified by the ASP program is one of several inputs to a performance indicator used to monitor the agency's strategic safety goal (Ref. 2).

Results. A review of the data for the 10-year period from FY 2005 through FY 2014 reveals the following insights:

- No *significant* precursors have been identified during FY 2005 through FY 2014. The staff has completed the initial review of FY 2015 events and identified no potentially *significant* precursors (as of September 30, 2015).
- The last *significant* precursor was identified in FY 2002 and involved concurrent, multiple degraded conditions at the Davis-Besse nuclear power plant.[9]

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8 The occurrence rate is calculated by dividing the number of precursors by the number of reactor years.

9 Commission Paper SECY-10-0125, "Status of the Accident Sequence Precursor Program and the Standardized

4.3 Occurrence Rate of Precursors with a CCDP or ΔCDP ≥ 1×10^{-4}

Precursors with a CCDP or ΔCDP ≥ 1×10^{-4} are considered important in the ASP Program because they generally have a CCDP higher than the annual CDP estimated by most plant-specific ~~probabilistic risk assessments~~ (PRAs).

Results. A review of the data for the 10-year period from FY 2005 through FY 2014 reveals the following trend and insights:

- The staff did not identify any precursors with a CCDP or ΔCDP greater than or equal to 1×10^{-4} for FY 2013 or FY 2014.
- The mean occurrence rate of precursors with a CCDP or ΔCDP greater than or equal to 1×10^{-4} does not exhibit a statistically significant trend (p-value = 0.11; see Figure 3).

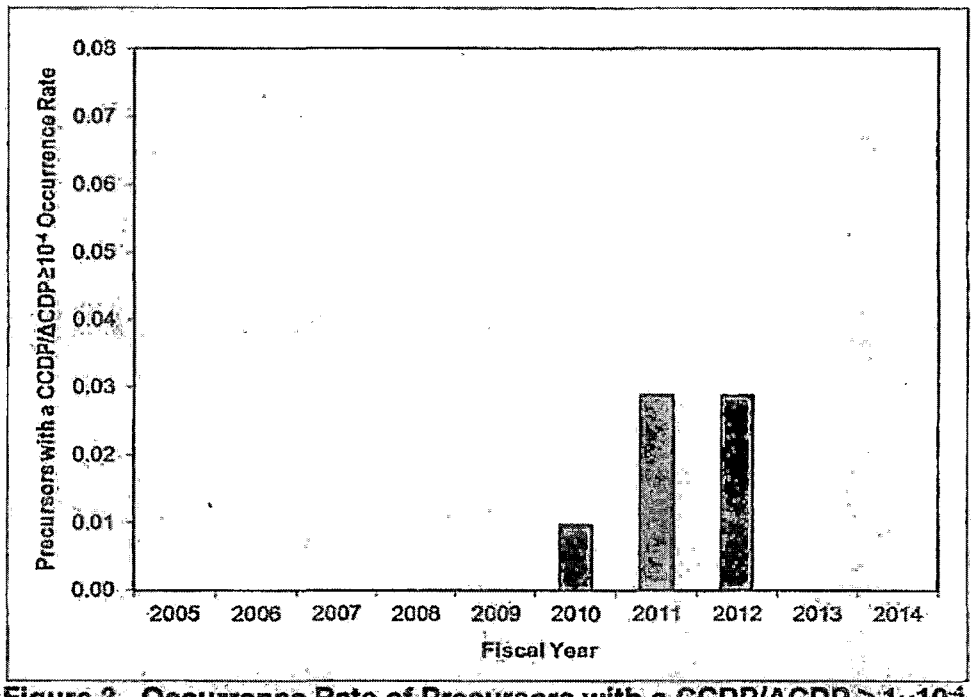

Figure 3. Occurrence Rate of Precursors with a CCDP/ΔCDP ≥ 1×10^{-4}.

- For FY 2012 and FY 2013, statistically significant increasing trends were observed in each respective 10-year period (FY 2003 through FY 2012 and FY 2004 though FY 2013, respectively). However, with no additional precursors observed in FY 2013 and FY 2014, the trend is no longer statistically significant.
- Over the past 10-year period (FY 2005 through FY 2014), a total of 7 precursors with CCDP or ΔCDP greater than or equal to 1×10^{-4} were identified: in FY 2010 (1 precursor), FY 2011 (3 precursors), and FY 2012 (3 precursors). As reported to the Commission last year, 6 of the 7 precursors involved electrical events in electrical distribution systems. See Enclosure 1 to SECY-14-0107, "Status of the Accident Sequence Precursor Program and the Standardized Plant Analysis Risk Models," for a listing of these precursor events and a summary of insights (Ref. 9).

Plant Analysis Risk Models" (Ref. 8), provides a complete list of all *significant* precursors from 1969 through 2010.

4.4 Precursors Involving Initiating Events and Degraded Conditions

A review of the data for the 10-year period from FY 2005 through FY 2014 reveals the following insights for precursors involving initiating events and degraded conditions.

Initiating Events

- The mean occurrence rate of precursors involving initiating events does not exhibit a statistically significant trend (p-value = 0.26) (see Figure 4).

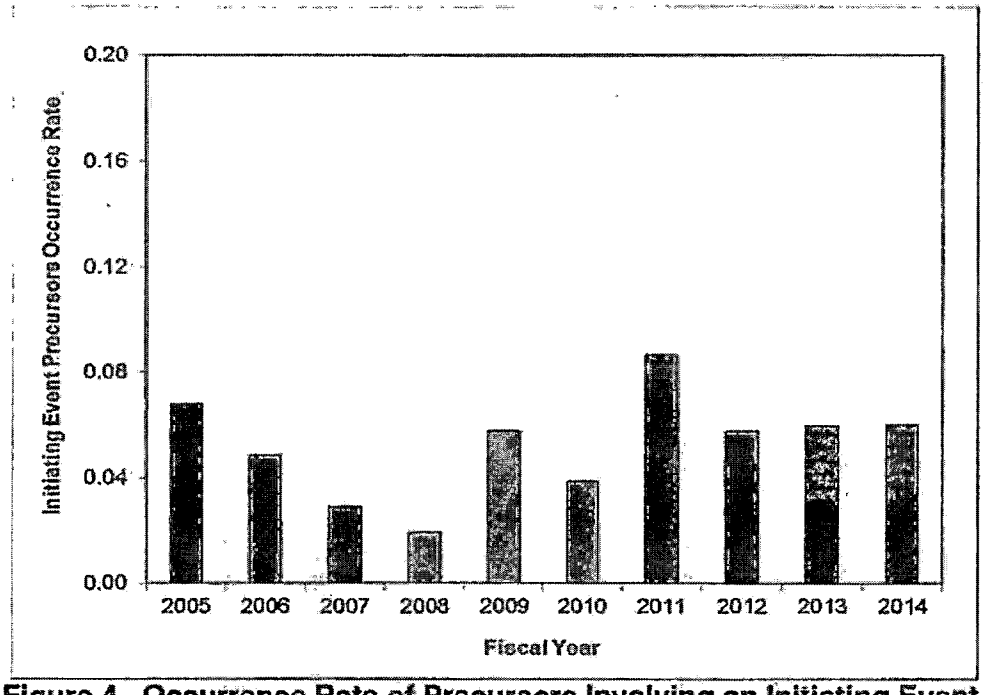

Figure 4. Occurrence Rate of Precursors Involving an Initiating Event.

- Of the 54 precursors involving initiating events, 27 precursors (50 percent) were LOOP events. While the frequency of complicated trips[10] (27 precursors) is about the same as the frequency of LOOPs (27 precursors), the CDP~~core damage probability risk~~ estimates for LOOPs are somewhat higher.

Degraded Conditions

- The mean occurrence rate of precursors involving degraded conditions does not exhibit a statistically significant trend (p-value = 0.94) (see Figure 5).
- Over the past 10 years, precursors involving degraded conditions (104 precursors) outnumbered initiating events (54 precursors) by 93 percent.
- Of the 104 precursors involving degraded conditions, 35 precursors (34 percent) involved degraded conditions existing for a decade or longer.[11] Of these 35 precursors,

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[10] A complicated trip is a reactor trip with a concurrent loss of safety-system equipment.

[11] Note that although these degraded conditions lasted for many years, ASP and SDP analyses limit the exposure period to 1 year.

15 precursors ~~(43 percent)~~ involved degraded conditions dating back to initial plant construction.

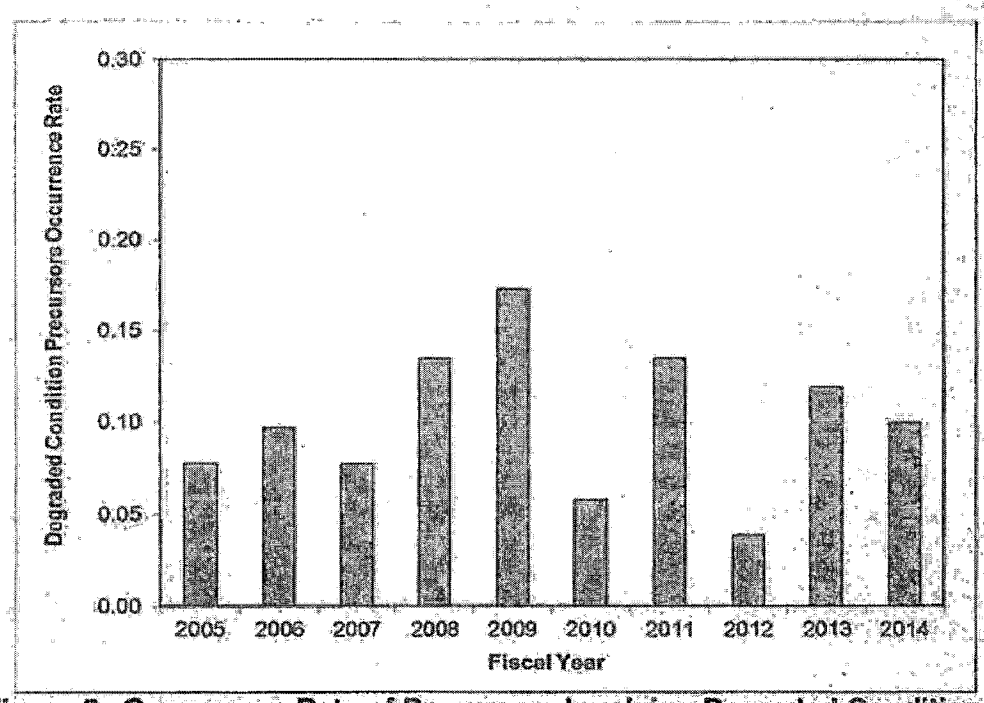

Figure 5. Occurrence Rate of Precursors Involving Degraded Conditions.

4.5 Precursors Involving a Complete Loss of Offsite Power Initiating Event

In FY 2014, 3 precursors from 2 NPP sites resulted from a complete LOOP initiating event.[12] In FY 2015, 3 complete LOOP initiating events occurred at 2 NPP sites.[13] Typically, all complete LOOP initiating events meet the precursor threshold.

Results. A review of the data for the 10-year period from FY 2005 through FY 2014 reveals the following insights:

- *Trend.* The mean occurrence rate of precursors involving LOOP precursor events exhibited a statistically significant increasing trend (p-value = 0.01; see Figure 6). The increasing trend of LOOP precursor events became significant in FY 2014 when 6 LOOP precursor events dropped out of the rolling 10-year trend period and 3 LOOP precursor events occurred in FY 2014.
- *Precursor Counts.* Of the 158 precursors that occurred during the FY 2005 through FY 2014 period, 27 precursors (17 percent) were LOOP precursor events that occurred at 19 NPP sites. Of the 27 LOOP precursor events, 20 ~~(74 percent)~~ precursors occurred during

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12 A LOOP initiating event involves a reactor trip and the simultaneous loss of electrical power to all unit safety buses (also referred to as emergency buses, Class 1E buses, and/or vital buses) requiring all emergency power generators to start and supply power to the safety buses. The non-safety buses may (or may not) be deenergized as a result of the LOOP initiating event. (Ref. 10)

13 Precursor analyses of events occurring in FY 2015 are not final. Three LOOP initiating events occurred in FY 2015 and will most likely meet the ASP threshold (i.e., CCDP $\geq 1 \times 10^{-6}$). These events are not included in the trending analysis. These FY 2015 LOOP events occurred at Pilgrim on January 27, 2015 (LER 293/15-002) and Calvert Cliffs Units 1 and 2 on April 7, 2015 (LER 317/15-002).

the last 4 years (FY 2011 through FY 2014).

- *Concurrent Unavailability of an Emergency Power Train.* Of the 27 LOOP precursor events, 2 (7 percent) precursors involved a concurrent unavailability of an emergency power system train during the FY 2005 through FY 2014 period. One precursor involved an emergency diesel generator (EDG) failure to run due to a leak in the EDG coolant system and 1 precursor involved an EDG out of service due to maintenance. In FY 2015, a LOOP initiating event (and potential precursor) occurred involving an EDG failure to start due to a fault in the EDG startup circuity and the shutdown sequencer failure for the other EDG to automatically restart selected equipment (see Calvert Cliffs LER 317/15-002).
- *External Hazards.* Of the 27 LOOP precursor events, 12 (44 percent) precursors resulted from external hazards, including: 2 tornados (5 precursors), Hurricane Katrina (1 precursor), 3 other weather-related events (4 precursors), and the 2011 Virginia earthquake (2 precursors). All ~~plant~~ units at the 5 multi-unit NPP sites involved in these events were affected by the external events. Of these 12~~1~~ LOOP precursor events, 7 (58~~64~~ percent) occurred in FY 2011.[14]
- *Outside Plant Boundary.* Of the 27 LOOP precursor events, 3 (11 percent) precursors resulted from an electrical fault either in the plant switchyard or offsite power transmission line to the switchyard.
- *Multi-unit NPP Sites.* Of the 27 LOOP precursor events, 15 precursors occurred at all units at a multi-unit NPP site, 5 precursors occurred at a single unit at a multi-unit site, and 7 precursors occurred at a single-unit site.

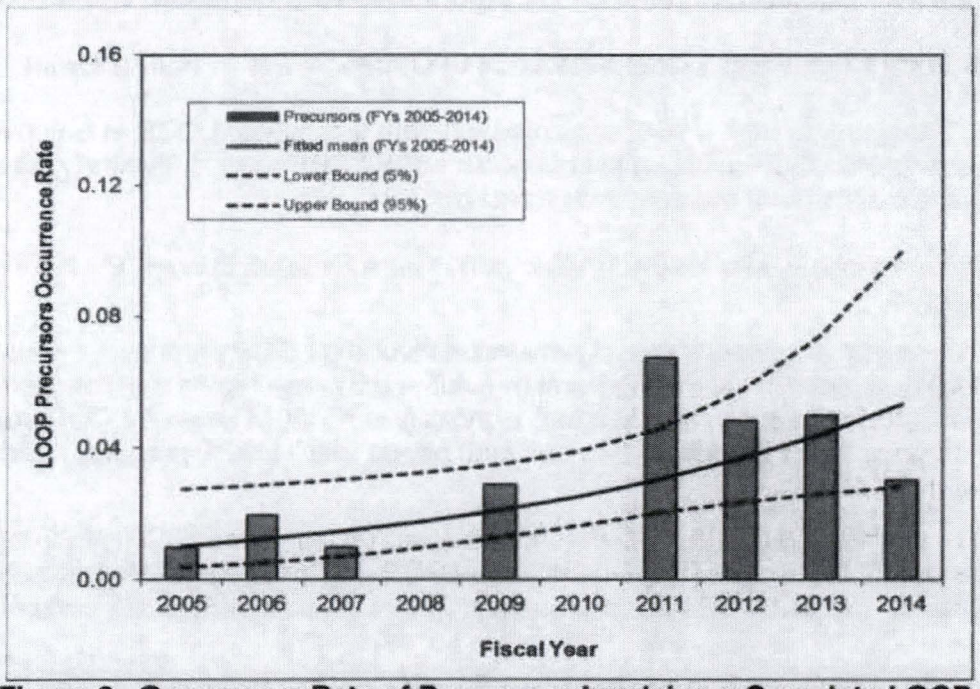

Figure 6. Occurrence Rate of Precursors Involving a Complete LOOP.

[14] These FY 2011 events were the Surry Units 1 and 2 tornado precursor events that occurred on April 16, 2011; the Browns Ferry Units 1, 2, and 3 tornado precursor events that occurred on April 27, 2011; and the North Anna Units 1 and 2 earthquake precursor events that occurred on August 23, 2011.

4.6 Precursors at BWRs and PWRs

A review of the data for the 10-year period from FY 2005 through FY 2014 reveals the following insights for boiling-water reactors (BWRs) and pressurized-water reactors (PWRs).

BWRs

- The mean occurrence rate of precursors that occurred at BWRs does not exhibit a statistically significant trend (p-value = 0.41; see Figure 7).

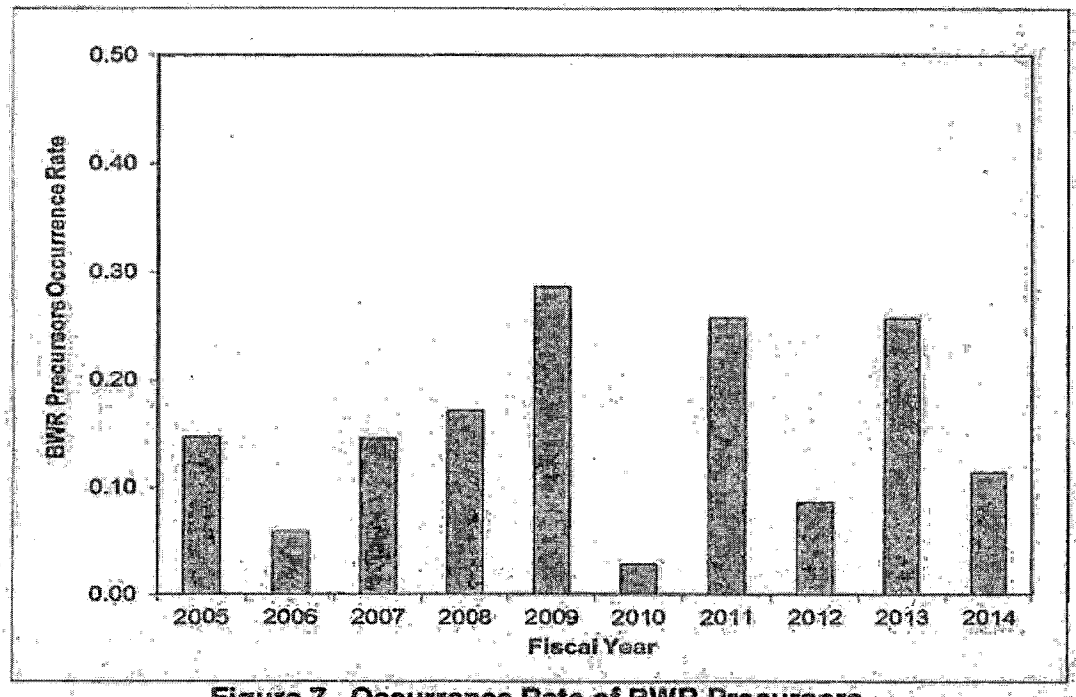

Figure 7. Occurrence Rate of BWR Precursors.

- Of the 21 precursors involving initiating events at BWRs, 11 precursors (52 percent) were complete LOOP events.
- Of the 33 precursors involving the unavailability of safety-related equipment that occurred at BWRs, most were caused by failures in the emergency power system (12 precursors or 36 percent), emergency core cooling systems (7 precursors or 21 percent), electrical distribution systems (2 precursors or 6 percent), or safety-related cooling water systems (1 precursor or 3 percent).

PWRs

- The mean occurrence rate of precursors that occurred at PWRs does not exhibit a statistically significant trend (p-value = 0.95; see Figure 8).
- Of the 33 precursors involving initiating events at PWRs, 16 precursors (48 percent) were complete LOOP events.
- Of the 71 precursors involving the unavailability of safety-related equipment that occurred at PWRs, most were caused by failures in the emergency power system (17 precursors or 24 percent), auxiliary feedwater system (10 precursors or 14 percent), electrical distribution system (10 precursors or 14 percent), safety-related cooling water systems (7 precursors or

10 percent), or emergency core cooling systems (5 precursors or 7 percent).

- Of the 5 precursors involving failures in the emergency core-cooling systems, 3 precursors (60 percent) were because of conditions affecting sump recirculation during postulated loss-of-cooling accidents of varying break sizes.

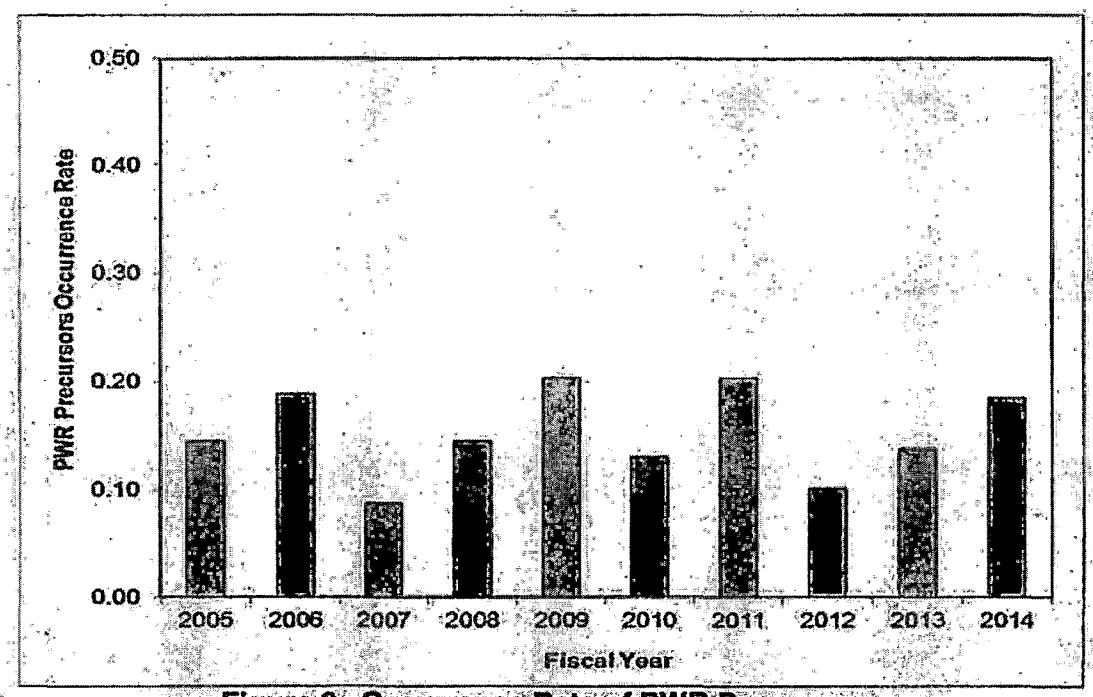

Figure 8. Occurrence Rate of PWR Precursors.

- Of the 10 precursors involving failures of the auxiliary feedwater system, random hardware failures (7 precursors or 70 percent) and design errors (2 precursors or 20 percent) were the largest failure contributors. Nine of the 10 precursors (90 percent) involved the unavailability of the turbine-driven auxiliary feedwater pump train.
- Of the 17 precursors involving failures in the emergency power system, 14 precursors (82 percent) were from hardware failures.
- Design errors contributed to 2 precursors involving the unavailability of safety-related equipment that occurred at PWRs.

4.7 Operating Experience Insights Feedback for PRA Standards and Guidance

One objective of the ASP Program is to provide insights into the adequacy of current PRA standards and guidance~~state of practice in risk assessment~~. ASP event analyses, both precursors and events that did not exceed the ASP Program threshold, from FY 2014 were reviewed against the ~~approaches to~~ PRA elements described in the American Society of Mechanical Engineers (ASME)/American Nuclear Society (ANS) RA-Sa-2009, "Addenda to ASME/ANS RA-S-2008 Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications" (Ref. 11), as endorsed in Regulatory Guide 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities" (Ref. 12). This review sought to identify aspects of the event analyses for which the risk-significant ASME/ANS PRA Standard did not provide adequate guidance.

Results. None of the FY 2014 event analyses indicated an inadequacy in the ~~state of~~ PRA elements~~practice~~ as described in ASME/ANS RA-Sa-2009. The staff continues to work with ASME/ANS on refining the standard to ensure that it provides sufficient guidance ~~to assess the risk significance of external events, including external flooding~~.

5.0 Summary

This section summarizes the ASP results, trends, and insights:

- ***Significant Precursors.*** The staff identified no *significant* precursors (i.e., CCDP or ΔCDP greater than or equal to 1×10^{-3}) in FY 2014. The staff identified no potentially *significant* precursors in FY 2015 (as of September 30, 2015).
- ***Occurrence Rate of All Precursors.*** The occurrence rate of all precursors does not exhibit a trend that is statistically significant from FY 2005 through FY 2014.
- ***Additional Trend Results.*** During the same period, a statistically significant increasing trend was observed in precursors involving LOOP precursor events. No statistically significant trend was observed in precursors with a CCDP or ΔCDP greater than or equal to 1×10^{-4}, precursors involving initiating events or degraded conditions, or~~and~~ precursors at BWRs or PWRs.

6.0 References

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September 29, 2010, ADAMS Accession No. ML102100386.

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12. U.S. Nuclear Regulatory Commission, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," Regulatory Guide 1.200, Revision 2, March 2009, ADAMS Accession No. ML090410014.

Status of the Standardized Plant Analysis Risk Models

1.0 Background

The objective of the U.S. Nuclear Regulatory Commission's (NRC's) Standardized Plant Analysis Risk (SPAR) Model Program is to develop standardized risk analysis models and tools ~~for staff analysts~~ to support various regulatory activities, including the Accident Sequence Precursor (ASP) Program and ~~Phase 3 of~~ the Significance Determination Process (SDP). The SPAR models have evolved from two sets of simplified event trees initially used to perform precursor analyses in the early 1980s. Today's SPAR models for internal events are far more comprehensive than their predecessors. For example, the revised SPAR models include improved loss of offsite power (LOOP) and station blackout modelules; an improved reactor coolant pump seal failure model; new support system initiating event models; and updated estimates of accident initiator frequencies and equipment reliability based on recent operating experience data.

The SPAR models consist of a standardized, ~~plant-specific~~ set of plant-specific risk models that use the event-tree and fault-tree linking methodology. Although the SPAR models are plant-specific models, they rely on a set of standardized modeling conventions (e.g., standardized naming conventions, standard modeling approaches, and logic structure). They employ a standard approach for event-tree development, as well as a standard approach for initiating event frequencies, equipment performance parameters, and human performance data. These input data can be modified to be more plant- and event-specific, when needed. SPAR standardization is needed to allow agency risk analysts to efficiently use SPAR models for a wide variety of nuclear power plants (NPPs) without having to relearn modeling conventions and basic assumptions. Although the system fault trees contained in the SPAR models generally are not as detailed as those in licensee probabilistic risk assessments (PRAs), in some cases SPAR models may contain more sophisticated modeling, such as for common-cause failures, support systems, and losses of offsite power. The staff maintains 75 SPAR models representing all 99 operating commercial NPPs. The SPAR models for NPPs that have recently permanently ceased operation (Kewaunee, Crystal River, San Onofre, and Vermont Yankee) are no longer being updated but remain available for staff use. All SPAR models are developed under a comprehensive quality assurance (QA) program and have been benchmarked against licensee PRAs through either onsite QA~~quality assurance~~ reviews or other information provided by the licensee.

The staff initiated the Risk Assessment Standardization Project (RASP) in 2004. A primary focus of RASP was to standardize risk analyses performed in SDP ~~Phase 3~~, in ASP, and under Management Directive (MD) 8.3, "NRC Incident Investigation Program." Under this project, the staff initiated the following activities:

- Enhance SPAR models to be more plant-specific and improve the Systems Analysis Programs for Hands-on Integrated Reliability Evaluations (SAPHIRE) code used to manipulate the SPAR models.
- Document consistent methods and guidelines for risk assessments of internal events during power operations; internal fires and floods; external hazards (e.g., seismic events and tornadoes); and internal events during low-power and shutdown (LPSD) operations.
- Provide on-call technical support for staff involved with licensing and inspection issues.

This effort resulted in the development of the Risk Assessment of Operational Events Handbook (commonly referred to as the RASP Handbook) and better alignment between the SDP and ASP Program event assessment processes.

2.0 SPAR Model Program Status

The SPAR Model Program continues to play an integral role in the ASP analysis of operating events. Many other agency activities, such as the SDP analyses and MD 8.3 evaluations, also involve the use of SPAR models. All SPAR models include logic modeling covering internal events at power through core damage (i.e., Level-1 PRA model). The NRC is developing new SPAR modules for assessing plant risk for internal fires, external hazards (e.g., high wind and seismic events), and for assessing post-core damage severe accident progression (i.e., Level-2 PRA modeling).

The staff has completed the following activities in model and method development since the previous status report (SECY-14-0107, "Status of the Accident Sequence Precursor Program and the Standardized Plant Analysis Risk Models," dated October 6, 2014), as described below.

Technical Adequacy of SPAR Models. The staff implemented a quality assurance (QA) plan covering the SPAR models in 2006. It updated the SPAR QA plan in fiscal year (FY) 2013. The main objective of this plan is to ensure that the SPAR models continue to represent the as-built, as-operated NPPs and continue to be of sufficient quality for performing event assessments of operational events in support of the staff's risk-informed activities. In addition to model development, the QA plan provides mechanisms for internal and external peer review, validation and verification, and configuration control of the SPAR models. The staff has processes in place to verify, validate, and benchmark these models according to the guidelines and standards established by the SPAR Model Program. As part of this process, the staff performs reviews of the SPAR models and results against the licensee PRA models, when applicable. The QA plan also provides a feedback process from the model users for error reporting, tracking, and resolution. The staff also has processes in place for the proper use of these models in agency programs such as the ASP Program, the SDP, and the MD 8.3 process. These processes are documented in the RASP HHandbook, which serves as a desktop guidance document for agency risk analysts.

In 2010 the staff (with the cooperation of industry experts) performed a peer review of SPAR models for a representative boiling-water reactor (BWR) and a representative pressurized-water reactor (PWR) in accordance with American Society of Mechanical Engineers/American Nuclear Society RA-S-2008, "Standard for Level-1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications," and Regulatory Guide (RG) 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities" ADAMS Accession No. ML090410014.

The peer review teams noted a number of strengths for the SPAR models, including:

- The SPAR model structure is robust and well developed.
- The SPAR model fault trees are streamlined with an appropriate level of detail for its intended uses.

- The SPAR model structure and the SAPHIRE software are "state of the technology."
- The SPAR models are an efficient method to develop qualitative and quantitative insights for risk-informed applications, SDP evaluations, inspections, event assessments, and model evaluations.

The peer review teams also noted a number of enhancements that could be made to the SPAR models. The staff reviewed and prioritized the peer review comments in order to identify potential improvements to the SPAR models. Enhancements that improved the usability, capabilities, and technical adequacy of the models in a cost effective manner were given high priority and the staff initiated projects to address these comments. Specific enhancements that have been completed include structuring the SPAR model documentation to more closely align with the structure of the PRA standard, incorporation of improved LOOP modeling, development of new support system initiating event models, and expanding the SAPHIRE Web site to better log and track model change requests. All high priority BWR and PWR SPAR peer review enhancements were completed by August 2015.

It should be noted that the SPAR models are generally used to categorize and prioritize operational events and conditions, including licensee non-compliance issues with existing regulations. Licensee PRA models developed to support licensing basis changes must meet the technical adequacy requirements of RG 1.200. Although the SPAR models are not maintained under a RG 1.200 program, the SPAR QA~~quality assurance~~ program and other process controls (such as internal and external reviews) help to ensure that SPAR-based analyses appropriately reflect the as-built, as-operated NPP.

Routine SPAR Model Updates. Existing SPAR models for operating plants need to be updated regularly as a result of any significant plant changes that may affect the risk profile of the plant. In general, the staff goal is to perform significant updates to approximately 10 to 12 SPAR models per year. As SPAR models are updated, their documentation (i.e., the model report and the plant risk information eBook summary reports) is also updated to represent the latest PRA information included in each SPAR model. Comparisons between the SPAR model baseline results and licensee model results (when voluntarily submitted by the licensee) are also performed. These comparisons include baseline core damage frequency, conditional core damage probability for each initiator type, top cut sets, and importance measures. These comparisons help ensure that SPAR models and associated risk assessments that support the SDP process are of high quality and reflect the as-built, as-operated plants. In FY 2015, the staff performed significant updates to six SPAR models to reflect changes, such as the addition of logic for new station blackout generators, battery charging generators, and broad expansion of electrical power modeling detail. Although the level of effort in FY 2015 was less than the staff goal due to resource limitations, the effort is expected to~~will~~ be increased again in FY 2016 to complete approximately 10 model updates per year.

In FY 2015, the staff also modified all SPAR models to take advantage of new SAPHIRE features and to improve the usability of the~~make~~ models ~~more understandable to users~~. Among these new SAPHIRE features is the ability to eliminate most event tree linkage rules. SAPHIRE now automatically merges multiple overlapping rules, thus precluding the need to manually generate multiple explicit rule sets. Automatic generation and application of convolution

correction factors is another SAPHIRE enhancement that eliminates multiple manual actions each time a model is updated.

Approximately 30 SPAR models were also updated to support specific SDP or ASP activities. These more limited SPAR model updates are performed when requested by agency risk analysts. These updates are normally required to better model specific features of an operational event that are not normally captured in a base PRA or to reflect an enhanced understanding of the as-built, as-operated plant as a result of event followup activities.

During FY 2015, the staff continued to perform a comprehensive data update to all 75 SPAR models to reflect recent operating experience and implement other enhancements to improve the usability and functionality of the models. In addition to updating SPAR model parameters, this activity will improvecomprehensive update will also update model documentation; provide an integrated hazard categories (i.e., internal events, external hazards, Level-2, and LPSD models) into a single report for each SPAR model report; and resolve structural modeling issues associated with the SPAR logic modeling framework. Other data updates include modification of common cause events to more closely follow the guidance in the RASP Handbook. A plant-specific model convergence analysis (to assess the appropriate truncation level to run the model) and documentation of the results is also included in this task.

SPAR Models for the Analysis of All Hazards (External Events). Development of SPAR All-Hazard (SPAR-AHZ) models, —which contain accident scenarios from all hazard categories (including seismic, high wind, and internal fire) applicable to a given site, —has continued during FY 2015, although at a lower intensity than the previous year. The lower intensity was due tobecause of budgetary constraints and the balancing of limited staff resources to work on other projects, such as the Commission- directed site Level-3 PRA project for the Vogtle site. Currently, 22 of the 75 SPAR models, representing 28 NPPs, include internal fire and external hazard groups. Eighteen of the SPAR-AHZ models are based on assessments conducted for Supplement 5, "Individual Plant Examination of External Events for Severe Accident Vulnerabilities," to Generic Letter 88 20, "Individual Plant Examination for Severe Accident Vulnerabilities 10 CFR 50.54(f)," and other readily available information. In FY 2015, one new SPAR-AHZ model, which includes internal fire models extracted from the National Fire Protection Association (NFPA) Standard 805- compliant fire model for the Vogtle plant, has been constructed and placed in the SPAR model library for use by NRC risk analysts. SPAR-AHZ models for the Shearon Harris, D.C. Cook, and V.C. Summer NPPs had been previously completed. Because the licensee-developed NFPA 805-compliant fire PRA models contain thousands of quantified fire sequences, a significant focus of the SPAR-AHZ effort was combining similar sequences to enhance model usability while maintaining the ability to retaining the resolution contained in the licensee models.

Recently, a new SPAR-AHZ model for the Point Beach site washas been developed, and the SPAR-AHZ model for the Sequoyah site underwenthas undergone a major upgrade. The staff is currently working on a major update to the Peach Bottom SPAR-AHZ model. Development of the Peach Bottom SPAR-AHZ model includes licensee site visits to gather information and discuss modeling assumptions and results. Currently, the Office of Nuclear Regulatory Research (RES) and the Office of Nuclear Reactor Regulation (NRR) are working together to identify ways to improve the efficiency and therefore increase the pace of SPAR-AHZ model development, given expected resource constraints in FY 2016 and beyond.

New Reactor SPAR Models. Before new plant operation, the staff may perform risk assessments to inform potential risk-informed applications for combined licenses, focus construction inspection scope, or assess the significance of construction inspection findings. Once the plants begin operation, independent assessments using SPAR models will be used by the staff for the evaluation of operational findings and events similar to the assessments performed for current operating reactors.

There are currently five new reactor internal hazard SPAR models. These include one model for the AP1000, two Advanced Boiling-Water Reactor (ABWR) models (one for the Toshiba design and one for the General Electric-Hitachi design), one model for the U.S. Advanced Pressurized-Water Reactor (US-APWR), and one model for the U.S Evolutionary Power Reactor (U.S. EPR). In addition to these internal events models, there is a seismic model for the AP1000 and a LPSD model for the Toshiba ABWR. Since FY 2013, the staff has been extending the capabilities for the AP1000 reactor design SPAR model. The AP1000 SPAR-AHZ model includes an internal flooding model (completed in FY 2013) and an internal fire model (completed in FY 2014). The staff is in the process of completing a LPSD model and developing a new severe accident model (Level-2 PRA model) for the AP1000 reactor design.

The staff plans to continue developing new reactor SPAR models, including AHZ and LPSD models, as needed, to support licensing and oversight activities.

MELCOR Thermal Hydraulic Analysis for SPAR Model Success Criteria. The staff continues to perform MELCOR analyses to investigate success criteria associated with specific Level-1 PRA sequences. In some cases, these analyses confirm the existing technical basis, and in other cases they support modifications that can be made to increase the realism of the agency's SPAR models. The latest round of activity is documented in two reports: (1) soon to be published NUREG-2187, "Confirmatory Thermal-Hydraulic Analysis to Support Specific Success Criteria in the Standardized Plant Analysis Risk Models—Byron," and (2) NUREG/CR-7177, "Compendium of Analyses ~~To~~to Investigate Select Level-1 Probabilistic Risk Assessment End-State Definition and Success Criteria Modeling Issues," published in May 2014 (ADAMS Accession No. ML14148A126). The results of these studies will be used to confirm specific success criteria for a suite of four-loop Westinghouse plants, which are similar to Byron, with appropriate consideration of the design and operational differences of these plants. They also will be used to support application-specific consultation on the use of the SPAR models.

This effort directly supports the agency's goal of using state-of-the-art tools that promote effectiveness and realism. The NRC is communicating the project plans and results to internal and external stakeholders through mechanisms such as the Regulatory Information Conference and the industry's Modular Accident Analysis Program Users' Group.

3.0 Additional Activities

SAPHIRE Maintenance and Improvements. In FY 2015, new features and capabilities ~~were have been~~ implemented in SAPHIRE to better support NRC regulatory activities. The new features include:

- SAPHIRE offers multiple methods for solving PRA models. Models can be assessed by solving individual accident sequences or by grouping sequences by common end states. A new capability in SAPHIRE allows users to trace the contribution of individual accident sequences regardless of the solving method that is used.
- Improvements to the reporting capabilities for external hazard model results.
- Improved tools for modelers to update and maintain the SPAR models.

All of these improvements to SAPHIRE have been performed in accordance with the SAPHIRE software QA program. A set of software QA documents has been developed for SAPHIRE. These documents cover topics such as the software development plan, configuration management, requirements tracking, and testing and acceptance. The NRC project manager performs an annual audit of the SAPHIRE software QA program. The most recent audit was completed on January 15, 2015, and no significant issues were identified. The NRC project manager confirmed that the maintenance and implementation of the SAPHIRE software QA program is consistent with the guidance contained in NUREG/BR-0167, "Software Quality Assurance Program and Guidelines," dated February 1993 (ADAMS Accession No. ML15043A791).

The SAPHIRE developers continue to explore advanced features and enhancements that may be implemented in future SAPHIRE revisions. The SAPHIRE team has developed a demonstration version of a Web-based SAPHIRE application. A Web-based SAPHIRE application is envisioned to have several advantages that are not available with a desktop application, such as improved configuration management of models and analyses, enhanced collaboration capabilities, and remote access to high-performance computing resources. After successfully demonstrating a limited capability prototype version of a web-based application capable of supporting SAPHIRE, the SAPHIRE team developed an implementation plan to describe how a fully functional Web based version could be completed and made available to users as a replacement to the current personal computer version of SAPHIRE. Research activities on the Web based version also identified other potential algorithmic enhancements that could be implemented in the current version of SAPHIRE. The team continues to enhance the quantification and analysis capabilities to remain consistent with industry-wide accepted PRA practices and tools.~~After successfully demonstrating a prototype version of the application, the SAPHIRE team is developing an implementation plan to describe how a fully functional Web-based version could be completed and made available to users as a replacement to the current version of SAPHIRE. The implementation is expected to occur in a phased approach over the next several years. The work on the Web-based version has also helped the SAPHIRE team to explore new ways to use parallel computing resources to reduce code runtimes for complex analyses. These methods may even be able to benefit near-term updates to the current version of SAPHIRE.~~ In addition to this work, the SAPHIRE team continues to remain cognizant of academic and international research activities on advanced PRA quantification techniques.

Cooperative Research for PRA. The staff has executed an addendum to the memorandum of understanding with the Electric Power Research Institute (EPRI) to conduct cooperative nuclear safety research for PRA. Several of the initiatives included in the addendum are intended to help resolve technical issues that account for the key differences between NRC SPAR models and licensee PRA models.

During FY 2015, significant efforts have been made in implementing PRA methods for support system initiating event (SSIE) analysis and treatment of LOOP in PRAs. The SSIE PRA modeling approach was developed in collaboration with EPRI and is documented in EPRI Report 1016741, "Support System Initiating Events," published December 19, 2008. These methods are being implemented in the SPAR models as one of the activities associated with addressing the peer review comments. To date, all SPAR models have been enhanced with the improved SSIE modeling methodology. Various LOOP methodology enhancements have been added to all models, with the remaining enhancements expected to be completed in conjunction with routine SPAR model updates. The staff plans to continue these cooperative efforts with EPRI and other stakeholders to address the remaining issues over the next several years.

On July 14–15, 2015, RES, in collaboration with Idaho National Laboratory staff, held a two-day public workshop on the agency's SPAR model program. Workshop discussions included the objectives of the SPAR model program; data collection and analysis; human reliability analysis; loss of offsite power modeling; and SPAR model maintenance and QA~~quality assurance~~. The workshop participants included representatives from NPPs, industry contractors, international partners, and public interest groups. In addition, NRC staff from NRR, Office of New Reactors, and the Regions attended. A meeting summary of the workshop can be found in ADAMS at Accession No. ML15198A191.

4.0 Conclusion

SPAR models are one of the primary risk tools for the agency and support a wide variety of regulatory uses. The staff maintains and updates the suite of SPAR models to help ensure that agency-performed risk assessments represent the as-built, as-operated reactor plants. Recent activities have focused on the development of external hazard models, updates to model parameter estimates to reflect recent plant operating experience, and increased public outreach to promulgate information about the SPAR model program.

	NRR Comment	RES Response
SECY, pg 2, para 1, line 5	Underline "important" – risk significant?	Deleted "important" – The ASP Program scope includes assessment of all operating events, not just those that are risk significant or important.
SECY, pg 2, para 2, line 6	Underline "the staff uses the SPAR models to risk inform inspection activities," – How? The licensee develops their ISI, etc...	The intent of this phrase was that SPAR models are used to risk inform NRC's inspection activities. Inserted "NRC" between "inform" and "inspection".
SECY, pg 2, para 4, lines 6 & 7	Underline – "while risk assessments performed under MD 8.3 are used to determine, in part, the appropriate level of reactive inspection in response to an event." For example single deficiency? And uses what to evaluate the significance?	The criteria for evaluating the significance of an event, including a single event, are included within MD 8.3. No change made.
SECY, pg 3, para 1, lines 4, 5, & 6	Underline – "If the SDP analyses considered all concurrent degraded conditions or equipment unavailabilities that existed during the time period of the condition." But the SDP does not do that.	Modified the text of the sentence to read: "To minimize overlap and improve efficiency, since 2006, SDP results have been used in lieu of independent ASP analyses to the extent practical and consistent with the overall objectives of both programs. Typically the SDP analyses are used in the ASP Program when the analysis performed addresses the major contributors to risk for the event based on a review conducted by an ASP Program risk analyst."
SECY, pg 3, add new 2nd para before Status and Results	Paraphrased – insert Project AIM 2020 rebaselining work to evaluate different programs and determine how best to further reduce duplication of effort and potentially propose to the Commission to modify the criteria used in the CBJ as a means of improving efficiency.	~~No change made. RES OD believes this is a statement that the Commission is already fully aware of and does not need to be repeated in this Commission Paper.~~ Incorporated proposed discussion on Project AIM 2020 under the background section of the SECY rather than under the status of the ASP Program. This is consistent with the concept that the Commission is already aware of ongoing staff efforts under Project AIM 2020 and there is a specific link to Project AIM 2020 and the effort to minimize the overlap between the ASP and SDP.

	NRR Comment	RES Response
SECY, pg 4, para 1. Last sentence	What is the result of the review? Any change in the	In the last Commission paper, a trend was identified in electrical component failures contributing to precursors. As a result RES initiated an electrical system and component study that is still ongoing. The LOOP trend provides additional support to the continuation of this study. A sentence was added that the results for this study should be available in FY 2017.
SECY, pg 4, last paragraph, line 8	They have not yet been updated to include the seismic information being developed under Fukushima Near Term Task Force Recommendation 2.1	This statement is partially correct. Information that is being developed by licensees to update their seismic bases, including in response to Fukushima, is used in the SPAR models once it is made available to the NRC. As resources have permitted, the SPAR-AHZ models have been updated with seismic data (as stated previously in the SECY). Most of the licensees have not developed their seismic PRAs in response to Fukushima, therefore it is premature to expect this information to be included. As this information becomes available, it will be incorporated into the SPAR-AHZ models consistent with the planned and routine process to update SPAR models or in response to SPAR model user needs to support risk assessment of operating events.
SECY, pg 6, 3rd bullet under 2nd paragraph	Modify sentence to read: "Evaluation of code infrastructure improvements necessary to support a multi-user server-based platform for SAPHIRE."	Modified the bullet as suggested. Also, the word "server" was changed to "Web" per NRO comment.

	NRR Comment	RES Response
SECY, pg 6, new paragraphs at the end of the page	Paraphrased Add a discussion of NRR's plans to pilot the use of licensee PRAs for the SDP.	This is a policy issue that does not belong in an information paper on the status of the ASP Program and the SPAR Models. This issue should be brought to the attention of the Commission in a Notation Vote paper prepared by NRR proposing the pilot activity. Recognizing that NRR is considering this pilot activity, the following has been added to the SECY on page 5, 3rd paragraph at the end of the paragraph. "Further, NRR is considering how it can improve the efficiency and effectiveness of the SDP process. These improvements may include pilot activities to assess the use of alternatives to the SPAR models. The use of alternatives to the SPAR models has other implications that will need to be assessed and addressed in support of any pilot activity that may be undertaken. NRR will address its plans to pilot alternatives to the SPAR model in a separate paper to the Commission."
Enclosure 1, pg 4, para 3, lines 5, 6, & 7	Only if no other equipment was OOS, etc...	A conforming change was made to modify the text of the sentence to be consistent with the main body of the SECY to read: "To minimize overlap and improve efficiency, since 2006, SDP results have been used in lieu of independent ASP analyses to the extent practical and consistent with the overall objectives of both programs. Typically the SDP analyses are used in the ASP Program when the analysis performed addresses the major contributors to risk for the event based on a review conducted by an ASP Program risk analyst."

	NRR Comment	RES Response
Enclosure 1, pg 4, last paragraph, last line	As a result of this safety significance, the NRC did . . .	Changed the last sentence and added additional information so that it reads: ". . . The ASP Program analysis integrated these deficiencies and aggregated the risk which resulted in a ΔCDP of 6×10^{-3} identifying this as a significant precursor that was reportable to Congress. The ASP analysis result confirmed the risk significance of this event following a systematic and repeatable process that, in part, undergirded the substantial regulatory response that was undertaken. The regulatory response included issuance of Order EA-03-009 requiring all licensees with plants susceptible to reactor pressure vessel head degradation to perform visual inspections for indications of degradation or boric acid leakage, worked with the American Society of Mechanical Engineers (ASME) to incorporate reactor pressure vessel head inspections into the ASME code, adopted a new operating experience program, and enhanced the NRC's ability to detect declining plant performance by changing several NRC inspection and management programs."
Enclosure 1, pg 5, para 1, last line	This realization caused NRC to do . . .	Changed the last sentence and added additional information so that it reads: ". . . The ASP analysis of this complicated LOOP event resulted in an aggregated plant risk CCDP of 1×10^{-4}. This realization contributed to the basis for the ongoing staff efforts on the system study of electrical system and component failures to risk. In addition, the NRC staff issued Bulletin 2012-01, "Design Vulnerability in Electric Power System," and Information Notice (IN) 2012-03, "Design Vulnerability in Electric Power System" highlighting the potential significance of a single-phase open circuit condition."
Enclosure 1, pg 14, 2nd para under Section 4.7, Results	Strike out "a" in the reference to ASME/ANS RA-Sa-2009.	No change made. The reference as stated has been confirmed to be correct.

	NRR Comment	RES Response
Enclosure 2, pg 4, para 4, line 7	Replace "increase the pace of" with "improve the efficiency and therefore increase the pace of"	Made the change as suggested.
Enclosure 2, pg 6, para 2, lines 10, 11, and 12.	Why spend time to add parallelism when the runtime is so small? Waste of resources.	The main focus of this part of Enclosure 2 is to share at a high level with the Commission the Staff's efforts to develop a Web-Based version of SAPHIRE to support the needs of the Regional and HQ risk analyst. This activity is driven by User Need Request (UNR) NRR-2015-009, item 5.9. While evaluating potential approaches to developing a server-based framework for SAPHIRE, INL identified opportunities to improve SAPHIRE's ability to take advantage of the increased processing power of current computers. These improvements take advantage of the parallel processing capability of current computers and can be incorporated into efforts to maintain the current version of SAPHIRE. Having a web-based version of SAPHIRE also improves the NRC's ability to assure compliance with federal information technology requirements related to the control of information technology systems that handle proprietary or official use only information. It also provides increased assurance that risk analysts will have access to the most up-to-date models and software to conduct their analyses. Feedback from Regional and HQ users of SAPHIRE and SPAR Models indicate that while in many cases the time to conduct a PRA analysis using SAPHIRE is not excessive, more complex analyses require substantial time to perform a single run (on the order of several hours or more). Models that include external hazards such as seismic or make extensive use of "k of n" gate logic (often found in service water system models) can require significant time to run. An SDP or ASP analysis is an iterative process that for more complex operating events requires multiple runs of model changes to finalize. Often, these types of events are those for which NRC should provide a reasonably timely analysis in support of timely regulatory decision-making. As currently configured, SAPHIRE has the capability to perform limited parallel processing using several core processes in existing standalone PCs and laptops. However, substantial improvements in performance could be achieved, meeting the needs of Regional and HQ users, to take full advantage of the parallel processing available in high-speed computers that are available. Added "to reduce code runtimes for complex analyses" to the end of this sentence for clarification.

	NRR Comment	RES Response
SECY, pg 6	On page 6 of the paper where Jennifer added information about doing a pilot with Vogtle PRA, Bill wants words added to indicate how much we spend on SPAR model and SAPHIRE development and maintenance.	Resources expended on a project are not included in information papers to the Commission. RES OD agrees that this information should not to be added to the Commission Paper. Further, see RES response to the NRR comment to add information on a pilot alternative to the use of the SPAR models in the SDP. While RES does not believe that use of licensee models will provide cost savings to the agency and will pose challenges to maintaining agency independence, RES will support NRR in considering the implications of such a pilot program should it consider moving forward with the proposal. It should be noted that the Vogtle PRA currently being used by RES was provided for the specific purpose of supporting the Commission-directed Level 3 PRA project and cannot be used to support any other purpose. Therefore, NRR will need to obtain a commensurate level of PRA information from an industry volunteer to support such a pilot. Further, given the staff's current familiarity with the Vogtle PRA, RES would not recommend using Vogtle as a potential pilot.
Enclosure 2, pg 6	On page 6 of Enclosure 2 where Jennifer mentioned that RES should not work on adding parallelism to SAPHIRE since the runtime is fast enough, Bill adds that NRR funds should not be applied on this task or on developing a web-based version.	In User Need Request (UNR) NRR-2015-009, dated August 10, 2015, NRR requested that RES develop a web-based version of SAPHIRE that can be run on a centralized server and accessed using the internet. The purpose of this request was to provide users an efficient and effective way to utilize centralized high-speed computing resources and improve sharing of model results and analyses. Included within the scope of this activity is incorporating within the SAPHIRE program the capability to take advantage of the parallel computing power of high speed computers to maximize the efficiency of the processing of more complex SPAR model changes used to conduct risk analyses of challenging operating events. There may be some misunderstanding with regard to the development of dynamic PRAs that was discussed with NRR and removed from the UNR NRR-2015-009.

301-415-2480 (w)
(b)(6) (c)

Richards, Karen

From: Lee, Samson
Sent: Thursday, October 01, 2015 7:46 AM
To: Nakoski, John; Weerakkody, Sunil; Giitter, Joseph
Cc: Correia, Richard; Coyne, Kevin; Kichline, Michelle
Subject: RE: RES ASP and SPAR Model Status SECY

John,

We (Michelle, Jeff, and me) met with Bill Dean yesterday right before he met with Brian Sheron. Please let us know when you would like to meet.

Thanks,
Sam, x2884

PS: Michelle and Sunil are out the remainder of the week. Jeff and I are out Friday.

From: Nakoski, John
Sent: Wednesday, September 30, 2015 5:59 PM
To: Weerakkody, Sunil <Sunil.Weerakkody@nrc.gov>; Giitter, Joseph <Joseph.Giitter@nrc.gov>; Lee, Samson <Samson.Lee@nrc.gov>
Cc: Correia, Richard <Richard.Correia@nrc.gov>; Coyne, Kevin <Kevin.Coyne@nrc.gov>; Kichline, Michelle <Michelle.Kichline@nrc.gov>
Subject: RES ASP and SPAR Model Status SECY

Joe, Sam, and Sunil,

This morning I sent you RES staff responses to the NRR comments on the RES SECY providing the Commission with an update on the status of the ASP Program and the SPAR Models. Have you had a chance to review and discuss the RES response and will NRR be in a position to concur on the paper tomorrow morning, if not later today? Would you like to meet tomorrow to discuss the RES response further? Please let Kevin Coyne and I know as soon as practical. I appreciate your continued support on this action.

Best regards,

John A. Nakoski
Chief, Performance and Reliability Branch
Division of Risk Analysis
Office of Research
301-415-2480 (w)
(b)(6) (c)

Richards, Karen

From:	Circle, Jeff
Sent:	Thursday, October 01, 2015 3:04 PM
To:	Giitter, Joseph; Lee, Samson
Cc:	Weerakkody, Sunil
Subject:	The ASP/SPAR SECY Paper Concurrence

Joe/Sam,

I checked on our past practice with this paper (our rite of passage for the end of summer) and found that the office directors concur. So, I went up and gave Bill a one-minute update of our comment resolution (he was between meetings). I told Bill that we are waiting for the official version to come out so that it can be put into a package hopefully by tomorrow for his or Jen's concurrence. He was satisfied and said that either of them will concur.

Jeff.

Jeff A. Circle
Team Leader – PRA Model Development
PRA Operations and Human Factors Branch
NRR/Division of Risk Assessment
(301) 415-1152
BB (b)(6)

Richards, Karen

From: Correia, Richard
Sent: Wednesday, September 30, 2015 1:29 PM
To: Giitter, Joseph
Cc: Lee, Samson; Salley, MarkHenry; Klein, Alex; Coyne, Kevin
Subject: Re: Changes made to RES SECY on ASP/SPAR Status

Joe. Both reports are now profiled as publicly available in ADAMS.

View ADAMS P8 Properties ML15266A525
Open ADAMS P8 Document (NUREG CR-7197, HELEN-FIRE Final Report)

View ADAMS P8 Properties ML15266A516
Open ADAMS P8 Document (NUREG-2178 RACHELLE-FIRE, FINAL DRAFT)

Do you want my concurrence on the memo? If not please cc me and Stuart Lewis/EPRI. We may get calls so we want to have any correspondence with NEI available. Thx
Rich
Send by BlackBerry

From: Giitter, Joseph
Sent: Wednesday, September 30, 2015 10:58 AM
To: Correia, Richard
Cc: Nakoski, John; Lee, Samson
Subject: RE: Changes made to RES SECY on ASP/SPAR Status

Thanks Rich. We have the ML# for the HRR (Helenfire) report and I'm ready to send the letter to NEI, but we would like to make the report publically available first. Right now it looks like October 12th is the date. Can we make it publically available within the next day or so. ?

From: Correia, Richard
Sent: Wednesday, September 30, 2015 10:48 AM
To: Giitter, Joseph <Joseph.Giitter@nrc.gov>
Subject: Re: Changes made to RES SECY on ASP/SPAR Status

Joe...I've been out on SL since Monday noon. sorry for not getting back sooner. John Nakoski sent back the revised SECY paper with RES responses to NRR cpmmnets. Brian and Bill are meeting today to discuss this paper and other topics.

Richard P. Correia, PE
Director, Division of Risk Analysis
RES
US NRC

From: Giitter, Joseph
Sent: Tuesday, September 29, 2015 3:24 PM
To: Correia, Richard
Subject: FW: Changes made to RES SECY on ASP/SPAR Status

Rich- Let's discuss.

From: Nakoski, John
Sent: Tuesday, September 29, 2015 12:28 PM
To: Weerakkody, Sunil <Sunil.Weerakkody@nrc.gov>
Cc: Coyne, Kevin <Kevin.Coyne@nrc.gov>; Tetter, Keith <Keith.Tetter@nrc.gov>; Circle, Jeff <Jeff.Circle@nrc.gov>; Kichline, Michelle <Michelle.Kichline@nrc.gov>; Giitter, Joseph <Joseph.Giitter@nrc.gov>; Lee, Samson <Samson.Lee@nrc.gov>
Subject: RE: Changes made to RES SECY on ASP/SPAR Status

Sunil,

Thank you for the feedback. Kevin and I will be meeting with Brian Sheron and Steve West this afternoon to discuss RES' responses to NRR's comments.

If you would like to propose alternatives to the comments that we have received, of course I welcome them. I do however need to caveat my acceptance of your revised comments with the re-emphasis of the RES position that it is not appropriate for an RES status paper to inform the Commission of an NRR initiative to pilot the use of the licensee's PRA models in the SDP – that is something that NRR should do in a separate Notation Vote paper to the Commission. With regard to Project AIM 2020, as we discussed yesterday – if this is the Agency wide policy to add a statement into every SECY going to the Commission on Project AIM 2020, RES will happily add such a statement. However, as we discussed yesterday, it is not appropriate to selectively apply such a statement to Commission Papers as it inappropriate suggests to the Commission where Project AIM 2020 will recommend discontinuing an activity. Project AIM 2020 has not finalized its prioritization – let the process work as planned.

John Nakoski

From: Weerakkody, Sunil
Sent: Tuesday, September 29, 2015 12:21 PM
To: Nakoski, John
Cc: Coyne, Kevin; Tetter, Keith; Circle, Jeff; Kichline, Michelle; Giitter, Joseph; Lee, Samson
Subject: RE: Changes made to RES SECY on ASP/SPAR Status

John,

Michelle has reviewed the changes in the mark-up. Subsequently, the three of us (Jeff Circle, myself, and Michelle) met and discussed. Michele agrees with most of your changes. We found a couple of areas where we could make suggestions to enhance. We also found a couple of other places where, you (or your designee) should go back to Jennifer and ask for clarifications.

In my view, there are three issues that RES falls short of addressing NRR ET comments. I suggest that we elevate them to Joe\Rich as opposed to working them at our level:

1. Bill Dean wanted to include the resources that we spend on SPAR updates and ASP. For reasons that you mentioned, RES doesn't believe that information should be included in this SECY.
2. Jen had proposed a sentence to say that we would be looking at ASP and SPAR (in my words) under Project Aim. I don't believe the sentence that you have proposed goes far enough. (Jen's sentence may be going too far). If you want, we can send a proposal.
3. Jen provided a ½ page insert on how we plan to pilot the use of licensee's models. This has not been addressed. I agree that the words Jen has proposed not ideal. We can send a proposed bullet that may address the overall intent.

I am leaving for our division meeting. Will be back here tomorrow.

Sunil D Weerakkody, Chief
PRA Operations & Human Factors Branch
Office of Nuclear Reactor Regulation
Nuclear Regulatory Commission

Address: Mail Stop O-10 C-15, US NRC, Washington DC 20005-0001

Tel: 301-415-2870
Black Berry (b)(6)

From: Nakoski, John
Sent: Monday, September 28, 2015 5:09 PM
To: Weerakkody, Sunil; Circle, Jeff
Cc: Coyne, Kevin; Correia, Richard; Tetter, Keith
Subject: Changes made to RES SECY on ASP/SPAR Status

Sunil and Jeff,

Attached are the changes that we made in response to the comments we received from NRR ET. If you would like to add some context with regard to the broader agency response to Davis Besse and Byron events, please send me and Keith Tetter your sentences.

Regards,

John A. Nakoski

Chief, Performance and Reliability Branch
Division of Risk Analysis
Office of Research
301-415-2480 (w)
(b)(6) (c)

From: Bloom, Steven
Sent: Wednesday, September 30, 2015 8:38 AM
To: Marshall, Jane
Subject: FW: NRR/RES ET Periodic Meeting
Attachments: NRR RES ET Meeting Agenda 9-30-15.docx

Importance: High

Jane,

Here is the agenda with the background information.

Steve

From: Perkins, Leslie
Sent: Tuesday, September 29, 2015 6:35 PM
To: Miller, Chris
Cc: Wittick, Brian ; Bloom, Steven ; Moore, Ross
Subject: NRR/RES ET Periodic Meeting
Importance: High

Chris,

I sent you the scheduler for the NRR/RES ET periodic meeting. After DLR left, Jennifer indicated that she would like to have DLR provide support for the meeting tomorrow. Please let me know who can attend and provide support. We only need to couple of people.

Attached is the latest agenda along with background info for each topic. Please note RES updated the background information for SLR which is item 8 on the agenda.

Thanks,
Leslie Perkins
Project Manager
Licensing Processes Branch (PLPB)
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation
Phone: 301-415-2375

RES/NRR Executive Team Meeting
September 30, 2015
3:00 – 4:00
TWFN-10A74

Agenda

1. Non Responsive
2.
3.
4.
5.
6.
7. Research related to SPAR models (RES/DRA)
8. Non Responsive
9.
10
11

1. Status of Action Items from June 23, 2015, Meeting

RES Action Items

- Non Responsive

Non Responsive

Non Responsive

NRR Action Items

- Non Responsive
-
-

Non Responsive

New Agenda Items

2. Non Responsive

3.

Non Responsive

4.

5.

6.

7. **Research related to SPAR models (RES/DRA)**
   - SPAR Model program provides independent risk analysis capability for NRC in support of reactor oversight process (ROP) and a variety of risk-informed technical applications
   - Plant-specific SPAR models (99 operating plants are represented by 75 SPAR models) use standardized modeling and naming conventions. Standardization increases analyst efficiency and accuracy and supports cross comparison across models.
   - SPAR models and the SAPHIRE PRA code are designed to support event and condition analyses by performing "delta-risk" analyses (e.g., change in CDF from base case to performance deficiency). Licensee developed models and supporting codes lack this capability (requiring additional calculations and manual sequence/cutset result comparisons)

   - The User Need Request for Support in the Development and Enhancements of NRC Risk Analysis Tools (NRR-2015-009) was received and accepted by RES/DRA. The UNR ask RES to continue additional development and enhancements of SPAR models and to provide enhanced risk analysis methods and guidance that incorporate new research

insights to enhance risk tools used by NRC senior reactor analysts (SRAs) and risk analysts.

- RES is actively working on these items:
  - Maintain and Update SPAR Models
  - Update SPAR Models for Internal Events
  - Develop SPAR Models for At-Power External Events
  - Develop and Enhance SPAR Models for Shutdown Events
  - Maintain and Enhance SAPHIRE 8 Code
  - Enhance PRA and Risk Methods
  - Develop and Update Guidance for Risk Assessments (RASP Handbook)
  - Provide Technical Support to Risk Analysts

- RES Staff will continue to interact with NRR/DRA staff and the SRAs periodically to share preliminary results and draft reports.

8. Non Responsive

9.

Non Responsive

10.

11.

Additional Background Information

Non Responsive

Topic #7 – Research related to SPAR models
Key Talking Points for the Standardized Plant Analysis Risk (SPAR) Model Program

- Program provides **independent** risk analysis capability for NRC in support of reactor oversight process (ROP) and a variety of risk-informed technical applications
- Plant-specific SPAR models (99 operating plants are represented by 75 SPAR models) use **standardized** modeling and naming conventions. Standardization increases analyst efficiency and accuracy and supports cross comparison across models.
- SPAR models and the SAPHIRE PRA code are **designed to support event and condition analyses** by performing "delta-risk" analyses (e.g., change in CDF from base case to performance deficiency). Licensee developed models and supporting codes lack this capability (requiring additional calculations and manual sequence/cutset result comparisons)
- The program leverages available licensee PRA information to reduce program costs, but includes validation of licensee modeling assumptions and integrates licensee model conventions into standardized SPAR modeling framework. Although SPAR models use some simplifying assumptions compared to licensee models, in several areas most pertinent to ROP applications, the SPAR models are generally more detailed (e.g., CCF, LOOP, and support system initiators)
- All models run on a single code platform (SAPHIRE). SAPHIRE can be updated and configured to directly support NRC risk assessment activities through coding changes and customized reporting functions. Use of licensee models would require the NRC to maintain licensees and network environmental approval for multiple commercial software codes and eliminate the ability to revise these code to support NRC-specific applications.
- Although licensees have made progress in developing RG 1.200 compliant PRA models, these models lack the standardization and ROP-specific features that are essential to the agency's needs for performing event and condition analyses.

SPAR Model Uses

- Significance Determination Process (Reactor Oversight) - **Regions**
- Accident Sequence Precursor Program (used as an input metric to the performance budget process) - **RES**
- Evaluation of Notices of Enforcement Discretion – **Regions, NRR** *
- MD 8.3 Incident Investigation Program Risk Evolutions (e.g., determine level of inspection response to an event) – **Regions** *
- Establish technical basis for rulemaking – **RES, NRR**
- Evaluate generic issue safety significance - **RES**
- Perform system and component studies - **RES**
- Inspection Planning (e.g., risk insights from Plant Risk Information eBooks) - **Regions**

These applications typically are performed with limited time, highlighting the importance of model standardization for SPAR

SPAR Model Annual Budget

The SPAR/SAPHIRE annual budget for **FY2015 was ~$2.2 million**. This amount is scalable depending on agency needs and available resources. Major activities include:

Base Resources (i.e., minimum requirements for the program):

- SPAR Model Configuration/Quality Control and User Support Help Desk ~$500k/year
  - Help desk handles ~ 2 calls/day from SRAs

- Ensures model version control and maintains INL Website
- Performs model updates to support specific SDP/ASP activities (~30 models were updated to support a specific analysis in FY2015). These updates are often highly specific to the event/condition that occurred and would also need to be performed for a licensee PRA model

- SAPHIRE QA and User Support ~$300k/year
  - Maintain NUREG/BR-0167 QA program
  - User help desk Support

Resources needed to Support Specific User Enhancements:

- Model Updates to Reflect Significant Plant Changes (~12 models/year) - ~$250k
  - Incorporate station blackout EDGs
  - Battery charging generators
  - Significant model upgrades

- External Hazard and Fire Models - ~ $400k/year
  - Add NFPA 805 fire modeling
  - Add seismic and high wind model capabilities

- SAPHIRE Enhancements ~$300k /year
  - New reporting features and code capabilities

- Data Updates (performed every 3 years) - ~$500k (every three years)
  - Upgrade SPAR models to reflect most recent operating data
  - Update model documentation and Plant Risk Information eBooks (PRIBs)
  - General model cleanup/improvements

Letter to NEI from OEDO on Use of SPAR models (2007, ML072490566)

This letter addressed an NEI proposal to use licensee PRA models instead of SPAR models. A detailed review was conducted and concluded that SPAR was needed to:

- Maintain **independence** of NRC analyses. Differences between NRC and Licensee assessments is not due to the base model, but by the assumptions for each specific event or condition analysis
- Provide **standardized model framework** for efficient analyses - industry does not use a standardized modeling approach
- Avoid inefficiencies in having agency risk analysts learn the conventions of over 70 licensee developed PRAs (utilizing up to four different software platforms)

The basis for the staff conclusion remains valid today.

Feedback from Regional SRAs on Potential Use of Licensee Models vice SPAR

- More efficient and objective to use SPAR models for risk assessments.
- It would take a significant increase in resources to use licensee models for event and condition assessment activities due to their lack of standardization and need for SRAs to understand unique modeling conventions and new code platforms.
- Use of licensee models would cause delays in the SDP process due to need to engage in additional requests for information to understand licensee PRA modeling assumptions.
- NRC's ability to perform independent regulatory assessment activities will be eroded by not having a centralized system evaluating Generic Safety Issues, SBO/LOOP studies, etc.

Richards, Karen

From: Uhle, Jennifer
Sent: Tuesday, September 29, 2015 6:28 PM
To: Montecalvo, Michael; Dean, Bill
Cc: Weerakkody, Sunil; Rosenberg, Stacey; Giitter, Joseph
Subject: RE: SPAR vs. Licensee PRA models

Thanks Mike. Very helpful. J

From: Montecalvo, Michael
Sent: Tuesday, September 29, 2015 10:43 AM
To: Dean, Bill <Bill.Dean@nrc.gov>; Uhle, Jennifer <Jennifer.Uhle@nrc.gov>
Cc: Weerakkody, Sunil <Sunil.Weerakkody@nrc.gov>; Rosenberg, Stacey <Stacey.Rosenberg@nrc.gov>; Giitter, Joseph <Joseph.Giitter@nrc.gov>
Subject: SPAR vs. Licensee PRA models

Bill and Jennifer,
Attached is the letter from NEI and the NRC response discussing using licensee models vs. SPAR models for SDP issues. As stated in the NRC response, multiple public meetings were held but Pete Appignani shared with me that the NRC response effectively killed that effort back in 2007. Please let me know if you would like any more information.
Mike

Richards, Karen

From: Weerakkody, Sunil
Sent: Monday, September 28, 2015 3:23 PM
To: Nakoski, John
Cc: Giitter, Joseph; Correia, Richard; Circle, Jeff; Kichline, Michelle; Tetter, Keith
Subject: additional comments from Bill Dean on the ASP\SPAR SECY

John,

1. On page 6 of the paper where Jennifer added information about doing a pilot with Vogtle PRA, Bill wants words added to indicate how much we spend on SPAR model and SAPHIRE development and maintenance.

2. On page 6 of Enclosure 2 where Jennifer mentioned that RES should not work on adding parallelism to SAPHIRE since the runtime is fast enough, Bill adds that NRR funds should not be applied on this task or on developing a web-based version.

Sunil D Weerakkody, Chief
PRA Operations & Human Factors Branch
Office of Nuclear Reactor Regulation
Nuclear Regulatory Commission

Address: Mail Stop O-10 C-15, US NRC, Washington DC 20005-0001

Tel: 301-415-2870
Black Berry: (b)(6)

Richards, Karen

From: Monninger, John
Sent: Monday, September 28, 2015 1:04 PM
To: Webber, Kimberly; Correia, Richard; Giitter, Joseph; Lee, Samson
Subject: RE: weekly RES, NRR & NRO DD call

We should probably have a meeting with all 3 offices to discuss SPAR models.

A question came up last week during the New Reactors Commission meeting on the SPAR models. We expressed our support for continued use and development of the SPAR models. I've heard comments on the side that NRR is not supportive of future SPAR efforts, but I haven't heard first-hand what NRR's concerns are and the basis for the concerns.

From: Webber, Kimberly
Sent: Monday, September 28, 2015 12:54 PM
To: Correia, Richard <Richard.Correia@nrc.gov>; Madden, Patrick <Patrick.Madden@nrc.gov>; Monninger, John <John.Monninger@nrc.gov>; Giitter, Joseph <Joseph.Giitter@nrc.gov>; Lee, Samson <Samson.Lee@nrc.gov>
Subject: RE: weekly RES, NRR & NRO DD call

John and I won't be able to participate today due to meeting and appointment conflicts. I don't have anything to discuss in particular. If there is anything we need to discuss, please email or call.
Thanks,
Kim

-----Original Appointment-----
From: Correia, Richard
Sent: Tuesday, May 20, 2014 8:13 AM
To: Correia, Richard; Madden, Patrick; Monninger, John; Hawkins, Kimberly
Subject: weekly RES, NRR & NRO DD call
When: Monday, September 28, 2015 4:00 PM-5:00 PM (UTC-05:00) Eastern Time (US & Canada).
Where: office

1-888-790-2553 passcode (b)(6)

Richards, Karen

From: Dean, Bill
Sent: Monday, September 28, 2015 10:15 PM
To: Circle, Jeff; Uhle, Jennifer; Evans, Michele
Cc: Giitter, Joseph; Lee, Samson; Weerakkody, Sunil
Subject: Re: NRC Letters to and from NEI Regarding Continued Use of SPAR

thanks Jeff. I am excited about trying to pilot this to work out how we can be successful in all working from the same sheet of music on risk analysis tools.

From: Circle, Jeff
Sent: Monday, September 28, 2015 11:40 AM
To: Dean, Bill; Uhle, Jennifer; Evans, Michele
Cc: Giitter, Joseph; Lee, Samson; Weerakkody, Sunil
Subject: NRC Letters to and from NEI Regarding Continued Use of SPAR

Bill, Jennifer, and Michele,

After the GYO ceremony on 9/10/15, we had a discussion on funding issues with regard to adopting licensee's models in lieu of SPAR for our SDP phase 3 analyses. I mentioned that this issue had been considered by us and NEI in the past. Here are the letters from and to NEI on this topic back from 2007. Back in 2007, the industry argued that if we all used the same models, there would be fewer greater-than-Green findings. We disagreed on a few points mentioned in our letter. An additional difference between then and now is that there is now an offer from industry to pilot the use of their models. IMHO, that sounds interesting at our end to consider trying how such a program for one plant would work within our processes as long as we can work out the details. I'm sure that there'll be more to follow on this topic.

If you have any questions, please feel free to contact me.

Jeff.

Jeff A. Circle
Team Leader – PRA Model Development
PRA Operations and Human Factors Branch
NRR/Division of Risk Assessment
(301) 415-1152
BE (b)(6)

Richards, Karen

From: Pearson, Alayna
Sent: Thursday, September 24, 2015 8:35 AM
To: Lee, Samson; Giitter, Joseph
Cc: Weerakkody, Sunil
Subject: RE: Recommendation for Concurrence: Draft SECY for ASP and SPAR Models

Do you think we'll get Jennifer's comments today? RES is awaiting our input.

From: Lee, Samson
Sent: Wednesday, September 23, 2015 8:18 AM
To: Pearson, Alayna; Giitter, Joseph
Cc: Weerakkody, Sunil
Subject: RE: Recommendation for Concurrence: Draft SECY for ASP and SPAR Models

Jennifer Uhle said she'll be providing her comments to us.

Thanks,
Sam

From: Pearson, Alayna
Sent: Wednesday, September 23, 2015 8:08 AM
To: Giitter, Joseph <Joseph.Giitter@nrc.gov>
Cc: Lee, Samson <Samson.Lee@nrc.gov>; Weerakkody, Sunil <Sunil.Weerakkody@nrc.gov>
Subject: RE: Recommendation for Concurrence: Draft SECY for ASP and SPAR Models

Were there any additional comments?

From: Pearson, Alayna
Sent: Friday, September 18, 2015 7:52 AM
To: Giitter, Joseph
Cc: Lee, Samson; Weerakkody, Sunil; Dean, Bill; Uhle, Jennifer
Subject: RE: Recommendation for Concurrence: Draft SECY for ASP and SPAR Models

The draft SECY is attached (ADAMS access is below). The review was completed by AHPB, and DIRS/IPAB.

View ADAMS P8 Properties ML15187A434
Open ADAMS P8 Package (SECY-15-XXXX, Status of the Accident Sequence Precursor Program and the Standardized Plant Analysis Risk Models)

From: Giitter, Joseph
Sent: Friday, September 18, 2015 1:35 AM
To: Pearson, Alayna <Alayna.Pearson@nrc.gov>
Cc: Lee, Samson <Samson.Lee@nrc.gov>; Weerakkody, Sunil <Sunil.Weerakkody@nrc.gov>; Dean, Bill <Bill.Dean@nrc.gov>
Subject: Fw: Recommendation for Concurrence: Draft SECY for ASP and SPAR Models

Alayna-Can you send this to me for review? Who reviewed it for NRR/DRA. I'm assuming it came from RES.

From: Dean, Bill
Sent: Thursday, September 17, 2015 07:25 PM
To: Pearson, Alayna; Uhle, Jennifer
Cc: Evans, Michele; Wertz, Trent; Lee, Samson; Weerakkody, Sunil; Giitter, Joseph
Subject: Re: Recommendation for Concurrence: Draft SECY for ASP and SPAR Models

Given my interest in potentially eliminating these programs I would be interested in what we may indicate in this paper about this.
Bill Dean
Director
Office of Nuclear Reactor Regulation
USNRC

On: 17 September 2015 09:59, "Pearson, Alayna" <Alayna.Pearson@nrc.gov> wrote:
Good Morning!

DRA and DIRS have reviewed the draft SECY for Accident Sequence Precursor Program and the Standardized Plant Analysis Risk Models and recommend that NRR concur with two comments.

Comments:

1. Enclosure 2 states that the SPAR models are used for Phase 3 SDP evaluations. Please remove the reference to Phase 3. SPAR models are used in any Phase of SDP.
2. The SECY does not mention that the SPAR models are used for NOEDs. The SECY or enclosure 2 should acknowledge that the SPAR models are used for NOEDs.

Please let me know if you have any questions or comments.

Alayna Pearson
Technical Assistant
Division of Risk Assessment
Office of Nuclear Reactor Regulation
Phone: (301)415-1096

Lee, Samson

From: Lee, Samson
Sent: Monday, September 21, 2015 3:51 PM
To: Uhle, Jennifer; Giitter, Joseph
Subject: RE: Fwd: please send me the NEI letter on use of plant PRAs in lieu of SPAR
Attachments: NEI letter on AIM rebaselining.pdf

SPAR is Number 21 in the attached September 15 NEI letter.

Thanks,
Sam
-----Original Message-----
From: Uhle, Jennifer
Sent: Monday, September 21, 2015 3:41 PM
To: Lee, Samson <Samson.Lee@nrc.gov>; Giitter, Joseph <Joseph.Giitter@nrc.gov>
Subject: FW: Fwd: please send me the NEI letter on use of plant PRAs in lieu of SPAR

I asked Mike T and he gave me this. Are you sure it was a letter?

Thx J

-----Original Message-----
From: TSCHILTZ, Michael [mailto:mdt@nei.org]
Sent: Monday, September 21, 2015 3:23 PM
To: Uhle, Jennifer <Jennifer.Uhle@nrc.gov>
Subject: [External_Sender] Fwd: please send me the NEI letter on use of plant PRAs in lieu of SPAR

Not sure we ever sent a letter but here are 2 power points and a white paper on this issue.
[http://resources.nei.org/email/NEI_Logo.jpg]<http://www.nei.org>

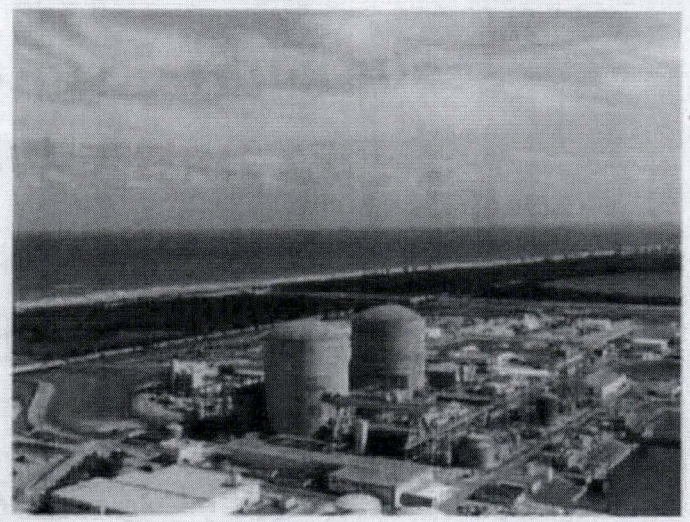
Take The NEI Future of Energy Quiz, www.NEI.org/futureofenergy<http://www.nei.org/futureofenergy>

FOLLOW US ON

[http://resources.nei.org/email/twitter.jpg]<http://twitter.com/NEI>[http://resources.nei.org/email/NEI_FB.jpg]<http://www.facebook.com/NuclearEnergyInstitute>[http://resources.nei.org/email/youtube.jpg]<http://www.youtube.com/user/NEINetwork>[http://resources.nei.org/email/flickr.jpg]<http://www.flickr.com/photos/_nei/>[http://resources.nei.org/email/blogger.png]<http://neinuclearnotes.blogspot.com/>

NEXTera ENERGY

PSL Comparison to NRC SPAR Model



Jake Porterfield

PRA Region II Counterparts Meeting

11-15-2013

Agenda

- Purpose
- PSL SPAR Baseline Results
- Basic Event Importance Measures
- Human Error Probability Comparison
- Initiating Event Contributions
- SDP Results Comparison
- General Comments on Differences

NEXTera ENERGY

PURPOSE

- SDP process transitioning from pre-solved tables to evaluation of SPAR models using SAPHIRE
- Need for an understanding of how plant SPAR models work
- Reduce conservatisms, model the as-built, as-operated plant
- Compare/Contrast SPAR model with site model for differences in modeling and results
- Preliminary Results

NEXTera ENERGY

PSL Comparison to NRC SPAR Model

SPAR MODEL BASELINE RESULTS

- **Quantification:**
  - PSL Model v. 8.19, SAPHIRE v. 8.0.9
  - 1.0E-11 Truncation
  - RANDOM EVENTS Model
  - No Change Sets used
  - Solved all Event Trees for Full Power – Internal Events

UNIT 1 CDF = 2.66E-06/yr.	UNIT 2 CDF = 2.04E-06/yr.
[PSL1 CDF = 5.35E-06/yr.]	[PSL2 CDF = 6.77E-06/yr.]

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PSL Comparison to NRC SPAR Model

BASIC EVENT IMPORTANCE MEASURES

SPAR Top 10 Basic Events

Rank	Basic Event	Component	Description	Prob	RAW
1	RPS-VCF-FO-MECH	CONTROL RODS	CONTROL ROD ASSEMBLIES FAIL TO INSERT	1.20E-06	14900.00
2	RPS-RTB-FC-FTO	Rxr TCBs	TRIP CIRCUIT BREAKERS FAIL TO OPEN	1.60E-06	3590.00
3	AFW-TNK-FC-CST	COND STOR TK	AFW CONDENSATE STORAGE TANK FAILURES	4.37E-07	1600.00
4	HPI-MOV-OC-3659	V3659	ECCS MINIFLOW MOV V3659 FAILS TO REMAIN OPEN	8.13E-07	1010.00
5	HPI-MOV-OC-3660	V3660	ECCS MINIFLOW MOV V3660 FAILS TO REMAIN OPEN	8.13E-07	1010.00
6	HPI-TNK-FC-RWST	RWT	RWST AND WATER SUPPLY FAILURES	4.37E-07	977.00
7	CCW-TNK-FC-SURGE	CCW SURGE TK	FAILURE OF CCW SURGE TANK	4.37E-07	586.00
8	ACP-BAC-LP-1A	4KV BUS 1A3	DIVISION 1A AC POWER 4160V BUS 1A3 FAILS	3.33E-05	520.00
9	ACP-BAC-LP-1B	4KV BUS 1B3	FAILURE OF 4160V BUS 1B3	3.33E-05	512.00
10	DCP-BDC-LP-1B	125V DC BUS 1B	FAILURE OF 125V DC BUS 1B	5.64E-06	240.00

PSL Top 10 Basic Events

Rank	Basic Event	Component	Description	Prob	RAW
1	NMM1CEDM	CONTROL RODS	MECHANICAL FAULT PREVENTING ROD INSERTION	2.10E-06	26425.385
2	GTKJ1RWT	RWT	REFUELING WATER TANK RUPTURE	5.35E-08	2949.687
3	JMVL13480I	V3480	MOV V3480 CATASTROPHIC INTERNAL LEAK (1 CYCLE EXPOSURE)	4.01E-05	453.394
4	JMVL13481I	V3481	MOV V3481 CATASTROPHIC INTERNAL LEAK (1 CYCLE EXPOSURE)	4.01E-05	453.394
5	JMVL13651I	V3651	MOV V3651 CATASTROPHIC INTERNAL LEAK (1 CYCLE EXPOSURE)	4.01E-05	453.394
6	JMVL13652I	V3652	MOV V3652 CATASTROPHIC INTERNAL LEAK (1 CYCLE EXPOSURE)	4.01E-05	453.394
7	ET2F11B2LC	1B2 LC XFMR	1B2 LC TRANSFORMER FAULT	2.17E-05	128.684
8	EB2F11B2LC	1B2 LC BUS	1B2 LC BUS FAULT	6.37E-06	122.963
9	EB1F11B3	4KV BUS 1B3	4 KV BUS 1B3 FAULT	5.33E-06	122.646
10	EC2R120402	1-20402	AC BREAKER 20402 TRANSFERS OPEN (1B3 4KV TO 1B2 LC)	3.81E-06	120.531

NEXTera ENERGY

PSL Comparison to NRC SPAR Model

BASIC EVENT IMPORTANCE MEASURES

SPAR Top 10 Basic Events

Rank	Basic Event	Component	Description	Prob	RAW
1	RPS-VCF-FO-MECH	CONTROL RODS	CONTROL ROD ASSEMBLIES FAIL TO INSERT	1.20E-06	14900.00
2	RPS-RTB-FC-FTO	Rxr TCBs	TRIP CIRCUIT BREAKERS FAIL TO OPEN	1.60E-06	3590.00
3	AFW-TNK-FC-CST	COND STOR TK	AFW CONDENSATE STORAGE TANK FAILURES	4.37E-07	1600.00
4	HPI-MOV-OC-3659	V3659	ECCS MINIFLOW MOV V3659 FAILS TO REMAIN OPEN	8.13E-07	1010.00
5	HPI-MOV-OC-3660	V3660	ECCS MINIFLOW MOV V3660 FAILS TO REMAIN OPEN	8.13E-07	1010.00
6	HPI-TNK-FC-RWST	RWT	RWST AND WATER SUPPLY FAILURES	4.37E-07	977.00
7	CCW-TNK-FC-SURGE	CCW SURGE TK	FAILURE OF CCW SURGE TANK	4.37E-07	586.00
8	ACP-BAC-LP-1A	4KV BUS 1A3	DIVISION 1A AC POWER 4160V BUS 1A3 FAILS	3.33E-05	520.00
9	ACP-BAC-LP-1B	4KV BUS 1B3	FAILURE OF 4160V BUS 1B3	3.33E-05	512.00
10	DCP-BDC-LP-1B	125V DC BUS 1B	FAILURE OF 125V DC BUS 1B	5.64E-06	240.00

PSL Top 10 Basic Events

Rank	Basic Event	Component	Description	Prob	RAW
1	NMM1CEDM	CONTROL RODS	MECHANICAL FAULT PREVENTING ROD INSERTION	2.10E-06	26425.385
2	GTKJ1RWT	RWT	REFUELING WATER TANK RUPTURE	5.35E-08	2949.687
3	JMVL13480I	V3480	MOV V3480 CATASTROPHIC INTERNAL LEAK (1 CYCLE EXPOSURE)	4.01E-05	453.394
4	JMVL13481I	V3481	MOV V3481 CATASTROPHIC INTERNAL LEAK (1 CYCLE EXPOSURE)	4.01E-05	453.394
5	JMVL13651I	V3651	MOV V3651 CATASTROPHIC INTERNAL LEAK (1 CYCLE EXPOSURE)	4.01E-05	453.394
6	JMVL13652I	V3652	MOV V3652 CATASTROPHIC INTERNAL LEAK (1 CYCLE EXPOSURE)	4.01E-05	453.394
7	ET2F11B2LC	1B2 LC XFMR	1B2 LC TRANSFORMER FAULT	2.17E-05	128.684
8	EB2F11B2LC	1B2 LC BUS	1B2 LC BUS FAULT	6.37E-06	122.963
9	EB1F11B3	4KV BUS 1B3	4 KV BUS 1B3 FAULT	5.33E-06	122.646
10	EC2R120402	1-20402	AC BREAKER 20402 TRANSFERS OPEN (1B3 4KV TO 1B2 LC)	3.81E-06	120.531

NEXTera ENERGY

PSL Comparison to NRC SPAR Model

BASIC EVENT IMPORTANCE MEASURES

SPAR Top 10 Basic Events

Rank	Basic Event	Component	Description	Prob	RAW
1	RPS-VCF-FO-MECH	CONTROL RODS	CONTROL ROD ASSEMBLIES FAIL TO INSERT	1.20E-06	14900.00
2	RPS-RTB-FC-FTO	Rxr TCBs	TRIP CIRCUIT BREAKERS FAIL TO OPEN	1.60E-06	3590.00
3	AFW-TNK-FC-CST	COND STOR TK	AFW CONDENSATE STORAGE TANK FAILURES	4.37E-07	1600.00
4	HPI-MOV-OC-3659	V3659	ECCS MINIFLOW MOV V3659 FAILS TO REMAIN OPEN	8.13E-07	1010.00
5	HPI-MOV-OC-3660	V3660	ECCS MINIFLOW MOV V3660 FAILS TO REMAIN OPEN	8.13E-07	1010.00
6	**HPI-TNK-FC-RWST**	**RWT**	**RWST AND WATER SUPPLY FAILURES**	**4.37E-07**	**977.00**
7	CCW-TNK-FC-SURGE	CCW SURGE TK	FAILURE OF CCW SURGE TANK	4.37E-07	586.00
8	ACP-BAC-LP-1A	4KV BUS 1A3	DIVISION 1A AC POWER 4160V BUS 1A3 FAILS	3.33E-05	520.00
9	ACP-BAC-LP-1B	4KV BUS 1B3	FAILURE OF 4160V BUS 1B3	3.33E-05	512.00
10	DCP-BDC-LP-1B	125V DC BUS 1B	FAILURE OF 125V DC BUS 1B	5.64E-06	240.00

PSL Top 10 Basic Events

Rank	Basic Event	Component	Description	Prob	RAW
1	NMM1CEDM	CONTROL RODS	MECHANICAL FAULT PREVENTING ROD INSERTION	2.10E-06	26425.385
2	**GTKJ1RWT**	**RWT**	**REFUELING WATER TANK RUPTURE**	**5.35E-08**	**2949.687**
3	JMVL13480I	V3480	MOV V3480 CATASTROPHIC INTERNAL LEAK (1 CYCLE EXPOSURE)	4.01E-05	453.394
4	JMVL13481I	V3481	MOV V3481 CATASTROPHIC INTERNAL LEAK (1 CYCLE EXPOSURE)	4.01E-05	453.394
5	JMVL13651I	V3651	MOV V3651 CATASTROPHIC INTERNAL LEAK (1 CYCLE EXPOSURE)	4.01E-05	453.394
6	JMVL13652I	V3652	MOV V3652 CATASTROPHIC INTERNAL LEAK (1 CYCLE EXPOSURE)	4.01E-05	453.394
7	ET2F11B2LC	1B2 LC XFMR	1B2 LC TRANSFORMER FAULT	2.17E-05	128.684
8	EB2F11B2LC	1B2 LC BUS	1B2 LC BUS FAULT	6.37E-06	122.963
9	EB1F11B3	4KV BUS 1B3	4 KV BUS 1B3 FAULT	5.33E-06	122.646
10	EC2R120402	1-20402	AC BREAKER 20402 TRANSFERS OPEN (1B3 4KV TO 1B2 LC)	3.81E-06	120.531

NEXTera ENERGY

PSL Comparison to NRC SPAR Model

BASIC EVENT IMPORTANCE MEASURES

SPAR Top 10 Basic Events

Rank	Basic Event	Component	Description	Prob	RAW
1	RPS-VCF-FO-MECH	CONTROL RODS	CONTROL ROD ASSEMBLIES FAIL TO INSERT	1.20E-06	14900.00
2	RPS-RTB-FC-FTO	Rxr TCBs	TRIP CIRCUIT BREAKERS FAIL TO OPEN	1.60E-06	3590.00
3	AFW-TNK-FC-CST	COND STOR TK	AFW CONDENSATE STORAGE TANK FAILURES	4.37E-07	1600.00
4	HPI-MOV-OC-3659	V3659	ECCS MINIFLOW MOV V3659 FAILS TO REMAIN OPEN	8.13E-07	1010.00
5	HPI-MOV-OC-3660	V3660	ECCS MINIFLOW MOV V3660 FAILS TO REMAIN OPEN	8.13E-07	1010.00
6	HPI-TNK-FC-RWST	RWT	RWST AND WATER SUPPLY FAILURES	4.37E-07	977.00
7	CCW-TNK-FC-SURGE	CCW SURGE TK	FAILURE OF CCW SURGE TANK	4.37E-07	586.00
8	**ACP-BAC-LP-1A**	**4KV BUS 1A3**	**DIVISION 1A AC POWER 4160V BUS 1A3 FAILS**	**3.33E-05**	**520.00**
9	**ACP-BAC-LP-1B**	**4KV BUS 1B3**	**FAILURE OF 4160V BUS 1B3**	**3.33E-05**	**512.00**
10	DCP-BDC-LP-1B	125V DC BUS 1B	FAILURE OF 125V DC BUS 1B	5.64E-06	240.00

PSL Top 10 Basic Events

Rank	Basic Event	Component	Description	Prob	RAW
1	NMM1CEDM	CONTROL RODS	MECHANICAL FAULT PREVENTING ROD INSERTION	2.10E-06	26425.385
2	GTKJ1RWT	RWT	REFUELING WATER TANK RUPTURE	5.35E-08	2949.687
3	JMVL13480I	V3480	MOV V3480 CATASTROPHIC INTERNAL LEAK (1 CYCLE EXPOSURE)	4.01E-05	453.394
4	JMVL13481I	V3481	MOV V3481 CATASTROPHIC INTERNAL LEAK (1 CYCLE EXPOSURE)	4.01E-05	453.394
5	JMVL13651I	V3651	MOV V3651 CATASTROPHIC INTERNAL LEAK (1 CYCLE EXPOSURE)	4.01E-05	453.394
6	JMVL13652I	V3652	MOV V3652 CATASTROPHIC INTERNAL LEAK (1 CYCLE EXPOSURE)	4.01E-05	453.394
7	ET2F11B2LC	1B2 LC XFMR	1B2 LC TRANSFORMER FAULT	2.17E-05	128.684
8	EB2F11B2LC	1B2 LC BUS	1B2 LC BUS FAULT	6.37E-06	122.963
9	**EB1F11B3**	**4KV BUS 1B3**	**4 KV BUS 1B3 FAULT**	**5.33E-06**	**122.646**
10	**EC2R120402**	**1-20402**	**AC BREAKER 20402 TRANSFERS OPEN (1B3 4KV TO 1B2 LC)**	**3.81E-06**	**120.531**

NEXTera ENERGY

PSL Comparison to NRC SPAR Model

Human Error Probability Comparison

SPAR Rank	Operator Actions BE	Desc	Prob	RAW
1	AFW-XHE-XM-U2CST	OPERATOR FAILS TO XTIE TO UNI2 2 CST FOR LONG TERM CST M/U	1.00E-04	1630.00
2	RCS-XHE-XM-TRIP	OPERATOR FAILS TO TRIP RC PUMPS	5.00E-04	211.00
3	CCW-XHE-XR-HTX1A	OPERATOR FAILS TO RESTORE HTX 1A AFTER T&M	1.00E-03	12.40
4	CCW-XHE-XR-HTX1B	OPERATOR FAILS TO RESTORE HTX 1B AFTER T&M	1.00E-03	12.40
5	HPI-XHE-XM-RWST	OPERATOR FAILS TO REFILL THE RWST FOR LONG TERM INJ	4.00E-03	8.37
6	HPI-XHE-XR-MDP1B	OP FAILS TO RESTORE HPI MDP TRAIN 1B	1.00E-03	4.17
7	HPI-XHE-XR-MDP1A	OP FAILS TO RESTORE HPI MDP TRAIN 1A	1.00E-03	4.16
8	LPI-XHE-XM-SDC1	OPERATOR FAILS TO INITIATE SHUTDOWN COOLING (DEPENDENCY)	5.19E-02	4.16
9	PCS-XHE-XM-CDOWN	OPERATOR FAILS TO INITIATE COOLDOWN	1.00E-03	4.08
10	HPI-XHE-XM-FB1	OPERATOR FAILS TO INITIATE FEED AND BLEED COOLING	8.80E-02	2.49

NEXTera ENERGY

PSL Comparison to NRC SPAR Model

Human Error Probability Comparison

SPAR Rank	Operator Actions BE	Desc	Prob	RAW
1	**AFW-XHE-XM-U2CST**	**OPERATOR FAILS TO XTIE TO UNI2 2 CST FOR LONG TERM CST M/U**	**1.00E-04**	**1630.00**
2	RCS-XHE-XM-TRIP	OPERATOR FAILS TO TRIP RC PUMPS	5.00E-04	211.00
3	CCW-XHE-XR-HTX1A	OPERATOR FAILS TO RESTORE HTX 1A AFTER T&M	1.00E-03	12.40
4	CCW-XHE-XR-HTX1B	OPERATOR FAILS TO RESTORE HTX 1B AFTER T&M	1.00E-03	12.40
5	HPI-XHE-XM-RWST	OPERATOR FAILS TO REFILL THE RWST FOR LONG TERM INJ	4.00E-03	8.37
6	HPI-XHE-XR-MDP1B	OP FAILS TO RESTORE HPI MDP TRAIN 1B	1.00E-03	4.17
7	HPI-XHE-XR-MDP1A	OP FAILS TO RESTORE HPI MDP TRAIN 1A	1.00E-03	4.16
8	LPI-XHE-XM-SDC1	OPERATOR FAILS TO INITIATE SHUTDOWN COOLING (DEPENDENCY)	5.19E-02	4.16
9	PCS-XHE-XM-CDOWN	OPERATOR FAILS TO INITIATE COOLDOWN	1.00E-03	4.08
10	HPI-XHE-XM-FB1	OPERATOR FAILS TO INITIATE FEED AND BLEED COOLING	8.80E-02	2.49

BE	Desc	Prob	RAW
AHFPSWU2CST	**Fail to provide suction to U1 AFW from U2 CST**	**1.10E-03**	**18.775**

NEXTera ENERGY

PSL Comparison to NRC SPAR Model

Human Error Probability Comparison

SPAR Rank	Operator Actions BE	Desc	Prob	RAW
1	AFW-XHE-XM-U2CST	OPERATOR FAILS TO XTIE TO UNI2 2 CST FOR LONG TERM CST M/U	1.00E-04	1630.00
2	RCS-XHE-XM-TRIP	OPERATOR FAILS TO TRIP RC PUMPS	5.00E-04	211.00
3	**CCW-XHE-XR-HTX1A**	**OPERATOR FAILS TO RESTORE HTX 1A AFTER T&M**	**1.00E-03**	**12.40**
4	**CCW-XHE-XR-HTX1B**	**OPERATOR FAILS TO RESTORE HTX 1B AFTER T&M**	**1.00E-03**	**12.40**
5	HPI-XHE-XM-RWST	OPERATOR FAILS TO REFILL THE RWST FOR LONG TERM INJ	4.00E-03	8.37
6	HPI-XHE-XR-MDP1B	OP FAILS TO RESTORE HPI MDP TRAIN 1B	1.00E-03	4.17
7	HPI-XHE-XR-MDP1A	OP FAILS TO RESTORE HPI MDP TRAIN 1A	1.00E-03	4.16
8	LPI-XHE-XM-SDC1	OPERATOR FAILS TO INITIATE SHUTDOWN COOLING (DEPENDENCY)	5.19E-02	4.16
9	PCS-XHE-XM-CDOWN	OPERATOR FAILS TO INITIATE COOLDOWN	1.00E-03	4.08
10	HPI-XHE-XM-FB1	OPERATOR FAILS TO INITIATE FEED AND BLEED COOLING	8.80E-02	2.49

BE	Desc	Prob	RAW
QHFPICWCCW	**OPERATOR FAILS TO RESTORE ICW TO CCW HX WHEN LOST**	**5.40E-05**	**7.626**

NEXTera ENERGY

PSL Comparison to NRC SPAR Model

Human Error Probability Comparison

SPAR Rank	Operator Actions BE	Desc	Prob	RAW
1	AFW-XHE-XM-U2CST	OPERATOR FAILS TO XTIE TO UNI2 2 CST FOR LONG TERM CST M/U	1.00E-04	1630.00
2	RCS-XHE-XM-TRIP	OPERATOR FAILS TO TRIP RC PUMPS	5.00E-04	211.00
3	CCW-XHE-XR-HTX1A	OPERATOR FAILS TO RESTORE HTX 1A AFTER T&M	1.00E-03	12.40
4	CCW-XHE-XR-HTX1B	OPERATOR FAILS TO RESTORE HTX 1B AFTER T&M	1.00E-03	12.40
5	HPI-XHE-XM-RWST	OPERATOR FAILS TO REFILL THE RWST FOR LONG TERM INJ	4.00E-03	8.37
6	**HPI-XHE-XR-MDP1B**	**OP FAILS TO RESTORE HPI MDP TRAIN 1B**	**1.00E-03**	**4.17**
7	**HPI-XHE-XR-MDP1A**	**OP FAILS TO RESTORE HPI MDP TRAIN 1A**	**1.00E-03**	**4.16**
8	LPI-XHE-XM-SDC1	OPERATOR FAILS TO INITIATE SHUTDOWN COOLING (DEPENDENCY)	5.19E-02	4.16
9	PCS-XHE-XM-CDOWN	OPERATOR FAILS TO INITIATE COOLDOWN	1.00E-03	4.08
10	HPI-XHE-XM-FB1	OPERATOR FAILS TO INITIATE FEED AND BLEED COOLING	8.80E-02	2.49

BE	Desc	Prob	RAW
GHFL1PUMPS	**PRE-INIT HFE: HPSI PUMPS NOT RESTORED AFTER MAINTENANCE**	**2.70E-05**	**1321.41**

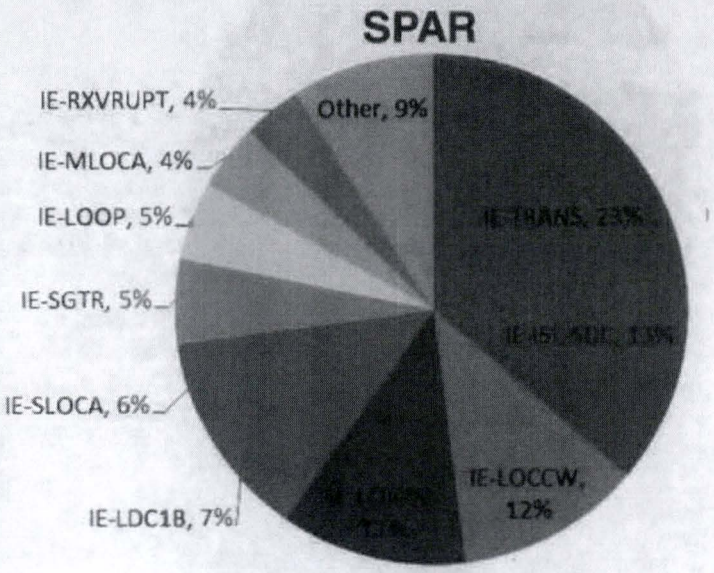
NEXTera ENERGY

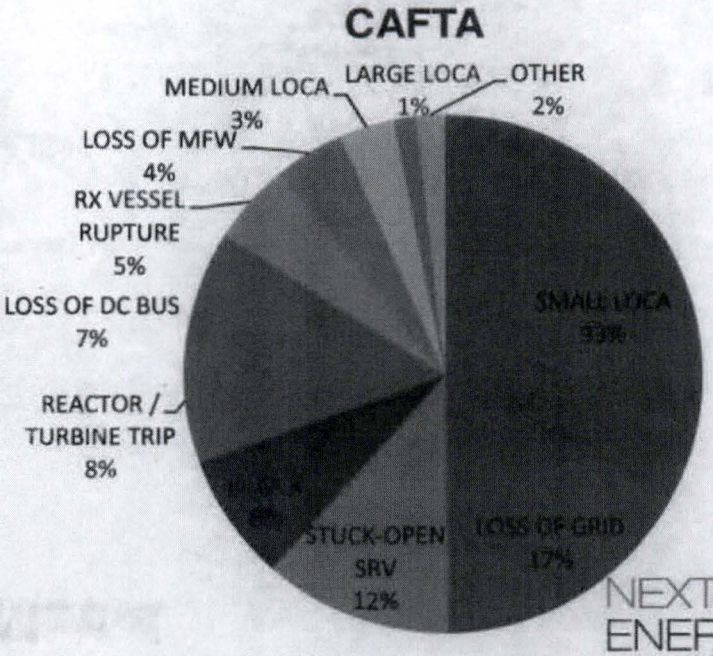
PSL Comparison to NRC SPAR Model

IE Contribution

SPAR Rank	Initiating Events BE	Desc	Freq	FV
1	IE-TRANS	TRANSIENT	6.90E-01	23%
2	IE-ISL-SDC	ISLOCA IE 2-MOV SDC interface	2.50E-06	13%
3	IE-LOCCW	LOSS OF COMPONENT COOLING WATER	2.46E-04	12%
4	IE-LOICW	LOSS OF INTAKE COOLING WATER	2.46E-04	12%
5	IE-LDC1B	LOSS OF DC BUS 1B	3.69E-04	7%
6	IE-SLOCA	SMALL LOCA INITIATOR	3.67E-04	6%
7	IE-SGTR	SG TUBE RUPTURE	2.07E-03	5%
8	IE-LOOP	LOSS OF OFFSITE POWER	2.84E-02	5%
9	IE-MLOCA	MEDIUM LOCA INITIATOR	1.50E-04	4%
10	IE-RXVRUPT	Reactor Vessel Rupture Initiating Event	1.00E-07	4%
11	Other	Other Initiating Events	N/A	9%

PSL Rank	Initiating Events BE	Desc	Freq	FV
1	%ZZSU1	SMALL LOCA	3.65E-03	34%
2	%ZZT8SRVU1	UNIT 1 STUCK OPEN SRV IE	2.88E-03	12%
3	%ZZ1LOGP	LOSS OFF-SITE POWER (PLANT-CENTERED)	1.64E-02	9%
4	%ZZU1ISLOCASDC	SDC PATH ISLOCA IE	1.00E+00	7%
5	%ZZVESSELRUP	REACTOR VESSEL RUPTURE INITIATING EVENT	2.70E-07	5%
6	%ZZT1AU1	TURBINE TRIPS	2.13E-01	5%
7	%ZZDC1B	LOSS OF DC BUS 1B IE FOR UNIT 1	1.00E+00	4%
8	%ZZMU1	MEDIUM LOCA	1.08E-05	3%
9	%ZZDC1A	LOSS OF DC BUS 1A IE FOR UNIT 1	1.00E+00	3%
10	%ZZT1BU1	REACTOR TRIPS	4.87E-01	3%
11	Other	Other Initiating Events	N/A	15%





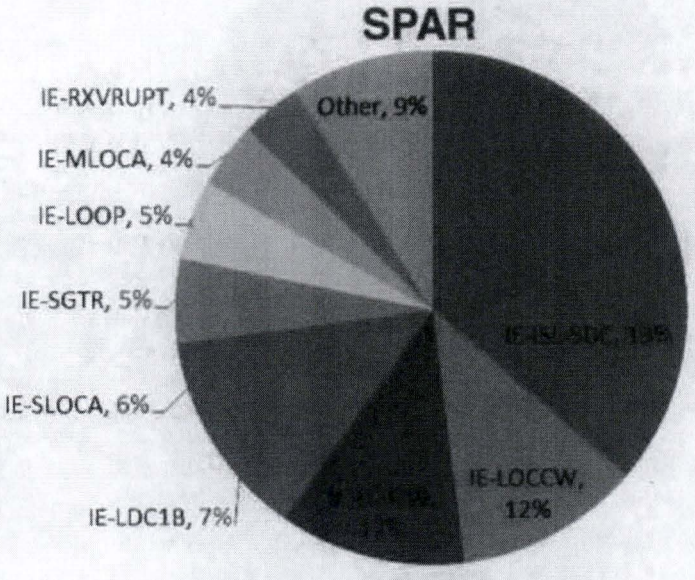
NEXTera ENERGY

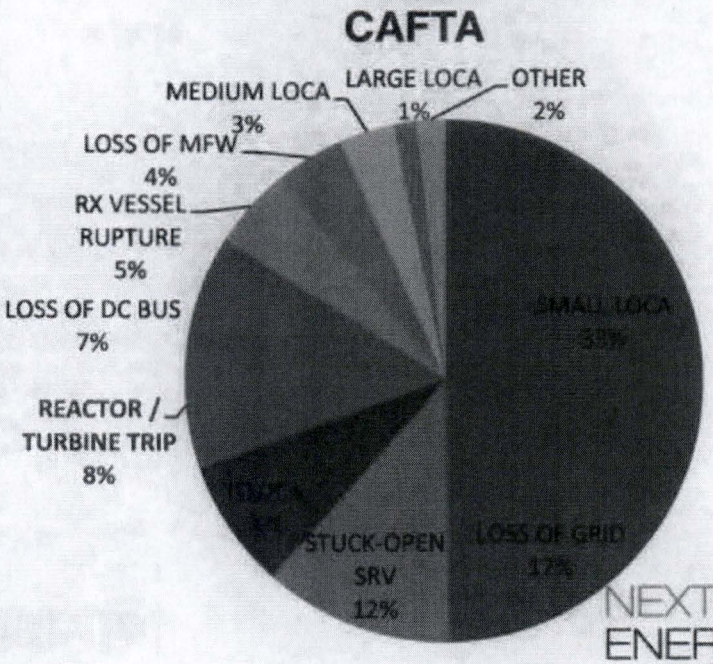
PSL Comparison to NRC SPAR Model

IE Contribution

SPAR	Initiating Events			
Rank	BE	Desc	Freq	FV
1	**IE-TRANS**	**TRANSIENT**	**6.90E-01**	**23%**
2	IE-ISL-SDC	ISLOCA IE 2-MOV SDC interface	2.50E-06	13%
3	IE-LOCCW	LOSS OF COMPONENT COOLING WATER	2.46E-04	12%
4	IE-LOICW	LOSS OF INTAKE COOLING WATER	2.46E-04	12%
5	IE-LDC1B	LOSS OF DC BUS 1B	3.69E-04	7%
6	IE-SLOCA	SMALL LOCA INITIATOR	3.67E-04	6%
7	IE-SGTR	SG TUBE RUPTURE	2.07E-03	5%
8	IE-LOOP	LOSS OF OFFSITE POWER	2.84E-02	5%
9	IE-MLOCA	MEDIUM LOCA INITIATOR	1.50E-04	4%
10	IE-RXVRUPT	Reactor Vessel Rupture Initiating Event	1.00E-07	4%
11	Other	Other Initiating Events	N/A	9%

PSL	Initiating Events			
Rank	BE	Desc	Freq	FV
1	%ZZSU1	SMALL LOCA	3.65E-03	34%
2	%ZZT8SRVU1	UNIT 1 STUCK OPEN SRV IE	2.88E-03	12%
3	%ZZ1LOGP	LOSS OFF-SITE POWER (PLANT-CENTERED)	1.64E-02	9%
4	%ZZU1ISLOCASDC	SDC PATH ISLOCA IE	1.00E+00	7%
5	%ZZVESSELRUP	REACTOR VESSEL RUPTURE INITIATING EVENT	2.70E-07	5%
6	**%ZZT1AU1**	**TURBINE TRIPS**	**2.13E-01**	**5%**
7	%ZZDC1B	LOSS OF DC BUS 1B IE FOR UNIT 1	1.00E+00	4%
8	%ZZMU1	MEDIUM LOCA	1.08E-05	3%
9	%ZZDC1A	LOSS OF DC BUS 1A IE FOR UNIT 1	1.00E+00	3%
10	**%ZZT1BU1**	**REACTOR TRIPS**	**4.87E-01**	**3%**
11	Other	Other Initiating Events	N/A	15%



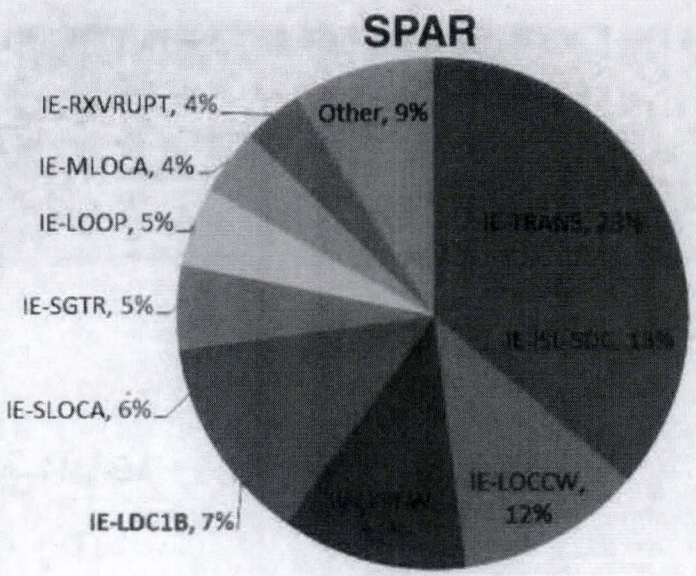


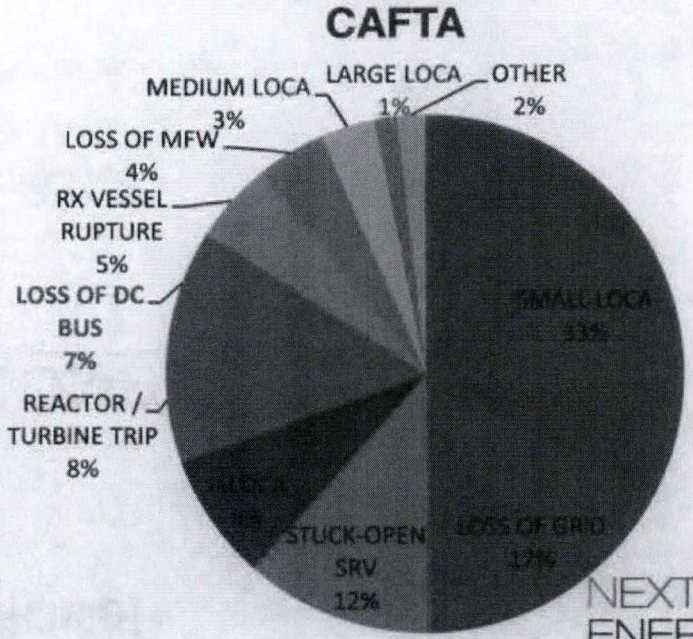
PSL Comparison to NRC SPAR Model

IE Contribution

SPAR	Initiating Events			
Rank	BE	Desc	Freq	FV
1	IE-TRANS	TRANSIENT	6.90E-01	23%
2	IE-ISL-SDC	ISLOCA IE 2-MOV SDC interface	2.50E-06	13%
3	IE-LOCCW	LOSS OF COMPONENT COOLING WATER	2.46E-04	12%
4	IE-LOICW	LOSS OF INTAKE COOLING WATER	2.46E-04	12%
5	**IE-LDC1B**	**LOSS OF DC BUS 1B**	**3.69E-04**	**7%**
6	IE-SLOCA	SMALL LOCA INITIATOR	3.67E-04	6%
7	IE-SGTR	SG TUBE RUPTURE	2.07E-03	5%
8	IE-LOOP	LOSS OF OFFSITE POWER	2.84E-02	5%
9	IE-MLOCA	MEDIUM LOCA INITIATOR	1.50E-04	4%
10	IE-RXVRUPT	Reactor Vessel Rupture Initiating Event	1.00E-07	4%
11	Other	Other Initiating Events	N/A	9%

PSL	Initiating Events			
Rank	BE	Desc	Freq	FV
1	%ZZSU1	SMALL LOCA	3.65E-03	34%
2	%ZZT8SRVU1	UNIT 1 STUCK OPEN SRV IE	2.88E-03	12%
3	%ZZ1LOGP	LOSS OFF-SITE POWER (PLANT-CENTERED)	1.64E-02	9%
4	%ZZU1ISLOCASDC	SDC PATH ISLOCA IE	1.00E+00	7%
5	%ZZVESSELRUP	REACTOR VESSEL RUPTURE INITIATING EVENT	2.70E-07	5%
6	%ZZT1AU1	TURBINE TRIPS	2.13E-01	5%
7	**%ZZDC1B**	**LOSS OF DC BUS 1B IE FOR UNIT 1**	**1.00E+00**	**4%**
8	%ZZMU1	MEDIUM LOCA	1.08E-05	3%
9	**%ZZDC1A**	**LOSS OF DC BUS 1A IE FOR UNIT 1**	**1.00E+00**	**3%**
10	%ZZT1BU1	REACTOR TRIPS	4.87E-01	3%
11	Other	Other Initiating Events	N/A	15%





NEXTera ENERGY

PSL Comparison to NRC SPAR Model

SDP RESULTS COMPARISON

- **Quantification:**
  - PSL Model v. 8.19, SAPHIRE v. 8.0.9
  - 1.0E-11 Truncation
  - RANDOM EVENTS Model
  - Change Set Used to set BEs to 1.0
  - Solved all Event Trees for Full Power – Internal Events

UNIT 1 CDF = 2.66E-06/yr.	UNIT 2 CDF = 2.04E-06/yr.
[PSL1 CDF = 5.19E-06/yr.*]	[PSL2 CDF = 6.65E-06/yr.*]

*Trunc = 1E-11

NEXTera ENERGY

SDP RESULTS COMPARISON

- Evaluated MSPI Pumps and EDGs
- Quantified each BE set to 1.0, used most conservative ΔCDF value
- Doubled Internal Events CDF to account for External Events
- Calculated time to WHITE SDP (ΔCDP = 1E-06) in days using the following equation:

$$TTW = \frac{1.0E-06}{2 \times \Delta CDF} \times 365$$

$$\Delta CDF = CDF(1) - CDF$$

NEXTera ENERGY

PSL Comparison to NRC SPAR Model

Unit 1 SPAR RESULTS

Comp	SPAR CDF	SPAR ΔCDF	SPAR TTW (Days)
AFW PP 1A	4.71E-05	4.44E-05	4.11
AFW PP 1B	2.29E-05	2.02E-05	9.02
AFW PP 1C	8.16E-06	5.50E-06	33.18
CCW PP 1A	5.82E-05	5.55E-05	3.29
CCW PP 1B	5.89E-05	5.62E-05	3.25
CCW PP 1C	2.84E-05	2.57E-05	7.09
CNTMT SPR PP 1A	2.69E-06	3.00E-08	6083.33
CNTMT SPR PP 1B	2.69E-06	3.00E-08	6083.33
DSL GEN 1A	7.59E-06	4.93E-06	37.02
DSL GEN 1B	7.53E-06	4.87E-06	37.47
HPSI PP 1A	3.22E-05	2.95E-05	6.18
HPSI PP 1B	3.23E-05	2.96E-05	6.16
ICW PP 1A	4.59E-05	4.32E-05	4.22
ICW PP 1B	4.59E-05	4.32E-05	4.22
ICW PP 1C	1.53E-05	1.26E-05	14.44

Unit 1 CAFTA RESULTS

Comp	CAFTA CDF	CAFTA ΔCDF	CAFTA TTW (Days)
AFW PP 1A	1.38E-05	8.62E-06	21.18
AFW PP 1B	1.79E-05	1.27E-05	14.41
AFW PP 1C	9.25E-06	4.06E-06	44.92
CCW PP 1A	4.01E-05	3.49E-05	5.22
CCW PP 1B	5.23E-06	3.56E-08	5126.40
CCW PP 1C	5.69E-06	5.01E-07	364.42
CNTMT SPR PP 1A	5.25E-06	6.26E-08	2915.34
CNTMT SPR PP 1B	5.25E-06	6.36E-08	2869.50
DSL GEN 1A	8.14E-06	2.95E-06	61.79
DSL GEN 1B	8.52E-06	3.33E-06	54.82
HPSI PP 1A	1.14E-04	1.09E-04	1.68
HPSI PP 1B	1.10E-04	1.05E-04	1.73
ICW PP 1A	5.34E-06	1.53E-07	1192.81
ICW PP 1B	5.19E-06	1.20E-09	152083.33
ICW PP 1C	5.32E-06	1.29E-07	1418.03

*Unit 2 yields similar results

NEXTera ENERGY

SDP Results Comparison

- **AFW**
  - PSL detailed convolution analysis, updated failure rates for AFW pumps
  - SPAR has large importance in Transient events (i.e. transient events with LOMFW)
- **EDGs**
  - SPAR TTW lower by factor of 2
  - PSL detailed convolution to calculate non-recovery of Loss of Offsite Power (LOOP) factors and credit EDG recovery.
- **ICW/CCW**
  - T/H analysis to support ICW-CCW dependency
  - High contribution to CDF from ICW/CCW initiator in SPAR
- **HPSI**
  - Worth investigation

NEXTera ENERGY

SDP Results Comparison

- **Other Factors**
  - Lack of recovery actions in SPAR, lead to higher importance of FTS events
  - Erroneous CDF values for high probability BEs
    - -- Ex. – CCW PP 1A FTR
      - Prob = 1.0, CDF = **3.34E-05**
      - Prob set to TRUE, CDF = **5.82E-05**
  - Conservative HEP values
  - Plant alignments – PSL credits normal alignment to the 'A' bus
  - Test/Maintenance events not modeled for 'B' ICW/CCW pumps in SPAR model
  - HPSI failures during recirculation are modeled in U1 SPAR model, but not U2

NEXTera ENERGY

Conclusions

- These are preliminary results
- Work together to benchmark and model the as-built, as-operated plant, reduce conservatisms, revise both models where there are deficiencies
- Plant input is important to Significance Determination Process

NEXTera ENERGY

QUESTIONS?

Lee, Samson

From: Weerakkody, Sunil
Sent: Monday, August 10, 2015 12:47 PM
To: Uhle, Jennifer
Cc: Giitter, Joseph; Lee, Samson
Subject: answer to your question on the user need

Importance: High

Jennifer,

So I'll propose an alternative sentence that addresses you objective without creating least confusion at RES. My black berry is (b)(6) if you need to get hold of me.

Here is my proposed sentence (changes highlighted)"

In light of the uncertain budget environment and NRR's consideration of the use of licensees' PRA models in the future, NRR requests that RES coordinate with NRR staff before initiating significant updates to plant-specific SPAR models for internal events to ~~work on any Task to ensure that work is being conducted in a prioritized manner~~ focus resources on higher priority tasks.

Sunil D Weerakkody, Chief
PRA Operations & Human Factors Branch
Office of Nuclear Reactor Regulation
Nuclear Regulatory Commission

Address: Mail Stop O-10 C-15, US NRC, Washington DC 20005-0001

Tel: 301-415-2870
Black Berry: (b)(6)

From: Uhle, Jennifer
Sent: Monday, August 03, 2015 4:02 PM
To: Weerakkody, Sunil
Cc: Giitter, Joseph
Subject: user need questions

Is it okay if I add this to the user need and the memo?

Also, who do you want to put as POC in NRR in lieu of Antonios?

Jennifer

Lee, Samson

From: Glitter, Joseph
Sent: Tuesday, June 09, 2015 8:49 AM
To: Weerakkody, Sunil
Cc: Lee, Samson; Rosenberg, Stacey
Subject: factsheetC_coyne.docx
Attachments: factsheetC_coyne.docx

Sunil -- Please see my comments and we can discuss later today.

POP for the Discussion on SPAR Model User Need

Objectives:

- Inform NRR OD & DOD about various uses of SPAR models by NRR.
- Receive NRR OD\DOD endorsement on the User Need

Briefers:

- Sunil Weerakkody & Joe Giitter

Background

- The subject User Need consist of nine major tasks of various priorities.
- NRR uses Standardized Plant Analysis Risk (SPAR) Models in support of various oversight, licensing, and rulemaking activities as articulated below.
- RES uses SPAR models to support SRAs on ROP related issues. RES also uses SPAR models to perform generic issue screening, back-fit analyses, Accident Sequence Precursor analyses and any other SRM driven mandates that requires plants specific ~~PRA~~ risk analyses:

NRR- Oversight:

- Plant-specific SPAR models support SDP assessments.
- Plant-specific SPAR models are used to support NOEDs.
- Plant-specific SPAR models are used to support MD 8.3 (Incidence Response).
- Plant-specific SPAR models also support inspection planning and ~~are used to develop Plant-specific Risk Information eBooks (PRIBs)~~ and SPAR models have been made available to resident inspectors who may use them to glean risk-insights.
- Plant-specific SPAR models provide technical bases to provide plant-specific or generic risk-informed on other emerging issues (e.g., Enforcement Guidance Memorandums (EGMs) (e.g., tornado missile EGM).

Licensing:

- We do not (or rarely use) SPAR models to review risk-informed licensing actions.
    - Staff requires that licensee meet standards established by RG 1.200 (on the contrary, for ROP related actions described above, staff does not require licensees to meet RG 1.200).
      (Joe: We Stacey/Sunil/Sam/you should explore whether we could use SPAR models to reduce (or improve quality of) RAIs and perform confirmatory calculations using SPAR models to enhance the timeliness of licensing action review.)

Rulemaking:

- Supports detailed cost-benefit analysis and assessment of safety benefits for proposed regulatory actions (e.g., rulemaking, backfits, ~~and~~.)

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Commented [JGG1]: Need to explain the purpose of the PRIBs. SHouldn't PRIBS be used to develop SPAR models?

Commented [JGG2]: Begs the question: Are they being used? Are they qualified to run the models? Leads to more questions.

Commented [JGG3]: Then why couldn't we take a similar approach for SDP?

Commented [JGG4]: Really? Do we have examples?

Option 1: Continue with Status Quo

Under this option, NRC will continue to update about 8-12 SPAR models per year and develop new All Hazard (including fire and seismic hazards) SPAR models per year. {Joe: RES has already developed about 20 external event models that are representative of about 30 plants. Fernando helped finishing two more while on rotation. RES expects to develop 2-3 models more per year using the current resource levels, i.e., we should have external event models for most of our plants within about 10 years. The sophistication of these models will depend on the best available information} Actual number of models updated during a given year depends upon the resources applied to these updates and existing user needs. Annually, NRC expends approximately $1.5 million and 3 FTEs to update and maintain the SPAR models.

Advantages:

- Provide a means to maintain an independent assessment tool from that of the licensees.
- Provides an enhanced public confidence in that the regulator will arrive at a conclusion based on a diverse path from that of the licensee.
- Enables staff to assess risk-significance of various plants on a common basis, i.e., PRA methods used to estimate critical parameters such as common cause failures and human error probabilities will be identical (RG 1.200 compliance does not assure use of one method).
- Modeling techniques and data are standardized for each plant and run on the same software platform making it possible to train NRC practitioners and use trained NRC staff to efficiently make timely assessments.
- Will not rely on licensees' external event models or updates to internal events (e.g., flex equipment) to enhance NRC's understanding of risk profile of plants (See Attachment--- This is the spread sheet that Fernando generated).
- Enables NRR staff to support management efforts to risk-inform regulatory decisions on generic or plant specific basis.

Commented [JG65]: Context??

Disadvantages

- Requires staff to expend resources to update or develop models.
    - Note: RES is likely to pursue continued development to support other needs (GI screening, ASP, etc...) even if there is no User Need.

Option 2: Rely on results provided by licensee's models

Under this option NRC staff will rely on licensees to run their PRA models. Results will be provided to NRC staff in order to make a determination.

Advantages:

- Will not require staff to expend additional resources to update the models.
  - It is quite possible that RES would still require independent SPAR models to support activities such as regulatory analysis, generic issue screening, system studies, and ASP and any other future SRM driven mandates by the Commission. So, there may be minimal cost savings for the agency if NRR were to utilize licensee models.
- If the staff mandates that licensees' models comply with RG 1.200 (this may be viewed as a backfit) in order to rely on licensees' models, it may motivate licensees to develop and maintain PRA models that comply with RG 1.200.
- **A "certified" PRA (consistent with RMRF Option 2) would allow the licensees PRA to be the PRA of record for all regulatory actions—including SDP.**

Disadvantages:

- Inhibits staff's ability provide timely, independent, and unbiased inputs to time-critical NRC decisions in support of NOEDs and MD 8.3s.

- ~~NRC may have to impose additional standards (e.g. RG 1.200) on licensees' PRA models when they support of licensees' ROP related efforts (Such impositions may be viewed as backfits).~~

- The burden of performing screening and final assessments in support of SDPs, NOEDs, MD 8.3s and answering staff questions with respect to results in a timely manner will shift to the ~~licensees~~ licensees--increasing their workload.

- ~~Significant NRC staff resources will be required to become familiar in the various licensee models and software platforms in order to effectively direct modifications required for assessments.~~

- May inhibit NRR's ability to effectively deal with future challenges "Aggregation" and "Integrated Risk-informed Decision Making," related challenges since staff's ability to enhance external events risk assessments will be affected.

Option 3: Staff relies on access and use of licensees' models

- Under this option, NRC staff will be given access and training to run licensees' PRA models in support of various regulatory actions.

- Advantages

Commented [JGG6]: RES may have this desire, but it still need to be funded.

Commented [JGG7]: Of course, another option would be to allow licensees to use their models if they are RG 1.200 compliant. I would word it as such.

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Commented [JGG8]: I could possibly see this as an advantage from an NRC perspective.

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Commented [JGG9]: I don't see this under Option 2, but Option3.

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- Will not require staff to expend additional resources to update the models.
- May motivate licensee to develop and maintain PRA models that comply with RG 1.200.

- Disadvantages
- Will require significant resources to train the multiple NRC staff members (both in NRR, NRO, and the Regions) on running licensees' models. This may pose significant burdens since
  - Licensees use different software to develop PRA models
  - Each PRA models contain important switches\House Events that requires familiarity on the part of the analyst (i.e., there can be significant training burden).

- NRC will need to maintain commercial software licenses for multiple PRA codes (e.g., CAFTA, RISKMAN, FRANX, FTREX, etc.)

- Licensee may not grant access of their models to NRC

Staff Recommendation

Staff recommends Option 1.

Lee, Samson

From: Dean, Bill
Sent: Monday, April 20, 2015 7:06 PM
To: Weerakkody, Sunil; Uhle, Jennifer
Cc: Giitter, Joseph; Lee, Samson; Wong, See-Meng
Subject: Re: Heads Up: User Need coming for your approval

I would want to make sure that we are not spending $ for money's sake and that we aren't developing SPAR models to be equivalent to a licensee's PRA. Also, I am a little wary of saying we are just "replacing" a user need. That was a need 5 years ago and I would offer that maybe some of those "needs" no longer exist. with our budget constraints, we have to be more conscientious about what we really need.
Bill Dean
Director, Office of Nuclear
Reactor Regulation
USNRC

From: Weerakkody, Sunil
Sent: Monday, April 20, 2015 02:21 PM
To: Dean, Bill; Uhle, Jennifer
Cc: Giitter, Joseph; Lee, Samson; Wong, See-Meng
Subject: Heads Up: User Need coming for your approval

Bill\Jennifer,

In the next day or two, DRA will be transmitting a User Need for your signature. This User Need covers nine tasks. It replaces a 2010 User Need and enables us to continue to secure RES support on a variety of tasks that are important to us. These include updates to SPAR models, continuing to provided support to SRAs on complex SDPs, and development of state-of-the-art PRA tools.

See-Meng has coordinated the tasks\due dates\deliverables for each of the tasks with his NRR\DIRS, regional SRAs, and the RES staff and branch chief level management.

Please contact me or See-Meng if you have any questions on this User Need when you receive it for your signature.

Sunil D Weerakkody, Chief
PRA Operations & Human Factors Branch
Office of Nuclear Reactor Regulation
Nuclear Regulatory Commission

Address: Mail Stop O-10 C-15, US NRC, Washington DC 20005-0001

Tel: 301-415-2870
Black Berry: (b)(6)

Lee, Samson

From: Coyne, Kevin
Sent: Tuesday, February 24, 2015 8:40 AM
To: Pruett, Troy; Weerakkody, Sunil; Howe, Allen; Vegel, Anton
Cc: Giitter, Joseph; Lee, Samson; Wong, See-Meng; Appignani, Peter; Gonzalez, Michelle; Correia, Richard; Madden, Patrick
Subject: RE: Questions on the SPAR model program

Troy –

Just to recap - there are two types of SPAR updates we do – (1) routine updates to reflect recent plant modifications, and (2) emergent updates to support specific event or condition analyses (such as the SDP). We place an extremely high priority on the second type of emergent updates since they can impact the timeliness of various reactor oversight programs. The routine updates are just that – they are lower priority and we fit them in as resources allow (and we sometimes defer work on the routine updates to provide more timely support to SRAs in support of emergent SDP issues). It's also important to recognize that we cannot perform any update without the supporting technical information from the licensee – and we rely heavily on the Regional SRAs to both identify the need for a SPAR model update and facilitate collection of the supporting technical information.

Ideally, the need for a SPAR model update (along with the supporting information) would be known well before there is a need to do an SDP analysis. However, if an SDP/NOED/MD 8.3 analyses is needed before a routine update can be completed, RES and INL can support the rapid development of a more limited scope SPAR update to support the specific analysis required. These types of emergent updates happen routinely and we generally are able to quickly get the required information from the utilities since they are far more motivated when they have an oversight issue to contend with. I also want to stress that no PRA model (licensee or SPAR) is capable of handling the nuances of most operational events without some adjustments – sometimes the SRAs can make these changes by themselves, but we are available to provide any support whenever needed.

Finally, as I indicated to Allen, we are planning a public workshop later this summer to go through a number of issues that routinely raise questions on the SPAR program (CCF and HRA modeling, QA activities, updating process, etc.) – although we are trying to fix the schedule to maximize industry representation, we definitely encourage the SRAs to participate in the workshop also.

Let me know if you have any questions about the SPAR program or would like a more detailed brief on how the program is managed –

Kevin

Kevin Coyne, P.E., Ph.D.
Chief, Probabilistic Risk Assessment Branch
Division of Risk Analysis, Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
(301) 251-7586 (work)
(b)(6) [redacted] *(cell)*

From: Pruett, Troy
Sent: Monday, February 23, 2015 11:00 AM
To: Weerakkody, Sunil; Coyne, Kevin; Howe, Allen; Vegel, Anton
Cc: Giitter, Joseph; Lee, Samson; Nakoski, John; Wong, See-Meng; Appignani, Peter; Gonzalez, Michelle; Correia, Richard; Madden, Patrick
Subject: RE: Questions on the SPAR model program

Thanks Sunil. I'm just trying to learn the system. I may need to do a better job getting an expected delivery date for the model update on the front end.

Troy

From: Weerakkody, Sunil
Sent: Monday, February 23, 2015 10:57 AM
To: Pruett, Troy; Coyne, Kevin; Howe, Allen; Vegel, Anton
Cc: Giitter, Joseph; Lee, Samson; Nakoski, John; Wong, See-Meng; Appignani, Peter; Gonzalez, Michelle; Correia, Richard; Madden, Patrick
Subject: RE: Questions on the SPAR model program

Troy,

IMC 609 already has guidance that request we proceed to App. M if the quantification will require a significant time. IMO, having to perform an update that requires significant time and effort to the SPAR model(IMO) falls into that category. Having mentioned, this please note that, most of the time, as Kevin Coyne mentioned, the time that INL takes is hours or days after receiving regional request to modify the model to properly model the PD.

Sunil D. Weerakkody
Chief, PRA Operations and Human Factors
Division of Risk Assessments
Office of Nuclear Reactor Regulations

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Black Berry: (b)(6)

From: Pruett, Troy
Sent: Monday, February 23, 2015 10:41 AM
To: Coyne, Kevin; Howe, Allen; Weerakkody, Sunil; Vegel, Anton
Cc: Giitter, Joseph; Lee, Samson; Nakoski, John; Wong, See-Meng; Appignani, Peter; Gonzalez, Michelle; Correia, Richard; Madden, Patrick
Subject: RE: Questions on the SPAR model program

Thanks for the insights.

This might be a good case to consider. The goal is to complete a timely SDP analysis. I'm not sure that waiting for INL to complete a model update before proceeding with the SDP process is the best answer. Given the wait time for a licensee to voluntarily provide information and then several months for INL to complete the update, maybe we should have utilized Appendix M and proceeded to a SERP/Regulatory Conference.

Joe/Sunil: Do the SRA's have guidance to proceed to App M if a model update is required? Should MC 0609 be changed?

Troy

From: Coyne, Kevin
Sent: Thursday, February 19, 2015 6:12 PM
To: Howe, Allen; Weerakkody, Sunil
Cc: Glitter, Joseph; Lee, Samson; Pruett, Troy; Nakoski, John; Wong, See-Meng; Appignani, Peter; Gonzalez, Michelle; Correia, Richard; Madden, Patrick
Subject: RE: Questions on the SPAR model program

Allen –

Some follow up on the Wolf Creek SPAR model question - INL issued Revision 8.26 to the SPAR model on February 9th and communicated that the model was available for use to Dave Loveless (the Region IV SRA who requested the change) at that time. Although Dave had apparently brought this issue up with INL in early 2014, INL did not receive the necessary plant information to support the change until September 2014. As you know, licensees are not required to submit this type of PRA information to the NRC, so we rely on the SRAs (and the voluntary submittal of information by licensees) to provide us with up to date information.

So, I don't think what happened in this case was unreasonable, given the initial delay in obtaining the information needed for the update. But let me know if you or the Regional folks have any other concerns about how this was handled.

Kevin

From: Howe, Allen
Sent: Wednesday, February 18, 2015 8:47 AM
To: Coyne, Kevin; Weerakkody, Sunil
Cc: Glitter, Joseph; Lee, Samson; Pruett, Troy; Nakoski, John; Wong, See-Meng; Appignani, Peter; Gonzalez, Michelle; Correia, Richard; Madden, Patrick
Subject: RE: Questions on the SPAR model program

Kevin – thanks for the explanation and Sunil thanks for the assist. I will let you know if there are any additional questions.

Allen

From: Coyne, Kevin
Sent: Wednesday, February 18, 2015 7:26 AM
To: Weerakkody, Sunil; Howe, Allen
Cc: Glitter, Joseph; Lee, Samson; Pruett, Troy; Nakoski, John; Wong, See-Meng; Appignani, Peter; Gonzalez, Michelle; Correia, Richard; Madden, Patrick
Subject: Re: Questions on the SPAR model program

Allen -

Thanks for the question. The SPAR model program is run out of my branch (RES/DRA/PRAB) - John Nakoski handles the

performance and reliability branch (RES/DRA/PRB - responsible for the asp program).

The SPAR update process has been frequently communicated to the SRAs during both monthly calls and counterpart meetings. There are two types of updates we perform: (1) limited updates for the purpose of supporting a specific SDP or ASP analysis and (2) more complex updates to reflect significant model changes.

The first type of update usually takes a few hours or days and is done upon request from an SRA or other agency pra analyst - we place an extremely high priority on getting these updates done since they are typically required to support an sdp or inspection issue. The SRAs are quite familiar with the process for getting this support from the folks at INL (they simply contact the SPAR/SAPHIRE help desk with their request). It would also be good if the SRAs could let my project manager know about the request so we can make sure it gets the appropriate priority (Pete Appignani is the contracting rep for the help desk). In these cases, inl works directly with the sra to provide what ever support is needed - and often there are several iterations as more information is obtained during the sdp process.

The second type of update takes substantially more time and requires more documentation from the licensee and/or sra. As such, we are limited (by both contract funding and available contract support) to performing about 8-12 more complex spar updates per year. The wolf creek update you mentioned would fall into this category. We periodically pulse nrr and the sras to identify models that require more comprehensive updating. The list of potential updates is prioritized with our nrr counterparts and inl works through the updates as able during the year. I have to stress that we have neither the capability nor resources to monitor licensee PRA updates and plant changes - so the SRAs are an integral part of the spar quality process and if they do not inform me or my staff about the need for an update, we have no way of knowing about the issue or ensuring it gets appropriate priority. It should also be recognized that the more complex updates take time - and we do not update a spar model simply because the licensees makes the change. We review the potential change, the supporting documentation, and verify the consistency of the change with our overall spar model philosophy (there are some things that licensee's credit in their pras that we do not credit in the spar models - notably certain types of recovery actions or manual actions). If the change is technically well supported, we make the model change and then update the SPAR model documentation and Plant Risk Insights eBook (PRIB). We also compare the spar model results to the best available licensee pra information we have (which can be out of date if a licensee does not voluntarily provide updated information) and make sure we understand (and document) the cause of any differences. In the end, the physical changes to the model represents a small percentage of the time spent on the update. Any questions on this process should be sent to Michelle Gonzalez of my staff who runs the spar update contract with inl.

We also maintain an electronic model issue reporting system that we have asked SRAs to use to report model issues - this is the best way to let us know when models need updates. And at a minimum, the SRAs should keep my project managers in the loop when they have issues - and both Michelle and Pete have been in their position for many years now so should be well known to the SRAs. And the SRAs can also contact me if they are experiencing any problems.

And while I'm on the issue of spar updates, there is a persistent myth that we only update approx 10 models per year - this is not correct. We update any model as needed to support the asp, sdp, md 8.3, or generic issue program - and just about every pra (the licensee's included) needs some modifications to represent a real operational event. The sra's are generally able to make simple modeling changes, but if they don't have the time, or if the change is more involved, the inl or the res staff can assist them. Last year we ended up updating over 40 of the 79 operating reactor spar models in some way. And if the wolf creek update become a critical issue for an sdp assessment, we would put it on the fast track to be updated sufficiently to support the SRAs analysis.

I will follow up on the wolf creek update and get you a specific status update. We are also planning on holding a public spar workshop later in the summer to discuss a number of spar technical issues that routinely arise (data, common cause failure. Human reliability assessment, spar quality and updating) - the sras are encouraged to participate in this meeting and it will provide another opportunity to inform the industry about the updating process.
Please let me know if you need more information or have other questions -

Kevin

Sent from an NRC Blackberry
Kevin Coyne
(b)(6)

From: Weerakkody, Sunil
Sent: Wednesday, February 18, 2015 06:44 AM
To: Coyne, Kevin
Cc: Howe, Allen; Glitter, Joseph; Lee, Samson; Pruett, Troy; Nakoski, John; Wong, See-Meng
Subject: Questions on the SPAR model program

Kevin,

Please see questions from Allen Howe below. Please send him replies with copies to all those in CC. Thanks!

Sunil D. Weerakkody
Chief, PRA Operations and Human Factors
Division of Risk Assessments
Office of Nuclear Reactor Regulations

Mail Stop: O-10 C-15
Phone: 301-415-2870
Black Berry: (b)(6)

From: Howe, Allen
Sent: Tuesday, February 17, 2015 5:32 PM
To: Weerakkody, Sunil; Nakoski, John
Cc: Pruett, Troy
Subject: Question on the SPAR model program

Sunil/John – I am at the Region IV end of cycle meeting and there was a discussion about the need to update the SPAR model at Wolf Creek, specifically the addition of a new station blackout diesel generator. The discussion indicated that the RIV SRA had requested INEL to review the differences between the licensee's model and the NRC's SPAR model and update the SPAR model as appropriate.

What is the process for requesting a review/update to a SPAR model, how are requests prioritized, and who owns the INEL contract for SPAR models?

Thanks – Allen

Lee, Samson

From:	Giitter, Joseph
Sent:	Thursday, February 19, 2015 9:00 AM
To:	Weerakkody, Sunil; Morris, Scott; Howe, Allen; Lee, Samson
Cc:	Sanfilippo, Nathan
Subject:	RE: About the letter that is being draft on SPAR Models and industry access to those models and their ability bring any potential concerns on the models to NRC

While I don't oppose the idea of the SRAs working together for a common approach I believe that we should establish some uniform expectations now.

From: Weerakkody, Sunil
Sent: Thursday, February 19, 2015 7:56 AM
To: Morris, Scott; Giitter, Joseph; Howe, Allen; Lee, Samson
Cc: Sanfilippo, Nathan
Subject: About the letter that is being draft on SPAR Models and industry access to those models and their ability bring any potential concerns on the models to NRC

Scott,

With respect to Item (a), I suggest that we wait until you receive the draft letter from RES. We'll be more than happy to support a bi-weekly call item on that topic.

With respect to Item (b), the NEI speaker (Jim S) did not elaborate details during the call. I have, however, heard this concern from licensees more than once when I travelled to meetings (PWROG Risk Committee, PRA Counterpart). Succinctly, the issue is as follows:

Once the licensee and the regional SRA perform the risk analyses on a finding independently, they begin comparing the results of their analyses to identify differences in their results. The licensees would like to receive as much information as early as possible (e.g., dominant accident scenarios, key assumptions, etc..) However, the nature of the information that a regional SRA is willing to share with the licensee during these early discussions can be region specific. For example, whereas one region may share the dominant accident scenarios, assumptions. Etc..etcc with the licensee in preliminary discussions, another region may not.

The following are my views on the subject: I am not aware of any situations where this regional difference in information sharing resulted in any of the regions been able to understand the differences between regions' and licensees' prior to making the regulatory decisions on color. Eventually, prior to SERPs, all key assumptions, dominant accident scenarios etc.. are shared. The difference in the amount of risk analyses information shared between regions in early discussion simply creates a frustration at a utility who would want to receive as much information as early as possible. In my view, if the HQ division level management tries to impose a consistency among the regional SRAs at this level of detail, it could create undue tensions among SRAs and their managers. My suggestion would be to seek a bottom-up solution. At the next monthly call among the regional SRAs, I will ask the SRAs in the four regions to work together and agree on a process.

If you agree with my suggestion, I will make this a topic in the next monthly call with the SRAs and ask that they propose a solution. After that, we should bring it to regional division management attention as a FYI.

Sunil D. Weerakkody
Chief, PRA Operations and Human Factors
Division of Risk Assessments
Office of Nuclear Reactor Regulations

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From: Weerakkody, Sunil
Sent: Wednesday, February 11, 2015 9:38 AM
To: Giitter, Joseph; Morris, Scott; Howe, Allen; Lee, Samson
Cc: Vaughn, Stephen; Sanfilippo, Nathan; Wong, See-Meng
Subject: FYI.....A letter that is being draft on SPAR Models and industry access to those models and their ability bring any potential concerns on the models to NRC

Joe\Scott,

At the last Reactor Oversight Process monthly meeting (1/15/15), NEI representative (Jim S) raised concerns regarding (a) inconsistencies between the agency's Standardized Plant Analysis Risk (SPAR) models and licensee Probabilistic Risk Assessments (PRAs), and (b) how the regional differences in communications between SRAs and licensees during SDP dispositioning are affecting licensees' ability to address those inconsistencies when SDPs occur.

After the ROP meeting we (See-Meng, Steve Vaughn. myself) met with RES (Kevin Coyne, John Nakoski, and their staff) to discuss this issue with the intent of effectively addressing it. One idea (which we fully endorsed) was sending a brief letter to each utility explaining the processes available to them to engage us.

RES has drafted that letter and sent it to See-Meng and Steve Vaughn for their review. Most likely we will need DORL's assistance to transmit this letter to the licensees after the two of you concur.

RES is also scheduling a public meeting on SPAR. So far PWROG has expressed significant interest on that public meeting.

I think these two activities will effectively address Item (a) above. We have not had an opportunity to discuss Item (b) among us yet.

(Scott\Allen\Nathan: Steve has details).

Sunil D. Weerakkody

Chief, PRA Operations and Human Factors
Division of Risk Assessments
Office of Nuclear Reactor Regulations

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From:	Montecalvo, Michael
To:	Weerakkody, Sunil; Gilter, Joseph; Humberstone, Matthew
Subject:	RISC presentation - Licensee PRA Use
Date:	Friday, February 05, 2016 1:47:47 PM
Attachments:	Licensee PRA Use RISC 02092016.pptx

Gentlemen,
This is my proposed presentation for the public RISC on Tuesday. Please let me know if you have any comments.
Mike

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Use of Licensee PRA Models in Regulatory Applications

Michael Montecalvo
PRA Operations & Human Factors Branch
Division of Risk Assessment

Office of Nuclear Reactor Regulation

February 9th, 2016

Why?

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Cost to maintain and update SPAR models
  - Project AIM, increased budget pressure
- Perceived inefficiency in the maintenance of two models (SPAR and licensee)

- 2007 was the last detailed look at this issue

Discussion

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- NRC staff uses licensee model vice SPAR:
  - **The NRC will obtain commercial software licenses for PRA codes (e.g., CAFTA, RISKMAN, FRANX, FTREX, etc.) and conduct staff training**
  - **NRC maintains a copy of licensee model with periodic updates**
  - **Will not require NRC to expend resources to update SPAR models**
  - **Regulatory independence is maintained along with ability to run generic assessments, etc.**
  - **Question as to whether all licensees will give access to their models**
  - **Many other issues (allowed uses of models, FOIA, legal, etc.)**

What's Next

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Form NRC project team
- Develop project plan for RISC approval
- Plan will contain a pilot to objectively evaluate:
  - Licensee and NRC issues with shifting to this approach
  - True cost of the approach including software, training, possible staff increases, changes to regulatory structure, etc.
  - Any unforeseen issues that are encountered

Herbert, Tiana

From:	Dean, Bill
Sent:	Friday, February 05, 2016 12:26 PM
To:	NRR Distribution
Cc:	Johnson, Michael
Subject:	Summary of This Week's NRR Senior Managers' Strategy Meeting
Attachments:	FOCUS AREAS FOR OPERATING REACTOR BUSINESS LINE 2016.docx

Dear NRR colleagues –

We hope that you all fared well in the "Blizzard of 2016" or "Storm Jonas" or "#Snowzilla," or whatever name you would like to use. We know that the extreme weather didn't make anyone's lives easier, so we would like to thank those who followed the agency's telework policy for days when the office was closed by leveraging Citrix, webmail, teleconferencing, and other tools that enable us to work at home and keep the business of the NRC and government going. Take heart that spring is just around the corner (as you know, Punxsutawney Phil did not see his shadow on Tuesday), so hang in there!

We wanted to take a moment to fill you in on an ET/LT Strategy Meeting that was held on February 2. It was a very successful meeting, and the senior management team had quite a bit to discuss given the variety of current and upcoming changes that the agency and office are undergoing as a result of an evolving workload, Project Aim rebaselining considerations, and internal efficiency and effectiveness initiatives. OCHCO representatives attended the meeting and we discussed parameters surrounding the possibility for a potential additional round of early-out/buy-outs, if approval is received from OPM and OMB. We realize that might interest quite a few of you, so please be on the look-out for more information in the future. We also discussed tracking the implementation of efficiency activities (commonly referred to as "C" list items) as part of Project Aim's common prioritization and rebaselining for the operating reactor business line; our plans for reshaping the organization as JLD- and DLR-related work decline over the next several years; how we might incorporate and expand Centers of Expertise (COEs) into the way we do business; and staffing and succession planning considerations in light of Project Aim and other drivers. Additionally, we updated our list of key focus areas for NRR in FY16 (attached) and discussed impacts from decreases in the availability of agency-provided mobile devices for management.

Given that there are quite a few organizational changes on the horizon for NRR and the agency, we want you to feel like you have multiple avenues by which you can ask questions or provide related feedback, in addition to our normal communication channels. So, we will be conducting informal sessions where staff can chat with us and bring questions and feedback to the ET – more to come on this initiative. Additionally, we again encourage you to check out the Organizational Effectiveness Hub (OEH) where you can find a lot of information about NRR's initiatives and Project Aim-related activities.

Enjoy the Super Bowl this weekend and may your favorite team win and may the commercials be entertaining.

BILL, MICHELE and JOHN

FOCUS AREAS FOR OPERATING REACTOR BUSINESS LINE 2016

Non Responsive

Non Responsive

- Establish Pilot to evaluate PRA use vice SPAR (DRA)

Non Responsive

Non Responsive

Non Responsive

Richards, Karen

From: Correia, Richard
Sent: Friday, February 05, 2016 7:02 AM
To: Monninger, John; Giitter, Joseph
Subject: RE: use of licensee's PRAs pilot

Thanks Gents.

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Monninger, John
Sent: Friday, February 05, 2016 6:52 AM
To: Giitter, Joseph <Joseph.Giitter@nrc.gov>; Correia, Richard <Richard.Correia@nrc.gov>
Subject: Re: use of licensee's PRAs pilot

Yes, I agree. Given the many diverse views of the staff, it will be important for us to get together and align to keep the assessment moving forward.

John Monninger
(b)(6)

From: Giitter, Joseph
Sent: Thursday, February 04, 2016 12:57 PM
To: Correia, Richard
Cc: Monninger, John
Subject: RE: use of licensee's PRAs pilot

I support.

From: Correia, Richard
Sent: Thursday, February 04, 2016 12:53 PM
To: Giitter, Joseph <Joseph.Giitter@nrc.gov>; Monninger, John <John.Monninger@nrc.gov>
Subject: use of licensee's PRAs pilot

Joe, John,

As you could tell from the discussions at today's RISC meeting, there are lots of opinions, views, suggestions, cautions, questions etc. on whether it's feasible to use licensee's PRAs in lieu of SPAR models. My recommendation is that if both RISCs agree to pursue a pilot (I hope they do) we need to

serve as a steering committee and approach the pilot in an objective manner. Not to stifle good thinking and ideas, but guide the working group(s) let the process sort out the pros and cons.

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Montecalvo, Michael
To: [illegible]
Cc: [illegible]
Subject: RE: Internal RISC Meeting
Date: Thursday, February 04, 2016 7:32:00 AM
Attachments: [illegible]

Joel.

The handout from the last meeting is attached. I made up a short presentation with most of the information from that handout, but haven't had Joe look at it yet. I will pass that out at the meeting

Mike

From: Munday, Joel
Sent: Thursday, February 04, 2016 6:43 AM
To: Montecalvo, Michael <Michael.Montecalvo@nrc.gov>
Subject: RE: Internal RISC Meeting

Is there a handout for this meeting that I should have?

-----Original Appointment-----
From: Montecalvo, Michael
Sent: Thursday, January 28, 2016 10:25 AM
To: Montecalvo, Michael; Dean, Bill; West, Steven; Holahan, Gary; Munday, Joel; McDermott, Brian; Dorman, Dan; Spore, Candace; Circle, Jeff; Drouin, Mary; Fong, CJ; Appignani, Peter
Cc: Lubinski, John; Evans, Michele; Correia, Richard; Monninger, John; Lombard, Mark; Lorson, Raymond; Lew, David; Gitter, Joseph; Weerakkody, Sunil; Rosenberg, Stacey; Nakoski, John; R1ORACAL RESOURCE; R1SESCAL RESOURCE; Ning, Lauren (Killian); Felts, Russell; Humberstone, Matthew; Jackson, Christopher
Subject: Internal RISC Meeting
When: Thursday, February 04, 2016 11:00 AM-12:00 PM (UTC-05:00) Eastern Time (US & Canada).
Where: NRR-OWFN 13D20-15p

Added call-in information below.

Dial in number: 888-635-7934

Passcode: (b)(6)

Agenda:

1. Discussion on the use of licensee PRA models in regulatory processes

2. Non Responsive

3.

Option 1 – Status Quo – Continue to update 8-12 SPAR models per year and develop new All Hazard (including fire and seismic hazards) SPAR models.

Discussion:

- Provide a means to maintain an independent assessment tool from that of the licensees.
- Provides an enhanced public confidence in that the regulator will arrive at a conclusion based on a diverse path from that of the licensee.
- Enables staff to assess risk-significance of various plants on a common basis.
- Enables NRR staff to support management efforts to risk-inform regulatory decisions on generic or plant specific basis.
- Requires staff to expend resources to update and/or develop models.

Option 2 – Results will be provided to NRC staff in order to make regulatory decisions.

Discussion:

- Will not require staff to expend additional resources to update the models.
- Allowing licensees to use RG 1.200 compliant models for SDPs may motivate them to invest resources to advance the quality of their models.
- A "certified" PRA (consistent with RMRF Option 2) would allow the licensees PRA to be the PRA of record for all regulatory actions—including SDP.
- May inhibit staff's ability provide timely, independent inputs to time-critical NRC decisions in support of NOEDs and MD 8.3s.
- May inhibit NRR's ability to effectively deal with future challenges "Aggregation" and "Integrated Risk-informed Decision Making," related challenges since staff's ability to enhance external events risk assessments will be affected.
- Inhibits staff's ability to evaluate generic issues affecting the nuclear fleet.
- Inhibits staff's ability to provide input to regulatory basis documents for potential rulemaking efforts.
- May negatively affect public perception of the independence of our regulatory processes.

Option 3 – NRC staff will be given access and training to run licensees' PRA models in support of various regulatory actions.

3a – Licensees are required to give us their model of record at some established point in the regulatory process. NRC staff would then run the analysis using the licensee PRA model instead of using the SPAR model.

3b – NRC maintains a model of record for each plant with the requirement that if the licensee updates their model they have to send us the new model within a certain time frame.

Discussion:

- Will not require staff to expend additional resources to update SPAR models.
- The most up to date model will always be used.

- May motivate licensees to develop and maintain PRA models that comply with RG 1.200.
- Although NRC is using the licensee model, the independence is maintained.
- The ability to assess generic and other fleet-wide issues will be maintained if NRC maintains a model of record.
- Will require significant resources to train multiple NRC staff members (both in NRR, NRO, and the Regions) on running licensees' models.
- Each PRA model contains important switches\House Events that requires familiarity on the part of the analyst (i.e., there can be significant training burden).
- NRC will need to maintain commercial software licenses for multiple PRA codes (e.g., CAFTA, RISKMAN, FRANX, FTREX, etc.)
- It is not likely that all licensees will grant NRC staff access to their PRA models.
- Will need to establish infrastructure similar to the SPAR models to maintain a "model of record" for each plant that would be accessible to risk analysts.

Next Steps:

- Form a project team with individuals from NRR, RES and NRO.
- Provide a plan to pilot the use of licensee PRA models and criteria to objectively evaluate the pilot.
- Evaluate the true cost of maintaining SPAR models. This is to include an evaluation of lifetime costs, needed impending upgrades (i.e. seismic), etc.
- Evaluate true cost of using licensee PRA models. This would include software required, training to current practitioners, possible staffing increases and changes to regulatory structure, etc.

From:	Humberstone, Matthew
To:	Montecalvo, Michael
Cc:	Weerakkody, Sunil
Subject:	Draft Discussion Points for tomorrows RISC
Date:	Wednesday, February 03, 2016 1:46:29 PM
Attachments:	Discussion Points internal RISC .docx

Hi Mike,

Attached are the draft discussion points I put together for tomorrow's RISC. Feel free to change it however you see fit, and we might consider sending it to RES for their knowledge.

Matt

Matthew Humberstone, PhD
Reliability and Risk Analyst
PRA Operations and Human Factors Branch
Division of Risk Assessment
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission

1. **Provide a rationale for why we want to look at it**
    a. Perceived inefficiency in the maintenance of two models
    b. Agreement among stakeholders that the base models match and the issues encountered are with modeling of specific factors (e.g. HRA, Common Cause, etc.)
    c. Cost to maintain and update SPAR models

2. **What has changed in the past decade when there was an effort to look at this issue**
    a. 2007 review only looked at SDP
    b. Almost all licensees have at least a peer reviewed internal events model
    c. Overall, development and use of the models has increased significantly

3. **Lay out at a high level what are considered to be the pros and cons**

    PROS:
    a. Will not require staff to expend additional resources to update SPAR models.
    b. The most up to date model will always be used.
    c. May motivate licensees to develop and maintain PRA models that comply with RG 1.200.
    d. A "certified" PRA would allow the licensees PRA to be the PRA of record for all regulatory actions.

    CONS:
    a. Will require significant resources to train multiple NRC staff members (both in NRR, NRO, and the Regions) on running licensees' models.
        - Each PRA model contains important switches/House Events that require familiarity on the part of the analyst (i.e., there can be significant training burden)
    b. The NRC will need to maintain commercial software licenses for multiple PRA codes (e.g., CAFTA, RISKMAN, FRANX, FTREX, etc.)
    c. It is not likely that all licensees will grant NRC staff access to their PRA models.
        - Backfit Consideration/Cost to Licensees
    d. Will need to establish infrastructure similar to the SPAR models to maintain a "model of record" for each plant that would be accessible to risk analysts.
    e. Could have negative impact on current regulatory activities (e.g., SDP timeliness, Regulatory Analysis, NOEDs, etc.)
    f. Would likely cost more resources

4. **Discuss desire to do a pilot as a way to determine what it would take to address the cons**

5. **Get SC agreement to pursue a pilot**
    a. Need to get an appropriate plant for pilot (not Vogtle)

From: Montecalvo, Michael
To: Giitter, Joseph
Cc: Weerakkody, Sunil
Subject: RE: Fwd: RES SPAR Model Project
Date: Tuesday, February 02, 2016 5:40:00 PM

Joe,
The email says this is a "continuing project that seeks to strengthen the technical basis of SPAR success criteria and sequence timing", so it looks like they are using SPAR models not the licensee PRA models.

One interesting thing to note is they are looking at "Crediting of FLEX for ELAP, as well as non-ELAP, PRA sequences", our other favorite project.
Mike

From: Giitter, Joseph
Sent: Tuesday, February 02, 2016 1:57 PM
To: TSCHILTZ, Michael <mdt@nei.org>
Cc: Montecalvo, Michael <Michael.Montecalvo@nrc.gov>; Weerakkody, Sunil <Sunil.Weerakkody@nrc.gov>
Subject: RE: Fwd: RES SPAR Model Project

Mike- As you know Bill dean wants to pilot the use of licensee PRA models in lieu of the SPAR models. However, I'm not sure why the DORL PM sent this out on the behalf of RES, especially since NRR is heading up the effort. Thanks for the heads up.

From: TSCHILTZ, Michael [mailto:mdt@nei.org]
Sent: Tuesday, February 02, 2016 8:11 AM
To: Giitter, Joseph <Joseph.Giitter@nrc.gov>
Subject: [External_Sender] Fwd: RES SPAR Model Project

Joe is this something that NRR has requested RES do?

Mike.

From: Chawla, Mahesh [mailto:Mahesh.Chawla@nrc.gov]
Sent: Monday, February 01, 2016 5:06 PM
To: Cross, William
Cc: Swenzinski, Laura; Davis, J.Michael; Helton, Donald; Circle, Jeff; Kozak, Laura; Wrona, David; Wong, See-Meng
Subject: RES SPAR Model Project

Bill,

The NRC research department (RES) is soliciting NextEra Duane Arnold's interest in voluntarily participating in a confirmatory success criteria project with NRC/RES. They have previously done similar work for Peach Bottom, Surry, and Byron. The initial step will be to have a teleconference between NextEra and other folks from RES, NRR and the Region. Specifically, we would want someone representing NextEra's Regulatory Affairs and Risk Management groups to participate (though others are welcome). Following is the pertinent information provided by RES which I am sharing with you. Please let me know NextEra Duane Arnold's interest in moving further with this project, so I can set up the teleconference to discuss it further. Thanks

RES SPAR Model Project

NRC Research would like to use Duane Arnold as the next plant to be studied in a continuing project that seeks to strengthen the technical basis of SPAR success criteria and sequence timing.

- Previous rounds of work have been completed for Surry (NUREG-1953), Peach Bottom (NUREG-1953), Byron (to-be-published NUREG-2187), and generic modeling assumptions (NUREG/CR-7177).
- The target duration of the project is 2 years, with the first year focused on plant model and calculation matrix development, and the second year focused on analysis and documentation.
- The topical areas to be investigated in this work are:
  - Crediting of FLEX for ELAP, as well as non-ELAP, PRA sequences;
  - ECCS injection credit following containment venting or failure;
  - Requirements for achieving a safe and stable end-state;
  - ADS (and CRD) relief valve success criteria for non-ATWS.
- NRC would be seeking the following support from DAEC (aspects that are less critical are identified as such);
  - An established point of contact in Regulatory Affairs, as well as in either Engineering or Risk Management (or the equivalent);
  - Site access for 1.5 days in summer 2016 for 1 NRC RES staff member and 1 contractor, for discussions and limited walkdowns. Escorting could be by DAEC staff, an NRC SRA, or the NRC residents;
  - Current operating procedures including EOPs/SAGs, AOPs, and FSGs;
  - PRA system notebooks (including HRA and success criteria notebooks);
  - Periodic written or teleconference exchanges on plant operations/design questions;

- Training documents and/or aids for major systems (desired, but not critical);
- MAAP parameter file and supporting documentation (desired, but not critical);
- MAAP analyses for baseline PRA success criteria and sequence timing (desired, but not critical);
- Review of the NRC's MELCOR computer model (if desired by DAEC);
- Factual review of the resulting NUREG report (if desired by DAEC).

- Information sharing protocols have been used in the past, and these can be updated to reflect conditions suitable to both NRC and DAEC. Examples of past protocols are:
  - Any DAEC sensitive/proprietary information transmitted to NRC will be treated as "information purposes only." and treated by both parties as non-public. It will not be docketed, and NRC will not directly reference the information in public documents. It WILL be subject to Freedom of Information Act requests.
  - Any NRC sensitive/proprietary information transmitted to DAEC (e.g., the MELCOR model for peer review) will be transmitted under a non-disclosure agreement to the specific individuals requiring the information.
  - Written communications between NRC Research and DAEC staff (or its contractors) will be cc'd to the cognizant NRC SRA and plant PM, and to DAEC Reg Affairs.
  - The final NUREG will be provided to DAEC for a factual review prior to publication.
  - Teleconferences can occur during the project to discuss NRC's ongoing work (assumptions, preliminary results). Such calls would be noticed and open public meetings, but could include a closed portion if needed to discuss proprietary information.

Manesh Chawla
Project Manager
Phone: 301 415-8371
Fax: 301 415-1222

Take The NEI Future of Energy Quiz, www.NEI.org/futureofenergy

FOLLOW US ON

Sent through:

Lubinski, John

From: Giitter, Joseph
Sent: Tuesday, February 02, 2016 2:40 PM
To: West, Steven; Correia, Richard
Cc: Lubinski, John
Subject: FW: Fwd: RES SPAR Model Project

Follow Up Flag: Follow up
Flag Status: Flagged

Categories: SPAR FOIA

Guys- I'm getting REALLY frustrated by the lack of coordination on this effort. My guys were unaware that this request had been made. Suggest that we meet soon to ensure that we're aligned on roles and responsibilities. I shouldn't be finding out about this from NEI. I'll set something up on this end.

From: TSCHILTZ, Michael [mailto:mdt@nei.org]
Sent: Tuesday, February 02, 2016 8:11 AM
To: Giitter, Joseph
Subject: [External_Sender] Fwd: RES SPAR Model Project

Joe is this something that NRR has requested RES do?

Mike.

From: Chawla, Mahesh [mailto:Mahesh.Chawla@nrc.gov]
Sent: Monday, February 01, 2016 5:06 PM
To: Cross, William
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- Periodic written or teleconference exchanges on plant operations/design questions;
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Mahesh Chawla

Project Manager

Phone: 301-415-8371

Fax: 301-415-1222

mahesh.chawla@nrc.gov

Lubinski, John

From: Lubinski, John
Sent: Monday, February 01, 2016 5:12 PM
To: Roberts (Bettis), Ashley
Subject: FW: Final Steering Committee Re-baselining recommendations
Attachments: Steering Committee revised C list.xlsx

Categories: SPAR FOIA

Line number 225

From: Suri, Renu
Sent: Thursday, January 14, 2016 4:17 PM
To: Brown, Frederick ; Dean, Bill ; Uhle, Jennifer ; Moore, Scott ; Holian, Brian ; Carpenter, Cynthia ; Ash, Darren ; Vietti-Cook, Annette ; Dorman, Dan ; Wert, Leonard ; Dudes, Laura ; Dapas, Marc ; Pederson, Cynthia ; Fowler, Kevin ; Hackett, Edwin ; Hawkens, Roy ; Flanagan, James ; Stewart, Sharon ; Hudson, Jody ; Holahan, Patricia ; Ordaz, Vonna ; Lew, David ; Roberts, Darrell ; Kennedy, Kriss ; Evans, Michele ; Lubinski, John ; Lombard, Mark ; McDermott, Brian ; Holahan, Gary ; Doane, Margaret ; West, Steven ; Brenner, Eliot ; Dacus, Eugene ; Colgary, James
Cc: Weber, Michael ; Cohen, Miriam ; Johnson, Michael ; McCree, Victor ; Tracy, Glenn ; Jones, Bradley ; Wylie, Maureen ; Muessle, Mary ; Lemoncelli, Mauri ; Gavrilas, Mirela ; Monninger, John ; Roberts (Bettis), Ashley ; ODriscoll, James ; Silva, Patricia ; Bellosi, Susan ; Shay, Jason ; Rheaume, Cynthia ; OBrien, Kenneth
Subject: Final Steering Committee Re-baselining recommendations

On Fred's behalf, I am sending you the C list with Steering Committee recommendations.

http://fusion.nrc.gov/edo/team/projectaim/Project%20team%20workspace/Prioritization%20and%20Rebaselining/Steering%20Committee%20Information/Steering%20Committee%20revised%20C%20list.xlsx

There are a couple of areas that we are waiting to finalize the resources. They are shaded in the worksheet.

Item Number	Business Line	Product Line	Products	Loc	What	Impact (So What?)	Sub-product $K	Sub-product FTE
Non Responsive								
346	BL-11 Operating Reactors	PL-6 Research	P-213 Reactors Research	RES	Reduce the rate of updating the Standardized Plant Analysis Risk (SPAR) models	Minimal effect. Shedding this item will slow down the rate of updates to SPAR models that reflect plant changes from approximately 12 models per year to 6 models per year. This will also slow the pace of developing new capabilities for fire, seismic, and other external hazard SPAR models. Shed of this item would reduce the resources for SPAR model update activities by approximately 30%.	$300	0.0
Non Responsive								

Richards, Karen

From: Dean, Bill
Sent: Monday, February 01, 2016 10:08 AM
To: Giitter, Joseph
Subject: RE: Use of Licensees' Models Presentation At The Internal RISC Meeting

Ok thanks

BILL

From: Giitter, Joseph
Sent: Monday, February 01, 2016 9:29 AM
To: Dean, Bill <Bill.Dean@nrc.gov>
Subject: RE: Use of Licensees' Models Presentation At The Internal RISC Meeting

Thanks Bill. I spoke with Steve West on Friday and I think we're aligned.

From: Dean, Bill
Sent: Friday, January 29, 2016 3:47 PM
To: Giitter, Joseph <Joseph.Giitter@nrc.gov>
Subject: RE: Use of Licensees' Models Presentation At The Internal RISC Meeting

Fyi
My expectation for our discussion at RISC on this topic is that we are able to:

1. Provide a rationale for why we want to look at it;
2. What has changed in the past decade when there was an effort to look at this issue
3. Lay out at a high level what are considered to be the pros and cons;
4. Discuss desire to do a pilot as a way to determine what it would take to address the cons
5. Get SC ok to pursue a pilot

BILL

From: Giitter, Joseph
Sent: Friday, January 29, 2016 12:11 PM
To: Circle, Jeff <Jeff.Circle@nrc.gov>; Montecalvo, Michael <Michael.Montecalvo@nrc.gov>; Humberstone, Matthew <Matthew.Humberstone@nrc.gov>
Cc: Correia, Richard <Richard.Correia@nrc.gov>; Lund, Louise <Louise.Lund@nrc.gov>; Weerakkody, Sunil <Sunil.Weerakkody@nrc.gov>; Appignani, Peter <Peter.Appignani@nrc.gov>; Ning, Lauren (Killian) <LaurenKillian.Ning@nrc.gov>; Coyne, Kevin <Kevin.Coyne@nrc.gov>; West, Steven <Steven.West@nrc.gov>; Dean, Bill <Bill.Dean@nrc.gov>
Subject: RE: Use of Licensees' Models Presentation At The Internal RISC Meeting

Jeff- I can talk to Steve, but I would prefer to focus on the problem at a high level first. I think what Mike laid out was a good start. We can save the more detailed presentation for the next RISC meeting when we've had a chance to fully coordinate our thoughts.

From: Circle, Jeff
Sent: Friday, January 29, 2016 11:07 AM

To: Montecalvo, Michael <Michael.Montecalvo@nrc.gov>; Humberstone, Matthew <Matthew.Humberstone@nrc.gov>
Cc: Correia, Richard <Richard.Correia@nrc.gov>; Lund, Louise <Louise.Lund@nrc.gov>; Giitter, Joseph <Joseph.Giitter@nrc.gov>; Weerakkody, Sunil <Sunil.Weerakkody@nrc.gov>; Appignani, Peter <Peter.Appignani@nrc.gov>; Ning, Lauren (Killian) <LaurenKillian.Ning@nrc.gov>; Coyne, Kevin <Kevin.Coyne@nrc.gov>
Subject: Use of Licensees' Models Presentation At The Internal RISC Meeting

Mike and Matt,

Today, Pete Appignani briefed the RES office management on issues regarding leveraging the use of licensees' models in lieu of SPAR. The package he used contained some of the financial material I showed you and Sunil on Wednesday. It is not intended to be an opinion piece but, one where we discuss the various issues that need to be addressed going forward. One request that came afterward from Steve West was that RES should team up with you to make a joint NRR-RES presentation at the next internal RISC meeting on Thursday, 2/4/16. I imagine that on Thursday, we will have an opportunity to discuss how we will handle presenting to the public meeting on 2/9/16.

I would appreciate it if you can get together with Pete to work out the logistics of the presentation. I realize that it's in its infancy but, can you send us any pilot program material that you can share?

Thanks,
Jeff.

Jeff A. Circle
Chief (acting)
Probabilistic Risk Assessment Branch
RES /Division of Risk Analysis
(301) 415-1152
BB (b)(6)

From: Giitter, Joseph
To: Montecalvo, Michael
Cc: Weerakkody, Sunil
Subject: FW: Use of Licensees" Models Presentation At The Internal RISC Meeting
Date: Monday, February 01, 2016 9:28:42 AM

Let's discuss.

From: Dean, Bill
Sent: Friday, January 29, 2016 3:47 PM
To: Giitter, Joseph <Joseph.Giitter@nrc.gov>
Subject: RE: Use of Licensees' Models Presentation At The Internal RISC Meeting

Fyi
My expectation for our discussion at RISC on this topic is that we are able to:

1. Provide a rationale for why we want to look at it;
2. What has changed in the past decade when there was an effort to look at this issue
3. Lay out at a high level what are considered to be the pros and cons;
4. Discuss desire to do a pilot as a way to determine what it would take to address the cons
5. Get SC ok to pursue a pilot

BILL

From: Giitter, Joseph
Sent: Friday, January 29, 2016 12:11 PM
To: Circle, Jeff <Jeff.Circle@nrc.gov>; Montecalvo, Michael <Michael.Montecalvo@nrc.gov>; Humberstone, Matthew <Matthew.Humberstone@nrc.gov>
Cc: Correia, Richard <Richard.Correia@nrc.gov>; Lund, Louise <Louise.Lund@nrc.gov>; Weerakkody, Sunil <Sunil.Weerakkody@nrc.gov>; Appignani, Peter <Peter.Appignani@nrc.gov>; Ning, Lauren (Killian) <LaurenKillian.Ning@nrc.gov>; Coyne, Kevin <Kevin.Coyne@nrc.gov>; West, Steven <Steven.West@nrc.gov>; Dean, Bill <Bill.Dean@nrc.gov>
Subject: RE: Use of Licensees' Models Presentation At The Internal RISC Meeting

Jeff- I can talk to Steve, but I would prefer to focus on the problem at a high level first. I think what Mike laid out was a good start. We can save the more detailed presentation for the next RISC meeting when we've had a chance to fully coordinate our thoughts.

From: Circle, Jeff
Sent: Friday, January 29, 2016 11:07 AM
To: Montecalvo, Michael <Michael.Montecalvo@nrc.gov>; Humberstone, Matthew <Matthew.Humberstone@nrc.gov>
Cc: Correia, Richard <Richard.Correia@nrc.gov>; Lund, Louise <Louise.Lund@nrc.gov>; Giitter, Joseph <Joseph.Giitter@nrc.gov>; Weerakkody, Sunil <Sunil.Weerakkody@nrc.gov>; Appignani, Peter <Peter.Appignani@nrc.gov>; Ning, Lauren (Killian) <LaurenKillian.Ning@nrc.gov>; Coyne, Kevin <Kevin.Coyne@nrc.gov>
Subject: Use of Licensees' Models Presentation At The Internal RISC Meeting

Mike and Matt,

Today, Pete Appignani briefed the RES office management on issues regarding leveraging the use of licensees' models in lieu of SPAR. The package he used contained some of the financial material I showed you and Sunil on Wednesday. It is not intended to be an opinion piece but, one where we discuss the various issues that need to be addressed going forward. One request that came afterward from Steve West was that RES should team up with you to make a joint NRR-RES presentation at the next internal RISC meeting on Thursday, 2/4/16. I imagine that on Thursday, we will have an opportunity to discuss how we will handle presenting to the public meeting on 2/9/16.

I would appreciate it if you can get together with Pete to work out the logistics of the presentation. I realize that it's in its infancy but, can you send us any pilot program material that you can share?

Thanks,
Jeff.

Jeff A. Circle
Chief (acting)
Probabilistic Risk Assessment Branch
RES /Division of Risk Analysis
(301) 415-1152
BB (b)(6)

From: Circle, Jeff
To: Montecalvo, Michael
Cc: Weerakkody, Sunil
Subject: Options for Leveraging PRA Models
Date: Monday, February 01, 2016 9:11:20 AM

Mike and Sunil,

I took a look at your three options and have a comment regarding Option 1, "Status Quo". Did you consider something that could be a subset of that option which is continue with the status quo but, reduce the number of AHZ models produced and cut back on updates?

Jeff.

Jeff A. Circle
Chief (acting)
Probabilistic Risk Assessment Branch
RES /Division of Risk Analysis
(301) 415-1152
BB (b)(6)

Richards, Karen

From: Lund, Louise
Sent: Sunday, January 31, 2016 6:01 PM
To: Weerakkody, Sunil
Cc: Correia, Richard; Giitter, Joseph; Felts, Russell; Lee, Samson
Subject: RE: sensitive: Please read at your convenience: Summary of my 1-hr discussion with Rich and Louise this morning

Good summary, and good discussion, Sunil.

From: Weerakkody, Sunil
Sent: Friday, January 29, 2016 12:55 PM
To: Giitter, Joseph <Joseph.Giitter@nrc.gov>; Felts, Russell <Russell.Felts@nrc.gov>; Lee, Samson <Samson.Lee@nrc.gov>
Cc: Correia, Richard <Richard.Correia@nrc.gov>; Lund, Louise <Louise.Lund@nrc.gov>
Subject: sensitive: Please read at your convenience: Summary of my 1-hr discussion with Rich and Louise this morning

Joe/Russ/Sam,

I met Rich and Louise from 8 AM – 9 AM today. This Email summarizes the key issues that we discussed. I'll provide details during our next periodic. Rich\Louise: Please correct any miscommunications.

Non Responsive

3. Use of Licensees' Models vs SPAR

We agreed the need to work together. I mentioned that even though a number of us (including self) feel that the status quo is more cost-beneficial than relying on licensee's models, we will be fully supporting the Office Director's decision to perform the pilot.

PS: I and Mike Montecalvo will be meeting next Wednesday with Pete Appignani and Jeff Circle to discuss the cost-benefit analysis that RES has prepared. After my meeting with Rich & Louise, Jeff Circle stopped by. I mentioned that I envision a working group led by NRR (Mike Montecalvo) should lead this activity. The working group should have members from regions, RES, and NRO.

Non Responsive

Non Responsive

Sunil D Weerakkody, Chief
PRA Operations & Human Factors Branch
Office of Nuclear Reactor Regulation
Nuclear Regulatory Commission

Address: Mail Stop O-10 C-15, US NRC, Washington DC 20005-0001

Tel: 301-415-2870

Herbert, Tiana

From:	Dean, Bill
Sent:	Saturday, January 30, 2016 1:28 PM
To:	Gavrilas, Mirela; Roberts (Bettis), Ashley
Cc:	Lubinski, John; Evans, Michele
Subject:	Re: RESPONSE - SHED LIST ITEMS INVOLVING RES THAT REQUIRE COMMISSION ACTION

Nice assumption - let's see if that comes back to bite us in the you know where

Bill Dean
Director
Office of Nuclear Reactor Regulation

On: 29 January 2016 18:58, "Gavrilas, Mirela" <Mirela.Gavrilas@nrc.gov> wrote:
Mauri got back to me. The assumption the OEDO is making is that if the commission approves a cut without requesting additional information, the SRM that approves the cut overrides any earlier taskings.

M.

From: Gavrilas, Mirela
Sent: Friday, January 29, 2016 6:41 PM
To: Dean, Bill <Bill.Dean@nrc.gov>; Roberts (Bettis), Ashley <Ashley.RobertsBettis@nrc.gov>
Cc: Lubinski, John <John.Lubinski@nrc.gov>; Evans, Michele <Michele.Evans@nrc.gov>
Subject: RE: RESPONSE - SHED LIST ITEMS INVOLVING RES THAT REQUIRE COMMISSION ACTION

No problem with the information for the operating reactors business line. We do have a similar assessment for our items, although not as crisp as in the table generated by RES. We were not asked to provide this type of table by the OEDO.

The working group recognized early that many of the items that we would rank as low priority were tasked by the commission. That was part of the reason why the binning table generated by the SMEs had an entry next to every subproduct titled "Driver (e.g., SECY #, Specific Statute, Other)." More recently, the need to iterate with the commission before effecting specific cuts came up in the context of "how long do we need until each cut can be implemented." We specifically had discussions within the working group on whether getting commission approval to implement the C-list implies that the commission has reverted itself on those items that were explicitly tasked in earlier SRMs. We never got a definitive answer, but we were not asked to provide additional information. I'll ping Mauri and Fred to see if they can answer. For the OR BL, the type of information that Mike provided in embedded in the "what" and "so what" columns that are going to the Commission (see for example old 280, 287, and 316).

M.

From: Dean, Bill
Sent: Friday, January 29, 2016 4:04 PM
To: Roberts (Bettis), Ashley <Ashley.RobertsBettis@nrc.gov>; Gavrilas, Mirela <Mirela.Gavrilas@nrc.gov>
Cc: Lubinski, John <John.Lubinski@nrc.gov>; Evans, Michele <Michele.Evans@nrc.gov>
Subject: FW: RESPONSE - SHED LIST ITEMS INVOLVING RES THAT REQUIRE COMMISSION ACTION

Richards, Karen

From: West, Steven
Sent: Friday, January 29, 2016 2:02 PM
To: Giitter, Joseph
Cc: Correia, Richard
Subject: Preps for next week's internal RISC meeting

Joe,

Thanks for the call. I talked with Rich about our conversation. He'll talk to his folks about the approach we agreed to. i.e., a coordination meeting between NRR and RES staff (I suggest at the BC level) before the RISC meeting next week to discuss our respective preliminary thinking/efforts on the SPAR model vs licensee PRA question. Ideally, from this meeting I would appreciate Mike adding a few bullets into his presentation that reflect our preliminary high-level thinking and mentioning to the steering committee that NRR and RES have been talking. Under this approach, we can forgo a detailed RES presentation to the steering committee for the time being. (It is my hope that all future RISC meeting presentations on this subject will be jointly prepared.) As I emphasized to you, at this time my focus is on supporting an objective assessment that, among other things, helps guide our interactions with industry and yields the information we need to make an informed and defensible decision, and not on getting to one answer or another.

Steve

Steven West, Deputy Director
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission

301-415-1914
Steven.West@nrc.gov

From: Giitter, Joseph
Sent: Friday, January 29, 2016 12:52 PM
To: West, Steven <Steven.West@nrc.gov>
Subject: RE: Use of Licensees' Models Presentation At The Internal RISC Meeting

I should be free at 2:30—after our LT meeting. Does that work?

From: West, Steven
Sent: Friday, January 29, 2016 12:45 PM
To: Giitter, Joseph <Joseph.Giitter@nrc.gov>; Correia, Richard <Richard.Correia@nrc.gov>
Subject: RE: Use of Licensees' Models Presentation At The Internal RISC Meeting

Can the 3 of us get together today for 20 – 30 minutes to discuss?

Steve

Steven West, Deputy Director
Office of Nuclear Regulatory Research

U.S. Nuclear Regulatory Commission

301-415-1914
Steven.West@nrc.gov

From: Giitter, Joseph
Sent: Friday, January 29, 2016 12:11 PM
To: Circle, Jeff <Jeff.Circle@nrc.gov>; Montecalvo, Michael <Michael.Montecalvo@nrc.gov>; Humberstone, Matthew <Matthew.Humberstone@nrc.gov>
Cc: Correia, Richard <Richard.Correia@nrc.gov>; Lund, Louise <Louise.Lund@nrc.gov>; Weerakkody, Sunil <Sunil.Weerakkody@nrc.gov>; Appignani, Peter <Peter.Appignani@nrc.gov>; Ning, Lauren (Killian) <LaurenKillian.Ning@nrc.gov>; Coyne, Kevin <Kevin.Coyne@nrc.gov>; West, Steven <Steven.West@nrc.gov>; Dean, Bill <Bill.Dean@nrc.gov>
Subject: RE: Use of Licensees' Models Presentation At The Internal RISC Meeting

Jeff- I can talk to Steve, but I would prefer to focus on the problem at a high level first. I think what Mike laid out was a good start. We can save the more detailed presentation for the next RISC meeting when we've had a chance to fully coordinate our thoughts.

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Subject: Use of Licensees' Models Presentation At The Internal RISC Meeting

Mike and Matt,

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I would appreciate it if you can get together with Pete to work out the logistics of the presentation. I realize that it's in its infancy but, can you send us any pilot program material that you can share?

Thanks,
Jeff.

Jeff A. Circle
Chief (acting)
Probabilistic Risk Assessment Branch
RES /Division of Risk Analysis
(301) 415-1152
BB (b)(6)

From: Montecalvo, Michael
To: Circle, Jeff; Humberstone, Matthew
Cc: Correia, Richard; Lund, Louise; Giitter, Joseph; Weerakkody, Sunil; Appignani, Peter; Ning, Lauren (Killian); Coyne, Kevin
Subject: RE: Use of Licensees" Models Presentation At The Internal RISC Meeting
Date: Friday, January 29, 2016 11:45:11 AM

Jeff,
Sunil and I shared the same thought so I set up a meeting on Wednesday with Pete and Lauren to talk about this. The initial guidance I received from Bill was that he wanted to have a good discussion at the internal RISC, including benefits and challenges, of the different approaches. The path forward will be somewhat defined from that discussion, including any plans to pilot anything. Since the scope isn't really defined yet, I don't have anything developed as far as pilot program materials.

Looking forward to the meeting!
Mike

From: Circle, Jeff
Sent: Friday, January 29, 2016 11:07 AM
To: Montecalvo, Michael; Humberstone, Matthew
Cc: Correia, Richard; Lund, Louise; Giitter, Joseph; Weerakkody, Sunil; Appignani, Peter; Ning, Lauren (Killian); Coyne, Kevin
Subject: Use of Licensees' Models Presentation At The Internal RISC Meeting

Mike and Matt,

Today, Pete Appignani briefed the RES office management on issues regarding leveraging the use of licensees' models in lieu of SPAR. The package he used contained some of the financial material I showed you and Sunil on Wednesday. It is not intended to be an opinion piece but, one where we discuss the various issues that need to be addressed going forward. One request that came afterward from Steve West was that RES should team up with you to make a joint NRR-RES presentation at the next internal RISC meeting on Thursday, 2/4/16. I imagine that on Thursday, we will have an opportunity to discuss how we will handle presenting to the public meeting on 2/9/16.

I would appreciate it if you can get together with Pete to work out the logistics of the presentation. I realize that it's in its infancy but, can you send us any pilot program material that you can share?

Thanks,
Jeff.

Jeff A. Circle
Chief (acting)
Probabilistic Risk Assessment Branch
RES /Division of Risk Analysis
(301) 415-1152
BB (b)(6)

From: Montecalvo, Michael
To: Cook, William
Subject: FW: Internal RISC Materials
Date: Friday, January 29, 2016 10:59:25 AM
Attachments: Non Responsive

Use of Licensee PRA Models RISC 01272016.docx

Bill,
We didn't end up discussing the use of licensee PRA models, but the talking points I was going to use for the discussion are attached also. Jeff brought his own handouts on aggregation and we didn't get to talk about the uncertainty workshop or GSI-191 (as you know). We have a rescheduled meeting next week (currently Feb. 4) to discuss those items. I think Ray is going to call in to that meeting.
Thanks,
Mike

From: Montecalvo, Michael
Sent: Wednesday, January 27, 2016 12:15 PM
To: Dorman, Dan
Cc: ODaniell, Cynthia
Subject: Internal RISC Materials

Dan,
I apologize for sending these late. These are the materials I have so far for the Internal RISC at 1pm today.
Thanks,
Mike

Option 1 – Status Quo – Continue to update 8-12 SPAR models per year and develop new All Hazard (including fire and seismic hazards) SPAR models.

Discussion:

- Provide a means to maintain an independent assessment tool from that of the licensees.
- Provides an enhanced public confidence in that the regulator will arrive at a conclusion based on a diverse path from that of the licensee.
- Enables staff to assess risk-significance of various plants on a common basis.
- Enables NRR staff to support management efforts to risk-inform regulatory decisions on generic or plant specific basis.
- Requires staff to expend resources to update and/or develop models.

Option 2 – Results will be provided to NRC staff in order to make regulatory decisions.

Discussion:

- Will not require staff to expend additional resources to update the models.
- Allowing licensees to use RG 1.200 compliant models for SDPs may motivate them to invest resources to advance the quality of their models.
- A "certified" PRA (consistent with RMRF Option 2) would allow the licensees PRA to be the PRA of record for all regulatory actions—including SDP.
- May inhibit staff's ability provide timely, independent inputs to time-critical NRC decisions in support of NOEDs and MD 8.3s.
- May inhibit NRR's ability to effectively deal with future challenges "Aggregation" and "Integrated Risk-informed Decision Making," related challenges since staff's ability to enhance external events risk assessments will be affected.
- Inhibits staff's ability to evaluate generic issues affecting the nuclear fleet.
- Inhibits staff's ability to provide input to regulatory basis documents for potential rulemaking efforts.
- May negatively affect public perception of the independence of our regulatory processes.

Option 3 – NRC staff will be given access and training to run licensees' PRA models in support of various regulatory actions.

3a – Licensees are required to give us their model of record at some established point in the regulatory process. NRC staff would then run the analysis using the licensee PRA model instead of using the SPAR model.

3b – NRC maintains a model of record for each plant with the requirement that if the licensee updates their model they have to send us the new model within a certain time frame.

Discussion:

- Will not require staff to expend additional resources to update SPAR models.
- The most up to date model will always be used.

- May motivate licensees to develop and maintain PRA models that comply with RG 1.200.
- Although NRC is using the licensee model, the independence is maintained.
- The ability to assess generic and other fleet-wide issues will be maintained if NRC maintains a model of record.
- Will require significant resources to train multiple NRC staff members (both in NRR, NRO, and the Regions) on running licensees' models.
- Each PRA model contains important switches\House Events that requires familiarity on the part of the analyst (i.e., there can be significant training burden).
- NRC will need to maintain commercial software licenses for multiple PRA codes (e.g., CAFTA, RISKMAN, FRANX, FTREX, etc.)
- It is not likely that all licensees will grant NRC staff access to their PRA models.
- Will need to establish infrastructure similar to the SPAR models to maintain a "model of record" for each plant that would be accessible to risk analysts.

Next Steps:

- Form a project team with individuals from NRR, RES and NRO.
- Provide a plan to pilot the use of licensee PRA models and criteria to objectively evaluate the pilot.
- Evaluate the true cost of maintaining SPAR models. This is to include an evaluation of lifetime costs, needed impending upgrades (i.e. seismic), etc.
- Evaluate true cost of using licensee PRA models. This would include software required, training to current practitioners, possible staffing increases and changes to regulatory structure, etc.

Herbert, Tiana

From: Mohseni, Aby
Sent: Friday, January 29, 2016 9:50 AM
To: Mahoney, Michael
Cc: Stuchell, Sheldon; Inverso, Tara; Gavrilas, Mirela; Kokajko, Lawrence
Subject: FW: Bill's Dean's List of 2016 Focus Areas
Attachments: 2016 Focus Areas for Op Rx BL.docx

Mike,
We just received this version of Focus Areas. Could you plse use this version when you forward our input...
Thanks
Aby

-----Original Message-----
From: Miller, Chris
Sent: Friday, January 29, 2016 9:42 AM
To: NRR_LT Distribution <NRR_LT_Distribution@nrc.gov>
Cc: Dion, Jeanne <Jeanne.Dion@nrc.gov>; Chazell, Russell <Russell.Chazell@nrc.gov>
Subject: FW: Bill's Dean's List of 2016 Focus Areas

All,
This is the list that Bill wants to work from. See his note below on expectations for discussion of this on the 2nd.
Thx
chris

-----Original Message-----
From: Dean, Bill
Sent: Friday, January 29, 2016 9:39 AM
To: Miller, Chris
Cc: Marshall, Jane; Dion, Jeanne; Evans, Michele; Lubinski, John
Subject: RE: Bill's Dean's List of 2016 Focus Areas

Here is the document that the ET created leveraging the input from the LT. For this part of the meeting, I would just want to get a sense of where we think we are on each of these by appropriate lead division. One or two sentences. Maybe a little more for ones where we might be lagging. Also interested if something should come off or be added to the list.

BILL

-----Original Message-----
From: Miller, Chris
Sent: Thursday, January 28, 2016 10:29 AM
To: Dean, Bill <Bill.Dean@nrc.gov>; Evans, Michele <Michele.Evans@nrc.gov>; Lubinski, John <John.Lubinski@nrc.gov>
Cc: Marshall, Jane <Jane.Marshall@nrc.gov>; Dion, Jeanne <Jeanne.Dion@nrc.gov>
Subject: FW: Bill's Dean's List of 2016 Focus Areas

Bill,

For our retreat, we are updating the focus areas in prep for a discussion on Feb 2. As I recall we had created a version from the LT, and you had separately created a version, and asked for our input. I had not seen another version after some of those inputs were provided, as I recall (but I could have that wrong.)

I have asked the LT to provide comments to update this list. However if you have a more current list, I would use that as a baseline instead.
thanks
chris

FOCUS AREAS FOR OPERATING REACTOR BUSINESS LINE 2016

Non Responsive

FOCUS AREAS FOR OPERATING REACTOR BUSINESS LINE 2016

Non Responsive

- Establish Pilot to evaluate PRA use vice SPAR

Non Responsive

FOCUS AREAS FOR OPERATING REACTOR BUSINESS LINE 2016

From: Weerakkody, Sunil
To: Montecalvo, Michael
Subject: RE: Licensee PRA models
Date: Tuesday, January 26, 2016 11:58:11 AM

Mike I have no comments. Chat with me before the meeting ..... Let's discuss how I or Joe should assist you

From: Montecalvo, Michael
Sent: Tuesday, January 26, 2016 7:58 AM
To: Giitter, Joseph <Joseph.Giitter@nrc.gov>; Weerakkody, Sunil <Sunil.Weerakkody@nrc.gov>
Cc: Humberstone, Matthew <Matthew.Humberstone@nrc.gov>; Felts, Russell <Russell.Felts@nrc.gov>
Subject: Licensee PRA models

Joe/Sunil,
This is what I plan to speak from concerning use of licensee PRA models at the internal RISC tomorrow. I put it together based on the POP that you used to brief Bill when the user need was going through approvals. Please let me know if you have any comments.
Thanks,
Mike

Option 1 – Status Quo – Continue to update about 8-12 SPAR models per year and develop new All Hazard (including fire and seismic hazards) SPAR models.

Advantages:

- Provide a means to maintain an independent assessment tool from that of the licensees.
- Provides an enhanced public confidence in that the regulator will arrive at a conclusion based on a diverse path from that of the licensee.
- Enables staff to assess risk-significance of various plants on a common basis.
- Enables NRR staff to support management efforts to risk-inform regulatory decisions on generic or plant specific basis.

Disadvantages:

- Requires staff to expend resources to update and/or develop models.

Discussion:

Annually, NRC expends approximately $1.5 million and 3 FTEs to update and maintain the SPAR models.

PRA methods used to estimate critical parameters such as common cause failures and human error probabilities are identical (RG 1.200 compliance does not assure use of one method).

Modeling techniques and data are standardized for each plant and run on the same software platform making it possible to train NRC practitioners and use trained NRC staff to efficiently make timely assessments.

Option 2 – Results will be provided to NRC staff in order to make regulatory decisions.

Advantages:

- Will not require staff to expend additional resources to update the models.
- Allowing licensees to use RG 1.200 compliant models for SDPs may motivate them to invest resources to advance the quality of their models.
- A "certified" PRA (consistent with RMRF Option 2) would allow the licensees PRA to be the PRA of record for all regulatory actions—including SDP.

Disadvantages:

- Inhibits staff's ability provide timely, independent inputs to time-critical NRC decisions in support of NOEDs and MD 8.3s.
- May inhibit NRR's ability to effectively deal with future challenges "Aggregation" and "Integrated Risk-informed Decision Making," related challenges since staff's ability to enhance external events risk assessments will be affected.
- Inhibits staff's ability to evaluate generic issues affecting the nuclear fleet.
- Inhibits staff's ability to provide input to regulatory basis documents for potential rulemaking efforts.
- May negatively affect public perception of the independence of our regulatory processes.

Discussion:

This is the option the industry would prefer. One key issue is what information they will provide us from their assessment to allow us to make a proper regulatory decision.

Option 3 – NRC staff will be given access and training to run licensees' PRA models in support of various regulatory actions.

3a – Licensees are required to give us their model of record at some established point in the regulatory process. NRC staff would then run the analysis using the licensee PRA model instead of using the SPAR model.

3b – NRC maintains a model of record for each plant with the requirement that if the licensee updates their model they have to send us the new model within a certain time frame.

Advantages:

- Will not require staff to expend additional resources to update SPAR models.
- The most up to date model will always be used.
- May motivate licensees to develop and maintain PRA models that comply with RG 1.200.
- Although NRC is using the licensee model, the independence is maintained.
- The ability to assess generic and other fleet-wide issues will be maintained if NRC maintains a model of record.

Disadvantages:

- Will require significant resources to train multiple NRC staff members (both in NRR, NRO, and the Regions) on running licensees' models.
- Each PRA model contains important switches\House Events that requires familiarity on the part of the analyst (i.e., there can be significant training burden).
- NRC will need to maintain commercial software licenses for multiple PRA codes (e.g., CAFTA, RISKMAN, FRANX, FTREX, etc.)
- It is not likely that all licensees will grant NRC staff access to their PRA models.
- Will need to establish infrastructure similar to the SPAR models to maintain a "model of record" for each plant that would be accessible to risk analysts.

Discussion:

The potential cost savings from this approach may be limited without *all* licensees agreeing to give access to their models for NRC use.

Next Steps:

- Form a project team with individuals from NRR, RES and NRO.
- Provide a plan to pilot (Vogtle) the use of licensee PRA models and criteria to objectively evaluate the pilot.
- Evaluate the true cost of maintaining SPAR models. This is to include an evaluation of lifetime costs and needed impending upgrades (i.e. seismic).
- Evaluate true cost of using licensee PRA models. This would include software required, training to current practitioners, possible staffing increases and changes to regulatory structure, etc.

From:	Montecalvo, Michael
To:	Giitter, Joseph
Cc:	Weerakkody, Sunil
Subject:	RE: Licensee PRA models
Date:	Tuesday, January 26, 2016 9:24:59 AM

Thanks Joe, I updated the scheduler with the agenda and also sent Rich an email.

From: Giitter, Joseph
Sent: Tuesday, January 26, 2016 9:23 AM
To: Montecalvo, Michael
Cc: Weerakkody, Sunil
Subject: Re: Licensee PRA models

Mike- No comments. Looks good. During our Biweekly meeting (conference call) with RES and NRO yesterday, Rich mentioned that they had done a cost-benefit of using license models versus SPAR models. I was surprised and told him about the group that you were leading. We both agreed that we should coordinate better in the future. So, I'm going to forward this to Rich and ask that he share with us the cost-benefit that they are working on. Also, Rich did not get a copy on the agenda for the internal RISC meeting. Didn't we send that out?

From: Montecalvo, Michael
Sent: Tuesday, January 26, 2016 7:58 AM
To: Giitter, Joseph; Weerakkody, Sunil
Cc: Humberstone, Matthew; Felts, Russell
Subject: Licensee PRA models

Joe/Sunil,
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Thanks,
Mike

From:	Montecalvo, Michael
To:	ZACHARIAH, Thomas
Cc:	Weerakkody, Sunil; Spore, Candace; Humberstone, Matthew
Subject:	Use of Licensee PRA Models
Date:	Friday, January 22, 2016 3:19:59 PM

Tom,
I understand that you are leading a task group working on the use of licensee PRA models in regulatory applications for the industry. I am going to be leading a team from the NRC to explore this possibility. We are in the very preliminary stages right now, but we will be discussing this at the next public RISC meeting on 2/9. I imagine that you were planning on attending for the discussion on FLEX equipment credit anyway, but I wanted to let you know that this topic would be on the agenda.

I can put some time on the agenda if you would like to present something? Also, would it be possible to get a brief synopsis of what the industry thoughts are on this? It might be helpful for me to be able to frame my briefing to my management.

Thanks,
Mike

From: Montecalvo, Michael
To: [illegible]
Subject: Use of Licensee PRA Models
Date: Thursday, January 14, 2016 8:31:00 AM

As you all know, there has been a renewed interest in exploring the use of licensee PRA models in our regulatory processes. Mike Montecalvo has agreed to lead the effort with Matt Humberstone, a new member of APHB, assisting. Please provide them the support they need to objectively assess the benefits and challenges of such an approach.

Lee, Samson

From:	Dean, Bill
Sent:	Saturday, January 02, 2016 3:14 PM
To:	Weerakkody, Sunil; Giitter, Joseph; Lubinski, John; Evans, Michele
Cc:	Montecalvo, Michael; Mitman, Jeffrey; Humberstone, Matthew; Lee, Samson; Spore, Candace
Subject:	Re: Receiving formal regional concurrences on NEI Whitepapers on Treatment of MS \FLEX in RIDM

Ok. Thanks.

Bill Dean
Director
Office of Nuclear Reactor Regulation

On: 30 December 2015 08:53, "Weerakkody, Sunil" <Sunil.Weerakkody@nrc.gov> wrote:
Bill,

Joe has directed both topics to be included in the next RISC agenda. I think it would make sense to have a briefing to NRR ET on both topics before we discuss at internal RISC. I'll be asking Mike to follow up.

Sunil

From: Dean, Bill
Sent: Thursday, December 24, 2015 8:16 AM
To: Weerakkody, Sunil; Giitter, Joseph; Lubinski, John; Evans, Michele
Cc: Montecalvo, Michael; Mitman, Jeffrey; Humberstone, Matthew; Lee, Samson
Subject: RE: Receiving formal regional concurrences on NEI Whitepapers on Treatment of MS\FLEX in RIDM

Thanks for the update Sunil. I hope we aren't doing something out of expediency by assimilating white papers into our RASP guidance. I appreciate the creative thinking, but let's make sure there are no unintended consequences about this.

After the new year, I would like to have a RISC meeting to discuss the status of this activity, the challenges that exist, and our recommendations to address those challenges. Would also like the RISC agenda to have the SPAR model pilot and game plan to assess the efficacy of eliminating reliance on SPAR models.

BILL

From: Weerakkody, Sunil
Sent: Friday, December 18, 2015 8:56 AM
To: Giitter, Joseph <Joseph.Giitter@nrc.gov>; Lubinski, John <John.Lubinski@nrc.gov>; Dean, Bill <Bill.Dean@nrc.gov>; Evans, Michele <Michele.Evans@nrc.gov>
Cc: Montecalvo, Michael <Michael.Montecalvo@nrc.gov>; Mitman, Jeffrey <Jeffrey.Mitman@nrc.gov>; Humberstone, Matthew <Matthew.Humberstone@nrc.gov>; Lee, Samson <Samson.Lee@nrc.gov>
Subject: FYI: Receiving formal regional concurrences on NEI Whitepapers on Treatment of MS\FLEX in RIDM

Bill/Joe/John/Michele,

We had our public meeting with industry on December 9th. Based on what we learned during that interaction, and our discussions with responsible BCs in NRR and RES (Nathan, Kevin Hsueh, and John Nakoski), DRA\APHB concluded that we could incorporate NEI Whitepapers (after they incorporate our comments) to RASP guidance. We also concluded there is no need to make changes to higher tier documents (IMC 410, IMC 609, MD 8.3) which tend to be time consuming.

- Consequently, we should be able to produce guidance on how to credit MS\FLEX in RIDM for operational event assessments (SDP, NOED, MF 8.3, ASP) within several months. The primary challenge will be to assimilate regional comments and disposition them and get NEI to address a few difficult comments. To that extent, we have asked each of the 12 SRAs to provide us comments. In addition, in accordance with the new RASP update process, we will be transmitting the attached memo to engage regional management to ensure that we can learn and address any regional management concerns.

- Since RGN III had special concerns, I had a call with Pat Loudon to explain how we will be fully dispositioning RGN III staff concern wrt to potential increase in some CDF sequences due to Load Shedding.

- We also met with DPR management (Sheldon) to reach alignment on how we should put a regulatory foot print for more challenging areas such risk-informed licensing actions an MSPI. Our initial thoughts are to pursue an ISG followed by a modifications to a Reg Guide (e.g., update to RG 1.200).

APHB has asked all other stakeholders in NRO, RES etc to provide comment during the next several week. We'll send you an email communication after we receive those comments, and then provide a briefing to internal RISC in January 2016.

This is just FYI.

Sunil D Weerakkody, Chief
PRA Operations & Human Factors Branch
Office of Nuclear Reactor Regulation
Nuclear Regulatory Commission

Address: Mail Stop O-10 C-15, US NRC, Washington DC 20005-0001

Tel: 301-415-2870
Black Berry: (b)(6)

Harrison, Donnie

From: Monninger, John
Sent: Wednesday, November 04, 2015 3:44 PM
To: Holahan, Gary; Uhle, Jennifer
Cc: Mayfield, Michael; Harrison, Donnie; Mrowca, Lynn; Webber, Kimberly; Caruso, Mark
Subject: Summary - ACRS Mtg on RMRF

Jen, Gary

I attended today's ACRS full-committee meeting on RMRF. Overall, the meeting went fine. The staff focused on presenting the draft SECY paper. There were also presentations from NEI, BWROG, and PWROG. Presentations by industry generally supported the staff's recommendation (Option 1 – Stay the current course focused on incremental risk-informed initiatives). Also, Mary Drouin filled a non-concurrence on the paper. A copy of the non-concurrence was available at the meeting. The non-concurrence focuses on (1) not developing an agency-wide policy statement on RMRF, and (2) not attempting to further define and provide guidance on defense in depth. The non-concurrence references Jen's 2015 RIC session on defense in depth as providing support for further work on defense in depth. The SECY paper is due to the Commission by December 18th, and the staff is requesting an ACRS letter this month. I had to leave prior to the end of the meeting to support the STP mock hearing, so I didn't get a summary of the overall ACRS views. Overall, I believe the ACRS supports Option 2; however, they understand that there is no interest from industry in Option 2 and staff resources are limited. I've tried to summarize the line of questioning/comments from individual ACRS members below.

<u>ACRS & Staff</u>
- Doesn't the NRC use an approach similar to Option 2 in evaluating new reactor designs? The RTNSS classification process is similar to the attributes that the staff discusses for Option 2.
- Doesn't the NRC evaluate certain issues similar to Option 2, such as GSI-191?
- So, the NRC isn't proposing to do anything to clarify (cleanup) the collection of existing BDBAs (SBO, ATWS). There is no global approach to BDBAs.
- What's the strategic vision of the NRC's RISC? The current RISC activities are focused on implementation issues. Shouldn't the RISC define some long term vision?
- What's the NRC's game plan for advanced reactors? Are you developing something akin to RMRF for advanced reactors?

<u>ACRS & Industry</u>
- Can Level 3 PRAs be used to evaluate the risk significance/importance of requirements for DBAs vs. BDBAs?
- What's the industry's views on the use of licensee PRA models vs. NRC SPAR models?
- Are the industry's views on not supporting Option 2 unanimous?
- NFPA-805 left a bad taste for PRA. Expected costs for analyses and licensing was $5M and now pushes $50M, even without any plant design changes.

Monninger, John

From: Correia, Richard
Sent: Friday, February 05, 2016 7:02 AM
To: Monninger, John; Giitter, Joseph
Subject: RE: use of licensee's PRAs pilot

Thanks Gents.

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

From: Monninger, John
Sent: Friday, February 05, 2016 6:52 AM
To: Giitter, Joseph <Joseph.Giitter@nrc.gov>; Correia, Richard <Richard.Correia@nrc.gov>
Subject: Re: use of licensee's PRAs pilot

Yes, I agree. Given the many diverse views of the staff, it will be important for us to get together and align to keep the assessment moving forward.

John Monninger
(b)(6)

From: Giitter, Joseph
Sent: Thursday, February 04, 2016 12:57 PM
To: Correia, Richard
Cc: Monninger, John
Subject: RE: use of licensee's PRAs pilot

I support.

From: Correia, Richard
Sent: Thursday, February 04, 2016 12:53 PM
To: Giitter, Joseph <Joseph.Giitter@nrc.gov>; Monninger, John <John.Monninger@nrc.gov>
Subject: use of licensee's PRAs pilot

Joe, John,

As you could tell from the discussions at today's RISC meeting, there are lots of opinions, views, suggestions, cautions, questions etc. on whether it's feasible to use licensee's PRAs in lieu of SPAR models. My recommendation is that if both RISCs agree to pursue a pilot (I hope they do) we need to

serve as a steering committee and approach the pilot in an objective manner. Not to stifle good thinking and ideas, but guide the working group(s) let the process sort out the pros and cons.

Rich

Richard Correia, PE
Director,
Division of Risk Analysis
Office of Nuclear Regulatory Research
US NRC

richard.correia@nrc.gov

Mrowca, Lynn

From:	Gibbs, Russell
Sent:	Tuesday, January 19, 2016 2:57 PM
To:	Ayegbusi, Odunayo
Cc:	Mrowca, Lynn
Subject:	FW: Results of the 14 January Public Meeting
Attachments:	Perspectives from 14 January Public Meeting.docx

Hi there,

I truly apologize for not keeping you in the loop. Attached are a few perspectives from the last meeting. Also, below is a link to our activities. Feel free to review to see what's going on. I would emphasize at this point the Inspection Finding Review Board concept being proposed.

http://fusion.nrc.gov/nrr/team/dirs/ipab/sdp/stsdp/SitePages/Home.aspx?InitialTabId=Ribbon%2EDocument&VisibilityContext=WSSTabPersistence

Call for questions.

Russell

From: Gibbs, Russell
Sent: Friday, January 15, 2016 2:25 PM
To: Ferrante, Fernando <Fernando.Ferrante@nrc.gov>; Gulla, Gerald <Gerald.Gulla@nrc.gov>; Cahill, Christopher <Christopher.Cahill@nrc.gov>; Hartle, Brandon <Brandon.Hartle@nrc.gov>; Kichline, Michelle <Michelle.Kichline@nrc.gov>; Wong, See-Meng <See-Meng.Wong@nrc.gov>; Walker, Shakur <Shakur.Walker@nrc.gov>; Miller, Geoffrey <Geoffrey.Miller@nrc.gov>
Cc: Shuaibi, Mohammed <Mohammed.Shuaibi@nrc.gov>; Sanfilippo, Nathan <Nathan.Sanfilippo@nrc.gov>; Morris, Scott <Scott.Morris@nrc.gov>; Howe, Allen <Allen.Howe@nrc.gov>
Subject: Results of the 14 January Public Meeting

Hi Everyone,

Attached are a few perspectives. Feel free to comment/add. We'll discuss at the next team meeting 26-28 January.

As a reminder to prepare for that meeting, review the program documents I already provided so we can finalize them. Also, check your workload and priorities to ensure you can fully engage with the work we're doing. If not, let me know early - thanks.

Personal thought – the work we're doing is exciting and has great potential to make a real difference. I hope you feel the same way.

Nice and safe holiday weekend and thanks for the help.

Russell

SDP Streamlining
Perspectives from 14 January Public Meeting with Industry

Non Responsive

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11

12.

13. A thoughtful and constructive comment made as we were discussing SPAR models - why is SDP different from other regulatory processes such as licensing. Why do we feel the need to perform an assessment versus review and judge the licensee's conclusions.

Monninger, John

From: Monninger, John
Sent: Wednesday, December 09, 2015 6:46 AM
To: Harrison, Donnie
Subject: FW: SPAR models

FYI.

From: West, Steven
Sent: Tuesday, December 08, 2015 5:46 PM
To: Monninger, John <John.Monninger@nrc.gov>; Holahan, Gary <Gary.Holahan@nrc.gov>
Subject: Re: SPAR models

John,

I thought you were there, but you would know. The internal meeting I'm thinking of was after the external meeting you mentioned. It was a brief discussion and we agreed that the RISC was created to work on issues like this and a working group would be helpful. However, we didn't actually make any assignments or taskings. We saved that for a later meeting.

It will be interesting to see if (or for how long) NRO remains a supporter of the SPAR models.

Steve

Steven West, Deputy Director
Office of Nuclear Regulatory Research
U.S. NRC

From: Monninger, John
Sent: Tuesday, December 08, 2015 07:11 AM
To: West, Steven; Holahan, Gary
Subject: RE: SPAR models

Yes. I was at the "external/public" RISC meeting when it was brought up; however, I do not recall it being brought up or discussed at a prior "internal" RISC meetings. I may have missed the internal meeting if it was discussed. I was somewhat surprised to hear about during the external RISC meeting because we have weekly meetings among the 3 PRA divisions (NRR, NRO, RES) and the notion was never mentioned during those meetings. A fair compromise is to set up a working group to evaluate the issues.

From: West, Steven
Sent: Thursday, December 03, 2015 4:42 PM
To: Holahan, Gary <Gary.Holahan@nrc.gov>
Cc: Monninger, John <John.Monninger@nrc.gov>
Subject: Re: SPAR models

Gary,

I believe John Monninger was at the RISC meeting when this was discussed briefly.

Steve

Steven West, Deputy Director
Office of Nuclear Regulatory Research
U.S. NRC

From: Holahan, Gary
Sent: Thursday, December 03, 2015 06:56 PM
To: Dean, Bill; Weber, Michael; West, Steven
Cc: Johnson, Michael; Tracy, Glenn; Lubinski, John; Giitter, Joseph; Evans, Michele; Uhle, Jennifer
Subject: RE: SPAR models

Bill,

I see the SPAR question as "not so simple", so I support the idea of a multi-office working group. Southern Company would be an interesting volunteer for a pilot activity since they have both operating and new reactors (under construction). I will discuss with Jennifer on her return from travel.

Gary

From: Dean, Bill
Sent: Thursday, December 03, 2015 5:36 AM
To: Weber, Michael <Michael.Weber@nrc.gov>; West, Steven <Steven.West@nrc.gov>
Cc: Johnson, Michael <Michael.Johnson@nrc.gov>; Tracy, Glenn <Glenn.Tracy@nrc.gov>; Lubinski, John <John.Lubinski@nrc.gov>; Giitter, Joseph <Joseph.Giitter@nrc.gov>; Evans, Michele <Michele.Evans@nrc.gov>; Uhle, Jennifer <Jennifer.Uhle@nrc.gov>; Holahan, Gary <Gary.Holahan@nrc.gov>
Subject: SPAR models

Mike
I saw an email that I was not on distribution for from you indicating some rancor in the RES ranks over NRR's consideration of no longer sustaining the large infrastructure and expenses involved in our SPAR model program.

In the spirit of Project AIM I have targeted this as a possible efficiency gain in our long term plans. I also know there is a lot of staff who are resistant to this potential move. In order to move from a concept to an actuality will require some strategic thinking from many corners of the agency and in the final analysis may or may not be an appropriate approach to take. But we won't know unless we evaluate it.

I saw in your email your intent for RES to lead an effort to assess the efficacy of such an approach. I would offer that a better approach would be that NRR and NRO as the primary users of the SPAR models would form a working group, including RES and regional representation to develop the Pros and cons, barriers and opportunities, and strategies to address any barriers and challenges sometime after the beginning of the new year.

I have already reached out to southern company as to their interest in piloting an approach whereby we would use their PRA model in lieu of the SPAR model for one of their sights thru my interactions with Danny Bost on the Risk Informed Steering Committee. I see this "proof of concept" activity as vital to understanding if this makes sense or not. They are amenable to doing such a pilot.

I am back in the office next Monday and we can certainly talk at length about this then.

Bill Dean
Director
Office of Nuclear Reactor Regulation

Monninger, John

From: Monninger, John
Sent: Tuesday, December 08, 2015 7:13 AM
To: Harrison, Donnie
Cc: Mrowca, Lynn; Webber, Kimberly
Subject: FW: SPAR models

Donnie,

Please see below. If this SPAR working group comes about, we will probably be looking to you to represent us. If I see any more email traffic, I'll send it your way.

Thanks,
John

From: West, Steven
Sent: Thursday, December 03, 2015 4:42 PM
To: Holahan, Gary <Gary.Holahan@nrc.gov>
Cc: Monninger, John <John.Monninger@nrc.gov>
Subject: Re: SPAR models

Gary,

I believe John Monninger was at the RISC meeting when this was discussed briefly.

Steve

Steven West, Deputy Director
Office of Nuclear Regulatory Research
U.S. NRC

From: Holahan, Gary
Sent: Thursday, December 03, 2015 06:56 PM
To: Dean, Bill; Weber, Michael; West, Steven
Cc: Johnson, Michael; Tracy, Glenn; Lubinski, John; Giitter, Joseph; Evans, Michele; Uhle, Jennifer
Subject: RE: SPAR models

Bill,

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Gary

From: Dean, Bill
Sent: Thursday, December 03, 2015 5:36 AM
To: Weber, Michael <Michael.Weber@nrc.gov>; West, Steven <Steven.West@nrc.gov>
Cc: Johnson, Michael <Michael.Johnson@nrc.gov>; Tracy, Glenn <Glenn.Tracy@nrc.gov>; Lubinski, John

<John.Lubinski@nrc.gov>; Giitter, Joseph <Joseph.Giitter@nrc.gov>; Evans, Michele <Michele.Evans@nrc.gov>; Uhle, Jennifer <Jennifer.Uhle@nrc.gov>; Holahan, Gary <Gary.Holahan@nrc.gov>
Subject: SPAR models

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In the spirit of Project AIM I have targeted this as a possible efficiency gain in our long term plans. I also know there is a lot of staff who are resistant to this potential move. In order to move from a concept to an actuality will require some strategic thinking from many corners of the agency and in the final analysis may or may not be an appropriate approach to take. But we won't know unless we evaluate it.

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I am back in the office next Monday and we can certainly talk at length about this then.

Bill Dean
Director
Office of Nuclear Reactor Regulation

Monninger, John

From: Monninger, John
Sent: Thursday, October 01, 2015 7:01 AM
To: Tracy, Glenn; Holahan, Gary (Gary.Holahan@nrc.gov)
Cc: Webber, Kimberly; Harrison, Donnie
Subject: FW: RES Commission Paper on ASP and SPAR Status
Attachments: SECY-15-XXXX Enclosure 2 - Status of the SPAR Models_Changes 9-30-15.docx; SECY-15-XXXX Enclosure 1_Changes 9-30-15.docx; SECY-15-XXXX_Changes 9-30-15.docx; NRR ET Comments on ASP SECY_RES responses_r3.docx

Glenn, Gary

FYI. Last week, we received and responded to a question from Commissioner Baron during the New Reactor Business Line Commission meeting on NRC's SPAR models. We indicated that we supported continued use and development of the SPAR models.

Separately, NRR and RES are debating the merits of the use of licensee PRAs (instead of NRC SPAR models) for assessment of inspection findings (i.e., the SDP). RES prepares an annual Commission paper on the Accident Sequence Precursor program and the SPAR models to inform the Commission of progress and results in these areas. Although very informative, it is a rather routine Commission paper. The tension between NRR and RES on the SPAR models has bleed over into the annual Commission paper. NRO concurred on this paper about 2 weeks ago, with essentially no comments. The current debate has not altered our concurrence.

John

From: Nakoski, John
Sent: Wednesday, September 30, 2015 10:11 AM
To: Weerakkody, Sunil <Sunil.Weerakkody@nrc.gov>; Giitter, Joseph <Joseph.Giitter@nrc.gov>; Lee, Samson <Samson.Lee@nrc.gov>
Cc: Kichline, Michelle <Michelle.Kichline@nrc.gov>; Tetter, Keith <Keith.Tetter@nrc.gov>; Coyne, Kevin <Kevin.Coyne@nrc.gov>; Correia, Richard <Richard.Correia@nrc.gov>; Monninger, John <John.Monninger@nrc.gov>
Subject: RES Commission Paper on ASP and SPAR Status

Joe, Sam, and Sunil,

I am sharing with you the most up-to-date information on the RES Commission Paper on the ASP Program and SPAR Model status. The information is current as of this morning and reflects the position of RES on this paper. Should you have additional input that you would like to share or have feedback on the comment responses, please let me know as soon as you can. Time is of the essence, so I would appreciate your comments or NRR concurrence by COB today so that we can resend the paper to OGC to confirm that it still has no legal objections to the paper. Once we have NRR's concurrence and OGC's confirmation of its NLO, I will be send the final version of the paper to Brian Sheron for his review and approval. The paper is due to the Commission no later than October 6, 2015.

The attached files provide RES' responses to NRR's comments on the RES Commission Paper on the status of the ASP Program and the SPAR Models; and redline/strikeout versions of the body of the SECY and both enclosures that reflects all of the changes made to the version sent for Office Level review and concurrence based on comments from NRR, NRO, and OGC.

Kevin Coyne and I have briefed Brian Sheron and Steve West on our responses to NRR's comments. The most significant comments were explicitly discussed with Brian and Steve, and they are aligned with our responses to the NRR comments raised with regard to Project AIM 2020 and incorporating the NRR proposal to do a pilot using licensee PRA models for the SDP.

I look forward to working with you to resolve any outstanding issues.

Best regards,

John A. Nakoski

Chief, Performance and Reliability Branch
Division of Risk Analysis
Office of Research
301-415-2480 (w)
(b)(6) (c)

Mrowca, Lynn

From:	Webber, Kimberly
Sent:	Wednesday, September 16, 2015 8:02 AM
To:	Landry, Ralph; Lu, Shanlai; Harrison, Donnie; Mrowca, Lynn
Subject:	FW: Fwd: Industry Recommendations for NRC Project AIM 2020 Prioritization and Re-baselining Initiatives
Attachments:	09-15-15_NRC_ Industry Recommendations for NRC Project AIM 2020 Prioritization and Re-baselining Initiatives.pdf; ATT00001.htm

NEI letter is already publicly available as ML15279A048.

Ralph, Shanlai, Donnie,
Fyi... NEI request to "deprioritize and modify" the 50.46c rulemaking... I don't think this will affect the concurrence process on the rule package.

Lynn, Donnie,
NEI request to initiate a pilot to leverage the licensees PRAs (vice SPAR models) in the SDP

From: Monninger, John
Sent: Tuesday, September 15, 2015 4:47 PM
To: NRO_SES Distribution <NROSESDistribution@nrc.gov>
Cc: ODriscoll, James <James.ODriscoll@nrc.gov>; Dempsey, Heather <Heather.Dempsey@nrc.gov>; Humerick, David <David.Humerick@nrc.gov>
Subject: FW: Fwd: Industry Recommendations for NRC Project AIM 2020 Prioritization and Re-baselining Initiatives

FYI. NEI letter providing input/recommendations to the Project AIM rebaselining and common prioritization project. Note, there are only a few NRO projects (e.g., Part 21 rulemaking) on the list. NEI mentioned that due to the schedule they hadn't had time finalize their comments on New Reactors, and that they plan on sending in a supplemental letter addressing new reactors

From: WALTERS, Doug [mailto:djw@nei.org]
Sent: Tuesday, September 15, 2015 2:52 PM
To: Monninger, John <John.Monninger@nrc.gov>
Subject: [External_Sender] Fwd: Industry Recommendations for NRC Project AIM 2020 Prioritization and Re-baselining Initiatives

Sent from Doug Walters iPhone

Begin forwarded message:

> **From:** "BUTLER, John" <jcb@nei.org>
> **Subject: Industry Recommendations for NRC Project AIM 2020 Prioritization and Re-baselining Initiatives**
>
> September 15, 2015