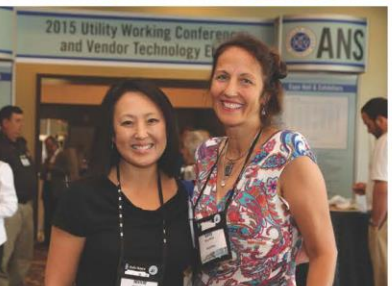
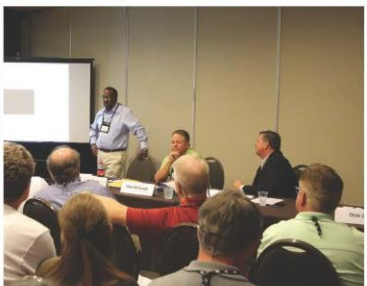
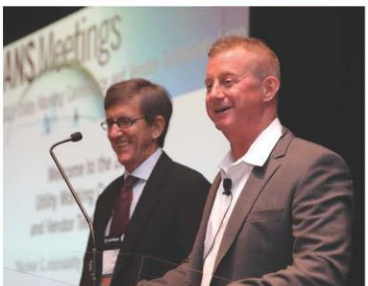
2016 Knowledge Base Report

Utility Working Conference and Vendor Technology Expo

Delivering the Nuclear Promise







August 14-17, 2016
Omni Amelia Island Plantation
Amelia Island, FL

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PLENARY SESSIONS

MONDAY, AUGUST 15: Delivering the Nuclear Promise/Light Water Reactor Sustainability

*No Presentation Title (No Slides)

Adam Cohen (Deputy Under Secretary for Science and Energy, U.S. DOE)

no notes

US Department of Energy Light Water Reactor Sustainability Program

Kathryn McCarthy (Director of the Light Water Reactor Sustainability Program Technical Integration Office, INL)

- Light Water Reactor (LWR) sustainability research pathways: Materials Aging and Degradation, Risk-Informed Safety Margin Characterization, Advanced Instrumentation Information and Control Systems Technologies, and Reactor Safety Technologies

- Material Aging and Degradation Pathways: This research topic involves identifying gaps in knowledge for understanding and predicting long-term environmental degradation behavior of material in nuclear plants. The areas of research are as follows: Reactor Metals, Concrete, Cables, and Mitigation Technologies.

- Advanced Welding Research and Development (R&D): Providing Options for Welding Irradiated Material: This research pathway is jointly funded by the Department of Energy (DOE) and Electric Power Research Institute (EPRI). The R&D will be aimed at repairing reactor internals without helium induced cracking, modeling and experimenting for long-term performance and cracking resistance. Current research progress includes the installing of integrated a welding hot cell.

- Risk Informed Safety Margin Characterization (RISMC) research pathway: The purpose of this research pathway is to support plant decisions for risk-informed margins management to support improved economics, reliability, and sustain safety of current nuke plants.
Some of the goals of RISMC is to develop and demonstrate a risk-assessment method coupled to safety margin quantifications for the purpose of margin recovery strategies. There will be a RISCM toolkit that would enable more accurate representation of Nuclear Plant safety margins.

- Advanced Instrumentation, Information, and Control Systems: This research pathway is purposed to address long-term aging and reliability concerns of existing I&C technologies. The advanced control systems will develop condition monitoring technologies in order to detect and characterize aging and degradation processes. Long term control room modernization will serve as input to planning, providing design options that can be developed and tested in the Idaho National Labs' Human System Simulation Laboratory.

Delivering the Nuclear Promise: Advancing Safety, Reliability, and Economic Performance

Maria Korsnick (Chief Operating Officer, NEI)

- Part of the solution to deliver the Nuclear Promise involves sustaining high levels of safety and reliability, identify opportunities to re-design plant processes, drive innovation to improve efficiency and effectiveness, and gain greater value for nuclear energy in electricity and clean air policy.

- There are four building blocks that are aimed at delivering a solution to the current issues within the nuclear industry:
  a) Building Block 1 (Analysis and Monitoring): There has been a CNO-led team that identified priority areas including improvement opportunities in work management, radiation protection, training, security and preventive maintenance. An analysis of plant cost drivers has resulted in identifying opportunities for efficiencies to be gained and administrative burden to be reduced.
  b) Building Block 2 (Value Recognition): This building block aims at increasing value recognition for existing reactors. Sub goals of this building block look to earn monetary value for clean air attributes, advocate changes in electricity markets for additional value, pursue changes at FERC and RTOs and advocate for the Clean Power Plan implementation which recognizes value of nuclear energy.
  c) Building Block 3 (Process and Program Redesign): Goals for this block include Implementing the 21 efficiency bulletins, emphasizing need for cultural change and innovation on all levels and anticipating and addressing emerging regulatory or technological issues.
  d) Building Block 4 (Strategic Communications): Communications emphasizing industry's effort to enhance efficiency, need for value recognition, advocating greater value for nuclear power plants in electricity and clean air markets, and greater employee communications focusing on the implementation of the Nuclear Promise.

TUESDAY, AUGUST 16: Keeping Nuclear Viable by Influencing the Political Landscape

Market and Pricing Issues from the Utility Perspective

Joe Dominguez (EVP of Governmental and Regulatory Affairs and Public Policy, Exelon)

- Nuclear Plant Economics: Small single unit and dual unit nuclear plants have a greater risk of closing from an economic perspective due to the $/MWh market value to continually run reactors.

- Dual and single unit nuclear plants cannot compete with combined with the cycle natural gas plants of today.

- Existing Nuclear is the Most Cost Effective Zero Carbon Choice (Illinois based study): The latest Residential Distributed Solar prices in IL are around $200/MWh which is $155 over the social cost of carbon. Existing nuclear plants in Illinois reside at $12/MWh over the market value for the social cost of carbon. Nuclear plants are the simple solution to meeting a national zero carbon output goal while residing at a near market value cost.

- Compared to renewables today, even challenged nuclear facilities remains a very valuable asset compared to renewables from the standpoint of carbon reduction, particularly if federal subsidies are allowed to expire.
- In a far future stress, the most challenged units likely will be rendered uneconomic on an unsubsidized basis, and even low-cost dual units could be rendered uneconomic if subsidies persist.

- NY ZERC Payment Calculation (The good news): The first step is to determine a price based on the social cost of carbon adjusted for RGGI. The resulting price starts at $17.5/MWh in 2017-18 and escalates to $28.8/MWH in 2027-28.

- The value of keeping plants vs cost of losing plant needs to be compared by policy makers in order to make an informed economic decision.

- From a federal perspective, there needs to be a push to level the playing with wind and solar to permit the nuclear industry to participate in federal tax credits.

Presenting The Case for Nuclear Energy In the United States

Donald Hoffman (President/CEO, EXCEL Services Corp.)

- Current Nuclear Plant Landscape: Until late 2013, the U.S. had 104 operating reactors. As of May 2016, the U.S. has 100 operating reactors
There are 4 AP1000s in construction in Georgia and South Carolina. There are 5 sites in some level of active decommissioning: Zion, San Onofre 2/3, Crystal River 3, Kewaunee, and Vermont Yankee.

- There have been recently announcements of 8 more premature shutdowns based solely on economic conditions: Pilgrim, FitzPatrick, Fort Calhoun, Clinton, Quad Cities 1 and 2, Nine Mile Point 1 and Ginna where more announcements of premature shutdowns may follow if no action is taken.

- Saving the Existing Fleet Committee: There has been a special committee formally rolled out which is called the “Nuclear in the States Toolkit” as of February 8, 2016. It is purposed to provide a consistent and standard approach for each of the states in valuing nuclear energy as an asset in their compliance with Section 111D of the Clean Power Plan or other Clean Energy Standard.

- The Special Committee plans to tailor this Toolkit for each State administration to appropriately consider and value nuclear in the decision related to the energy, economy and environment in that State

- (Key Nuclear Selling Points)
    -
        - Energy: Nuclear produces affordable, available, reliable energy 7 days per week/24 hours per day as the only environmentally friendly baseload energy supply. It supports grid stability, provides price stability, runs when needed, contributes to fuel and technology diversity.
        - Economy: Operation of the same average nuclear facility generates 700-1200 permanent jobs, which pay 36 to 42% more than average salaries in the local area and the state. Each nuclear plant generates an average of $16 -$20 million (U.S.) in state and local tax revenue for schools, roads and similar infrastructure.
        - Environment: Nuclear produces approximately 20% of the U.S. energy but provides over 63% of the carbon-free emitting energy in the U.S.
        - Nuclear provides clean air compliance value and avoids carbon emissions.

- Clean Power Plan (CPP) Requirements: The CPP requires each of the 48 contiguous states (Vermont and DC are exempt) to reduce the carbon emission levels by 32% from the 2005 levels by the year 2030. SEMA (Sensible Energy Matters to America) will

work with ANS Special Committee on Nuclear in the States to markup the CPP to assure it meets the intended goals and meet with the EPA in fall 2016

- Utilize ZEC (Zero Emission Credit) in order to advertise the program's benefits to states beyond New York: The intent of the ZEC program is to preserve the zero-emissions attribute benefits of the [nuclear] facilities to prevent backsliding in the State's carbon reduction performance that likely could not be avoided in any other way.

- The Saving the Existing Fleet Committee's Next Actions:
1. Continue to develop product/ tools that the state and federal staff can use to appropriately value nuclear in the energy decisions
2. Continue to develop the technical information that creates informed energy policy
3. Continue to meet with Governors and their staff about energy policy and the value of nuclear in the state, region and nation
4. Continue to meet with policy makers and utilities to broker agreements so nuclear plants do not shutdown prematurely
5. Continue to work with Governors and state legislatures to lift all new nuclear build moratoriums and bans
6. Continue to work with the states, region and federal to revise the flawed electricity policies
7. Plan is to halt premature shutdowns, lift bans/moratoriums, revise CPP and revise flawed electricity markets and
8. Provide a level playing field for nuclear so that it can play the role for which it is qualified, intended and needed for US energy needs

Policy Narratives for Nuclear Power
Emily Hammond (Professor of Law, GWU Law School)

WEDNESDAY, AUGUST 17: International Perspective on Nuclear Power

Global Nuclear Energy Today: Four Challenges
William Magwood (Former NRC Commissioner & Director, OECD NEA)
Nuclear: A Global Perspective
Neil Wilmhurst (VP of Nuclear, EPRI)

BUSINESS TRACK

BREAKOUT SESSION 1: Delivering Cost Reductions from the Nuclear Promise (DNP Session)

Session Organizer: Tim Schlimpert, (Title, MCR Performance Solutions)

The current financial health of nuclear power plants represents a pivotal moment in the industry's future as evidenced by the untimely and premature closing of critical nuclear units across the United States for economic reasons alone. The Business Track seeks to flesh out key building blocks of the industries' strategic response to the current market conditions; Delivering the Nuclear Promise. These building blocks are the analysis of cost drivers and identification opportunities to improve efficiency (Building Block 1) as well as the redesign of nuclear power plant processes to improve efficiency while advancing the fundamentals of safe, reliable operation (Building Block 3). This session is built around the fact this challenge is not simply a blunt cost reduction but instead a drive to fundamentally rethink age-old business operating practices, improve efficiency, and augment financial culture to help keep nuclear power cost competitive.

Delivering The Nuclear Promise

Dennis Koehl (CEO, STPNOC)

Session Notes

- Nuclear energy is the largest source of carbon-free electricity (62.4%) and this should be communicated better to the public. The benefits of nuclear in the energy mix have to be made clear to the public. Remove the stigma through education. For example, a worker can be moved from site to site no problem because of the intensive training. Whether or not you're in favor of such time consuming training, that's an amazing feat! And the education is working: favorability to nuclear energy has gone up in the long term.

- Market Stresses: subsidies cause distortions, low cost of shale gas, and diversity is undervalued. Be aware of what these stresses are in order to combat them.

Key Learnings

- Intensify efforts to communicate nuclear energy's benefits in ways that get people's attention -- be enthusiastic, be engaged, be constantly trying to bring it up in everyday conversation.

- Encourage stakeholders to help with the effort/help stakeholders with the effort

Q&A

What are you doing for your employees to help them with the effort?
Train, encourage, communicate; it is an opportunity, not a lecture.

How to Save an Industry: Implementing Safety, Reliability, and Economic Performance

Bob Duncan (Vice President, Nuclear Operations & Emergency Management, INPO)

Session Notes

- "Don't promote nuclear power -- promote excellence in nuclear power.""

- Safety is important because it improves industry performance and public opinion. It is not just INPO's job to monitor safety; it is every individual's job.

- Main barrier to success is the leadership i.e. lack of communication, lack of commitment. ""Innovate or drown."

Key Learnings

What is required of us? Anticipate and adapt to change. Think and discern. Continuous monitor of risk/reward implementation. Action with accountability and complete ownership for the industry.

Communicating Delivering the Nuclear Promise

Jeff Dehn (Strategic Communications Manager, Xcel Energy)

Session Notes

- Whatever reason you are in the industry, it is personal to you, and when communicating the opportunity of nuclear to others, that has to be the pivot point or it will fall flat and become a repeated lecture. The primary audience is internal, supporting Building Block 4.

- In the future, we will need to develop with the initiative by continually collecting feedback and survey data, increasing engagement at the plants with people on all levels and with vendors, and measuring the impact before reinforce the successes.

Key Learnings
Engage the workforce by creating an integrated structure. Identify coordinators, champions, communicators, and CNO's. Clarify the function of each (to inform, inspire, mobilize, etc.) and have them all working together, leading at different levels.

Q&A
Nuclear people vs. Wind people, etc. (someone wins, so someone loses) ... What are you doing to work with the wind and solar people instead of just pushing against them?
We need to talk about how nuclear, as a baseload, helps the other energy sources.

What is the right mix? What is the right number? What if it's not enough?
There's never going to be a single number given. There is a different value proposition for each location. We have to be prepared to defend our industry if we have to reduce or add regulations. Just keep the conversation going, keep thinking and promoting an energy mix.

BREAKOUT SESSION 2: Long Range Planning Processes and Tools

Session Organizer: Donna Keck (Corporate Business Consultant, Duke Energy)

Long Range Planning (LRP) Processes and Tools support efforts in Business Planning, Project Evaluation and of course Long Range Planning. Some of the most impactful decisions we make in the nuclear industry are made in these processes to ensure the long term technical and financial viability of our nuclear assets. Presenters will discuss good practices and process improvements in these areas with measurable results where available.

Long Range Planning - Managing Our Future
Pamela Metz (Director of Planning & Strategy, NextEra)

Session Notes
- In 2011, a Resources Planning Program for NextEra was developed that included strategic planning, long-range planning, and project evaluation and ranking.

- Overall, effort came in under budget, but cost was unpredictable due to weak estimates, schedules were too ambitious, and there were many emergent projects. To improve this, financial analysis requirements for large projects was added, the project sponsor was required to be at least a manager, consolidated fleet review boards into one executive project review board (EPRB), and created desktops to assist their users. These refinements improved Governance and Oversight.

- In 2015, Improving Capital Project and Spending Management became a top strategic initiative. ERPB meetings became a monthly occurrence as opposed to an annual one. There were capability reviews and there was a lower threshold required to come to the EPRB (all new projects >$250k as opposed to >$1 mil). They also ensured an adequate bridging strategy between project review board (PRB) and EPRB.

Q&A
- What tools are you using to capture and approve projects?
- Long-Term Asset Management (LTAM). The indicators are all in excel.

- What was the most impactful, productive change that you made?
- Any change that helped the organization recognize its capacity.

- What's the level of rigor in a long-term project?
- Use long-range plan placeholders so you don't have a $12 mil project come out of nowhere because it finally got approval from a specific committee. done.

- What are the results?
- We have now increased the amount of CR's that we're getting around work not being completed. There's a huge focus on operator burden. In putting more rigor around planning, it gets done when they say it's going to get

- Are you also looking at the capacity of the external organizations?

- Yes. There are meetings held with them, we know who has spring outages versus fall outages. It is just as important to consider as internal capacity.

Advanced Life Cycle Management Planning: Building Confidence in the Future

Tim Schlimpert (VP, MCR Performance Solutions)

Session Notes

- Lifecycle Management (LCM) plans suffer from inadequate project identification, lack of coordination and communication, short planning horizons, and a limited plant health committee. LCM plans are about optimizing the investment to achieve the organization's objectives. LCM plan phases identify the appropriate system and components, assess system conditions by interviewing and fact gathering, develop a plan, develop business cases, and finally, review and update.

- Benefits of LCM Planning include greater confidence in the plan, more rigor, better alignment with work management, and key knowledge preservation.

Case Study: Making Credible and Objective Program Decisions with 13% Cost Savings

Kristy Neckowicze (President, Envizion)

Session Notes

- The Case Study revolves around the Oak Ridge Office of Environmental Management. There was an accident at the facility, so it needed to be remediated and modernized.

- When doing Project Management, start at the top. Do you have stakeholder sponsorship? Then, define the objectives. Then, break up the work.

- You increase risk and miss milestones when you think, "We're over budget, we need to cut something!" You cannot act on that without much deliberation. You have to look at the bigger picture. If you delay or cut a project that is connected to another project, you could mess up the entire system and end up spending a lot more money in the long run. Also, though it sounds counterproductive, sometimes the lower-impact projects need to be done first.

- Improvements implemented included real-time access to project information at a "sufficient" level of detail, the development of scenarios that obeyed inter-project dependencies, and the ability to compare and contrast the different ways to go about cutting projects. Communication improved and long-term costs were reduced.

Key Learnings

When planning long range and making decisions, here are the tools and processes needed. First, collect objective and integrated information on all projects/investments. Then, collect such information in timely manner at an appropriate level of detail. Then, continually update costs and expected benefits. Finally, ensure realistic expectations with effective communications.

Q&A

- On the specific tool itself, is it a smart app? Or are you continuing to depend on the independent project managers to come in and say "here is the information"?
- Some companies use a tool to get all of the information together, but as long as you have good people, then there's little wrong with relying on the manual communication of information. And since you're meeting with them regularly, any errors should be cleared up.

BREAKOUT SESSION 3: Cost Optimization and Financial Culture

Session Organizer: Maria Hernandez (Nuclear Corporate Finance Manager, Duke Energy)

The Cost Optimization and Financial Culture session topics will be short term in nature from a budgeting perspective or more broad from an organizational perspective when improving culture. The “cost stack” at any nuclear utility comprises outage, capital projects, O&M projects including major maintenance, base O&M, staffing, and regulatory expense structure. This session will focus on key successes producing tangible results across several of these cost categories as well as potential lessons learned from recent market events. Particular emphasis will be given to the transition from “initiative space” to sustainable operational savings drawing upon the perennial foundations of safety, reliability and profitability.

Cost Effective Operation

Brad Sawatzke (COO/CNO, Energy Northwest)

Session Notes
- The issue wasn't a lack of money or a lack of people... They just weren't operating nearly as efficiently as they could have been.

- Culture is important because everyone understands that plants have shut down and nuclear is not getting subsidies that other energy companies are. These things need to be discussed and made tangible so that everyone can hold themselves and others to a certain standard.

- Business as usual won't cut it, so are we willing to take the necessary steps?

- Single unit approach to driving budget down
  - Set benchmark (they use bonneville)
  - Plan for staffing and communications
  - Review and reduce contractor, capital, and non-labor
  - Don't invent measures internally, rather fully implement NEI delivering nuclear promise goals (through efficiency bulletin)

Targeted Cost Optimization in a Challenging Energy Market
Tim Schlimpert (VP, MCR Performance Solutions)

Session Notes
- A process analysis focuses on cross-functional mapping of workflows. Must be viewed from the perspectives of the implementation as is, as proceduralized, and as industry best practice.

- Zero-based budgeting is the antithesis of a more traditional incremental budgeting process. It requires every budget line item to be risk-ranked and has produced 10% to 15% savings in routine budgets.

- For project evaluation, first establish an active executive review team, link business case evaluations to overall project spending targets, develop robust business cases, and then prioritize projects within the overall portfolio.

- Nuclear Asset Management is very effective for analyzing costs on an ongoing base.

- Effective implementation and use of enterprise-level technologies are vital to the long-term success of nuclear plants. All too often, the software platform is impractical or non-compatible.

Q&A
- The Financial culture piece... Any insights into how to make a change?
- Engagement. You don't have to work hard to get people to understand the issues; most of the time, they already know. You just have to engage them. Promote individual accountability and results will improve drastically.

Using Value to Drive Cultural Change
Phil Jones (VP, Copperleaf)

Session Notes
- In Value-based decision making, you must first agree on what "value" is or the tradeoffs will be inconsistent.

- "Value is ALL of the things that support your company's objectives and deliver benefits to your business." Value also includes costs. Value should become a currency, a language, and a driver of change.

- Having a value-oriented culture enables you to recognize investments that don't merit execution. Zero-based budgeting will come naturally to value-oriented cultures and investment portfolios will become optimized. To help with this, use an Efficient Frontier model and keep investments as close to the efficient frontier line as possible.

- If the risk score is identical, look at how the risk changes over time and assess the project whose risk increases faster.

Key Learnings
- Determine what you value, then when making decisions under that value system, use optimization over prioritization... Case study is a 1-year budget extracted from an optimized 6-year plan instead of conventional yearly budget

Q&A
- Cycle time in the nuclear industry is much longer than in other industries. How do we shorten that cycle time?
- If you have different ways to approach a problem, treat them as alternatives. It might cost more, but because of the timing benefit, it might be worth it. Seriously considering alternatives is key for optimization.

Cost Optimization and Financial Culture

Ernie Kapopoulos (VP, Duke Energy)

Session Notes

- Employees need to know how money is made and spent (employees are the most valuable resource). Every employee needs to be taught how to make money. First year supervisors need to know what their budget is. "Business as usual" is not enough. Focus on controlling what you're planning on spending rather than what was spent.

- DNP Efficiency Bulletins alone are not enough to hit 30% cost reduction

- Fleet perspective
  - Take advantage of Economies of Scale
  - Organization optimization includes doing less with less ("work destruction") and a zero-based functional design from the base up. You can also go after additional savings by leveraging the fleet and realizing economies of scale.
  - Redesign nuclear generation

- To reduce outage costs, establish an outage box (cost, duration, dose, and productivity) and keep inside of the box.
  - Duke Energy saved $77 mil between fall 2014/spring 2015 and fall 2015/spring 2016 (and went from 270 to 161 days). They simply asked people to be more efficient with their time.
  - reduce outage staffing needs (shared resources of large fleet and cap on contractors)

Q&A

- What do you mean by "less with less"?
- We will have less process and the process we have should be simpler.

- Are you using digitization for administrative work?
- We are making a full transition to automatic work packages. We will be paperless in 2017. We are also hoping to free up engineers to do more creative work through digitization of processes.

BREAKOUT SESSION 4: Process Analysis & Improvement

Session Organizer: Adam Dow (Lead Consultant, MCR Performance Solutions)

The Process Analysis and Improvement session will present approaches to analyze processes, identify improvements in terms of efficiency or effectiveness and implementation approaches to realize benefits of improvement efforts. By virtue of their complex interfaces; integrated processes are prone to unnecessary steps, missed hand-offs, duplication of efforts, excess resource consumption and less than optimum results. The major objective of this session is to provide current-market actionable strategies guided by cost or staffing benchmarks, financial or non-financial performance indicators and technology solutions in order to improve plant operating expense performance driving a competitive paradigm.

Adam Dow (Lead Consultant, MCR Performance Solutions), Tim Schlimpert (VP, MCR Performance Solutions), Jim Hill (Senior Business (IT) Manager, Xcel Energy), Steve Bethay (Director, Support Services, TVA)

Process Improvement & Analysis: Assessment to Data to Action

Adam Dow (Lead Consultant, MCR Performance Solutions)

Session Notes

- NEI's strategic plan for delivering the nuclear promise

- Break processes into
  - primarily autonomous (ex. nuclear security)
  - primarily integrated (ex. business processes, work management); these are prone to unnecessary steps, duplication of efforts, and excess resource consumption

- Scope: Through benchmarking, they conducted process variance analysis for key areas (Building Block 3). Process implementations were compared from the perspectives of industry best practice, as implemented, and as proceduralized.

- Approach: Processes are mapped cross-functionally through swimlanes to identify key interactions from the three aforementioned perspectives. From this, you get the Standard Nuclear Performance Model (process level and sub-process level which can be scored through aggregation of data and can then be explained when questioned). A matrix then illustrates the distance between two cost centers. A single matrix shows thousands of comments and months of work and the visualization of such information is

extremely helpful.

- Common solutions subsequent to process analysis and optimization include process integration of systems, life cycle management plan implementation, widespread zero base budgeting, etc.

Key Learnings
- Building Block 3 of the DNP Strategic Plan requires a targeted, data-driven approach to redesign processes to improve efficiency

Pilot Use of Hill: Systematically Improving Productivity
James Hill (Sr Bus IT Mngr, Xcel Energy)

Session Notes
- Lean (www.lean.org/whatslean) is about efficiency and value. Waste does not just refer to tangible objects, but also intellect and wait time

- How do we increase productivity with Lean
  - Do NOT simply bring more staff, more machines, more hours, etc.
  - Use a qualitative approach and focus on eliminating waste, simplifying process, and working more efficiently

- Value Stream Mapping measures the time consumed by each process as well as the value of each process. From there, you can identify where cross-training or other transformations are needed and create a Future Value Stream Map. Bringing different organizations together (I&C with Operations with IT) keeps them from blaming the other for their individual setbacks and gets them all working toward solving the same problem of waste and inefficiency via VSM.

- Benefits of this processes included an increase completion rate, labor savings for elimination of processing waste, an understanding and appreciation processes, interrelationships, co-workers, and a desire to continue to apply Lean for its lasting benefits.

- Individual isolated improvements do not lead to systematic use. A cultural shift is required to achieve sustainable improvement.

Key Learnings
- Nuclear promise cost reduction requires cultural change, not simply a new set of procedures with fewer requirements.

Q&A
- When you're going through the exercise, what were the demographics that participated?
- Older and younger, but we did have over 200 years' experience on the team. We got statements like "20 years ago, we used to just be able to call someone..." The older persons are used to doing it a certain way and the new persons have learned the more complex way of procedures. Now, they're all making decisions in the field and constantly thinking about needed changes.

TVA Continuous Improvement Program
Steve Bethay (General Manager, TVA)

Session Notes
- Delivering the nuclear promise is industry driven, but continuous improvement is internally driven and is further driven when made personal to each employee.

- Employees with improvement ideas should not put their ideas in a suggestion box. They should be given the responsibility to make it happen, to implement it. Results must be measured and presented to higher-ups and there is a point system depending on how effective the change was. Competition, though not required, drives continuous improvement. Examples of successes have been a radio inventory consolidation which saved $200k in spare parts, a contract modification/consolidation initiative (changed to as-needed) which saved around $400k/year, and a security camera project which eliminated an entire security post.

Q&A
- As you rolled this out, how did you work who managed the point system?
- Someone's specific job (someone who works for me) is to educate people on the new process, to be the gatekeeper and to assign the points.

BREAKOUT SESSION 5: Optimizing Site Services: Security, Staffing, Use of Contractors
Session Organizer: Maria Hernandez (Nuclear Corporate Finance Manager, Duke Energy)

The Optimizing Site Services session will focus on successes in cost optimization in Security and other Site Services costs. The session will also discuss methods to analyze and optimize in house staffing and major contractor expenses. These costs are often contract expenses which helps them elude the watchful eye of staffing. They also may have Safeguards issues for Security costs making thorough reviews a challenge. Multiple cost reduction perspectives will be examined including security budgeting and benchmarking, investments in new services or technologies resulting in proven cost savings, discussions around the current regulatory environment and staffing optimization through task analysis and successful implementation of reduced work forces.

Nuclear Protective Services: O&M Recovery 2015

Ed O'Neil (Nuclear Protective Services Director, Duke Energy)

Session Notes

- In June 2016, Duke was $7.6 mil over O&M budget (mostly driven by employee OT and contractor costs)

- They had a beneficial starting point. One of the things they did was a security shift turnover. Everyone was working 50+ minutes over their 12 hour shifts which was counted as OT. To fix this, they the furthest post position out of the briefing first, they made pistol issuance more efficient, among other things, and saved $1.05 mil per site annually.

- Staffing Levels
  - It costs less to overstaff than it does to continually run OT. Staffing levels must be maintained at 100%.

Q&A

- If you have a pool of officers from Securitas, do you maintain a pool?
- No. Securitas will hire additional people.

- Do you keep 60 pistols on site (2 for each of 25 people) or 200 per site?
- People take better care of their own stuff, so we will typically assign each individual their own gun(s).

- Where do the savings come in...?
- We are working on eliminating pistols with one AR-15 and from there, looking at smaller AR-15's. We're going from 2 to 1 and cheaper ammo, less continual training, etc.

Delivering the Nuclear Promise: Best In Class Talent Acquisition Staffing Strategies

Trish McDonald (HR Director, AREVA)

Session Notes

- In order to acquire the talents necessary, the core processes, roles, structure, and tools must be defined and in place. You have to know exactly what you're hiring for.

- Talent assessments must be in place as well as performance predictors. Also, continuing to add previous applicants to your talent pool will help maintain your talent pool.

- Having a Best In Class Acquisition Strategy improves retention rates, performance, and HM (hiring manager) satisfaction (15% year over year improvement).

Q&A

- What do the metrics actually look like? Are you just looking at retention rate? Are you tracking people...?
- Every business is different. We use retention rates. We don't just look at the first six months of them walking in, we track them over several years. We also compare ourselves to labor markets.

- With your hiring process, is there such a thing as an overqualified applicant?
- Yes and we look at them very carefully. We try to give them a different successful career path due to worry about their flight risk.

Using Task Analysis to Optimize Staffing Resource Utilization

Adam Dow (Lead Consultant, MCR Performance Solutions)

Session Notes

- Challenges overall in staffing optimization include inability to discharge contract workforce, in-house staff become de facto project managers, critical work is ambiguous, reduced cost transparency, and critical component experts (OEM's have become ingrained in the organization and this incentivizes a loss of local, in-house component knowledge).

- Conventional approaches are ineffective and harmful

- Hiring freezes are quick and easy, but leaves the workforce waiting for the other shoe to drop
- Contract reviews/freezes are difficult and drawn out and need lots of persons to succeed
- Layoffs are the painful, last resort that damage the cultural and moral of the company

- Once you determine the scope, the next step is to assess the task impact and choose the tools for analysis. Tabulate the information and look for critical work with high FTE's (full time equivalents) and low critical work with low FTE's.

- Once you decide which tasks are more or less deserving... It's time to take effective action through re-deployment of resources, re-classification of job descriptions, termination of contracts, and support for current or strategic approach.

Key Learnings
- Right people doing the right work at the right time with the right resources

- Analysis execution comes down to robust communication, sufficient support, and information management

BREAKOUT SESSION 6: TIP Award Winners (TIP Session)

Session Organizer: Shann Coleman (Manager, Strategic Nuclear Alliances and Variable Resources, Duke Energy)

The TIP Awards are open to individuals and teams from both domestic and foreign utility members of NEI that have created and implemented transfer- able new practices—or improved processes and equipment—within the past three years. To be considered for a TIP Award, the entry must be complete, and the new process or practice must be implemented and address the following criteria: Safety, Cost-Savings Impact, Productivity/Efficiency, Innovation, and Transferability. All TIP Award winners will be recognized at a special gathering during the Nuclear Energy Assembly—the annual meeting of NEI.

TIP Award - Communications WBN Stakeholder Outreach

Steve Higginbotton (Sr Mngr of Nuclear Communications, TVA)

Session Notes
- Stakeholders were generally unfamiliar with nuclear plants and unaware of the redundant safety systems, on top of the media calling the project obsolete so they had to fight for a WBN2 License acquisition. Communications had to establish a cross-functional outreach team to target stakeholder groups.
  - highlight the safety and quality of the unit through tours and briefings
  - telling the story through anecdotes, visuals and employee featuring that reflected the safety and quality
  - demonstrate absolute transparency and commitment

- Results included 380 articles which reached 10.02 mil people, overall favorable/neutral rating of 96%, and 2.2 mil people engaged through Facebook (one of the most effective tools that they used).

Key Learnings
TVA - WBN #2 Stakeholder Outreach

Had its construction restarted after much headwinds both internally and externally including the local media calling it a boondoggle and a brand new eight track tape player. Fought back by providing hundreds of plant tours for local and non-local stakeholders as well as politicians. Engaged with anti-nuclear advocates and environmental activists. NRC Commissioner MacFarlane cited it as a strength in WBN # 2 eventual license approval.

Hired media company for media mentions such that ~96% of coverage was favorable, but most coverage was internally from employees posting informally on their own social media accounts.

Maintenance Strategy Optimization (2016 NEI TIP Award)

Brad Diggans (Program Director of Equipment Reliability, Rolls-Royce)

Session Notes
- Wanted to become more efficient and reduce the workload and improve sustainability

- Results included millions of dollars of savings in maintenance labor, material, inventory carrying costs, and savings from efficiency improvements. Drastically reduced the number of PM's and CM's needed as well as the cost of the remaining PM/CM's.

Key Learnings
RR – Data Analytics Cost Savings

Collected plant data from over 180 nuclear power plants in an attempt to provide better data analytics to reduce maintenance without lowering equipment reliability.

When sufficient data sets were collected (including outcomes) informed & optimal PM frequency times were determined.

When taking costs and operation risks into account then a true cost could be determined and a reduction of work was implemented that resulted in $11 million in cost savings.

The cost savings should continue to increase as deferred,
reduced, and cancelled PM work is avoided over the next few years. Sufficient data sets from Davis Besse were not available, so anonymized data from the other 180 nuclear plants was used.

*No Presentation Title Provided

Daniel Geraghty (Training Manager, Duke Energy)

Session Notes

- Ran a Lean event because they were bringing in people 5 weeks early because of a lack of a process. After the event, they found out that the average time it took to get someone a badge and get them on site took 5 days.

- They were accused of being "hack and slashers" (reduce training time which will only lead to unqualified people). There was a lot of argument back and forth of "you can't train them in days, you need weeks" and "yes we can." And they did even more efficiently than they had anticipated. Almost too efficiently (their parking lot was full 3 weeks before the outage began).

Key Learnings

- Really invest in the people. Pour into the people. Churn the thought process and get the people involved.

Duke Energy – King's Mountain Training Facility

It took almost 5.5 days of training at Duke Energy's central training facility for contractors/vendor/new hires to get trained and badged.
Additionally, the completion times were unpredictable.

By performing LEAN analysis, the average amount of days training has been reduced to 2.5 days and the completion times were much more predictable.

Improvements have come from the individual contributor (in the trenches) level workers.

Coming January 2017, standard NANTEL/PADS modules will continue to drive training day times for Duke Energy and throughout the US Nuclear Industry.

TIP Award: Post Fukushima Seismic Safety

Kenneth Canavan (Director, EPRI)

Session Notes

- Fukushima was a disaster because of the tsunami, not the earthquake.

- There was an effort to reduce the costs of investigations and regulations that had been put in place to prevent an earthquake-caused disaster.

Key Learnings

EPRI – Post Fukushima Seismic Safety
Industry leaders got together to come up with strategies to deal with seismic risk if the seismic risk of US nuclear power plants were determined to exceed the assumed frequency.

For plants that determined that their assumed frequency was lower, then cost savings were realized for reduction in future evaluation frequency, reduction in work scope, and elimination of work entirely.

BREAKOUT SESSION 7: Knowledge Transfer and Retention (Cross Listed with ENGINEERING / EQUIPMENT RELIABILITY)

Session Organizer: Dan Redden (Sr Engineer, Corporate Engineering, Exelon Nuclear), Ted Quinn (President of Technology Resources, ANS Past President), Tim Schlimpert (VP, MCR Performance Solutions)

The turnover in engineering disciplines occurring across the industry, including its vendor base, is resulting in a widespread diminishment of engineering knowledge, skill, and proficiency and this has played a key role in consequential events. Within all nuclear plant disciplines and departments, a key organization goal is to develop and implement effective Knowledge Transfer and Retention Programs using formal training and mentoring. These programs are designed to maintain industry, fleet and specific plant expertise to optimize plant safety and performance. The major objective is to support the development of the next generation of site and corporate technical experts for specific topical areas. The Engineering and Licensing disciplines are the most vulnerable. Competency in Design and Licensing bases, Operating Experience, vendor methodologies, etc., is a major element of Engineering and Licensing KT&R. Speakers will address specific plant, fleet and industry lessons learned and best practices as well as INPO's role in supporting the development of computer-based courses, made available to U.S. nuclear utility staff through the INPO NANTeL training system.

Advancing Safety and Reliability - Engineering Knowledge, Skills, and Experience

Sudesh Gambhir (Engineering Lead, INPO)

Session Notes

- Knowledge transfer from Architect Engineers was not systematic and design basis knowledge was not preserved. Consequential errors become more and more prevalent...

- Initiatives for reducing consequential errors
  - Advanced engineer training
  - There was an industry-wide effort to improve technical competence
  - Knowledge transfer and a healthy technical conscience was promoted (knowledgeable employees must understand what knowledge it is they have that they need to pass on)
  - Provide a forum for industry including EPRI to develop new training modules that can be easily shared

Engineering Knowledge Transfer and Retention

Dan Redden (Sr Staff Engineer, Exelon Nuclear)

Session Notes

- Elements of the Exelon Engineering 2016 KT&R Strategy
  - Exelon University: Courses include mentored cert guide sessions, SME led discussions on specific topics, and vendor led skills training or cert guide prereq training.
  - Advanced Engineering Training: Computer-based training (CBT) modules covering very narrow topics (ex. flooding). Often at older plants, the flooding experts have long since retired and there are no experts left at that plant. These CBT's are the first step in creating experts (followed by apprentice work and a review of the site specific records).
  - Knowledge/Skills Assessment, Development, Management: Engineers perform individual self-assessments,

- The outcome of this process is a 5-year staffing plan and next year's IDP's (Intern Development Program)

Q&A

- Is succession planning different?
- Yes. Succession planning is often done behind closed doors. There is more focus on the technical competency of managers so that they can second-guess some of the technical decisions being made. Our technical proficiency "training" is done in a much more open environment. Also, not everyone wants to be promoted; and that's not a bad thing. Lateral movement is not a negative movement.

Knowledge Management Impact On Organizational Proficiency

Dave Heler (Manager NHRG)

Session Notes

- Key elements of knowledge management include
  - People: orientation, teaming, sharing, and training programs
  - Process: maps, procedures, best practices, knowledge risk assessment
  - Technology: data bases and warehousing, wikis, data mining and search tools

- Knowledge management is a transcending process that touches on all parts of an organization

- HR's role is to introduce the employee to the industry, the Trainer does most of the work from there, but the Manager is key in "experting" the worker no longer than 4 - 10 years into their career. This last component HAS to happen because of the age gap.

- The people we're bringing in now will be talking about the same issues we are talking about today because there is a huge gap of employees between the ages of 30 and 45. Almost half of many staffs have less than 5 years of experience. This causes adverse effects on leader oversight, worker proficiency, workforce development, operational experience and overall plant performance. Retirees are being brought back in to train the young people because there is such a need for such training, but this is not a long term solution!

- To solve this, you must really understand the issues caused by the age and experience differences. Implement a knowledge risk assessment process and create a knowledge capture tool (there are a million methods for this). Implement a leadership review committee to provide oversight and create knowledge and skill development programs even beyond accredited training areas. Finally, and most importantly, establish a plan for replacing critical knowledge workers before they exit the organization. AND, get this information in front of the leadership.

Current Efforts in Knowledge Management at the NRC

John Lubinski (Director, Division of License Renewal, NRR, NRC)

Session Notes

- Strategic Workforce Plan: map the current workforce to the projected future work; ensure you have the right number of people with the right competencies at the right time; understanding, utilizing, and developing critical skills; identifying and planning for exit employees; continual monitoring and reassessing.

- Creating a competency model benefits recruiting, onboarding, career planning, etc. A competency model is the roadmap that closes skill gaps, increases engagement, and drives intrinsic motivation to succeed. Facilitators and recorders interview several high performers and a manger to identify critical skills and create a workshop for the lower-level employees.

ENGINEERING/EQUIPMENT RELIABILITY

BREAKOUT SESSION 1: Preserving the Nuclear Promise: New Reactor Experience and Advanced Reactor Initiatives (Cross Listed with REGULATORY RELATIONS)

Session Organizer: Marilyn Kray (Vice President, Nuclear Technology Strategy, Exelon Nuclear), Pareez Golub (Vice President, Engineering and Technical Services, EXCEL Services Corporation)

Preserving the nuclear promise extends beyond the operating fleet into the next wave of reactor construction and advanced reactor development. Action is needed now in order to sustain the nuclear industry and preserve the nuclear promise for the next generation. This session will cover the spectrum of new plant designs ranging from the large LWRs under construction to the SMRs and Generation IV advanced reactors under consideration. The session will also address the various regulatory approaches being considered for the continuum of designs. Come and see the future of nuclear!

V.C. Summer Nuclear and AP1000 –Advancing to the Next Generation

David Lavigne (General Manager, Operational Readiness, SCANA)

Session Notes

SCANA submitted their application for a Combined Construction and Operation License at the end of 2008. It was granted on March 30, 2012. The current target for commercial operation is the 2019/2020 timeframe. The AP 1000 control room simulator design includes numerous technology changes, including fully digital indications, computerized emergency operating procedures/abnormal operating procedures, and mouse driven control.

The Updated Final Safety Analysis Report process for the AP 1000 plant has been complex. The process to license operators using an approved simulator is not clearly spelled out in regulations for new plant designs. The AP 1000 instrumentation and control design is not complete, so SCANA does not have a traditional Plant Reference Simulator.

The new 10 CFR 52 process combines the construction and operating license into one permit. 10 CFR Part 52 leaves little or no room for interpretation. Design criteria must be understood to the lowest level of detail.

The nuclear industry needs to work with the NRC on rule-making to provide better guidance to improve the 10 CFR 52 process.

Key Learnings

Technology change: the future is here, digitized C/R, fully integrated utility.
- 10 CFR 52 leaves little or no room for interpretation.
-Design criteria must be understood to the lowest level of detail.
-Work with NRC on Rule Making to provide better guidance.

NuScale Power: Design, Licensing, Deployment

Mike McGough (Chief Commercial Officer, NuScale Power)

Session Notes

Provided overview of NuScale Plant Design. Size equal to the size of S/G from Westinghouse. Three Methods: convection, conduction and gravity. In a loss of offsite: design to safely shut itself down. Integrated testing facility: press release tomorrow morning to announce the testing. Hardware- recipient of DOE hardware grant. Licensing: Reg. Info. Report, design application is to be submitted no later than this year. about 95% complete.

A NuScale Power Module (NPM) includes the reactor vessel, steam generators, pressurizer and containment in an integral package that eliminates reactor coolant pumps and large bore piping (no LB-LOCA). Each NPM is 50 MWe and factory built for easy transport and installation. NPMs can be incrementally added to match load growth - up to 12 NPMs for 600 MWe gross (~570 net) total output.

Utah Associated Municipal Power Systems (UAMPS) Carbon Free Power Project (CFPP) will be first deployment, in Idaho.

Coolant Flow Driven by Physics. Core Damage Frequency Significantly Reduced.

NuScale's additional barriers include water in reactor pool, s stainless steel lined concrete reactor pool, and a biological shield covers each reactor. There is a smaller Emergency Planning Zone (EPZ) Due to Safer Design. The combined operating license application submittal for the NuScale Power Module design is to be completed by 4Q-2017 or 1Q-2018.

Q&A
Describe other projects you are working on?
NuScale projects has numerous options for sites. UK is working on preparations for an SMR. Various countries may do reviews and share information. Globalization is a theme. NRC has provided assistance to countries without nuclear regulations.

Advanced Nuclear Energy
Nicolas Smith (Senior Research Engineer, Southern Nuclear)

Session Notes
Advanced Energy Systems- looking at everything that could help in making cheap power for the company in the south east. The goal is not to be profitable, it is to be a useful. Doing things philosophically for the greater good. 50% replacement needed by 2025, that is a huge amount of energy. we need a huge dominate source of energy. Nuclear is the source for the energy needed by 2025. People are irrationally afraid of nuclear, we have a great challenge.

Reactor design - options and benefits of each discussed. Advanced Reactor technology is gaining attention and funding. Recently, an award was granted for TerraPower's Molten Chloride Fast Reactor (MCFR). Action now is critical to success and nuclear sustainability.

Key Learnings
New investors interested in advanced reactors and new technology: bill gates/ policy makers/…

NRC Non-Light Water Reactor Mission Readiness
Jennifer Uhle (Director of the Office of New Reactors, US NRC)

Session Notes
Stakeholder Feedback: Initiative to be very efficient. don't impose unnecessary burden. 1. Technical readiness, 2. regulatory readiness, 3. optimize communication (3 strategic objectives). need to be ready by 2025. Been listening to the stakeholders, having a step wide. Working on submitting a porting of the design to show a progress, get it approved and work on the next step.

The NRC recognizes that reviews need to be efficient for non-light water reactors (LWRs). A strategy document developed. Funding is needed to support progress and NRC staff is currently small. Readiness means having the knowledge, analytical tools, etc.to support reviews. Regulatory readiness is needed. No risk-informed information is available currently. However, the work done for small modular reactors (SMRs) benefits non-LWRs.

The near-term strategies include acquiring/developing sufficient knowledge, technical skills, and capacity to perform non-LWR regulatory reviews. Additionally, sufficient computer codes and tools are needed to perform non-LWR regulatory reviews.

The near-term strategies include the establishment of a more flexible, risk-informed and performance-based non-LWR regulatory review process within the bounds of existing regulations, including the use of conceptual design reviews and staged-review processes.

Mid-term strategies include resolving technology-specific policy issues that impact regulatory reviews, acquire/develop sufficient technical skills and capacity to perform regulatory reviews/oversight, and develop a new non-LWR regulatory framework (if needed).

The long-term strategy is to finalize a new non-LWR regulatory framework (if needed) that is risk-informed, performance-based, and that features staff review efforts commensurate with the demonstrated safety performance of the non-LWR design being considered.

Key Learnings
Communication is vital!! Developing a plant design is a huge effort. Regulatory readiness: guidance for other designs Advanced reactors. Staged Review Process: we are modifying how we typically work to meet the needs of the vendors. What do we mean by readiness? knowledge, train staff. have analytical tools available: reaching out to the national labs. Ongoing effort for briefing staffers, dealing with DOE or NRC. don't want to be in a situation where congress is directing the review of non-LWR. Continue to listen to stakeholders to determine what's needed.

Q&A
How does the licensing process work? Any difference for a 12 module design?
How is reactor cooled, security, etc. Licensing will be on a modular basis. Similar to a COL applicant. Same process for one or numerous modules.

BREAKOUT SESSION 2: Think Smart Think Digital: Delivering the Nuclear Promise through Digital I&C

Session Organizer: Raymond Herb (Digital Principal Engineer, Fleet Design, I&C, Southern Nuclear), Pareez Golub (Vice President, Engineering and Technical Services, EXCEL Services Corporation)

There are a lot of misconceptions, myths, and fear surrounding digital projects. With the pressures to reduce costs, there is a need to do more with less. The single largest cost driver is the cost of manpower, the second being equipment replacement. Digital components require less periodic maintenance, and are more reliable and digital controls reduce wear and tear on controlled components. The reduction in maintenance and replacement costs results in big savings and ultimately a smaller, more agile workforce. Come and see examples showcasing where digital technology has increased reliability, increased power, reduced manpower, reduced outage time, and contributed to long term reliability of large investment assets.

Improving Equipment Performance through Digital I&C

Michael Bailey (Director of Digital Engineering Support, Nuclear Corporate Engineering, Duke Energy)

Session Notes

Provided overview of Oconee nuclear station (ONS) modernization project. Benefits are: Equipment Reliability Improvement, Improved System Monitoring (how can we make it easier for OPS and ENG), and Reduced Maintenance required support. ONS came online in 1973, designed and built in late 60s using early 70s technologies. There are improved ways to achieve performance. Driver from an ENG and MNT stand point is to improve systems and processes with replacement and reduction of number of preventive maintenances (PM). Reduces maintenance activities and number of steps in operations procedures; and, in conjunction with new upgrades, would allow focus on more important priorities.

Key Learnings

Reduces maintenance activities and number of steps in operations procedures; and, in conjunction with new upgrades, would allow focus on more important priorities. Digital Modernization is more programed into the system and allowed elimination of extra crew work on the weekend. Improved process drastically. Reduce outage window when we're starting the outage. Automation of certain processes that previously had to be monitored by the operators.

Q&A

Questions were held at the end for all the speakers to answer:
Q1. how are we addressing obsolescence's?
A1. build into contracts for 20+ years with vendors. hasn't been seen through DCS, more so with supporting components/switches/valves/routers (control system networking with the plant); supporting components go through a cycle 6-7years of replacement.

Q2. economic challenges?
A2. we live in an economically challenged industry. Digital Modernization allows for savings over the long run, maintenance. activities, efficiently managing the secondary side steam production, and replacement of equipment and PM activities.

Q3.how can we improve the Digital I&C modifications going forward?

Q4. How do you handle configuration management and configuration control with this process change?

Q5. have you had to reduce the workforce?

Q6. what makes the resolution to the digital systems better for nuclear?

A3. There is an industry wide initiative looking at improving the Digital modifications. NRC action plan to address regulatory concerns. 5059 process to handle Mods: digital I&C implementation.A.4 Handled through defining upfront. implementing EPRI document for guidance. part of the design activity is inviting the operations and maintenance representatives to the initial planning meeting to involve different organizations in developing the procedures.

A5. no, the modifications didn't result in reduction of workforce just shift of focus on other important jobs.

A 6. obsolescence. having upgraded strategy. Improving equip. reliability. and eliminating single point vulnerability. "

The Tangible Benefits of Digital Modernization

John Connelly (Engineering Manager, Exelon Nuclear)

Session Notes
Modernization: Digital technology is the approach for modernization. Standardized solutions through targeted individual upgrades at the sites such as Digital voltage regulators/Cyber Security. Systems that were installed weren't to industry best practices, redundancy, maintenance activities, etc. Now we are looking from an equipment reliability point of view and cost. Performance charts: we can look at the performance history, and call out SCRAMs that results from the Digital equipment. Analysis data: direct comparison between analog vs. digital. Feedwater control system, turbine controls, 488 unit years of operations worth of data. This tells us that there is a lot to be gained. digital is better: Modifications by and large is much better. Enhanced maintenance practices, training, equipment.

Key Learnings
Enhanced maintenance practices, training, equipment.

Q&A
See above

Realized Benefits of Digital Upgrades at Millstone Power Station
Richard Gigliotti (Consulting Engineer, Millstone Power Station, Dominion)

Session Notes
Richard discussed specific projects upgrades at Millstone.
-Steam Generator Feedwater Pump (SGFP) speed control system: Previous systems were a significant operator burden and trip-sensitive, requiring dedicated operator response. The replacement system is a digital control replacing with a single hydraulic actuator. controlled steam could not have been implemented with analog.
-FW heater level Control System: previous system resulted in a number of trips during turbine control valve testing. weren't seen after the new system was installed. new system highlights: DCS, redundant, Digital valve positions. valve positioner maintenance man-hours reduced by >50%.

Q&A
See above

BREAKOUT SESSION 3: Delivering the Nuclear Promise: Advancing Safety, Reliability, and Economic Performance (Engineering Initiatives)
Session Organizer: Scot Greenlee (Sr VP, Engineering and Technical Services, Exelon Nuclear)

Within the Delivering the Nuclear Promise theme, there is much that engineering can do to help maintain safety while optimizing the many aspects of engineering in support of plant operations. The Chief Nuclear Officers (CNOs) for all utilities have established key goals in each plant discipline area and engineering's role includes the following:

1) Making "Margin Management" more efficient.
2) Updating component classifications to focus on the most "critical" equipment so that preventive maintenance strategies can be optimized using new tools.
3) Standardizing the modification process across the industry, along with the development of a common software platform.
4) Supporting improving organizational structures and gaining efficiencies in systems, programs and design engineering.
5) Implementation of an NRC endorsed screening process to reduce NRC reviews of low safety significance Materials Program documents.

Speakers for this session will outline progress on these initiatives, lessons learned and the remaining challenges to implementation. Additionally, the audience will be part of a brainstorming session to surface new ideas to support Delivering the Nuclear Promise.

Delivering the Nuclear Promise: Advancing Safety, Reliability, and Economic Performance (Engineering Initiatives)
Scott Greenlee (Sr. VP. Eng. and Tech. Services, Exelon) & Mark Woodby (VP, Engineering & Technical Services, Entergy)

Session Notes
Component Classification Cluster. Two phases for changing the definition of critical equipment and systems. Previous philosophy has been to "never let critical equipment fail. In turn failure could lead to a SCRAM (single failure vulnerability)". New philosophy is to try to change the definition of critical components. Looking strategically at degrading nuclear safety related components and systems. which would allow more margin in terms of PMs and maintenance activities. Efficiency Bulletin Colors: green-means recommended but utilities don't have to implement them, Blue- have to do them-on their own timeframe, Red- have to implement with a specified timeframe. --Implementation of Common software's for the industry. Industry database software: tells us how much

would it cost to do maintenance activity, also Data Visualization software: evaluate strategy based on cost. ENG-003: standardize one process. Highlight: vision for a software tool for KTR to guide engineers'/maintenance personnel to perform activities. Also to ensure we are doing the right level of modifications.

Mark Woodby: covered ENG 004 and 005. Forward focus on what's really important for engineering. following a graded approach. changing process towards optimization. Focus on System/Design/Programs Engineering and Maintenance. Also, Maintenance Rule focus and Health Reporting(HR). for HR: want to convey the same info without the admin burden. Want to be able to issue the bulletins by the end of the year.

Key Learnings

There are lots of changes coming with the nuclear promise, it is going to take a long time for utilities to change the cultures and adjust.

With our Regulated Utilities and our nuclear promise efforts. everything we're doing might not be enough. We have to do more. Looking at what's the right organization structure. There will be a lot more focus on employees: 1. Capacity 2. Ability. Shaping the organization with the right engineer of choice. The Industry is at a Fast Change.

Almost everything we do at a utility comes from engineering, there is a high technical reliance on engineering personnel. Engineering is the driver for the nuclear promise. Focus is on doing the core functions for system engineers, such as long term planning for systems verses being called by maintenance and operations every day to assist in troubleshooting.

Brainstorming

Other session organizers also made commentary: Bradley Adams (VP Fleet Engineering, Southern Nuclear), John Elnitsky (Sr VP, Nuclear Engineering, Duke Energy), Bob Coward (Principal Officer, MPR; ANS President-Elect)

Session Lead brainstormed with the audience: "What are we missing for the nuclear promise"
-Phase 2 for Design Process to achieve the saving. most of the cost is in the production phase (i.e. Calcs, Drawings, etc.)
-Common Operability Evaluation in Orgs.
-50.59
-Refocusing System Engineering Function to long term planning
-KTR/Technical Competencies
-Advanced Engineering Training Modula's- EPRI/industry standard
-Graded Approach based on Risk
-M-Rule
-P.M. Change Process

BREAKOUT SESSION 4: Efficiently Realizing the Promise of Risk Informed Engineering Programs (50.69) (Cross Listed with RISK MANAGEMENT)

Session Organizer: Tom Zachariah (Project Manager, Risk Assessment, NEI)

In support of implementing the "Nuclear Promise" this track includes sessions with the early adopters of 10 CFR 50.69, "Risk-informed Categorization and Treatment of Structures, Systems and Components for Nuclear Power Reactors". The scope and breadth of what this risk-informed initiative can do to help reduce costs is considerable. Results and lessons learned from pilots that are already under way will be discussed and will include sessions related to understanding actions being taken to cut 30% of plant operating costs. This session will be combined with other tracks to provide a broad based, multi-discipline understanding of the topics being discussed.

Forming a Cost-Competitive Industry with Risk Informed Engineering Programs

Tom Zachariah (Project Manager, Risk Assessment, NEI)

Session Notes

Bob introduction: 50.69 has the ability to allow us to save money that most efficiency bulletins and focus on the high risk components. As you listen to the presentations focus on how we can bring the industry together to implement 50,69 to save on our nuclear costs.

The 50.69 process has the most potential to DNP to allow us to focus on the truly high risk safety related products. This is a direct input to reduce cost to meet the DNP initiative as an industry.
This process is not too expensive.

Tom Zachariah Discussion: This initiative is to reduce the work burned on the low risk component. Maintain safety and improve efficiency. Improvement to be demonstrated by the south Texas project and south nuclear as the pilot plants. 50.69 provides a

Scoping Rule to the industry, that scopes all the low safety significant SSCs. Designed to be methodical and strategic. every step is up to the licensee. The submittal by the rule requires 4: Categorization Process, Risk analyses, PRA Peer Review Results, Risk Sensitivity study process. Currently we are working with the NRC to streamline the process. The next step for the Task Working Group: is to develop NEI 16-09 Implementation Guide.

The purpose is to reduce focus on low safety significant portions and focus on the high safety significance.
South Texas Project and Vogtle have both implemented 50.69.
These two plants have shown that 3/4 of the systems fall into low safety significance. As part of the 50.69 rule it scopes these low safety significant systems out of many programs.
Alternate treatments are licensee controlled and only have to show confidence but do not have to NRC directed actions.
Must do entire systems but do not have to do all systems in the plant. Cannot perform 50.69 on individual components.
Must have all hazards evaluated but do not need to have a PRA analysis of all hazards. IPEEE seismic evaluation is acceptable to address seismic.
The next step for the task force is to develop the implementation guidance (NEI 16-09: Risk Informed Engineering Programs 50.69)
There is a need to coordinate submittals across the industry to ensure that we do not overwhelm the NRC and cause delays for plants that are ready to implement.
The review periods are very excessive, Vogtle has passed 4 years in this process. NEI is involved in trying to get the review interface streamlined."

Key Learnings
Summary: trying to convince the industry to submit for a 50.69. Not Submitting 50.69 leaves significant operational savings on the table every year for the industry. It's a tool that gives Licensees control.

Q&A
See presentation for list of frequently asked questions.

Are we looking at submitting a single LAR for the industry instead of site by site?
There is discussion about a fleet approach within Exelon but the industry approach does not look to be plausible.

Is there an obligation to apply 50.69 to non-safety systems?
There is no obligation to apply 50.69 to any specific system, you are allowed to select the systems that you want to apply 50.69. The only requirement is that you apply the methodology to the entire system including the non-safety portions of the system.

Will the guide include the business case/strategy for implementing 50.69?
The guide will include the methodology for selecting the appropriate systems to apply 50.69 to.

When will the guide be issued?
The goal is to issue the guide early 2017.

Overview of Exempted Programs and Alternate Treatment
Pat O'Regan (Technical Executive, EPRI)

Session Notes
Discussed Programs and processes of what is in the 50.69. Limited to specific programs. some programs are exempted, "special treatment" requirement are removed from scope of a RIEP (10CFR50.69) application. Currently the industry is working on developing guidance documents and updating currently available information for better industry understanding. NRC has a specific definition for "Special Treatment" defining SSC requirements and particular examination techniques. In particular, the NRC has specific requirements on what we can and cannot do. Pat provided an example Repair Replacement and discussed the NRC requirements and 50.69 applicability.

There are a few EPRI technical reports available to assist in implementation of 50.69.
50.69 is a safety rule, this is demonstrated how the rule treats high risk components.
The burden reduction is only available for ASME Class 2 and 3 components. Class 1 components will not see a benefit from 50.69.

Need to focus on where we are spending our money to determine where 50.69 is going to be effective.

Key Learnings
Summary: 50.69 is a safety rule that helps us scopes all the low safety significant SSCs. Working with the Industry and NRC to better understand and identify the requirements and alternatives.

Q&A

Any changes to the piping code would only apply to the maintenance process, would not affect the design code of record?
Correct

If a component is not part of the PRA do you still have to model it?
You are not required to model those components that are not included in the PRA.

Q. when performing modifications, How is performing Equivalency evaluation handled with the reduction of classification? A. We will have to meet the functional design and the design change process, however the specification is a lot less.

Risk Informed Categorization- Overview

Ralph Chackal (Senior Consultant, AER Inc.)

Session Notes

Ralph Chackal- Discussed the process of how you categorized SSCs. Tracks for the process (qualitative, functions, etc.) can be processed in parallel, then following would be PRA model and other models such as Fire model. Once a System is selected all the components in the systems have to be evaluated. Electrical systems provide a challenge. Ralph Chackal provided an example of what system selection criteria would look like. System Functions would include system boundary and components, sub-divide functions would provide granularity. For System Function Risk- Integrated assessment/weighted assessment would allow you to evaluate both models resolution if each of the model have a different outcome. Defense-in-Depth: strategy for multiple independent and redundant layers of defense to compensate for potential human and mechanical failures.

It is recommended that for the electrical power systems that you categorize the loads prior to doing those systems.

You can do an integrated weighted assessment to evaluate a reduced risk, this is something that can be done in a single day for a component.

The periodic inspection portion of this requirement is counter to the DNP initiative. Though there is overall savings, invoking periodic inspections exposes the industry to additional efforts. At some point in the future it may be worth investigating removing the periodic inspection requirement but this is the best improvement that we have at this time.

Q&A

The IDP has the ability to overrule due to considerations, how is this documented?
The NEI 16-09 will consider layout the requirements for documenting the exemption considerations for components.

Q1. What is the benefit you saw in having a Fire model vs.
not having a Fire model?

Q2. Follow up question- if you determine a fire
model, do you have to use it?

50.69 Lessons Learned from Southern Nuclear.

Vish Patel (Risk Modeling Manager, Risk Informed Engineering, Southern Nuclear)

Session Notes

Vish Patel- discussed project lesson learned. Project kicked off 1/26/2011, this was before the nuclear promise roll out. Highlights of the Project and best practices are:
-All components within a system, developed a controlled database in the management program for component determination.
-Results after all the categorization are officially put and documented in a controlled database.
-Developed defined criteria to determine the differences between the project and program development.
-Selected Three Systems for initial phase: Containment Spray System, Chemical and Volume Control System, Radiation Monitoring System.
-Remember: Classification is different than categorization. -50.69 does NOT change the classification.
All of the results were documented in PDMS.
Licensing, program, and system engineers need to be heavily involved in the process to develop the LAR and categorization of components per 50.69.
Took over 2 years to receive NRC approval for the LAR.
The owners group is looking to see if work for specific systems can be performed generically.

Key Learnings
Key- keeping licensing folks and program engineers/system engineers informed and involved in the 50.69 process. Provide Training!!

Q&A
What is the most impactful benefit on the CVCS system?
At this time the alternate treatments have not been applied yet. But they will be soon procuring commercial valves to use in the system.

BREAKOUT SESSION 5: Equipment Vulnerability Reduction

Session Organizer: George Malone (Engineering Director, Exelon Nuclear), Nally Osburn (Fleet Equipment Reliability, Duke Energy)

This special session on Equipment Vulnerability Reduction will focus on the lessons learned and best practices in the various aspects of improving generation performance through equipment vulnerability identification, mitigation, and elimination. Despite previous efforts to improve nuclear generation profiles, industry SCRAM rates were flat for the past several years and equipment issues continue to be the major contributor. Several initiatives were commissioned by utilities over the last several years with the focus on identifying and managing vulnerabilities that could lead to a SCRAM. This session will share industry experiences and best practices to improve equipment reliability and the approach needed to maintain these efforts in support of the Nuclear Promise initiatives. Speakers from utilities and industry organizations will share the progress and future actions of this important element in fulfilling the nuclear promise and will include a panel discussion with the audience at the end.

Duke Energy Fleet SCRAM Prevention
Tom Cosgrove (General Manager, Corporate Engineering, Duke Energy)

Session Notes
Discussion on identification of historical SCRAMs and analysis of the data. -started the efforts back in early 2000s. Identified multiple of SCRAMS due to number of systems failures and or/ aging affects.
Solutions have been involving implementation of modifications pretty efficiently, identification of critical components maintenance, and PHC involvement in the bridging strategies for preventions.
Actions for aging Management: systematic long range plan for improvement. When it comes to decision making, challenge operators to make the right decisions.

Key Learnings
Key takeaway advice: get involve in INPO SCRAM ongoing
industry discussion.

(we share OE pretty good, there's also another
side of the story that we miss unless we get in on the discussions.)

Q&A
Q. Can you give us an example of Aging and Design issues you have addressed?
A. weak modifications made to the plant, latent issues resulted in SCRAM. Also,
absence of post mod testing, software glitches, over voltage protection, lack
of testing during the design implementation.

Exelon Vulnerability Reduction
George Malone (Engineering Director, Exelon Nuclear)

Session Notes
Exelon identified a number of business plans to address SCRAMS and single point vulnerability. The goal for developing the risk tools is to be proactive vs. reactive.
Programs have improved troubleshooting effectiveness, specifically electrical IC. Additionally, Engineering Organizational Leadership and CFAM have resulted in effectively challenging the sites to change the culture and be more proactive. Retrained entire organization to think "what's the worst thing that could happen" and Know how to eliminate it, or have a strategy. The results of 2016 are largely due to the risk management process on how to do emergent maintenance and what to focus on.
Plant Health Committee:
-Categorize vulnerabilities in risk space. all vulnerabilities are identified /reviewed at PHC.
-Provided Plants with the appropriate resources. PHC was trained on the vulnerability process/ how to challenge engineers.
- Prior SPV elimination efforts were incomplete, everyone has to go back and reevaluate.

Key Learnings
As we go through the risk management process do we have the appropriate tools. ensuring high technical conscious intergraded in the organization.

Q&A
Q. use of risk based rules, can u give examples of what you did?
identifying multiple multisite modifications installed across the fleet:

A. example: EHC (turbine control system), put duplex screening on CV/SV and on the system pumps to allow swapping during online service. BOP pump trip, had SPV- the change allowed redundancy. PWR- MSIV modifications / high rad monitors, single power supply.

Entergy Nuclear SCRAM Corporate
Vince Bacanskas (Director/Chief Engineer, Entergy)

Session Notes
Vincent-Entergy Nuclear SCRAM Corporate Event Review Team (CERT)
it's important to know what is the oldest component in the system.
Example discussed manual Feedwater pump and identified heater drain switch associated with the system as SPV. The question the plant was faced with was “how to address an aging related problem with a calibration frequency". The plant's go to approach/mitigating strategy was wrong and they realized they needed a change.
As a solution, Entergy developed the CERT team and included INPO members on the team as well as industry benchmarking for best practices for the newly developed CERT team.

Key Learnings
**Educate!!! the staff what it really means to be a SPV and how to change it. Find a definitive cause, when problems are identified. specifically, FMEs.

Risk-Informed Applications Used at STP
Fatma Yilmaz (Reliability Engineer, South Texas Project)

Session Notes
Risk-Informed Applications Used at STP.
Use of the applications is directly in line with the DNP initiatives.
Risk-Informed Component categorization process. Risk-Managed Technical Specifications. Risk-Informed STIs. Generation Risk Model. Risk-Informed Decision Making Tool. Started the initiative early in 2000s however when revisited discovered missing components and definition uncompleted for SPV.

Q&A
Q.do you have a specific tool you use to look at all of processes and programs:
A. We complete the evaluation separately for each and the engineers input into
monitoring plans accordingly.

INPO Insight for single point vulnerability
Thom Huckaby (Equipment Reliability, INPO)

Session Notes
- INPO Insight for single point vulnerability:
General SCRAM causes from industry trends and organizational causes. Highlight is that 5 units accounted for 25% of industry total scrams (17 scrams total).
causes: weakness in identifying vulnerabilities, buried or not communicated. work package and quality. Bias to modify plant design to eliminate SPVs vs. other mitigation strategy (such as PMs or acceptance of risk). the
definition of Critical component is being changed however the new definition
still includes equipment failure that can result in a reactor scram.

BREAKOUT SESSION 6: Changes in Component Classifications and The Promise Approach to Maintaining the PM Program (Cross Listed with MAINTENANCE/WORK MANAGEMENT)

Session Organizer: Jon Anderson (CEO, ACA Inc), Nally Osburn (Fleet Equipment Reliability, Duke Energy), Mark Utz (Manager, Corporate Work Management, Exelon Nuclear)

You are maintenance and suddenly 95% of the components at your plant are non-critical. Finally, you can rid yourself of all those pesky PM's and start saving manpower. Be careful what you wish for! Changing PM strategies in such a way to maintain the required amount of component reliability for the minimum amount of cost is a tricky business, and not well understood by the nuclear industry as "reliability at any cost" has always prevailed throughout the industry. This session is designed to give you the sense of the next steps to take in keeping your plant safe and reducing your costs. This session will start with a discussion about critical component classifications and then move into a discussion of real results from the Promise approach to manage the PM Program.

Nuclear Promise Component Cluster

Rich Weisband (Sr Staff Engineer, Exelon Nuclear)

Session Notes

Goal is to develop a new critical component definition/classification.

Proposed new definition: credible single active component failure will directly result in: reactor trip/scram (single point vulnerability), significant power transient >= 20%, MSPI monitored component failure, single failure that results in loss of core, reactor coolant, or SFP heat removal, containment isolation/temperature/pressure, reactivity control, vital AC electrical power, single failure that results in loss of multiple high safety significance function.

Other previous criteria (e.g., half scram, unplanned shutdown LCO actions < 72 hours) now reclassified as non-critical. These will still hit other performance indicators.

Prior to component reclassification (will be in Efficiency Bulletin) the technical authority needs to perform a review (typically System Engineer, possibly Maintenance, depends on site).

Guidance will be added to AP-913.

New non-critical population will include many important components, cannot lose sight of maintaining their reliability. Change should not negatively ERI, but thresholds should be re-evaluated.

Change will result in more consistent industry standard for component classification.

Potential for cost reductions through optimizing supply management (critical spares), MNT work controls and work packages and CAP burden.

AP-913 consequential failure event definition will change accordingly; utilities will need to perform a historical review of previously classified AP-913 failures and reclassify in ICES, if needed.

Vogtle Units 3 and 4 (AP 1000) building their component classification from the ground up; OPS involvement is highly recommended.

- Redefining what is considered critical components to reduce the number that exist. The intention is to raise the specifications of what is considered a critical component.

- What's no longer a critical component

- there are indications and monitors in place to track this items. Continue to monitor performance of the equipment by monitoring the indicators. The technical authority Is a reviewer whom is typically the system engineer.

- What is truly unacceptable to fail: this is where you want to put your maintenance resources. Look at a historical review to identify where and why failures existed in the past.

Key Learnings

- Vogtle 3&4: reviewing criticality. Using cross functional teams to review. It is important to have an operations review.

- Exelon: It is criteria to have an operations review of these critical component.

Key Lessons:

AP-913 revision introduces significant changes in criteria for critical component classification.

Significant amount of components now classified as critical will become non-critical; important to realize that these components are still important to operation and will still affect other Performance Indicators. Review by Technical Authority (typically Engineering or Maintenance) will be needed prior to reclassification.

Potential for cost reductions through optimizing supply management (critical spares), MNT work controls and work packages and CAP burden.

Use of software tools can significantly aid in achieving maximum reliability for the least cost. Palo Verde pilot program has resulted in major work reductions with no commensurate increases in corrective maintenance. Resource commitments needed to manage data and process changes to PMs, work execution packages, etc.

Recommendations:

Review revision to AP-913 and prepare sites for potential changes to critical component classification.

Pre-emptively engage system owners (Technical Authority) on potential for critical component reclassification and resulting changes to model work orders for PM.

Evaluate Palo Verde pilot program for changes to work paradigm based on component reclassification.

Q&A

Q1: How does this classification change correspond/relate to 50.69?
A1: Can be done independently. They don't have cross functions. 50.69 is a different view of things, not much overlap. Looking at safety related equipment and can result in reduced regulatory burden. Component classification changes are independent of 50.69.

Q2: Has a pilot been performed on this? Elaborate.
A2: Yes, haven't gotten very far. Limited detail. MSPI aren't specifically flagged yet. Exelon pilot effort at one site for component reclassification. Preliminary feedback from pilot effort is favorable.

PMP-003 Value Based Maintenance, Reducing Costs

John Langskov (System Engineering, Palo Verde, APS)

Session Notes

Palo Verde impact of AP-913 changes. 24% of components currently scoped as critical/low critical; preliminary scoping could shift classification as low as 4%. Not necessarily optimal; there is a point of convergence in the relationship between maximum reliability and minimum total maintenance cost (particularly minimum cost from corrective maintenance). Important to find the equilibrium. ""This isn't about cutting PMs to reduce the maintenance burden.""

Need tools to help make decisions. Maintenance feedback is not helpful in this regard.

Software tools used by Palo Verde pilot team: Preventance, EPRI licensed content, uses advanced analytical methods to calculate a net benefit on current strategies and changes to strategies, contains templates outside of explicitly nuclear assets (i.e., cranes). Qlik, highly rated business intelligence analytic software, load in work history of sites, output datasets that can be sorted by components/subcomponents, failures, work tasks, costs of corrective maintenance vs. preventive maintenance, man-hours, etc.

Planned software improvements include integration of INPO ICES data.

Improved analytics has resulted in more efficient work planning, T-24 meetings eliminated as a direct consequence, 120 MNT positions will not be filled upon normal attrition losses. Significant resource commitments needed to manage data, process changes to PMs, work windows, etc., for maximum value. Palo Verde team consists of nine (9) FTEs. More time is spent changing work mechanisms than data analysis. Start with non-critical components first.

- Critical equipment is no longer critical, what do you do?

- Maintenance Cost curve: Few PM tasks = most equipment is run to failure. This is not cost effective. Started adding more PMs and capability favors improved. Once INPO got involved, there were even more PMs introduced. This is how we became inefficient and not getting the cost savings.

- May not be a critical failure, but it still falls in tech spec space.

- The program looks at cost, consequence of failure, production, and returns how much money each PM will make the company. Entire work histories loaded into Qlik. Allows you to look at PM cost and CM cost by component type and system. The tool will show how many man hours are spent in the field.

- No longer have T-24 meeting. The next 120 retirements of maintenance staff guys will not warrant new hires. Down 175k man hours. Improving craftsmanship processes. Corrective maintenance numbers are down.

- Resetting the baseline based on reliability and economics.

Key Learnings

- Understand the consequence of the PM before you cut it. The intention is to fall between the point of minimum total maintenance cost and the point of maximum reliability.

- Organizational infrastructure: If you don't have people in place to form teams, you will not experience success. Have at least one expert using Qlik, and one expert per discipline. The more staffing, the quicker to implement. Start in the non-critical arena.

- Achieving the amount of required reliability for the least cost. Run to failure isn't always cost effective.

- One size doesn't fit all. Not from site to site or from component to component. Consequences are different depending on the cost. The tool allows you to look at all the cost for your site. All associated cost should be factored into the maintenance strategy. - Gives the opportunity to exercise flexibility. Find a monitoring method that detects failures so that you don't risk as much up planned failures.

Key Lessons:

AP-913 revision introduces significant changes in criteria for critical component classification.

Significant amount of components now classified as critical will become non-critical; important to realize that these components are still important to operation and will still affect other Performance Indicators. Review by Technical Authority (typically Engineering or Maintenance) will be needed prior to reclassification.

Potential for cost reductions through optimizing supply management (critical spares), MNT work controls and work packages and CAP burden.

Use of software tools can significantly aid in achieving maximum reliability for the least cost. Palo Verde pilot program has resulted in major work reductions with no commensurate increases in corrective maintenance. Resource commitments needed to manage data and process changes to PMs, work execution packages, etc.

Recommendations:

Review revision to AP-913 and prepare sites for potential changes to critical component classification.

Pre-emptively engage system owners (Technical Authority) on potential for critical component reclassification and resulting changes to model work orders for PM.

Evaluate Palo Verde pilot program for changes to work paradigm based on component reclassification.

Q&A

Q0: Will EPRI classification templates be revised or replaced?
A0: Templates will be revised, target for end of 2016.

Q1: Why is feedback from maintenance not the best tool to use?
A1: Must look at the age of the components and not only the PM feedback. Monitoring the feedback and basing it off of past PMs is counterintuitive when considering components.

Q2: Does EPRI provide the software?
A2: EPRI does not own the software. You can buy it and load it in. Free version can be downloaded. Intention is to make everyone's data available to everyone. EPRI templates will get updated with this.

Q3: Based on Palo Verde data to populate database?

A3: Yes, by data migration. Everyone has different cost because the business models are different.

BREAKOUT SESSION 7: Knowledge Transfer and Retention (Cross Listed with ENGINEERING / EQUIPMENT RELIABILITY)

Session Organizer: Dan Redden (Sr Engineer, Corporate Engineering, Exelon Nuclear), Ted Quinn (President of Technology Resources, ANS Past President), Tim Schlimpert (VP, MCR Performance Solutions)

The turnover in engineering disciplines occurring across the industry, including its vendor base, is resulting in a widespread diminishment of engineering knowledge, skill, and proficiency and this has played a key role in consequential events. Within all nuclear plant disciplines and departments, a key organization goal is to develop and implement effective Knowledge Transfer and Retention Programs using formal training and mentoring. These programs are designed to maintain industry, fleet and specific plant expertise to optimize plant safety and performance. The major objective is to support the development of the next generation of site and corporate technical experts for specific topical areas. The Engineering and Licensing disciplines are the most vulnerable. Competency in Design and Licensing bases, Operating Experience, vendor methodologies, etc., is a major element of Engineering and Licensing KT&R. Speakers will address specific plant, fleet and industry lessons learned and best practices as well as INPO's role in supporting the development of computer-based courses, made available to U.S. nuclear utility staff through the INPO NANTeL training system.

Advancing Safety and Reliability - Engineering Knowledge, Skills, and Experience

Sudesh Gambhir (Engineering Lead, INPO)

Session Notes

- Knowledge transfer from Architect Engineers was not systematic and design basis knowledge was not preserved. Consequential errors become more and more prevalent...

- Initiatives for reducing consequential errors
  - Advanced engineer training
  - There was an industry-wide effort to improve technical competence
  - Knowledge transfer and a healthy technical conscience was promoted (knowledgeable employees must understand what knowledge it is they have that they need to pass on)
  - Provide a forum for industry including EPRI to develop new training modules that can be easily shared

Engineering Knowledge Transfer and Retention

Dan Redden (Sr Staff Engineer, Exelon Nuclear)

Session Notes

- Elements of the Exelon Engineering 2016 KT&R Strategy
  - Exelon University: Courses include mentored cert guide sessions, SME led discussions on specific topics, and vendor led skills training or cert guide prereq training.
  - Advanced Engineering Training: Computer-based training (CBT) modules covering very narrow topics (ex. flooding). Often at older plants, the flooding experts have long since retired and there are no experts left at that plant. These CBT's are the first step in creating experts (followed by apprentice work and a review of the site specific records).
  - Knowledge/Skills Assessment, Development, Management: Engineers perform individual self-assessments,

- The outcome of this process is a 5-year staffing plan and next year's IDP's (Intern Development Program)

Q&A

- Is succession planning different?
- Yes. Succession planning is often done behind closed doors. There is more focus on the technical competency of managers so that they can second-guess some of the technical decisions being made. Our technical proficiency "training" is done in a much more open environment. Also, not everyone wants to be promoted; and that's not a bad thing. Lateral movement is not a negative movement.

Knowledge Management Impact On Organizational Proficiency

Dave Heler (Manager NHRG)

Session Notes

- Key elements of knowledge management include
  - People: orientation, teaming, sharing, and training programs
  - Process: maps, procedures, best practices, knowledge risk assessment
  - Technology: data bases and warehousing, wikis, data mining and search tools

- Knowledge management is a transcending process that touches on all parts of an organization

- HR's role is to introduce the employee to the industry, the Trainer does most of the work from there, but the Manager is key in "experting" the worker no longer than 4 - 10 years into their career. This last component HAS to happen because of the age gap.

- The people we're bringing in now will be talking about the same issues we are talking about today because there is a huge gap of employees between the ages of 30 and 45. Almost half of many staffs have less than 5 years of experience. This causes adverse effects on leader oversight, worker proficiency, workforce development, operational experience and overall plant performance. Retirees are being brought back in to train the young people because there is such a need for such training, but this is not a long term solution!

- To solve this, you must really understand the issues caused by the age and experience differences. Implement a knowledge risk assessment process and create a knowledge capture tool (there are a million methods for this). Implement a leadership review committee to provide oversight and create knowledge and skill development programs even beyond accredited training areas. Finally, and most importantly, establish a plan for replacing critical knowledge workers before they exit the organization. AND, get this information in front of the leadership.

Current Efforts in Knowledge Management at the NRC

John Lubinski (Director, Division of License Renewal, NRR, NRC)

Session Notes

- Strategic Workforce Plan: map the current workforce to the projected future work; ensure you have the right number of people with the right competencies at the right time; understanding, utilizing, and developing critical skills; identifying and planning for exit employees; continual monitoring and reassessing.

- Creating a competency model benefits recruiting, onboarding, career planning, etc. A competency model is the roadmap that closes skill gaps, increases engagement, and drives intrinsic motivation to succeed. Facilitators and recorders interview several high performers and a manger to identify critical skills and create a workshop for the lower-level employees.

REGULATORY RELATIONS

BREAKOUT SESSION 1: Preserving the Nuclear Promise: New Reactor Experience and Advanced Reactor Initiatives (Cross Listed with REGULATORY RELATIONS)

Session Organizer: Marilyn Kray (Vice President, Nuclear Technology Strategy, Exelon Nuclear), Pareez Golub (Vice President, Engineering and Technical Services, EXCEL Services Corporation)

Preserving the nuclear promise extends beyond the operating fleet into the next wave of reactor construction and advanced reactor development. Action is needed now in order to sustain the nuclear industry and preserve the nuclear promise for the next generation. This session will cover the spectrum of new plant designs ranging from the large LWRs under construction to the SMRs and Generation IV advanced reactors under consideration. The session will also address the various regulatory approaches being considered for the continuum of designs. Come and see the future of nuclear!

V.C. Summer Nuclear and AP1000 –Advancing to the Next Generation

David Lavigne (General Manager, Operational Readiness, SCANA)

Session Notes

SCANA submitted their application for a Combined Construction and Operation License at the end of 2008. It was granted on March 30, 2012. The current target for commercial operation is the 2019/2020 timeframe. The AP 1000 control room simulator design includes numerous technology changes, including fully digital indications, computerized emergency operating procedures/abnormal operating procedures, and mouse driven control.

The Updated Final Safety Analysis Report process for the AP 1000 plant has been complex. The process to license operators using an approved simulator is not clearly spelled out in regulations for new plant designs. The AP 1000 instrumentation and control design is not complete, so SCANA does not have a traditional Plant Reference Simulator.

The new 10 CFR 52 process combines the construction and operating license into one permit. 10 CFR Part 52 leaves little or no room for interpretation. Design criteria must be understood to the lowest level of detail.

The nuclear industry needs to work with the NRC on rule-making to provide better guidance to improve the 10 CFR 52 process.

Key Learnings

Technology change: the future is here, digitized C/R, fully integrated utility. - 10 CFR 52 leaves little or no room for interpretation.- Design criteria must be understood to the lowest level of detail. -Work with NRC on Rule Making to provide better guidance.

NuScale Power: Design, Licensing, Deployment

Mike McGough (Chief Commercial Officer, NuScale Power)

Session Notes

Provided overview of NuScale Plant Design. Size equal to the size of S/G from Westinghouse. Three Methods: convection, conduction and gravity. In a loss of offsite: design to safely shut itself down. Integrated testing facility: press release tomorrow morning to announce the testing. Hardware- recipient of DOE hardware grant. Licensing: Reg. Info. Report, design application is to be submitted no later than this year. about 95% complete.

A NuScale Power Module (NPM) includes the reactor vessel, steam generators, pressurizer and containment in an integral package that eliminates reactor coolant pumps and large bore piping (no LB-LOCA). Each NPM is 50 MWe and factory built for easy transport and installation. NPMs can be incrementally added to match load growth - up to 12 NPMs for 600 MWe gross (~570 net) total output.

Utah Associated Municipal Power Systems (UAMPS) Carbon Free Power Project (CFPP) will be first deployment, in Idaho.

Coolant Flow Driven By Physics. Core Damage Frequency Significantly Reduced.

NuScale's additional barriers include water in reactor pool, s stainless steel lined concrete reactor pool, and a biological shield covers each reactor. There is a smaller Emergency Planning Zone (EPZ) Due to Safer Design. The combined operating license application submittal for the NuScale Power Module design is to be completed by 4Q-2017 or 1Q-2018.

Q&A

Describe other projects you are working on?

Nuscale projects has numerous options for sites. UK is working on preparations for an SMR. Various countries may do reviews and share information. Globalization is a theme. NRC has provided assistance to countries without nuclear regulations.

Advanced Nuclear Energy

Nicolas Smith (Senior Research Engineer, Southern Nuclear)

Session Notes

Advanced Energy Systems- looking at everything that could help in making cheap power for the company in the south east. The goal is not to be profitable, it is to be a useful. Doing things philosophically for the greater good. 50% replacement needed by 2025, that is a huge amount of energy. we need a huge dominate source of energy. Nuclear is the source for the energy needed by 2025. People are irrationally afraid of nuclear, we have a great challenge.

Reactor design - options and benefits of each discussed. Advanced Reactor technology is gaining attention and funding. Recently, an award was granted for TerraPower's Molten Chloride Fast Reactor (MCFR). Action now is critical to success and nuclear sustainability.

Key Learnings

New investors interested in advanced reactors and new technology: bill gates/ policy makers/…

NRC Non-Light Water Reactor Mission Readiness

Jennifer Uhle (Director of the Office of New Reactors, US NRC)

Session Notes

Stakeholder Feedback: Initiative to be very efficient. don't impose unnecessary burden. 1. Technical readiness, 2.regulatory readiness, 3. optimize communication(3 strategic objectives). need to be ready by 2025. Been listening to the stakeholders, having a step wide. Working on submitting a porting of the design to show a progress, get it approved and work on the next step.

The NRC recognizes that reviews need to be efficient for non-light water reactors (LWRs). A strategy document developed. Funding is needed to support progress and NRC staff is currently small. Readiness means having the knowledge, analytical tools, etc.to support reviews. Regulatory readiness is needed. No risk-informed information is available currently. However, the work done for small modular reactors (SMRs) benefits non-LWRs.

The near-term strategies include acquiring/developing sufficient knowledge, technical skills, and capacity to perform non-LWR regulatory reviews. Additionally, sufficient computer codes and tools are needed to perform non-LWR regulatory reviews.

The near-term strategies include the establishment of a more flexible, risk-informed and performance-based non-LWR regulatory review process within the bounds of existing regulations, including the use of conceptual design reviews and staged-review processes.

Mid-term strategies include resolving technology-specific policy issues that impact regulatory reviews, acquire/develop sufficient technical skills and capacity to perform regulatory reviews/oversight, and develop a new non-LWR regulatory framework (if needed).

The long-term strategy is to finalize a new non-LWR regulatory framework (if needed) that is risk-informed, performance-based, and that features staff review efforts commensurate with the demonstrated safety performance of the non-LWR design being considered.

Key Learnings

Communication is vital!! Developing a plant design is a huge effort. Regulatory readiness: guidance for other designs Advanced reactors. Staged Review Process: we are modifying how we typically work to meet the needs of the vendors. What do we mean by readiness? knowledge, train staff. have analytical tools available: reaching out to the national labs. Ongoing effort for briefing staffers, dealing with DOE or NRC. don't want to be in a situation where congress is directing the review of non-LWR. Continue to listen to stakeholders to determine what's needed.

Q&A

How does the licensing process work? Any difference for a 12 module design?
How is reactor cooled, security, etc. Licensing will be on a modular basis. Similar to a COL applicant. Same process for one or numerous modules.

BREAKOUT SESSION 2: Risk Informed Approaches for Legacy Design Issues (Cross Listed with RISK MANAGEMENT)

Session Organizer: Anil Julka (Manager, FPL)

This session will provide insights on using risk informed approaches to address legacy design vulnerabilities. Often times, design issues are identified due to unclear language in licensing documents or different interpretations by the reader. By using risk insights, we can make informed design decisions and balance the resources spent on tasks that are indeed improving safety. Examples include the impact of tornado missiles to nuclear plants, BWR suction strainer performance, and open phase relay design considerations. Full-blown PRA approaches (i.e. RG 1.200) are not necessarily required but risk informed approaches do warrant knowledge and understanding of PRA techniques by engineers.

Risk-Informed Regulation Without the Baggage: Using Insights to Improve Operations

Victoria Anderson (Senior Project Manager, Risk Assessment, NEI)

Session Notes

R.G. 1.200 provides an approach for demonstrating PRA technical adequacy for licensing applications. It is very important to keep peer reviews of PRA up-to-date. There is a new process being piloted for closing out findings. It is important that PRAs include clear criteria for eliminating event initiators.

Regulatory Guide 1.200 only applies for licensing applications.

Tornado Missile Protection (TMP)

Jack Grobe (Director, Strategic Projects, Exelon Nuclear)

Session Notes

Tornado protection expectorations have evolved since plant construction. NRC issued Regulatory Issue Summary (RIS) in June 2015 and an Enforcement Guidance Memorandum (EGM) in June 2015. TORMIS is a tool available to numerous utilities. A consistent tool is needed to support NRC reviews. Tornado Missile Risk Evaluator (TMRE) is being developed for industry guidance. TMRE involves modifying the internal events PRA, determine change in core damage frequency associated with the SSCs having nonconforming tornado missile protection, compare to the Standard Review Plan (SRP) acceptance criteria, and submit RG 1.174 LAR. Engineering building design conditions compared to current design standards. Exposure areas, separation of safety equipment, coverage are considered. Targets are either robust (few missile types) or less robust (more missile types). Missile Impact Parameter is missile hit probability per missile per exposed target area for each tornado intensity. TMP nonconforming conditions have low safety significance. TMRE focus groups for each site are being requested.

During the original design of these plants there was not clear instruction for design/licensing basis relative to tornado missiles.

About 6 sites across the industry have probabilistic TORMIS models as part of their design basis.

Tornado Missile Risk Evaluator (TMRE), guidance document and workshop to be issued early 2017.

Test plant for TMRE was modeled with 29 vulnerabilities.

The TMRE can be performed in 140 hours of work due to the simplified MIP that bounds all sites.

Focus group will be held in late September to lay out many of these details.

Key Learnings

Cost and risk of vulnerabilities need to be looked at and approached with safety significance as a priority.

An approach for the Utilization of FLEX equipment for Risk Mitigation at Duke Energy

Robert Isbell (Lead PRA Engineer, Duke Energy)

Session Notes

2 recent examples:

1. During routine testing of Motor Driven Auxiliary Feedwater (MDAFW) pumps, cooling water flow through lube oil heat exchangers was found to be below required minimum limit, due to a valve failure. To lessen the impact on this failure the PRA model was modified to credit a FLEX pump to supply AFW. The result of this evaluation supported the disposition of the event's risk significance.

2. Rebuild of both Emergency Service Water Pumps is required. Duration of maintenance too long for outage. Maintenance window expected to be 10-12 days. Technical Specification allowed outage time (AOT) is only 3 days. Actions taken include the staging of FLEX equipment for supplemental cooling where required, development of Operator Actions, which have been included in the PRA Model. PRA model update approach is standard.

At the time of utilizing the FLEX equipment to reduce risk, the FLEX equipment had been installed in the plant but had not been incorporated into the PRA model.

Operator intensive to model the actions required on their part to implement the FLEX equipment.

Actual walkthrough and performance of the operator actions was required -- tabletop was not sufficient.

Risk Informed Evaluation of Post-LOCA BWR Suction Strainer Performance

Larry Naron (Senior Manager, Base PRA Models and Risk Tools, Exelon Nuclear)

Session Notes

Boiling Water Reactors began evaluation of strainers for post-LOCA debris removal in early 90s. PWRs began similar evaluation in late 90s. Differences in plant design results in different potential issues. Risk-informed approach goals include use of a computer model to model each possible issue. Then, site PRA model can use this model output to calculate risk numbers. Defense-in-depth strategies were developed. Results of the analysis were used with RG 1.1.74.

NRC Insights on Risk-Informing Legacy Design Issues

John Lubinski (Director, Division of License Renewal, NRC)

Session Notes

NRC is evaluating its processes and determining whether they are adequate for resolving low risk design issues. They are looking at a process similar to a NOED over a longer time period. The Risk-informed approach (deterministic and risk informed) is meant to be integrated; normally occurs in series. NRC Challenges include the need to update procedures to address risk insights, R.G. 1.174 defense in depth guidance needs to be updated, NRC engagement on PRA models, and credit for FLEX equipment.

Past risk informed processes did not meld the two methods together, deterministic and probabilistic at the same time.

The goal is to be applying the appropriate about of resources to address the level of risk that this issue poses to the station.

Key Learnings

Industry needs to provide examples.

We do not need to implement modifications at any cost to address low risk issues. We must as an industry apply the appropriate resources commensurate with the risk significance of the issue.

Q&A

How will culture be changed? / How do you address the cultural issues to allow the NRC to approve probabilistic methodologies for low risk issues?
Examples are needed to prove its usefulness. NRC may need to rely more on engineering judgement. The NRC is trying to get everyone to understand the safety significance of the issue and from that point of view be able to rule on if the solution is appropriate.

Is there a level of risk that does not result in any necessary action? Is 10 CFR 50.59 an option?
No, the NRC has discussed this and there is not a point at which they would be comfertable establishing a level like this. There is an opening that on a case by case issue one could apply to be exempt from having to address a specific issue. NRC is considering allowing exemptions for certain low risk issues that call into question operability. Initiating events may screen out. 10 CFR 50.59 would result in a longer resolution time.

BREAKOUT SESSION 3: Project AIM, Delivering the Nuclear Promise, and Fukushima Lessons Learned (Cross Listed with EXECUTIVE)

Session Organizer: Matt Sunseri (President, Zeus Enterprises LLC), Jack Grobe (Director Strategic Projects, Exelon Nuclear)

Few initiatives in the last decade have had or will have as much impact on the nuclear industry as Project AIM, Delivering the Nuclear Promise and Fukushima lessons learned. No doubt economic forces have been a challenge for any industry in recent times. This session will shed light on how regulatory bodies and commercial nuclear operators intend to improve efficiencies while being responsible to safely regulating and operating in a society that has little tolerance for risk. Hear from leaders in the country how they intend to maintain economic viability while providing exceptional safety in the nuclear industry.

Bill Dean (Director, Office of Nuclear Reactor Regulation, US NRC)
Tim O'Connor (Sr VP and CNO, Xcel Energy)

Brad Adams (VP Fleet Engineering, Southern Nuclear)
Dave Crawley* (SAFER Project Manager, Southern Nuclear)

Project AIM and Fukushima Lessons Learned

Bill Dean (Director, Office of Nuclear Reactor Regulation, NRC)

Session Notes

Project AIM: A result of over-staffing for new nuclear plants. Re-baselining phase- identified actions to stop for cost savings. Long-term efficiencies are also being developed. Areas of expertise are being centralized.

NRR/NRO merger proposal has been developed and is awaiting feedback from the Commission. Next steps include strategic workforce planning and corporate organization restructuring.

Fukushima-related activities: mitigating strategies assessments are underway. Some plants will need to complete focused evaluations and take additional actions.

NRC has a goal to resolve all remaining Tier 2&3 recommendations by the end of 2016.

Rulemaking: Comments received include improvement of clarity in the use of the term "loss of all ac," removal of requirement for multiple source term dose assessment, clarification of use of risk insights for addressing reevaluated hazards, establishment of process to define when changes require prior NRC approval.

Results of initial inspections have not resulted in any significant issues.

•Allow flexibility with
implementation timeframes

-AIM has been around long before the nuclear promise
-A lot of restructuring of organizations needs to be done in order to meet the nuclear promise
-Everything that came out of Fukushima to modify in the plants and response centers is either on schedule or ahead of schedule
-Seismic hazard reevaluation and flooding evaluation is on going
-No negative inspections have been found so far

Q&A
1: Reduce overall cost of maintenance, what is it going to take to maintain training with reduced staff as well, is this a consideration in planning?
2: What if the efficiency changes we are talking about here are nowhere near enough to meet our goals in the delivering the nuclear promise? Are we going to start looking at harder things like security and regulatory requirements that don't add too much safety value but cost far too much?
3: What if we go too far and our efforts result in unintended consequences?
4: Nuclear is treated far differently than any other industry by US govt as far as safety, do you have any comments about this moving forward?
2: There are many regulations that need reevaluation due to being out dated due to previous ignorance to risk quantification. We will need to address these costly compliances based regulations. Reasonable vs high assurance will be contemplated
3: Take the time to talk to the people necessary on site to address these Things up front, it is obvious that things will be different for not just engineering but also for OPS and other working groups on site, it is our responsibility to provide as much insight as possible in this stage of addressing the nuclear promise
4: Our regulatory bodies were developed independently of gov't which has made nuclear much more heavily scrutinized by govt. At this point this is a part of the nuclear culture

Delivering the Nuclear Promise: Advancing Safety, Reliability, and Economic Performance

Tim O'Connor (brought own presentation*) (Sr VP and CNO Xcel Energy, Xcel Energy)

Session Notes

Competition in the market place has driven us to improving performance (30% cost reduction needed or 3 billion in savings)

Pricing changes based upon the energy portfolio. Government is driving the use of renewable energy sources before other sources (load-following). Solar and wind are provided subsidies and other competitive advantages.

Staffing of nuclear plants has increased since 1978. Opportunity to balance attrition with proving efficiencies. There are two types of improvements being pursued: efficiency initiatives and transforming the organization. There are 21 efficiency bulletins issued; more will be issued.

-Everything in our goals and mission statements are effectively the same, it is just that we need to cut costs to be competitive with all other energy sources
-Wind energy capacity has grown extraordinarily which is going to be a large competitor not too long from now
-Natural Gas is obviously a huge player in the competitive energy market
-Renewable energy sources are causing peak load prices to decrease, putting pressure on nuclear to consider load following to make more money
-Every other energy source is getting cheaper except for nuclear has to change
-Staffing is increasing at plants that used to run lighter, why?
-Great opportunity with baby boom retirement to reduce staff through attrition this will also help to facilitate the culture change required to meet the nuclear promise
-The goal is to reach a savings of $3 bil, we currently can account for $263 mil

Key Learnings

-We have a lot of bureaucratic baggage that is making everything cost more and require much more staff than is necessary, this is not a mystery especially to other utilities

Q&A

1. Are you looking at what it takes to train maintenance at a reduced staffing level?

2. What if DNP initiatives do not work?

3. How should the industry protect against cutting budget too much?

4. Does the federal government treat industries differently when it comes to oversight?

1. Training has been considered and efficiency bulletins will be issued soon to address this.

2. It is already obvious that more will be needed and efficiency improvements will continue to be pursued.

3. Bill Dean recommends soliciting feedback from the NRC resident and others. Tim mentioned that KPIs and metrics should also provide any indication of poor performance. CAP and self-assessment tools are also available to support critiques. Ultimately, a higher degree of accountability of plant staff will be needed.

4. NRC directly regulates the nuclear industry, whereas various other industries share regulation with the states.

1: There is a plan for this embedded in our programs, efficiency bulletins will be released soon addressing the training aspect directly
2: It's clear that we are going to need to do more, questions will be asked down the line that directly address these kinds of cost saving areas. We need to have more candid conversations like these if we want to meet our goals together
3: I don't think we will be unable to see future issues since we have so much more foresight into issues from OE and KPI's etc. Monitoring will increase for INPO for faster response to upcoming issues but to save cost their evaluation periods may decrease, this is an example of how we can save money but cover our bases the same or better. The level of accountability for workers will be far higher because we will not be able to afford inefficiencies that cause future problems

U.S. Lessons Learned from Fukushima Event

Brad Adams (Vice President Engineering, Southern Nuclear)

Session Notes

Lessons learned from the Fukushima event and industry response apply to DNP. The approach in the nuclear industry (thinking) will have to change for the DNP. Industry response to Fukushima illustrates the approach that will need to change. NRC and industry took immediate response.

Rule making is being developed based upon previous orders, recommendations, etc. The SAFER organization was developed.

International interaction regarding regulatory changes has also been conducted.
Key distinctions for the US include that FLEX does not extend to pre-planned recovery or cold shutdown functions, there are venting differences, SAFER varies, and the targeting of hazard mitigation strategies that US has completed.

-Its upsetting that the nuclear event is what people remember from the earthquake despite the billions of dollars and tens of thousands of lives that were lost; however, it is something we will always need to deal with
-The FLEX projects was the main response strategy along with INPO ier's and many plant monitoring parameter changes and enhancements, response centers were also established

Key Learnings

We are not making enough progress, the technical impossibility is not there though compared to the things we have accomplished over the past 40-50 years, we need to work harder

SAFER - Strategic Alliance FLEX Emergency Response

Dave Crawley (SAFER Project Manager, Southern Nuclear)

Session Notes

The Pooled Equipment Inventory Company (PEICo) joined forces with AREVA Inc. to create the SAFER Team to develop and manage a FLEX national response center
program as part of the PEICo's existing Pooled Inventory Management (PIM) Program for the U.S. nuclear industry.

Two National SAFER Response Centers (NSRCs); 5 sets (N+1) of "generic" equipment at each NSRC. Equipment design was developed to allow easy transportation, functionality under broad operating conditions, dimension limitations, etc.

Deployment is supported by Transportation and Warehouse & Maintenance contracts. MOUs are also in place to allow for backup resource options (commercial, military, etc).

-Massive effort by a huge team of people to make difficult decisions
-Memphis and Phoenix, all equipment is duplicated so either can respond
-5 duplicates of each equipment, 4 ready to go at all times with 1 out for maint.
-all equipment has standard hookups for ease of use and diverse usage
-transportable by ground, fixed wing, and helicopter. This spawned a series of design requirements including weight, space, and operating environment (location)
-Key contract for transportation (FedEx Custom Critical) allows 24 hr response to any US nuclear site

Key Learnings

-We have absolute confidence that all our ducks are in a row for any Fukushima type event

BREAKOUT SESSION 4: Effectiveness of the Backfit Process and the Committee to Review Generic Requirements

Session Organizer: Keith Jury (Vice President, Regulatory Affairs, Exelon Nuclear)

The NRC's backfit rule provided a regulatory structure to increase safety and promote regulatory stability, controlling changes to both generic and plant specific regulatory requirements. The NRC's Committee to Review Generic Requirements (CRGR) was established to ensure that generic backfits are justified according to the backfit rule. This session will review the purpose and framework of the backfit process and CRGR, discuss the basis for challenges to NRC's backfit decisions, and provide NRC perspectives on backfit rule implementation. The session will also explore opportunities to strengthen the NRC's backfitting program, and examine the role of licensees in the backfitting process.

Compliance Backfits

Bradley Fewell (Senior Vice President Regulatory Affairs & General Counsel, Exelon)

Session Notes

NRC may forego a backfit analysis when ""necessary to bring a facility into compliance with a license or the rules or orders of the Commission, or into conformance with written commitments by the licensee."" (10 CFR 50.109(a)(4)(i)). This is""to address situations in which the licensee has failed to meet known and established standards of the Commission because of omission or mistake of fact. It should be noted that new or modified interpretations of what constitutes compliance would not fall within the exception and would require a backfit analysis and application of the standard.""

Compliance exception cannot be interpreted in a way that renders the backfit rule meaningless.

A new or modified interpretation of compliance, in itself, is not an ""omission"" or ""mistake of fact.""

October 2015: NRC imposed a backfit on Byron and Braidwood regarding Pressurizer Safety Valves (PSVs). NRC relied on the compliance exception to forego a backfit analysis. Issue was identified during an inspection and also during the power uprate application process.

December 2015: Exelon appealed the backfit to the Director of NRR.

March 2016: Exelon presented its appeal to the Backfit Appeal Panel (appointed by NRR Director) in a public meeting.

May 2016: Director of NRR upheld use of the compliance exception to impose the backfit.

NRC mischaracterizes the ""mistake of fact,"" which is really a change in interpretation of compliance.

June 2016: Exelon appealed the NRR Director's backfit decision, this time to the EDO Appeal is currently pending before the EDO.

Compliance exception needs clearer guidance. Backfit training to important to ensure your employees know how to identify and raise backfit issues.

Key Learnings
Reviewing the licensing basis is critical for dealing with inspection issues.

Q&A
Has the NRC reviewed the docket to identify a 1995 compliance exception analysis that discussed omitted fact? Was this considered for agency precedence?
NRC is still reviewing items to support their position.

Backfitting Overview and Perspectives (It's Just A Process)
Bill Horin (Partner, Winston & Strawn LLP)

Session Notes
Backfitting laws were developed 70 years ago. Backfit is the modification to SSCs or design of a facility due to an NRC position different to a previous NRC position.

Cause may be a new or amended regulation or a new interpretation of a requirement.

NRC's interpetations or positions may be obtained through review of docketed coorespondence, rules, NRC guidance documents, and safety evaluations. ""Reasonable"" or ""timely"" is open to interpretation.

"Imposition" of a new interpretation or requirement may be in the form of an order. When a proposed "backfit" is determined by the NRC to obtain compliance and it is cost justified by improving safety, it may be imposed without analysis.

NRC staff cannot expect a licensee to adopt a newer version of a Regulatory Guide unless the licensee makes a change to its current licensing basis.

The ""forward-fit"" occurs when a licensee is requesting permission from the NRC for a particular change and the NRC would like the licensee to adopt something unrelated to the request. Opening CLB via a LAR does not permit the staff to impose new or amended requirements in areas that are not relevant and important determining whether the specific request at issue should be granted.

Backfit claims and appeals process is provided in Management Directive 8.4 "Management of Facility Specific Backfitting and Information Collections."

*No Presentation Title
Anthony Pietrangelo (Senior VP & CNO, NEI, NEI)

Session Notes
Adequate protection rule: applied when Fukushima orders were issued. Informal backfit process: during inspections and amendment application process, may come into play.

CRGR [Committee To Review Generic Requirements]

Steve West (Deputy Director, Office of Nuclear Security and Incident Response, NRC, NRC)

Session Notes

Committee To Review Generic Requirements (CRGR) mission is to review generic actions and make recommendations to correctly implement the backfit policy.

GRGR is periodically audited, completes self-assessments, and provides training to NRC staff on the backfit policy.

CRGR developed criteria for when CRGR should review changes that may involve rulemaking. A backfit review appeal panel has also been created. NRC is reviewing their process to make improvements as needed.

BREAKOUT SESSION 5: Digital Instrumentation and Controls, and Cyber Security

Session Organizer: John Connelly (Engineering Manager, Capital Projects, Exelon Nuclear)

The application of digital technology in nuclear power plants has been conclusively demonstrated to increase system reliability, fault tolerance, efficiency and most importantly, margins of safety. Despite these advantages the nuclear industry has been slow to modernize plant protection and control systems. This is largely driven by regulatory complexity and financial risk. This session will cover the major digital I&C regulatory issues and the NRC digital action plan contained in SECY 16-0070:

- Screening and evaluation of digital changes under 10CFR50.59
- Common cause failure and mitigation methods unique to digital
- Commercial grade dedication and digital procurement
- Cyber security

Cyber Security

William Gross (Senior Project Manager, Cyber Security, NEI)

Session Notes

Relationship between cyber and digital:

Part 50/52 protects DI&C against non-malicious events. Part 73 protects DI&C against malicious acts.

NRC guidance includes RG 1.152, Revision 3, NRC approved licensee Cyber Security Plan, Electric Power Research Institute guides (Technical Guideline for Cyber Security Requirements and Life Cycle Implementation Guidelines for Nuclear Plant Digital Systems - 1019187 and Cyber Security Procurement Methodology, Rev. 1 - 3002001824)

NRC's draft digital action plan indicated a near-term priority to develop guidance to review cyber attributes during design. Revised action plan in SECY-16-0070 removes cyber.

Digital Common Cause Failure and 10 CFR 50.59 Issues

Raymond Herb (Fleet Digital Principal Engineer , Southern Nuclear)

Session Notes

Vogle will be coming online soon with a high amount of digital systems.

Guidance exists for addressing common cause failures.

It is important to understand that we are primarily concerned with addressing software CCF, there is sufficient guidance for all other CCF sources.

BTP 7-19 implemented policy in an increasingly restrictive and confusing manner (growing scope to include all safety systems and some non safety control
systems).

The NRC has agreed to evaluate and update the almost 30 year old policy. The current policy is implemented with NEI 01-01.

NRC had concerns with the application of NEI 01-01. The NRC formalized the concerns with a letter to NEI. The industry and NEI developed a taskforce to address the concerns and come up with
a solution.

NEI 96-07 Appendix D: Replaces the digital specific 50.59 guidance in NEI 01-01. Submitted to the NRC on April 2016. We expect comment resolution by the end of 2016.

EPRI 3002005326: Methods for Assuring Safety and Dependability when Applying Digital Instrumentation and Control Systems; issued June 2016. Technical guidance to help utility engineers.

New NEI guidance is being developed to achieve alignment between the NRC and industry on the technical methods and acceptance criteria for assessing CCF in the following areas: CCF Susceptibility Analysis,
CCF Bounding Analysis, and CCF Coping Analysis.

Q&A

1. What do see in terms of obsolescence with digital equipment in the future?

2. Regarding cyber security program implementation, what is NEI doing to address concerns with insider mitigation issues (allowance for personnel mistakes)?
1. Operating systems change but are managable. Vendor quality is critical.

2. Insider mitigation guidance was developed from the physical protection plan. Measures are being implemented to allow for mistakes. NEI 13-10, Rev. 4, instructs direct impact CDAs in vital areas require physical protection.

Digital Commercial Grade Dedication

Ronald Jarrett (I&C Specialist/Digital Fleet Program Manager, TVA)

Session Notes

The Terry Turbine User Group (TTUG) has been facilitating a solution for the Utilities aging and obsolete control systems for Terry Turbines.

Utilities are out of spare parts and could be facing forced shutdowns due to this.

Utilities have been unsuccessful in obtaining spare parts (parts hoarding is occurring).

Reengineering attempts of the analog controls are good for short term for bridging but now NRC Info Notice is 2016-09 is challenging reverse engineering.

Critical Digital Reviews (CDRs) are normally used for Safety Related applications but also provide a great benefit for critical non safety projects.

Safety function of equipment being purchased should be defined by the utility in the purchase order (PO). Dedicators are bound to what is in the PO.

Some Utilities' lack ownership and assume the component is dedicated/qualified because the component was purchased from an Appendix B supplier.

Digital commercial grade dedication (CGD) shows successful operating history. Need NRC acceptance that successful operating experience is a very important indicator of quality.
Need to minimize the common causes that are important.

Need a process to deal with rapid software changes instead of freezing software or rededicating the components. Need to understand dedication is to a specific safety function. Components are being dedicated for generic use so there is a potential gap created between the safety function and the CGD. Need Industry Education.

Key Learnings

Digital commercial grade dedication (CGD) shows successful operating history. Need NRC acceptance that successful operating experience is a very important indicator of quality.

Need to minimize the common causes that are important.

Need a process to deal with rapid software changes instead of freezing software or rededicating the components. Need to understand dedication is to a specific safety function. Components are being dedicated for generic use so there is a potential gap created between the safety function and the CGD.

Need Industry Education.

Integrated Action Plan for the Modernization of the NRC's Digital I&C Regulatory Infrastructure

John Lubinski (Director, Division of Engineering Office of Nuclear Reactor Regulation, NRC)

Session Notes

NRC Commission directed staff to develop an integrated strategy to modernize the digital I&C regulatory infrastructure in SRM-SECY-15-0106.

Objective is to modernize the digital I&C regulatory infrastructure to enhance the NRC's capability to be more timely, efficient and effective in ensuring safety, and provide a consistent and predictable regulatory process.

Near term activities include implementing the regulatory activities needed to provide regulatory clarity and support industry confidence to perform digital I&C upgrades.

Long-term activities include the assessment and implementation of broader modernization of regulatory infrastructure.

NRC's biggest challenge is determining the level of testing needed to assure the potential of all CCFs are eliminated, OE applicability, other controls, etc.

Other plans include improving licensing guidance from lessons learned, consideration of timing of factory acceptance testing and scope of supporting application material in licensing processes, and the development of inspection guidance for DI&C upgrades.

Key Learnings

Need to minimize the common causes that are important.

BREAKOUT SESSION 6: Improving the Operability Determination Process and Resolving Low Risk Non-Compliances

Session Organizer: Marty Murphy (Director, Nuclear Licensing and Regulatory Affairs, Xcel Energy)

Operability determinations and associated resolution of issues must be appropriately balanced to ensure focus remains on safety. The industry is developing guidance to ensure consistent implementation and expectations for operability determinations. Concurrently, the NRC is developing a risk-informed approach to resolve low risk and low safety significance design compliance issues related to technical specification operability. The session will provide insights on the status of the individual initiatives and the intersection between the two initiatives.

Low Risk, Low Safety Significance Issue Resolution An Industry Perspective

James Barstow (Licensing Director, Exelon)

Session Notes

Low risk, low safety significant issues are not dispositioned and resolved in a risk-informed way in order to preserve resources, while maintaining adequate safety margin and protection.

Cultural change for both industry and NRC.

Simple Approach: NOED-like for Technical Specification Allowance Within the Licensee's Control

Scope: Design Issue Not Meeting Current Licensing Basis, Non-Conformances, GDC Requirements, and Equipment Degradation.

Industry concerns involve entry criteria, risk and safety significance thresholds, unintended consequences to TIA or Backfit Cost Analysis, and Forward Fitting Process Applicability.

A Risk-Informed Approach for Addressing Low Risk Issues

William Dean (Director, Office of Nuclear Reactor Regulation, NRC)

Session Notes

NRC is considering a new plant-specific process that would allows for evaluation of risk, defense-in-depth, safety margins, compensatory measures and risk management actions. Potential for enforcement discretion.

Potential benefits include maintaining a focus of resources on safety significant issues, implementing corrective action commensurate with safety significance, and ensuring continued safe operation (avoid unnecessary plant transient). This new approach would be complementary to existing regulatory processes and would be consistent with existing Enforcement Policy.

Challenges include the definition of low risk (RG 1.174 or other definition), stakeholder concerns/opportunity for public participation, transparency concerns, and communication/internal alignment.

Baffle Bolt Inspection and Replacement and Operability

Dave Mannai (Senior Manager Fleet Regulatory Assurance, Entergy)

Session Notes

During the 2R22 Refueling Outage for Indian Point Unit 2, the reactor vessel and its internal components were required to be inspected as part of our Aging Management Program (AMP), which is a commitment made in accordance with the License Renewal process. During visual exam of the bolts, three conditions were identified: Missing bolt head, cracked lock bar weld, missing lock bar. Highly specialized equipment was needed to support the repair.

In parallel to repairing Unit 2, Engineering worked with both Westinghouse and Lucius Pitkin, Inc. on an analysis (extent of condition) that demonstrates Unit 3 is safe to operate through March 2017.

Key Learnings

It seems that a process needs to be established for dealing with emergent issues as a result of plant age management.

Q&A

1. Why would baffle bolt condition impact operability (not in TS)?
2. How do you put a question into the operability determination process (extent of condition on other unit)?
3. Will there be a generic communication regarding bolt degradation and its impact on safety?
4. Would NRC consider re-defining operability (to exclude low risk/significant issues)?

1. The plant determined that the best process to be in was the corrective action program. If an event could displace a baffle bolt, core cooling could be affected.
2. Enter it in CAP and disposition it with appropriate rigor, rather than an operability determination process.
3. Yes.
4. Billl Dean – “I understand the concept but not at this time."

Industry Operability Guidance Initiative

Larry Nicholson (Director of Nuclear Licensing and Regulatory Compliance, NextEra)

Session Notes

There is no industry guidance for performing OPERABILITY determinations. Consequently, expectations are unclear with inconsistent implementation. Operability determinations and resolution of issues must be appropriately balanced to ensure focus remains on safety.

Effort underway to develop industry guidance necessary to effectively and efficiently address Technical Specification equipment operability challenges. Fundamental objectives are to clarify entry conditions; issue must have functional impact; include functions performed under postulated design conditions; issue must have a non-trivial impact; define graded approach that includes engineering judgment.

Operability decisions extremely important; must be made with confidence and consistency. Many benefits associated with re-baselining the operability process. Lack of industry guidance has contributed to program creep and resources not aligned with safety.

BREAKOUT SESSION 7: Reactor Oversight Process Issues - CDBI and EQ Pilot Inspection Results, PI&R Pilot Inspection and Significance Determination Process Issues

Session Organizer: Christopher Nolan (Director, Regulatory Affairs, Duke Energy)

This Reactor Oversight Process (ROP) discussion will explore the results of pilot inspections for the Component & Design Basis Inspection and Environmental Qualification Program Inspection, changes to the Problem Identification and Resolution (PI&R) inspection, and highlights from the Significance Determination Process (SDP) Streamlining. NRC proposed changes to the PI&R inspection procedure to better assess corrective action programs will be discussed. In SDP Streamlining, the panel will explore “readily available information” as well as future changes in the use of Appendix M, crediting FLEX for use in the SDP, and plans for a new SDP to address mitigating strategies.

Reactor Oversight Process Issues

William Dean (Director, Office of Nuclear Reactor Regulation, NRC)

Session Notes

NRC has developed draft procedures with emphasis on internal management oversight and planning and has established a separate initiative for Appendix M enhancements.

Objectives of Revision to Inspection Manual Chapter 609, Appendix M include providing clear and concise entry conditions for the use of IMC 609 Appendix M, identifying the set of key decision attributes that is relevant for each specific entry condition, and providing a formal Integrated Risk-Informed Decision Making (IRIDM) tool for SDP decision making.

NRC expect a rollout of the finalized document around June 2017.

Pilot CDBI inspection changes include: reduced onsite inspection weeks, reduced inspection scope, and a one-week engineering program inspection. The planned implementation of the new CDBI is in 2017.

Industry recommendations for CDBI changes include a reduction of sample size and duration, shift focus from design verification to licensee ability to maintain the design basis over time (implemented in part by the NRC), development of performance-basis for adjusting inspection scope, duration and team size (not accepted by the NRC), establishment of a means to credit robust licensee self-assessments (possible future effort by the NRC), and the improvement of process for early recognition of and treatment of generic issues identified (under observation by the NRC).

Potential PI&R Enhancement Areas include improvement of PI&R Performance Doc, Retrieval, & Use, Rigor of PCA Inspection Follow-up, follow up on 95001/2 issues to assure they have been addressed, periodically Revisit Significant Generic Issues, and refocusing on IP 71152B Biennial & Enhance Tools.

Q&A

1. Is the NRC looking at allowing licensees to move out of an ROP column once an inspection on an issue has been completed?
2. What are your thoughts on SPAR models and PRA? Also, would you give specific examples of when Appendix M may be applied in the new process?

1. Yes.
2. NRC is still looking using SPAR models for new reactors (not operating reactors). NRC used Appendix M frerquently. EP is a good example."

Significance Determination Process (SDP) What is the cost?

Robert Rishel (Director, Nuclear Engineering, Probabilistic Risk Assessment, Duke Energy, Duke Energy)

Session Notes

Significant Determination Process(SDP): Some NRC Reactor Oversight process SDPs have deterministic criteria (Security, Emergency Plan, and Rad Protection).

Initiating Events and Mitigating Systems use a probabilistic type of approach. NRC proposal would like to use RG1.174-like integrated decision-making to get to a more timely, albeit approximate, result.

Appendix M is used when there is a large uncertainty or unknowns, which seems to be taken towards the ""conservative"" direction (Greater than Green).

NRC staff acknowledge the challenge of identifying appropriate values of initiating event frequencies for such things as flooding events. NRC staff answer is ""we should set a deadline and go forward with the best information available at that time.""

SDP is not PRA: Licensee view of NRC use of SDP is that SDP outcomes appear to be risk based vs risk informed.

SDPs and Fire PRA Develop per NUREG 6850: Fire PRA are conservative by design.

Suggestions: Reduce the use of the SDP process for the ""vital few,"" do not use short cuts to gets results faster (significant downside to wrong answer).

Pilot Component Design Basis and Equipment Qualifications Inspections

Joseph Shea (Vice President Licensing, TVA)

Session Notes

In 2014, the industry identified the CDBI as a high priority for potential revision. NEI completes industry CDBI impact survey late 2014. NEI proposed four recommendations to improve CDBI. NRC agreed to pilot an revision to the CDBI at eight plants.

Pilot conducted at two plants in each NRC region November 2015-June 2016. Design inspection with a 2-week onsite review. Separate, one-week engineering program. inspection (Environmental Qualification (EQ) of Electrical Equipment).

Design Inspection (IP 71111.21M) -Reduced onsite inspection from 3 to 2 weeks. Reduced sample size from up to 25 to a range of 10-17. Allowed for reduction of offsite in-office preparation and reviews. Retained original baseline team size and use of contractors.

Engineering Program Inspection (IP 71111.21N) -New one-week inspection of a selected program every three-year inspection cycle. Team includes three NRC inspectors, no contractors. Primary focus on program implementation vs. program design.

Positives, Strengths and Successes include NRC willingness to consider industry recommendations for improving inspection effectiveness and efficiency, strong NRC management oversight in the field, NRC ability to make value-added adjustments during pilot program, and NRC focus on EQ program implementation vs. program design.

Remaining opportunities include net resources and effort required to support the pilot inspections remain significant, data requests, sample size/content, and timing improvement, focus on original design validity vs. design maintenance/assurance could be more proportionate, and overlap with other resource-intensive ROP technical inspections can be reduced.

NRC staff reviewing industry recommendations. NRC engagement on high priority industry inspection program concern was valuable. Additional improvements proposed. Continued engagement by utilities and NRC is crucial.

NRC Problem Identification and Resolution Inspection Changes and Current Industry CAP Initiatives

Timothy Steele (Fleet PI Manager, Southern Nuclear)

Session Notes

Reactor Oversight Process Enhancement Project released in April, 2014 recommended enhancements with baseline inspection procedure IP 71152, “Problem Identification and Resolution.

NRC has identified the “90 – 8 – 2” model where 90% of licensees are deemed to have an effective CAP, 8% have an “adequate” CAP but continuing or emerging issues raise concerns about ability to meet standards, and 2% that have “significant problems and in jeopardy of not meeting ROP bases assumptions.”

Possible revision to IP 71152 in January 2017, but no current information on how likely this will happen.

Delivering the Nuclear Promise CAP-002: Achieving the highest levels of safety and reliability requires high levels of efficiency and effectiveness. Improve timeliness and effectiveness of problem resolution by eliminating low-value process controls and administrative requirements. Maintain low threshold for condition reporting.

Industry task force is developing an NEI technical report to provide implementing guidance for CAP efficiency initiatives (NEI 16-07).

Population of items in CAP will be clearly defined (Significant Conditions Adverse to Quality, Conditions Adverse to Quality, Conditions Adverse to the ROP). Most CAQ and Adverse to ROP addressed at “Find and Fix” level.

Reactor Oversight Process Related (ROPR) issues – an undesired condition affecting one or more of the strategic performance areas and associated cornerstones defined in the NRC’s Reactor Oversight Process. Also included in the ROPR category is any violation subject to NRC traditional enforcement and non-compliance with docketed commitment made to the NRC.

For MOST ROPR conditions: because determination is not required. Action is assigned to correct the issue. For issues that screen as a White, Yellow, or Red Finding: assessment performed to identify root and contributing causes, extent of condition, extent of cause (IP 9500X series).

Q&A

Have you discussed CAP changes with NRC?
This needs to occur."

EQUIPMENT INNOVATION/SUPPLY

BREAKOUT SESSION 1: Maintaining the Old

Session Organizer: Greg Keller (Director, BD & Marketing, AZZ Nuclear)

This session addresses situations where plants need to maintain decades old equipment and struggles to obtain spare parts or components. The focus is on obtaining spare parts enabling maintenance to be performed, not on the maintenance itself. Reverse engineering spare parts, for example, can allow plants to perform maintenance on large complex pieces of obsolete equipment as an alternative to the high cost to replace the entire piece of equipment. This session will also address solutions for the repair of older circuit boards.

Reverse Engineering

Greg Keller (Director, BD & Marketing, AZZ Nuclear)

Session Notes

- This used to be a supply chain track
  - Trying to bring back that crowd
- Nuclear doesn't have thousands and thousands of customers, and the things we reverse engineering are not cheaper to make
- Its not enough to be cheaper, you've got to be way cheaper
- We're not often reverse engineering to save money, but manufacture parts that are no longer available off the shelf
- There's risks involved in using reverse engineered parts
  - There's also risks to the supplier
- Where are the cost savings?
  - Example: you either reverse engineer an impeller, or replace an entire pump
- One of the reasons we reverse-engineer is because certain parts may no longer be available
- We're staying analog to analog
  - If digital was acceptable we'd be digital already
- Mechanical parts are easier than electrical parts to reverse engineer
- Electronics often include operations and maintenance training, so it's worth going out of the way to reverse engineer parts to look photo-identical to original
- A lot of the OEM parts companies will charge a lot of money for parts like nuts and bolts
  - Example: you only need 4 nuts for a valve, but they company only sells them in large quantities for minimum order
- One of the biggest challenges of this industry is obsolescence
  - Suppliers will stop selling parts when customers stop desiring them
- Soviet Tupolev Tu-4 reverse engineered from US B-29s that made emergency landings in Soviet territory
- Mechanical reverse engineering largely escapes attention because its little piece parts
- One of the things that recently drew attention was HCU accumulators
  - Used to supply a slug of water to scram a BWR
  - About 180 per BWR unit
- Suppliers provide equivalent parts, NOT OEM replacements
- Seismic qualifications aren't simple for reverse engineered parts
  - What if only the piston of the HCU accumulator needed qualifications?
- A line was crossed in the eyes of the regulator when the HCU accumulator was reverse engineered in terms of seismic qualifications
- The point is that the NRC should probably develop some guidance on Reverse Engineering because there currently is nothing
  - At a recent meeting, regulators determined that guidance is indeed something that should be developed
- Where is the line of what should be seismically tested?
  - Test because its static, test because its dynamic, test because why?
- A conversation occurred between a person from EPRI and a person at NRC
  - NRC has said you have to know ALL design requirements of original requirements before you reverse engineer it
  - EPRI example: you have to replace tires on a Ford Mustang, but they don't make those tires anymore, so you go to the dealer to get new tires, do you need to know all of the original specs from the original tires that are no longer made?
  - The engineer who picked that material considered all relevant parameters (corrosion, wear resistance, thermal expansion, etc.)
  - EPRI individual is concerned that if the NRC is developing guidance people who are in the industry should be involved to make sure the reverse engineer doesn't need to know why things are necessary to know such as why Ford picked the original tires
- Probably didn't see a bunch of DNP savings in the slides, but these things aren't first cost savings

Q&A

1. Utilities have the license and are responsible for the design, so what is the relevance of this discussion on NRC regulations?

a. It would benefit the supplier to not have to know things like exactly WHY a specific material was chosen for a part when the same material is being used for the new part.
2. What about new requirements, especially circuit cards? Original cards would not pass specs. Now you test it and it fails. Another thing we see is a lot of the reverse engineered cards perform a lot better than the design spec, so when we put them in the plant they perform different than the old cards. A lot of things in circuit cards are very onerous.
a. Ran into a similar problem where the clock speed in a new system was so fast that it screwed with performance
3. Does the common design process effort work its way all the way down to reverse engineering?
a. Some people pushed for it because there's a huge benefit to share equivalencies and dedications. The reason the answer was no was engineering isn't the one responsible for this, its supply chain.
b. Will be brought to DNP.

ANS UWC "Maintaining the Old" CGD, NIMS & Surplus

Kevin Rietz (Senior Director, NIMS, ATC Nuclear)

Session Notes

- Believes ATC were doing their job anyway before DNP came along
- Anyone who is doing commercial grade dedication (CGD) is performing along the same lines
- Utilities are responsible for the design basis, so if the third party provider doesn't get that information, they'll design to the most critical pieces of the part
- Now that we've dedicated an item, (some utilities rededicate an item constantly multiple time) how are we going to rededicate these items multiple times?
  - We go to the OEM and see if we can just buy it
- NIMS takes commonly used items and lets the supplier see what they are to take a concerted effort to make a generic dedication plan from all utilities
  - Intent is to buy a lot of parts, dedicate them and shelve them so they can be used ASAP when the utility needs them.
  - This was in place before DNP came about
- One of the keys of reducing costs is to spread them across a large number of items
- Its pretty significant how much savings can be found using NIMS
- They know that not all work-order demand is accurate
  - Some is historical
  - Some was not done yet
- ATC is a big surplus house
  - Have contracts with utilities to hold inventory at their 66,000 sq ft warehouse
- ATC is a nuclear supply chain solutions company
- Don't forget what Maria said

Q&A

1. How is the data in NIMS generated?
a. Utilities willingly provide the data
2. How are you integrated with SEER
a. Tie in with RAPID, so if it's in SEER it's also RAPID based information for SEER, so its classified as non-emergent/SEER. Not tied in or in competition with SEER. Pay a subscription to SEER.
3. How are you tied in with PALMS?
a. Not tied in, but looking in to what lessons learned could be found from PALMS.
4. Are you in competition with PIM program?
a. No, that's very relevant and needed. We're talking about common everyday items.
5. Could you speak on the impacts of the draft reg. guide on commercial dedication?
a. EPRI is drafting a response along with NEI as a response to the reg. guide on behalf of civils.
6. For safety-related control systems, nobody wants to tilt the windmill of going digital. Thoughts?
a. That will be talked about a lot more this afternoon.

BREAKOUT SESSION 2: Replacing the Old

Session Organizer: Greg Keller (Director, BD & Marketing, AZZ Nuclear)

This session will address various strategies for replacing obsolete equipment with equivalent replacements. The focus of this session is on the various equivalent equipment replacement strategies such as reverse engineering, re-engineering, equipment qualification, modification of commercially available equipment, etc. Solving obsolete equipment challenges with available equipment using the same basic technology saves the high cost of design changes or modifications.

Practical Considerations for Replacing Obsolete Components

Chris Mitchell (Site Director, Curtis-Wright Nuclear Group)

Session Notes

- Canadian, so there's some interesting, so there's a Canadian translation guide at the end of the presentation

- General insights, specific examples, and some discussion about EPRI and NRC info notice will be discussed

- Passed out Lego black box toy example
  - First purpose of the black box is an example
  - Second purpose is if you get really super bored you can play with it
  - If you can visualize the toy as a black box you need to replace
  - Shake the toy to hear what's inside and spin the shaft
  - Take the top off and compare different boxes
  - You can easily see how many challenges you can find from having so many variations when replacing parts
  - Three solutions: get a new system, refurbish/repair, reverse engineer

- The process for reverse engineering is relatively simple and self-apparent
  - Often the largest constraint is time, as projects can take a lot of time to complete
  - Did some work at Pickering Station (5-10 years left of operations at station)
  - Power supplies, amps, detectors
  - Had to fit detectors on different places in different turbines (didn't work out so well because of mounting differences)
  - Very successful endeavor for Pickering
  - Ended up convincing the customer not to add new features

- Refurbishment has a place as well in obsolescence issues
  - CWNC Emergency Diesel Speed Switch used for example
  - Idea was to refurbish switch because of how extremely complicated it is
  - Old drawings were terrible and had no information about how they actually worked
  - Created a base model in CAD, and did a criticality assessment matrix for failure modes and effects
  - Component procurement was quite extensive and difficult
  - Lessons learned- complex devices can be refurbished to save difficult reverse engineering/redesign

- CWNC Turbine Hydraulic Governor System example
  - Station life is short, so refurb was chosen instead of redesign
  - Great documentation was kept of the devices
  - Base models were created for each part
  - Counterfeit parts were a huge issue for the project
  - Qualified the assembly with control and maintained techs onsite
  - Again, complex devices CAN be refurbed
  - Some of the devices didn't (before refurb) didn't work how they were supposed to

- New Systems Projects are often faster to design
  - QA and manufacturing control systems made the parts easier to qualify
  - Made replacing with new the best option

- EPRI Guideline 107232 is an excellent guideline about equipment reverse engineering at NPPs
  - EPRI Project evaluation Matrix is a useful chart to see where reverse engineering can be useful to use

- NRC Information Notice IN 2016-09 was quite shocking
  - You have to be really careful on the design
  - The NRC was pretty clear that the licensee is responsible for the design
  - Highly recommend reading this document before doing a project

Q&A

1. As built didn't match as designed for turbine detector vibration?
1. Because it's such an old plant, you are correct."

ANS UWC

Robert Lane (VP Sales and Marketing, ATC Nuclear)

Session Notes

- Good example of DNP
  - A mod that saved each utility $25m by reverse engineering and replacing an older part

- These analog systems worked forever, why not replace with analog - saves money

- More specific on reverse engineering
  - Not going to get too much into NRC perspective
  - Some people in this room are working on an EPRI guidance document to guide the NRC in the right direction
  - A lot of the time a utility will get rid of something like a destroyed power supply that could be reverse engineered to cut costs later
  - Goal is to hit utilities need date with a project manager to make sure date is hit
  - Equivalency will disposition every difference down to the discrete component level
  - Generally identical replication is preferred, but black box can be used if absolutely necessary
  - Black box approach is used for example a lot for power supplies because legacy designs are so poor

- Redesign is a good option to deal with if a part was designed poorly in the first place

- When he worked at Exelon, a lot of the I&C shops were literally garages
  - Whoever you use to replace equipment, you want to go out and see where/how they're doing working

Q&A

1. How long did it take to replace HIPC card?

2. Do you have a shared site that identifies things that have been reverse engineered?

3. When you get the specs in, do you have a lot of trouble with code reconciliations because you're working on 20/30 year old specs.

1. About 9 months.

2. It's on the ATC site/can be figured out by emailed Bob. Checking website or calling is the best way.

3. In I&C space it's really not difficult, probably more difficult in mechanical world."

Delivering the Nuclear Promise & Maintaining High Quality, Reliable Equipment

William Van Wormer (Manager, Products and Business Processes, Westinghouse)

Session Notes

- Will talk about where we are in the industry.

- Wants to give an OEM perspective

- Growing maintenance challenges include decreasing OEM supply base and age.

- First issue is commercial product quality.
  - Commercial suppliers view the nuclear marketplace in a very different way than those in it.
  - Nuclear industry is small compared to other industries being services
  - As soon as volume gets down to a certain point there's no product, no service
  - WEC finds themselves getting into the commercial product manufacturing process for some things at this point

- Obsolescence is an industry issue driven largely by the OEM supply base dwindling
  - What's interesting about obsolescence from an OEM perspective is that the definition varies wildly from place to place
  - As an OEM, there's a different approach to this: less than 400 of 83000 parts actually need to be investigated at this time
  - Its worth checking to see if a part that the industry is calling obsolete actually is before trying to reinvent the wheel

- Resuscitated Products such as the HFP circuit breaker had such a low volume of demand that they became obsolete from the manufacturer
  - After working with the manufacturer it is now back to being non-obsolete
  - Second example was molds for DB breaker cell insulators having such a low volume
  - In this instance the wheel was reinvented and the part was remade

- Reverse engineering has been the topic of debate, so won't spend a ton of time on it
  - Its obviously useful when there's no other solution in an industry like this for so many parts
  - Not saying don't reverse engineer, but be cognizant of things that come with reverse engineering
  - WEC even does some reverse engineering as an OEM
  - Stacked contact block switches are used in the control room, but the materials were subpar, and no solution was available
  - Worked with vendors and contractors to make the switch available again with different material options to maintain functionality

- Customer supplier relationship isn't something that's technical, but it's important
  - Investment in time up front to save time and problems down the road
  - Surprised how often WEC isn't given any type of specs from customer to meet for a part that can help qualify it

- Replacement (Motor control center) MCC buckets are an extremely common calm on the surface storm underneath product to replace
  - Need designs, drawings, specs, etc.
  - Everything that needs to be replaced is inside the bucket, making it seem simple to replace
  - ""replacing without replacing"" - replace the bucket but leave everything else in place

- Obviously obsolescence is causing maintaining the old to be difficult with OEMs exiting the market
  - As parts become scarce or obsolete, maintaining becomes more difficult and replacing may become necessary

- Original trip unit design is a good example
  - was obsolete, but was redesigned as a good drop-in solution

- When you look at this from an OEM perspective, there's a slightly different viewpoint
  - Have original drawings and designs
  - Direct access to original design helps to recreate or redesign parts

Q&A

1. What's the predominant product line that's failing?
1. Electrical- mostly breakers and fuses.

BREAKOUT SESSION 3: Embracing the New

Session Organizer: Greg Keller (Director, BD & Marketing, AZZ Nuclear)

This session will introduce new technologies and the benefits and challenges with using them in nuclear. Certain products and technologies may not be cutting edge in the industrial world, but may be new to nuclear. Examples include replacing analog equipment with digital, such as using differential pressure to measure flow versus ultrasonic flow measurement, or digital controls on a thirty-year old chiller. The accuracy and reliability gains available through new technologies may increase power output and capacity factors.

Variable Frequency Drives

Len LaCrosse (Product Development Manager, AREVA)

Session Notes

- VFDs would typically be located on Turbine Deck, NGSAT Room, portable outside units

- You can continue full load output with the loss of any two cells

- These units are fully designed to be placed outside and withstand weather

- New VFDs are a huge improvement over mid 90s models

- VFD design is continuously evolving, and if utilities like a design, they usually keep with them

- The main application is Reactor Recirc Pumps in BWR 3/4s
  - Non-safety related component
  - Potential of 4 MWe of released capacity
  - In essence you're simplifying while also getting state of the art electronics

- The main benefit of using it in reactor recirc flow controller are precise control of motor speed, improved flow regulation, controls can get closer to licensing set points, reduces heat generation, increases fuel savings due to optimization of fuel enrichment, reduces fire detection, ease of operator burden, and can incorporate future uprates with higher flow

- BWR/PWR Condenser Circulating Water Application
  - Went over a quick review of pump affinity laws
  - This application again gives enhanced control of the system

- Rule 316(b) of EPA Clean Water Act requires that intake structures be designed and operated so as to minimize adverse environmental impacts
  - Impingement is trapping of organisms
  - Entrainment is passing through of organisms
  - VFD doesn't 100% take care of the issue, but it definitely helps
  - All nuclear is subject to the rule

- VFDs can essentially be used for any secondary side pumps

Q&A

1. From 316(b) compliance, how would you go about getting assurance from VFDs?
1. As your permit comes up, it has to be addressed. I think by mid-2018 everybody must submit a series of study reports citing how they're going to deal with it. Talked to one plant who's permit has expired over 6 years. Have been fine because the EPA is so backed up and doesn't call them out on it like the NRC would."

Replacing Analog Equipment with Digital Equipment

Craig Irish (VP of Sales and Marketing, NLI)

Session Notes

- Len gave a great example of using digital technology, will show examples of the case studies about the use of digital tech

- Years ago at a site giving a presentation to a room of engineers, and when asking someone if they were a system engineer, he said ""no I'm a curator of a museum

- The focus of this presentation will be to express when it makes sense to use digital equipment

- Most plants would be able to take commercially available parts, modified parts, or reverse engineered parts as replacements before new state-of-the-art (digital) equipment (design change)
  - Typically a client won't want to spend a ton of money on a design change, but if you can show them the cost savings it could be shown to be worth it

- Low voltage breaker is a good example
  - 1960/50s technology (very very old)
  - Very simple to work on because it's just a hunk of steel, but also very labor intensive
  - Its becoming very difficult to find parts for them
  - Many plants at one time would work on the breakers themselves, but that expertise is becoming thing
  - The key is the trip unit, the UV, the shunt trip all have microtrips in them and are the new key components

- Chiller controls are another case study used
  - They play a really important role (safety related parts)
  - Most have been in the plant since day 1
  - Control systems that cause most of the problems
  - An old train system that can be adapted to pretty much any chiller
  - Update is done in one large package (usually during an outage)
  - Bought a vintage chiller and completed the change package on it to make sure they could do it well before doing it at a site

- A simpler example is panel meters
  - Control rooms are chock full of analog style meters which are in many cases obsolete
  - This is applicable to both safety and non-safety related
  - This is an example of replacing an analog meter with a digital meter one for one using same panel cuts
  - Control room operators try these out on the simulator for a few months to set parameters

- TVA had a situation in which three different TVA plants tripped offline because of digital products, so they needed to be better understood and qualified before further work

Q&A

1. One thing I haven't seen is the obsolescence issue with digital products. Could you comment?

2. How have new cyber security requirements impacted you guys?

3. On this digital control upgrade, are they under the LAR process or 50.59?

4. On the first slide you said option 2, buy commercially a better product, what if I make it equivalent? Is it not impacting functionality?

1. Early digital products would literally be obsolete after 3 months (example). Products are designed with firmware that can be updated so as to not make them obsolete, and there's an agree with the manufacturer that the company won't change it too often and everything will be kept backwards compatible.

2. Part of the V&V effort always includes cyber security requirements. So if there's a port on the back with Ethernet (for example) its disabled. Protocols have to be worked out with the client.

3. Both

4. Yeah, it's really situationally dependent

Equipment Innovation/Supply "Embracing the New"

Jesse Geris (I&C Product Development Manager, AREVA)

Session Notes

- The theme of this topic is using products not from the nuclear industry and have lots of time in operation that could be adapted for our industry

- Reverse engineering is somewhat of a pet peeve
  - Still engineering, why is it sometimes treated differently?
  - There's plenty of info on processes to follow for reverse engineering
  - At the end of the day it's still engineering
  - It's easy to look at inputs and outputs on paper, but you need to look at up and downstream and make sure you're doing what you think you are along the way
  - We drew the line on the system level for reverse engineering

- A good example is digital control rod drive control system (DCRDCS)
  - Davis-Besse just completed this upgrade this year
  - a (non-safety) PLC was replaced with one from the petrochemical industry
  - millions of hours of uptime and testing in use
  - Rockwell Automation TMW PLC was chosen for the system
  - Industrial safety related (personnel safety really)
  - An example of this, every smartphone uses digital control platform
  - Extremely large amount of data out there about the operation of these systems
  - The goal is to have an effective product to use in this application

- Replacing analog with modern analog is the last topic to cover
  - Just another option without any bias
  - Off/waste-gas control system replaced at a BWR
  - This is responsible for the timing and the process for the waste-gas system
  - Replaced with an analog relay-logic system (not novel/new)
  - Have the ability to build-in modern technology to 1960s logic and methodology
  - PLC is built in alongside to provide logged data alongside the analog system
  - This is a good solution for non-safety application where we're still staying in the analog world, but want some digital benefits

- Discrete logic solving platform (Lockheed Martin)
  - Helping to alleviate safety related functions with defense in depth/licensing issues
  - Very robust system from a trust name

Q&A

1. On the non-safety analog system why do your customers ask for the relay logic?

2. How do you overcome the challenge that schools are only training in digital?

3. Do you know what the military is doing?

1. Addressing a few things here not all technical hurdles. Some are cultural issues like comfort of the workers to use the systems like the brains of the system being a digital platform.

2. I think everyone can share that issue. I benefit from being brought up in the digital world, so I benefit from going digital."

BREAKOUT SESSION 4: Improving Efficiency and Reducing Costs through Environmental Monitoring and Emergency Response to Deliver the Nuclear Promise

Session Organizer: Jordan Gillis (Director, Scott Madden)

Come learn how Bruce Power recently leveraged technology and employed innovative tools and techniques to increase efficiency, reduce workload, enhance collaboration with government agencies, and gain recognition by the IAEA as the industry leader in emergency response, off-site radiological monitoring, environmental reporting and emergency response processes for regular operations and respond to emergency situations at its Canada nuclear power site. The program was designed after the lessons learned from the events of Fukushima Daiichi.

Emergency Response and Remote Monitoring Enhancements

Dan McArthur (Senior Strategist, Nuclear Oversight and Regulatory Affairs, Bruce Power)

Session Notes

- This was a 2.5 year effort just after Fukushima
  - Two other key vendors as part of this effort - non-profit Research Triangle Institute (RTI) and another vendor - a German Vendor
  - Weren't going down the road when this project started as a large efficiency, workload reduction, cost savings enhancement, but it has turned into that

- This fits in with delivering the nuclear promise (DNP) in the "improving efficiency" area
  - Changes to the existing program do a lot to help improve efficiency

- The two big lessons learned in communication were the lack of timely accurate information during the event created mistrust and misinformation

- When work started with ScottMadden/RTI certain things were done
  - Previous EP Program features as listed on slide were quite comprehensive, but had very little integration or interoperability
  - Looking back there was definitely opportunity to enhance the system
  - Transmissions were still largely by fax
  - The need to reach out to external stakeholders was completed in various ways across the industry with different systems and different numbers
  - If you look at Fukushima, there was no one set of facts and truth for people to look at and get numbers from
  - If everybody has different data, it's hard to integrate and interoperate

- Japan had a very sophisticated and robust remote monitoring system, but they all got washed away with the Tsunami hit

- The three critical path elements were reliable field elements, RTI Nu-PathNET Analytic Engine, and Process Integration and Change Management

- The first aspect of this was around the gamma monitors
  - The new system was a network designed to operate in beyond-design-basis events, and connected to a communication system with backup power and satellites, and the detectors have a 4.7-5 day battery with solar cell trickle, so there's no single point of failure
  - This system is sent every 15 minutes and is also sent directly to the province
  - A point to make is that mid-western Ontario the sun isn't always shining. The 5 day battery backup is proving quite reliable and robust
  - No problems going through first winter with heavy snows
  - Eight detectors were looks at for continuous air-sampling
  - 4 have backup power and 4 are connected to the grid
  - There's 44 spectrometers (28 outside the fence, and an additional 10 detectors that could be expanded to)
  - A mobile unit could be deployed if one were to fail

- Going back to OSST, it would take a significant amount of time to get data to the province
  - This system has helped to enhance the safety of OSST
  - Data is sent out for validation before distributing
  - Data is cached every 15 minutes, but can be as quick as real-time
  - 15 radionuclides are tracked, and can be expanded to 18

- There's different levels of access to this program- Bruce Power Administration, Bruce Power General Users, External Users
- One of the things they're happy to do with this system is open doors to agencies and keep as transparent as possible
- Perhaps in the future could make a version available as read-only to the public to help public perception and knowledge

- Some project objectives and benefits were clearly extremely important
  - Things like improving worker safety, which made this work much simpler and easier to handle
  - Putting all of the data into this type of solution/approach is extremely valuable, especially in relation to DNP

- Some lessons learned:
  - The power of aggregating disparate data into a single database support system will have many benefits (listed on the slide)
  - Typically data aggregation enhancements are not seen as valuable cost-reduction strategies

Q&A

1. What's the annual maintenance costs for each of this monitors?

2. Bruce brought this to the regulator. Was there a point they jumped on board?

3. I don't know how it is changing EP plans in Canada, but have you changed yours?

4. What type of agreement are you seeing between older tech and newer tech?

5. About these remote monitors, if there's EM activity like a solar flare or storm cloud, how long can the units store data to be transmitted as soon as possible?

6. You mentioned DNP, do you have any idea if there's anything like this in any of the efficiency bulletins being considered?

7. Have you guys looked at other environmental data parameters to use your system for other ideas?

8. Since it is outside of your protected area, and we're talking about cyber security controls, are you doing anything to block the ports to the general public?

1. One-year calibration and then annual license and maintenance fees. For each one of these gamma stations it takes about half a day per year for each of the 44 stations. We did not add a tremendous amount of work, and in fact saved a tremendous amount of money to stop having two chem techs to go out and check these devices. And these stations come with a ten-year warranty.

2. Yes definitely, when we went to the regulators, their eyes lit up, and in my opinion in our eyes and the CNSC's mind this system is THE best in the world without question, and the CNSC was very happy and wanted it implemented right away.

3. We have changed it, these are fully implemented and in our license and approved by the CNSC.

4. The reading themselves show a minor disparity between TLDs and LaBr. It's not a huge difference, but it's there, so we're slightly worried about public perception about two different numbers. We're talking about extremely minute differences, which we know are negligible, but the general public may not.

5. The system can store the data for days, and the data can also be retrieved via USB.

6. We don't think so.

7. Wind is already included in the system. We get our data from our onsite met towers and some offsite met towers as well.

8. The capability is that only authorized devices can use it.

BREAKOUT SESSION 5: Working Cross Functionality to Improve Nuclear Parts Availability

Session Organizer: Jordan Gillis (Director, Scott Madden)

This presentation will offer perspective on how one of the largest nuclear operators in North America has used a breakthrough approach to address longstanding issues with parts availability.

Working Cross-Functionally to Improve Nuclear Parts Availability

Frank Guglielmi (Vice President, Fleet Operations and Maintenance, Ontario Power Group) & Marc Miller (Partner, Scott Madden)

Session Notes

- Ontario Power Group (OPG) provides over half of Ontario's power
  - Power is 99.7% free of smog and greenhouse gas emissions
  - Burned last piece of coal in 2014
  - Two nuclear sites: Pickering (6 units 3100 MW) and Darlington (4 units 2512 MW)

- How does parts availability help the Delivering the Nuclear Promise?
  - Having the right parts in the plant workers hands at the right time improves efficiency, equipment reliability
  - OPG has always had a parts problem for at least the last 30 years
  - Parts problem is mainly started in getting the right parts in the right people's hands at the right time

- The three-phased project consists of defining the problem and plan, designing solutions, and implementing solutions.
  - Phase one (defining the problem) was an investigative team to identify all the issues that contribute to lack of parts availability
  - Wanted to fix the things that would be most impactful to lack of parts availability
  - Also wanted to identify the proper people to design the solution
  - 8-10 weeks was spent defining the problem, identifying the issues to investigate, and determining who would be involved
  - Phase two is where the solutions were designed and navigated
  - Several teams in phase two looked into the issues, determined which should be developed and executed development
  - Phase three is ongoing implementation (target completion date is end of 2016)

- Poor nuclear parts availability hampers OPG's ability to schedule and get work done
  - Data about of nuclear assets planning was poor
  - Different organizations had different priorities (different groups were working on different things)
  - Work balancing to available resources
  - OPG has changed so that work is balanced to resources which allows us to hold ourselves accountable to meet milestones
  - Because of these interdisciplinary challenges OPG advised that a cross-functional solution should be a priority

- It's a very long process from part identification to use of the part in the plant
  - Each stage was broken down into sub-processes cross-functionally to allow for subject matter experts to excel where they should be and pass off where it would make sense
  - A lot of solutions were tried before, but there was not cross-functional sustainability
  - Wanted to make sure they were fixing the important stuff first and foremost

- The last thing the teams did is they got a lot more into the details
  - What needed to change in policy or process land

- The line is leading most of the implementation, and PMOs are extremely important to the process

- Improvement themes include improving the health of our catalog and CAD id's, ROP max, description of the elements of the supply chain, assessing pieces of the plan of the job
  - Eliminating the churn, and executing cross-functional processes
  - The feedback loop is important to the process
  - It's important we understand what happened and assign actions to say what we're going to do about it
  - Nothing was easy, all colors of implementation of the current status chart were difficult

- At t22, a lot of the jobs we have are hard to do jobs
  - We call this a hardened backlog such as components that need to be redesigned
  - A lot of these projects would flunk out at t19 and recycle back into the process
  - A team was created specifically to help mitigate this issue

- Many supply chain led initiatives were led to help this process
  - The slide lists these initiatives
  - In a nutshell, sometimes we would cancel a work order, but the associated material requests weren't cancelled. This caused many different issues within planning and scheduling
  - The site organization led initiatives listed on the slide helped changed some behavioral issues from the top down

- Before implementation changes were made, anywhere from 10% of resources to 200% of resources were actually acquired as needed
  - We had parts available, healthy CAD IDs, and worked to bring those parts on, and send the broken parts back through the process
  - We had to make sure the work we were committing to was work we actually could complete and complete on time

- We had to really understand what the problem was, and it wasn't a simple problem
  - There was many problems and they were widespread
  - The only way we were actually able to implement this is to involve our CNO and get his buy-in
  - We're still not done yet- still in the process of making it sustainable and reinforcing the good behaviors

Q&A

1. What t week are you using? Do you go beyond t 22 for longer items?

2. What percentage ready are you at t8?

3. What is your inventory like?

4. I'm curious how long it took to change the culture?

5. Are planning and scheduling part of the same management organization?

6. Has OPG logistically looked at putting planning and scheduling together?

7. At the end of the day when we've looked at which work hasn't gotten done, and we looked at materials and parts no available, is it because engineering didn't ask, because it wasn't planned, etc. Do you guys break it down that far?

1. The process starts at t 22, and is locked at t8. The team at OPG has gone ahead to longer lead times for more difficult projects (up to t35)

2. At t8 we're ready at 90% materials in hand.

3. We have benchmarked those levels for OPG, but that doesn't necessarily help for all situations even if inventory is really high.

4. We're still in the process. I think what we've seen is more teamwork aspect in getting this resolved.

5. Work management does the planning and maintenance does the scheduling.

6. One of our initiatives in maintenance is to look at putting them all together in one spot. We have schedulers and planner and coordinators in place to make sure they work together. We have to look at the actual integration and it's one of our actual initiatives. Maybe 10-15% of people in the maintenance organization are just planning work. There's a lot of ground that can get gotten after.

7. Yes, and materials and parts is number 5 on the list of things that causes work to not get done. We're looking more into this issue.

BREAKOUT SESSION 6: Advanced Monitoring and Diagnostics to Reduce Cost

Session Organizer: Ted Quinn (President of Technology Resources, ANS Past President), Richard Wood (Professor of Nuclear Engineering, University of Tennessee)

Recent advances in condition monitoring technologies are allowing nuclear facilities to leverage data from existing plant sensors and components to improve reliability and help reduce operating costs. In this session, learn how these technologies have evolved from research and development activities to fully-implemented applications that are providing engineers and operators with the information they need to monitor the reliability, health, and performance of process instrumentation and to enable the transition from time-based to condition-based maintenance activities. Participate in the discussion with our panel experts on how your plant can take advantage of today's research and development activities to provide the foundation for future advances in safe, efficient, and reliable plant operation.

Nuclear Energy Enabling Technologies (NEET) Advanced Sensors and Instrumentation (ASI)

Suibel Schuppner (Department of Energy)

Session Notes

- The vision of the ASI program is to develop new sensors and instrumentation for monitoring and controlling advanced reactors and fuel cycle facilities
  - Gain initiative was highlighted during the plenary yesterday
  - GAIN's primary focus is to push forward with advanced nuclear technology, and engaging its own industry
  - More information can be found on the GAIN website (gain.inl.gov)
  - As of today there is a new GAIN director coming from Westinghouse

- There are mission specific applications of I&C Research in the program
  - In the LWRS program, the existing fleet modernization and life extension programs are focused on
  - Advanced reactor funding is focused on specific reactor types
  - Fuels is looking for transuranic protectors
  - Looking for advanced sensors to reduce uncertainty and increase accuracy
  - Nuclear plant communication research is being conducted for generation and transmission
  - Advanced concepts of operation focuses on higher integral control system architecture
  - Enhanced Monitoring and control systems is also a focus area

- Robust Online Monitoring Technology for Recalibration Assessment of Transmitters and Instrumentation is a joint effort lead by PNNL focusing on advancing technology for online monitoring and data transmission
  - A flow loop was used to determine uncertainty quantification, followed by a virtual sensor with uncertainty bounds
  - The virtual sensor can act to compensate for the reduced reliability of the physical sensor

- Operator Support Technologies for Fault Tolerance and Resilience is a joint effort lead by ANL

- All research in that office is funded through competitive solicitation
  - 3 areas for research
  - Universities (~$800k for three years/~$400k for three years)
  - NEET (open to all applicants)
  - NEUP (University lead and ~$5m for three years)
  - Webinar last week, due date for applications is 14th of September, more info can be found on neup.gov

- Another opportunity for industry participation is Small Business Innovation Research and Small Business Technology Transfer

- Research is focused on advanced I&C technology that will aid in advanced reactor and fuel cycle facility development

Ensuring the Health and Reliability of Rod Control Systems in CE PWRs

Ryan O'Hagan (AMS Corporation)

Session Notes

- AMS as a company has been providing rod control system health and reliability systems to Westinghouse plants for 20+ years
  - It was proposed that a similar application could have been used at CE plants

- Anywhere up to 5 coils in a CE drive mechanism
  - Coils work in concert with each other to move the control assemblies in and out of the core

- Right now at a portable testing system application
  - System is brought to CEDM cabinets and applied when needed

- Coil voltage calibrations are necessary for CE plants for coil health and proper rod movement, but not a requirement at Westinghouse plants
  - Critical path time reduced from ~18 to ~6 hours of critical path time with the automated system

- Were able to root cause an issue with the voltage calibration far faster with the automated system than with a manual test procedure

- The portable test systems was roving through all of unit 2's CEA's
  - Last issue was 7 days of outage time and ~$10m, so it was very important to not have to have this issue again
  - Saved upwards of $15m with the roving automatic system
  - Told them that coil temperature was important and implemented a temporary test system to monitor system to check coil temperatures on the fly
  - There's about a 7 F /volt relationship in coil temperature
  - They put in a scheduler to take data several times a day
  - There's now trending that puts the data together and makes sense of it
  - Discussing moving this to a permanent online monitoring system

Advanced Monitoring and Diagnostics - Preserving Nuclear Competition in Today's Economic Reality

Clint Carter (Luminant)

Session Notes

- We're here to deliver the nuclear promise
  - plants can't remain cost competitive
  - DNP is to help us remain cost competitive

- This is the 4th industrial revolution
  - the convergence of physical science and cyber
  - cyber is a real entity and it will change many aspects of what we do, how we live, and how we do business
  - everything is only going to get faster and faster

- Want to talk about the power optimization center and state-of-the-art advanced monitoring and diagnostics
  - In conversations with other utilities to expand their center

- The mission of the POC and with advanced analytics provide actionable intelligence
  - provide info to operations real-time 24/7
  - working with maintenance or systems engineering also

Mastering On-line Monitoring of Instrumentation and Control

Phillip Erikson (INL)

Session Notes

- In terms of drift of instruments, ATR is using digital pressure transmitters in the plant
  - Well within allowable limits
  - Very typical of the plant

- For methodology, for response time testing, using LCSR testing for Resistance Temperature Detectors (RTDs)
  - Old methodology would follow the temperature of the RTDs
  - Plant needed to be SCRAMed out early and surveillance could be made/met, so the plant wouldn't have been able to get back up
  - This methodology allowed that to not have to happen

- Cross calibration was used for the RTDs, and online monitoring calibration was used for the flow transmitters

- What was discovered is that there's some problems with the thermal wells in the conducting set of the RTDs - they should be a lot closer
  - Initiative to redo all RTDs and refurb thermal wells to get back to consistency with RTDs

- The number of times a bypass valve or transmitter has had to be opened up and then the part causes trouble when trying to come up doesn't start properly and delays tings shows that the less a part is touched, the better
  - There was no benefit on the response time side, but on the calibration side there's about an FTEs worth of time saved

- Future plans are to expand this on experimental loop systems
  - would have to be more modeling than current techniques
  - modeling method is coming through and doing very well

On-line Monitoring Delivering the Nuclear Promise

Ray Herb (Southern Nuclear)

Session Notes

- Here to give industry perspective from utility point of view and introduce some needs going forward

- Whole basis of this conference this year is DNP
  - Wants to connect online monitoring and DNP
  - DNP is a shorter effort, but it doesn't actually end in 2017
  - You'd like to get to a point in which you don't have to worry about many things at all because online monitoring would take care of the surveillance completely for periods of time

- There is even efforts in the industry to collect more data, so you can do more health monitoring of large components
  - Response time testing has been eliminated at many plants because the calibration of the sensor and monitoring (for safety-related components)

- The 5B process wasn't really designed to implement the input from online monitoring, but perhaps going forward it could be tweaked
  - Historical data could be stored with online monitoring from the plant computer

- Online monitoring (OLM) started back with EPRI in the 90s
  - It's been proven by the non-nuclear industry that it makes sense to online monitor without maintenance and then just provide maintenance when actually needed to reduce excess

- We rarely get back to what's the real purpose behind calibrations
  - Calibration is as old as sensor technology
  - periodic tweaks were often needed for sensors to make sure there's no degradation and fix any assumptions that could have been made on things such as drift
  - The sensors we use today typically don't drift in one single direction, it's much more random
  - OLM can really fix all of these legacy issues

Q&A

1. Question for everyone, 2017 is not the DNP end, we'll keep going with the production standpoint. In 2018 we'll implement the efficiency bulletins, and potentially lose people. Do we have a timeline when these things can be implemented and put in place?

2. Ray you had a list of desires, what is the industry doing to support that?

1. These are things that are beyond 2018 because of the large expanse of time money and effort that go into the projects. These are on each utility individually, not the industry to implement these strategies. An industrywide PM design basis was done through EPRI to talk about calibration, but nothing has been implemented so far.

BREAKOUT SESSION 7: Accident Tolerant Fuel and Control Room Modernization

Session Organizer: Greg Keller (Director, BD & Marketing, AZZ Nuclear)

Safety is central to the design, licensing, operation, and economics of Nuclear Power Plants (NPPs). Come learn what is happening in the industry in regards to the development of accident tolerant/failure proof fuel. This revolutionary, "game changing" technology is being designed to improve operating safety, reliability, cost effectiveness, and accident tolerance during severe plant events. Listen to what utilities, vendors, and the DOE are doing to make this technology available.

The US Department of Energy's Light Water Reactor Sustainability (LWRS) program includes research and development on advanced instrumentation, information, and controls to address critical gaps in technology development and deployment to reduce risks and costs to nuclear power plant operators. To mitigate the substantial technical, financial, and regulatory risks in a first of a kind control room modernization project, activities are being conducted through a federal-private partnership. This presentation will summarize the ongoing projects with commercial nuclear utilities, the technical and organizational approaches to long term modernization of legacy analog control rooms, and the current status of efforts.

Utility Perspective on Accident Tolerant Fuel

Bill Gassman (Senior Staff Engineer, Exelon Nuclear)

Session Notes

- Fukushima would not have happened or would have been significantly mitigated if we had accident tolerant fuel (ATF)
  - The event is what really kicked off the worldwide effort to really push ATF
  - Going to be talking about fuel designs that can withstand loss of core cooling without fuel damage or hydrogen generation

- In 2012 the US Congress directed the DOE to develop ATF
  - DOE has us deploying lead test fuel rods as soon as 2022
  - Exelon wants to accomplish this far sooner

- ATF is in development worldwide collaboratively

- US DOE ATF Road Map is the document to see if you want to learn about ATF
  - The road map contains a graphic showing the potential schedule
  - Earlier this year the DOE had an expert panel to decide which fuel types would be funded and which would be defunded

- Fuel has two components, fuel pellet and clad
  - Ideally ATF would increase all properties of both parts of the system
  - Many different types of ATF were initially considered

- The rest of this presentation will be a utility perspective
    - There are a couple steps coming up near term to facilitate early deployment
    - Phase 2 ""Development and Qualification"" are now beginning

- Economics is the biggest driver the industry
    - Accident tolerance doesn't matter if it's not economically feasible
    - Can't develop a fuel system that poses an economic challenge
    - Can we use ATF to develop an economic benefit?
    - Many BOP benefits could potentially be derived from ATF
    - 10CFR50.69 for example would introduce risk reclassification of SSCs that could provide substantial benefit
    - ECCS, EDGs, Scram/trip systems would allow it to be slightly less important with extra margin gained from the fuel
    - Could economic benefits come from needing less maintenance on reactor protection systems if the core is protecting itself with ATF
    - If the fuel has much more coping time, PRA models can be simplified and gain a lot of margin
    - Tech Spec 3.1/3.2 give limits on fuel licensing and operational margin
    - One example is LOCA performance, which could be N/A with different clad types
    - Outside of BOP and licensing there are other potential benefits that could be derived
    - Do you need a 50-mile radius zone around the plant for emergencies if you have ATF
    - In the area of plant life extension/license renewal, you have to determine if passive systems such as the reactor pressure vessel and ECCS can perform as well down the road, but ATF could potentially lower the performance requirements

- We also need a well-defined licensing and regulatory framework
    - It's not clear if 10CFR50.59 would be able to successfully implement ATR without a license amendment or a Safety Evaluation Report from the NRC

- From an operations standpoint, the easy parts are hopefully going to stay easy, and adverse operational impact must be avoided

- We came out of the gates with a lot of energy with funding in the beginning, and we have to make sure that the funding continues to be funded pursuant to the original road map guidance
    - Exelon hopes to have lead test rods in commercial LWRs by the fall 2019 outage
    - Been working with Areva, GNF, and Westinghouse, which has gone very well because they've all been funded adequately
    - This is something being talked about at the NRC now and hopefully further discussions can happen in the near term

- It takes a long time to roll out a new type of fuel, but in this instance the hope is that its more than worth it to continue on
    - One last time, Exelon is seeking to beat that 2019 date

Q&A

1. How much time are we looking at getting in terms of on top of oxidation of zirc.

2. Scot Greenlee linked ATF to 50.69, but also to high burnup fuels and high enrichment fuels, have you looked at that?

3. On the regulatory framework, you talked on lead test assemblies, what about a full core? Will there need to be changes to 10 CFR50?

4. Can you describe the involvement of the fuel suppliers for example during the conceptual phase. Did the DOE go to just techs or the fuel vendors.

5. Is the payback there to have to take 3 fuel cycles to get to a full core?

6. How are you defining commercialization?

1. Some of the concepts are metal so will see some type of reaction, but some of the ceramics don't even have an oxidation. Some of the shorter coping times are on the order of hours, some of the longer ones can get to days. We want to get to a minimum coping time of 72 hours.

2. We don't want to increase enrichment and have to ask NRC to relax that limit, but for example U3Si2 is much denser than UO2, so there's a benefit there.

3. That's right, 10CFR50 is a UO2 document. We'd have to take a step back and reevaluate our licensing basis for the fuel type we choose and perhaps make it a much more generic structure.

4. AREVA, GNF, and Westinghouse were all approached very early on and told by DOE that they would be given money to research this how they saw fit. But the three fuel vendors have been involved early on.

5. The payback is there for a plant that will be operating for more than a few years. Once you get to the first reload of a full core, it can be very worth it especially if 50.69 and other things are fully implemented at that time.

6. The insertion of a lead test rod or lead test assembly into a US LWR."

Evaluation of Accident-Tolerant Fuel within the Risk-Informed Safety Margins Characterization Pathway

Curtis Smith (Directorate Fellow, INL)

Session Notes

- I'm going to pick up on a few topics, specifically moving from qualitative to quantitative candidates for accident tolerant fuel (ATF)

- RISMIC is Risk-Informed Safety Margin Characterization
  - Sustainability is the key to RISMIC
  - We have two parts to RISMIC (on slide)
  - When we move to more advanced computer science platforms, we have multiphysics coupled toolsets
  - Bison will also be used, which is a fuel-performance code
  - We're really coupling the probabilistic ideas with the physics ideas
  - When we integrate these things, how do we judge and characterize ATF (what is the metric?)

- Our quantification is achieved via simulation
  - Some characteristics make themselves well-known through the simulation
  - These characteristics drive the use of the simulations

- If you go to the LWRS page we have program plans for all pathways (including the RISMIC plan)

- If we drill down into the technology, we have a different phased look
  - We need to determine the steady state performance, off-normal accidents, and create advanced modeling and simulation
  - One of the keys here is when we do these analyses, the fundamental properties of the fuels drive the outcome of the scenarios

- Some calculations examples we've done related to ATF might give temperature or power within an accident scenario
  - For example we could compare response of Zirc and SiC cladding during a TMI-type scenario
  - We push this sort of information in two ways- as a generic metric, and also to drill down and see what are the components that are important to that scenario

- Some of these parameters are uncertain, so uncertainty sampling is a continuous process

- What comes out of the analysis is a lot of information, but we can use all of this information to judge feasibility

- We would be able to use this as a virtual sandbox to see if we really get that 36hour 72 hours coping time

Q&A

1. As we're looking at ATF, it appears we're addressing the consequence side of the risk, but we're not really addressing the probability side such as worldwide differences in operations. How are we rolling all of this into the effort from a global standpoint?

2. You mentioned that you need certain material properties for these advanced fuels to actually get the calculation. Are you actually working with the folks doing this?

3. Are you looking at spacers/water rods/springs/etc.?

4. Are you looking at both B's and P's?
1. We're tackling industry application number 1. A more holistic solution to handling fuel cycles across different types of operators.

2. We've done this in a general sense. We haven't done it for absolutely every fuel-clad system, but we've done it for some individual types and rolled it back.

3. Not so much in bison because it's really a fuels code, but more on an operational side.

4. Not yet."

Control Room Modernization to Enable Long Term Sustainability of Light Water Reactors

Bruce Hallbert (Director, Nuclear Energy Enabling Technologies, INL)

Session Notes

- Work is part of the LWRS sustainability program

- Drilling down into this pathway, the goal is to develop, demonstrate, and enable the deployment of new digital technologies for instrumentation and control architectures

- If you thought this was simply replacing old technology with new technology, you wouldn't have a full grasp of what it was.
  - This focuses on plant systems, plant processes, and plant workers
  - The work is not performed in a vacuum
  - We do this work with commercial nuclear operators

- Also associate very closely with EPRI

- We've identified through interactions with industry 6 key items for the long term sustainability of power plants
  - Human performance improvement for NPP field workers
  - Outage safety and efficiency
  - Online monitoring
  - Integrated operations
  - Automated plant
  - Hybrid control room

- A background of why we're working on long-term control room modernization is in the slides
  - We currently already see islands of automation within a still mostly-analog control room

- Project begun with Palo Verde station
  - What systems could be replaced, and what opportunities are there to develop more of a strategic plan for the control room

- The approach overall is unique because we have techniques and methods available to us today that weren't available when these control rooms weren't designed, so we can now look at modernization and optimization together
  - We initially sent staff down the Palo Verde to take pictures of simulator and made 3 models from pictures
  - Based upon the scope of what Palo Verde was considering, what could be relocated and optimized
  - Came up with several integrated concepts and collected design feedback

- Orange boxes on control board picture are up for replacement, boxes in red are considered to be out of scope such as safety systems

- Some of the orange boxed items could be combined on displays, which would free up space
  - Preliminary designs were created and modeled
  - Things are moved around on the control board to optimize use of space

- Were looking for feedback from operators in terms of how they work and what they do and how this would affect their work

- The other thing that's really unique about the tools available today is that you can take the 3D model that's been developed and you can put into it what we call mannequins for ergonomics testing
  - 95th percentile male and 5th percentile female are used as models to gauge the full spectrum of person size
  - This was done in about 8 months' time to get where we are right now, and work is continuing

- First crew of Palo Verde operators were done last week, and a second crew is there this week
  - Operating crews have been very receptive, and probably most receptive to being approached so early on

- A report will be issues by September 30 on the website subject to Palo Verde's review

- Working with ScottMadden for a business case framework, hopefully to be completed by December 2016

Q&A

1. You mentioned the standard that had some ergonomics but how about the two aspects of configuration control and supervisor that may not be right at the controls, but back further?

2. How is what you're doing related to what I&C companies are doing with digitizing things.

3. Have you looked at experience of aerospace/game industry to bring that know-how to our work?

1. Yes absolutely. The first thing you mentioned would be unintentional input, which will be addressed at some point in time, and would require operator input confirmation of a command before execution. That's not being done in this project because this is very pre-conceptual. The second issue you talk about is called angle sub-tended, and it applies to anybody in the control room that needs any type of information. The limiting case for that is the furthest person away, which is always the control room supervisor.

2. I think, and this is my opinion, I think we're going to enable them because we're on the front end. We've already done work on individual control systems with utilities before.

3. Yes we have. When we did some of the control room modernization work with Duke Energy for example, we go back and do an OE review at their plants and our industry and other industries as well with the experience of going analog to digital. We have to draw boundaries somewhere, but certain things are quite useful for us to look at.

EXECUTIVE

BREAKOUT SESSION 1: Managing Commercial Risk

Session Organizer: Sean Clark (Business Development Manager and Senior Consultant Engineer, Atkins Nuclear Solutions)

Learn about the leading edge techniques and processes for identifying and managing commercial risk throughout the life cycle of major capital projects. This is an opportunity to interact with leaders in managing risk both within the nuclear utilities and in the broader major capital project markets, and to pick up techniques for developing a real sense of "fiduciary responsibility" within your organizations.

Exelon Nuclear Risk Management

Rich Weisband (Manager Equipment Reliability, Exelon Nuclear)

Session Notes

-Nuclear Risk Management - Risk Assessment: steps include: Identify potential consequences, perform risk assessment, engage right level of management, periodically review risks using risk maps
-Project Risk Management: projects can introduce new or additional risk, risk matrix is used to help manage project risks (allows questions to be answered early to predict risks), a risk rank score is provided to quantify the level of risk from the matrix
-Risk Classification Manager (RCM): a place to document risk assessments, can be linked to your CAP program to self-update as soon as new risk
information is entered, has screening and action tracking capabilities, plots data in a project risk map to assist in quantifying the present risk associated with the evolution
-Risk Management Committee is structured to incorporate many individuals involved with the risk management process all the way up to plant gm

Key Learnings

-Significant culture changes including reduction of scrams has led to significant power production cost savings to help deliver the nuclear promise

Q&A

1: Most of the discussion was focused on project risk vs plant issues, How do you align or reconcile risk of project drivers vs risk of project execution?
5: What is the risk that risk automata allows weak project managers to escape detection?
3: Once you develop your project risk map, what do you do with it? Do projects move on the map? Do you try to drive projects to green?
2: How do you monitor and manage time invested in risk process vs. payoff seen. That is, how do you keep from overdoing it?
4: Does your process address long term structural issues where deterioration mechanism is gradual? If yes, how is process different or the same
6: When an organization assigns risk to another entity, how does that organization retain sufficient ownership without being overbearing to the assigned entity?
1: keep separate degraded equipment from replaced equipment, easier to quantify risk
3: Historical values assist in moving the map to assess risk more accurately
4: LTAM program for 5-15 years out, do an analysis of each range of years to determine how the risk will change if the project moves back

Project Risk Process

Cortt Cousino (Director Enterprise Risk Management, Exelon Nuclear)

Session Notes

-Get as many important players together as early as possible to whiteboard as many potential risks as early as possible
-Exelon has moved from a far more qualitative system to a quantitative one that helps predict the level of risk on a process and help prioritize work
-Risk identification used to be top down and has since been switched to bottom up, this way the project managers can provide more valuable information about the risk level based on their knowledge and expertise
-Understand value drivers of risk to assist in quantitative analysis of risk
-Streamline process from development to implementation: Risk Identification>Risk Analysis>Risk Response Planning and Mitigation

-Continue the Risk profile after initial meeting to keep it as a living document to maintain an accurate evaluation of risk on the project
-Integrate risk model to have scheduling and cost information to show the biggest risk that could affect the schedule or budget

Key Learnings

-System allows you to truly have a sense of the cumulative effect of risk-Integrated process from development through implementation has shown
excellent results
-Keeping the model living to have a constant understanding of the risk and consequences

Q&A

2: Cultural shift, no quantitative evaluation to added value of implementing a project, only avoiding risks from the model you have developed
6: Put scheduling details in the contract, very often is an issue

Commercial Risk-Informed Project Management and Controls

Mark Gake (Nuclear Chief Engineer, Black and Veatch)

Session Notes

-Company has over 7000 projects running at a time so it is very important that they manage risk
-INPO 1511 issued last year to address large industry events that are risk significant, principles document, with the purpose of getting people to think and act in a risk management way
-To deliver the nuclear promise we must: Maintain Operational Focus, Increase Value, and Improve Efficiency
-Look outside the box in the development phase to reduce and mitigate risks which in the end will have large cost savings
-Toughest risk to manage is the unknown one, must identify risks and mitigate as early as possible
-Systematic approach for assessing risk for projects: Document Project Objectives> Identify Risks> Prioritize Top Risks> Model Scenarios> Define Risk Responses> Monitor and Adjust

Key Learnings

-Recognize Limitations
-Avoid over-confidence in performance capabilities
-Have flexible processes, sometimes you need to deviate from a plan to manage risk in the best way
-Continually updating throughout project

Q&A

5: Project managers can't avoid it; ownership is very important even with a mitigation plan

Applying Risk Management Best Practices in Nuclear Programs or Mega-Projects

Carlos Barrios (Lead Project Controls Manager, Faithful and Gould)

Session Notes

-Must adapt to many risks and issues that are unknown, this is not ideal and risk identification, quantification, and potential consequences need to be known as early as possible so that they can be addressed or mitigated much faster
-Risk register should help as a management tool to continue involvement and understanding of the project risks as well as track risk mitigation
-Strong emphasis on assessment in the development phase of projects
-RISK OWNERSHIP is very very important, mitigation actions can always be delegated but risk ownership is very important to be held at higher level
-Qualitative risk identification is the first step, quantification is the next step, apply an importance level to the risk as well as any variables of interest in a chart and sum the risks to quantify the overall risk consequence, this is important in comparing

project risks and determining which to mitigate first and which one to attack more aggressively

Key Learnings

-Risk ownership is paramount for risk mitigation
-Risks need to be reported and key risk indicators need to be developed to not only have a record, but to also apply accountability to the risk

BREAKOUT SESSION 2: Control or Collaboration

Session Organizer: Sean Clark (Business Development Manager and Senior Consultant Engineer, Atkins Nuclear Solutions)

Achieving the proper balance of oversight, collaboration, and risk and reward sharing between utilities and vendors is one of the key attributes of a successful major capital project. The consequences of imbalance could be financially devastating…or worse; while the benefit of achieving the proper balance may be the survival of the industry. Come interact with the distinguished panel of utility and vendor executives as they discuss the challenges of maintaining this balance, and new approaches to achieving successful balance that also challenge the status quo.

Control or Collaborate: The Balancing Act

Don Fleetwood (GM of Projects Control for Regulated Generation and Transmission, Duke Energy)

Session Notes

-Lack of trust between utility and vendor, this has stunted the creative problem solving process between the two
-Both parties tend to view the contract as distributive rather than integrative
-Revise our risk/reward model: needs to be an integrated model rather than oversight, open book concept, joint productivity model

Key Learnings

-The nuclear industry and utilities lack creative insight and problem solving, there needs to be a collaborative effort between the utility and the vendor

Q&A

1: What's the change management model for minimizing the cultural issues between 2 parties?
2: Established distrust within our systems is well ingrained and contractors and vendors are not incentivized because of the lack of trust. How do we become more self-critical to change this cultural issue?
3: As we push to give you everything you want, we get pushed back in the same way, how do we get past this?
4: How to manage risk and contingencies?
5: How do you handle a disconnect between upper management and the culture and goals of the company?
6: "First time Quality" Please elaborate and provide Examples
7: Do you see differences in ""integrated project delivery"" in the UK vs US? Examples?
8: Hold people responsible for holding stand downs for injuries or other things, any similar experiences?

1: 3 decades for us to get where we are, everyone at the top needs to show leadership to express these changes necessary to look past
cultural issues and/or change the company's culture
2: Open book policy, we are not always the smartest people in the room, sometimes we are the biggest problem for vendors, we design as we
go too often when there is a better way to design from the beginning with collaborating with the vendors and contractors
3: We have to be culturally aligned with the vendor
5: Early identification of issues early help reduce the disconnect between upper management and anyone/anything else
6: Bringing construction on site early to help do things right and stay on task to complete things as planned

Control or Collaborate: The Integrated Project Delivery Model

Nigel Thornton (Business Development Director - Energy, Atkins Nuclear Solutions)

Session Notes

-Relationships are more important than contracts, in order for this concept to work there must be a well established trust
-innovation depends on collaboration and trust
-Planning collaboration should begin very early, creative solutions can be discovered much earlier and the process is more inclusive

-This poly-party inclusive model is only used really in the healthcare industry and the IPD contract, it is a different concept but much stronger of a trust building process to help all parties achieve their goals

Key Learnings

-Poly-party model is much more effective there is multi-party equal voice in the planning process

1: Despite planning you need to have a cultural shift, there is no easy way around it and leadership needs to express interest and importance in having that culture change for mutual cooperation, people will have to do things that they do not want to do, those assigned to work directly need to have an open mind
2: We should be looking in a humble way to other industries and learn what we can from people who are doing it right
3: Open book, honesty, trust are necessary traits for cultural cooperation, sometimes the open book policy can cause issues as well
4: Each party has a part in this because different risks and contingencies are required for each there needs to be collaboration to help accurately
total these and acknowledge them to make a correct schedule and budget
5: Simply will not work if this condition exists
7: US moves much faster, UK is much more reserved in the beginning, we have alliance contracts to help keep cultural similarities and help achieve
goals, some things can only be achieved with long term partnerships between different cultures, the US needs to adopt some cultural aspects
from other countries
8: Soviets have interesting terms and conditions like this, I haven't had anything quite like this though, sometimes we would do things that we
would normally not in order to fit in with the culture of the other company/country

ANS UWC Executive Session

Tom Crumrine (Vice President - Nuclear, P1 Group Inc)

Session Notes

-Safety first and quality always
-Oversight can be effective if using the right tools, meant to eliminate inefficiencies, develops trust as well as helps create repeatability
-Collaboration: Reporting is a key factor to monitor improvements for strengths and weaknesses
-The nuclear promise is a testament that the old methods and cultures are not working in various aspects, there needs to be a collaborative effort to reduce costs by rectifying inefficiencies
-Being flexible is very important, this requires communication with the client for collaborative purposes

Key Learnings

-Honor the trust that clients show to you
-Both sides need to fulfill their sides of the contract

1: Change is tough and many people do not want to, all of it has been done before though so it is not impossible and needs to be recognized
2: Lessons learned is a really good place to draw assistance from, we definitely need to use outside industries other than nuclear to broaden this knowledge base to solve our problems in a much easier way
3: Mutual respect and cooperation requires both sides"

BREAKOUT SESSION 3: Project AIM, Delivering the Nuclear Promise, and Fukushima Lessons Learned (Cross Listed with REGULATORY RELATIONS)

Session Organizer: Matt Sunseri (President, Zeus Enterprises LLC), Jack Grobe (Director Strategic Projects, Exelon Nuclear)

Few initiatives in the last decade have had or will have as much impact on the nuclear industry as Project AIM, Delivering the Nuclear Promise and Fukushima lessons learned. No doubt economic forces have been a challenge for any industry in recent times. This session will shed light on how regulatory bodies and commercial nuclear operators intend to improve efficiencies while being responsible to safely regulating and operating in a society that has little tolerance for risk. Hear from leaders in the country how they intend to maintain economic viability while providing exceptional safety in the nuclear industry.

Bill Dean (Director, Office of Nuclear Reactor Regulation, US NRC)
Tim O'Connor (Sr VP and CNO, Xcel Energy)
Brad Adams (VP Fleet Engineering, Southern Nuclear)
Dave Crawley* (SAFER Project Manager, Southern Nuclear)

Project AIM and Fukushima Lessons Learned

Bill Dean (Director, Office of Nuclear Reactor Regulation, NRC)

Session Notes

Project AIM: A result of over-staffing for new nuclear plants. Re-baselining phase- identified actions to stop for cost savings. Long-term efficiencies are also being developed. Areas of expertise are being centralized.

NRR/NRO merger proposal has been developed and is awaiting feedback from the Commission. Next steps include strategic workforce planning and corporate organization restructuring.

Fukushima-related activities: mitigating strategies assessments are underway. Some plants will need to complete focused evaluations and take additional actions.

NRC has a goal to resolve all remaining Tier 2&3 recommendations by the end of 2016.

Rulemaking: Comments received include improvement of clarity in the use of the term "loss of all ac," removal of requirement for multiple source term dose assessment, clarification of use of risk insights for addressing reevaluated hazards, establishment of process to define when changes require prior NRC approval.

Results of initial inspections have not resulted in any significant issues.

•Allow flexibility with
implementation timeframes

-AIM has been around long before the nuclear promise
-A lot of restructuring of organizations needs to be done in order to meet the nuclear promise
-Everything that came out of Fukushima to modify in the plants and response centers is either on schedule or ahead of schedule
-Seismic hazard reevaluation and flooding evaluation is ongoing
-No negative inspections have been found so far

Q&A
1: Reduce overall cost of maintenance, what is it going to take to maintain training with reduced staff as well, is this a consideration in planning?
2: What if the efficiency changes we are talking about here are nowhere near enough to meet our goals in the delivering the nuclear promise? Are we going to start looking at harder things like security and regulatory requirements that don't add too much safety value but cost far too much?
3: What if we go too far and our efforts result in unintended consequences?
4: Nuclear is treated far differently than any other industry by US govt as far as safety, do you have any comments about this moving forward?
2: There are many regulations that need reevaluation due to being out dated due to previous ignorance to risk quantification. We will need to address these costly compliances based regulations. Reasonable vs high assurance will be contemplated
3: Take the time to talk to the people necessary on site to address these Things up front, it is obvious that things will be different for not just engineering but also for OPS and other working groups on site, it is our responsibility to provide as much insight as possible in this stage of addressing the nuclear promise
4: Our regulatory bodies were developed independently of gov't which has made nuclear much more heavily scrutinized by govt. At this point this is a part of the nuclear culture

Delivering the Nuclear Promise: Advancing Safety, Reliability, and Economic Performance

Tim O'Connor (brought own presentation*) (Sr VP and CNO Xcel Energy, Xcel Energy)

Session Notes

Competition in the market place has driven us to improving performance (30% cost reduction needed or 3 billion in savings)

Pricing changes based upon the energy portfolio. Government is driving the use of renewable energy sources before other sources (load-following). Solar and wind are provided subsidies and other competitive advantages.

Staffing of nuclear plants has increased since 1978. Opportunity to balance attrition with proving efficiencies. There are two types of

improvements being pursued: efficiency initiatives and transforming the organization. There are 21 efficiency bulletins issued; more will be issued.

-Everything in our goals and mission statements are effectively the same, it is just that we need to cut costs to be competitive with all other energy sources
-Wind energy capacity has grown extraordinarily which is going to be a large competitor not too long from now
-Natural Gas is obviously a huge player in the competitive energy market
-Renewable energy sources are causing peak load prices to decrease, putting pressure on nuclear to consider load following to make more money
-Every other energy source is getting cheaper except for nuclear has to change
-Staffing is increasing at plants that used to run lighter, why?
-Great opportunity with baby boom retirement to reduce staff through attrition this will also help to facilitate the culture change required to meet the nuclear promise
-The goal is to reach a savings of $3 bil, we currently can account for $263 mil

Key Learnings

-We have a lot of bureaucratic baggage that is making everything cost more and require much more staff than is necessary, this is not a mystery especially to other utilities

Q&A

1. Are you looking at what it takes to train maintenance at a reduced staffing level?

2. What if DNP initiatives do not work?

3. How should the industry protect against cutting budget too much?

4. Does the federal government treat industries differently when it comes to oversight?

1. Training has been considered and efficiency bulletins will be issued soon to address this.

2. It is already obvious that more will be needed and efficiency improvements will continue to be pursued.

3. Bill Dean recommends soliciting feedback from the NRC resident and others. Tim mentioned that KPIs and metrics should also provide any indication of poor performance. CAP and self-assessment tools are also available to support critiques. Ultimately, a higher degree of accountability of plant staff will be needed.

4. NRC directly regulates the nuclear industry, whereas various other industries share regulation with the states.

1: There is a plan for this embedded in our programs, efficiency bulletins will be released soon addressing the training aspect directly
2: It's clear that we are going to need to do more, questions will be asked down the line that directly address these kinds of cost saving areas. We need to have more candid conversations like these if we want to meet our goals together
3: I don't think we will be unable to see future issues since we have so much more foresight into issues from OE and KPI's etc. Monitoring will increase for INPO for faster response to upcoming issues but to save cost their evaluation periods may decrease, this is an example of how we can save money but cover our bases the same or better. The level of accountability for workers will be far higher because we will not be able to afford inefficiencies that cause future problems

U.S. Lessons Learned from Fukushima Event

Brad Adams (Vice President Engineering, Southern Nuclear)

Session Notes

Lessons learned from the Fukushima event and industry response apply to DNP. The approach in the nuclear industry (thinking) will have to change for the DNP. Industry response to Fukushima illustrates the approach that will need to change. NRC and industry took immediate response.

Rule making is being developed based upon previous orders, recommendations, etc. The SAFER organization was developed. International interaction regarding regulatory changes has also been conducted.
Key distinctions for the US include that FLEX does not extend to pre-planned recovery or cold shutdown functions, there are venting differences, SAFER varies, and the targeting of hazard mitigation strategies that US has completed.

-It's upsetting that the nuclear event is what people remember from the earthquake despite the billions of dollars and tens of thousands of lives that were lost; however, it is something we will always need to deal with
-The FLEX projects was the main response strategy along with INPO IER's and many plant monitoring parameter changes and enhancements, response centers were also established

Key Learnings

We are not making enough progress, the technical impossibility is not there though compared to the things we have accomplished over the past 40-50 years, we need to work harder

SAFER - Strategic Alliance FLEX Emergency Response

Dave Crawley (SAFER Project Manager, Southern Nuclear)

Session Notes

The Pooled Equipment Inventory Company (PEICo) joined forces with AREVA Inc. to create the SAFER Team to develop and manage a FLEX national response center
program as part of the PEICo's existing Pooled Inventory Management (PIM) Program for the U.S. nuclear industry.

Two National SAFER Response Centers (NSRCs); 5 sets (N+1) of "generic" equipment at each NSRC. Equipment design was developed to allow easy transportation, functionality under broad operating conditions, dimension limitations, etc.

Deployment is supported by Transportation and Warehouse & Maintenance contracts. MOUs are also in place to allow for backup resource options (commercial, military, etc).

-Massive effort by a huge team of people to make difficult decisions
-Memphis and Phoenix, all equipment is duplicated so either can respond
-5 duplicates of each equipment, 4 ready to go at all times with 1 out for maint.
-all equipment has standard hookups for ease of use and diverse usage
-transportable by ground, fixed wing, and helicopter. This spawned a series of design requirements including weight, space, and operating environment (location)
-Key contract for transportation (FedEx Custom Critical) allows 24 hr response to any US nuclear site

Key Learnings

-We have absolute confidence that all our ducks are in a row for any Fukushima type event

BREAKOUT SESSION 4: Load Following and Economic Dispatch

Session Organizer: Rich Hall (Director, Corporate Engineering, Exelon Nuclear)

Base load operation of nuclear facilities has been a long held operating practice in this country. In this session, hear how some utilities have overcome this paradigm and are now placing their plants in economic dispatch and load following operations. Learn what drove these utilities to this decision and why it makes sense for them.

Economic Dispatch

Brad Sawatzke (CNO, Energy Northwest)

Session Notes

-Columbia generating station is one of the first to load follow their units
-Over a 72-hour period it is likely to experience 17 reactivity changes as opposed to the few power settings you would expect due to Xenon
-There are many issues with thermal cycling due to the thermal stresses on the BOP side
-Large regulatory impacts as well due to dose rate changes, equipment failures and many other factors
-Drop no lower than 85% to reduce the amount of equipment that needs to be adjusted, as well as desirable to not cycle on a daily basis, once cycling down or up you must remain at that output for 72 hours before cycling again
-to reduce power below 65% certain equipment needs to be taken out of service which requires more scheduling rigor therefore must begin written process 48 hours before and remain there for 72 hours before cycling up again

Key Learnings

-This is doable but must follow a plan that reduces the impact to the plant while achieving the results on the grid desired
-Cannot cycle load on a daily basis effectively with current equipment and designs

Q&A

1: Any Changes for PM frequency?
2: Any monitoring to look for things not visible with equipment? Such as regulatory requirements and possibly OE?
3: For PWRs have you considered bypassing steam with the steam dumps as opposed to cycling reactor power?
4: What kind of core re-designing do you anticipate?
5: What changes have been made in your training for operators or additional tools provided to support load following?
6: Is there any consideration being given to keep power constant by using some power for another purpose? Desalination, pumped storage, hydrogen production etc.
7: Able to quantify cost changes to the plant?
8: Results from running a colder turbine and other equipment affecting warranties?
9: Limit for thermal cycles in piping to not exceed limits?
10: What changes need to be made to make in any facet to make this more commonplace?
11: BOP level controls were not mentioned, did you have feedwater heater level issues?
12: What do you see for the future for RTO and non RTO areas for balancing?
13: We have to do calculations below 95% to control decay heat and to ensure that our safety analysis remains correct, similar issues?
14: Does load following increase interest in digital controls?

1: No changes
5: Lots of preparation with many parties up front to make sure there are no rushes for any aspect of plant operation especially operations training
to make evolutions that are not common, just a more forward looking, collaborative, and early adjustments
7: A lot of money lost to overtime to fix equip that is having issues but definitely netted much more
9: This needs to be looked at and will come out of continued load cycling, has not needed to be challenged yet
10: Proactive approach will help other plants accept this as a possibility everything becomes much easier when there are specific plans
and analysis and fear of issues will definitely decrease
11: Yes, these are things we needed to adjust for as we went and create new ranges for proper operation
12: We have had a reduction in load following the past few years, I don't see a reason to increase load cycling more, I foresee us continuing as a base load more and more
13: Yes, at Columbia I would definitely agree that load following would be much easier with more digital controls "

Nuclear Dispatch

John Reimer (Operations Specialist, Exelon Nuclear)

Session Notes

-Goal is to cycle the load to an extent that there would be no negative pricing
-congestion relief: 24 hour look ahead that the control room can plan for to cycle given by constellation
-Advanced nuclear dispatch: gen manager, communicates with the control room on a minute by minute bases to give the output desired on the grid, the Shift Manager can opt out of the requirement if there are issues or instabilities
-The goal is to have a 15 min look ahead to assist in controlling power output most effectively and there are many restrictions due to the rate at which the plant can actually cycle
-Operators need to be specifically trained to be able to make these manipulations accurately and repeatedly
-Additional RO assistance is required to help provide peer checks and decrease the likelihood of errors making so many changes in a day
-Constellation dispatch office has a designated monitor in the control rooms to communicate directly with the unit
-Have limits to the amount of down power to avoid having to take a major pump or other piece of equipment out of service to reduce complications with powering back up

Key Learnings

-Powering up and down requires maneuvering plans to allow the operators to continue to control the plant safely
-Core design changes may need to be implemented over time to maintain a healthy core flux

Q&A

1: No changes, all equipment looks to be running fine thus far
2: Engineers and corporate developed baselines for all equipment to avoid regulatory and unseen issues with equipment cycling
3: Our bypassing capabilities are limited; I'll have to look into that but I have concerns about condenser health when running the steam
dumps for extended period of time
4: So far no changes to the core but if we continue to cycle this much we may have to make some changes
7: Don't have the exact number here but we have saved 10s of millions of dollars
8: Needed more margins on cooling tower longevity, some design changes needed to be made

9: Need to look at this I will bring this back with me to investigate
10: We want to expand our program to identify issues from extended load cycling so that we can make the necessary adjustments and provide valuable OE for future endeavors at other units
12: Exelon will be cycling their loads much more often
13: We had no issues with these limits for our operational ranges, mostly because we had such a large limit range on our equipment"

BREAKOUT SESSION 5: Surveillance Interval Extension by NEI 04-10 R1 for Safe and Cost Effective Operation

Session Organizer: Victoria Anderson (Senior Project Manager, Risk Assessment, NEI)

Within the Delivering the Nuclear Promise theme, there is a great deal of focus and attention on the optimization of surveillance frequencies, which can result in decrease in person-hours and outage critical path hours. The NRC-endorsed process described in NEI 04-10 Rev 1, entitled, "Risk-Informed Technical Specifications Initiative 5b, Risk-Informed Method for control of Surveillance Frequencies," allows licensees to use a combination of risk-informed and engineering judgment approaches to optimize surveillance frequencies. Sessions speakers will provide their lessons learned and best practices to assist other licensees with extracting the maximum operational benefit from this program.

5B Initiative NEE Fleet Experience

Anil Julka (Manager, FPL)

Session Notes

-Need to make it a business strategy to begin implementation if it is taking too long, get this implemented as fast as possible
-We took the bull by the horns and created the procedures ourselves
-We started with the ESFAS system test because it had a large and broad benefit to many people at the plant and we hoped it would increase motivation to do more
-Make sure that the evaluations are complete
-Key plant personnel need to be involved as early as possible

Key Learnings

-NEI forum has been very helpful to assist other sites and fleets to not make the same mistakes more than once
-Templates from other plants helped but required significant revision
-Early involvement of system engineering and plant staff in procedure development of procedures is necessary
-Screening step is unnecessary, decision to implement is redundant to evaluation step

Q&A

1: Clarify length of time to make change?
2: Performance indicators to track the benefits?
3: NEI 04-10 monitor after the change to complete analysis, how to carry out monitoring?

2: We are keeping track on a spreadsheet across multiple sites to make sure that we are getting the desired results, also single IDP is the way
we should be moving forward
3: Every 24-month monitor, write new procedure to track, no changes so far

Duke Energy Catawba Nuclear Station Surveillance Frequency Control Program

Will Coble (I&C Engineering Manager, Catawaba Nuclear Station, Duke Energy)

Session Notes

-Cut about 32 critical path hours out of the outage so far
-Level of effort is not the limiting factor in getting this done, work has to be done right and involve the right people
-Create more groups of engineers and PRA to be working together

Risk-Informed Surveillance Frequency Control Program (RI-SFCP) High Value Surveillance Frequency Extensions

Dr. David Johnson (VP, Quantitative Risk, ABS Consulting)

Session Notes

-Each plant will have their own template

-Motivations, reliability increases, less dose, less wear and tear etc
-PRAs do not need to be gold plated but certainly the more information you have about your plant the easier surveillance testing extension processes become
-Lessons learned - apply to high value added components first and learn from that process for the lower value added
-Save up to 900 hours per year including up to 90 critical path hours per year

Key Learnings

-PRA manager should be leading the process

TSTF-425: Advantages, Adoption, and Challenges

Brian Mann (VP, Industry Programs, EXCEL Services Corp)

Session Notes

-Industry developed and NRC approved TSTF traveler, allows generic changes to technical specifications
-Adopting TSTF-425 does not change any SR frequencies, only gives you the ability to change SR frequencies without NRC prior review and approval
-Takes all periodic surveillance frequencies and puts them under licensee control
-What does this do for you? -cuts down the time to make technical specification changes in 5 months versus 6.5 years
-72% of the sites have TSTF-425 approved or are awaiting approval
-Engineering evaluations are more typically limiting factors rather than risk level

Key Learnings

-Plant can make all the changes necessary themselves in 5 months vs 6.5 years
-Slow to approve partially due to an average of 3 supplements per approval by the NRC, also due to nonoccurrence during review
-This should be pursued now because the industry is supporting licensee-controlled frequencies, and waiting will make adoption more difficult and delay benefits
-NRC is supporting now, move this up in your priorities list

Surveillance Interval Extension by NEI 04-10 for Safe and Cost Effective Operation

Bob Bement (Executive Vice-President, Nuclear,)

Session Notes

-Joint NRC/industry effort for (RITS) 5B
-Tech spec appears the same but now it says in accordance with the frequency control program in the frequency section, should be very familiar upon implementation
-Why to do it? - less test-caused equipment unavailability, decreases wear and tear, less human errors from interaction, man power savings, reduced dose, more efficient use of resources
-STARS project: procedure development, training material development, common documentation process, single support vendor, single website to share documents, routine communication on lessons learned
-This can help to pull some work out of the outage so that less man hours are spent checking equipment and more time be spent actually fixing/replacing equipment

Key Learnings

-Estimated to save about 5000 man hours per year
-Continue to closely monitor risk as you propose surveillance frequency changes, we have seen risks be elevated to red from extending to 36 months from 18-month surveillance frequency
-This has to be pushed because it is not something that affects generation or scheduling initially so it will remain under the radar until leadership pushes it

BREAKOUT SESSION 6: Removing the Roadblocks to a Risk Informed Future (Cross Listed with RISK MANAGEMENT)

Session Organizer: Doug True (Executive VP, Jensen Hughes Power Services)

The U.S. industry has been actively employing risk-informed thinking for over 20 years. A risk-informed view illuminates where a plant may have safety weaknesses as well as robustness, a distinction not possible with deterministic techniques alone. Achieving the benefits of such views requires an understanding of the strengths and weaknesses of the deterministic and probabilistic approaches, and openness to the technical value brought by the different perspectives. Experience shows that a risk-informed process leads to improved safety ... it is time to take maximum advantage to help us understand where best to spend our resources in Delivering the Nuclear Promise.

Pressurized Water Reactor Owners Group (PWROG) Risk Aggregation Pilot

Roy Linthicum (Chairman, Risk Management Subcommittee, PWR Owners Group, Exelon Nuclear)

Session Notes

-The mean of many distributions can be equal but the distributions can be very different and depending on how you use the mean in your determinations you can be very wrong
-Pilot will be done by the end of 2016
-Aggregation needs to be used among all business

Not all means are the same unless you understand the uncertainties associated with the data then you can merge the PRA models into useful information.
The final report will be shared with the NRC and EPRI.

Q&A

Q1: Where are we for the acceptable use of FLEX equipment in HRA with the NRC?
Q2: What are we doing to bridge the gap between NRC and Vendor institutional?

A2: Decision makers need to be educated on each side

Q1. Related to Human reliability analysis where is the industry on the acceptable method for HRA?
Q2. What are we doing to change the institutional deterministic mindset?
Q3. Sites are looking at implementing 50.69 now, do you know how the changing reg guides will affect that?

A1. Working on NEI 16-06 that will include existing methods to address HRA analysis. EPRI has been working to use existing methods to apply for these current issues such as external events. Some methods may need to modified to adequately address the issue. It has been a challenge to get alignment with the NRC but maybe late 2017 for the guidance.
A2. We have to have a risk-informed safety culture that includes training on risk-informed guidance documents. We have to get decision makers educated. The NRC is working on an education campaign at all levels of the NRC organization to integrate risk-informed decision making into the NRC culture. At this time, they see defense in depth the ill-defined issue and how far does defense in depth needs to go.
A3. The changes that are proposed to the regulatory guides should only help clarify to make the implementation of 50.69 more successful.

Overcoming Technical Roadblocks to a Risk-Informed Future

Stuart Lewis (Program Manager, EPRI)

Session Notes

-Main focus areas are Fire and Seismic PRAs
-Improving realism in PRA models and reducing conservatism with estimating, PRA models are already conservative by nature
-Making too conservative of estimations can also make understanding the system and the PRA model difficult because the model and reality become more disconnected
-It is impossible to make more realistic estimations of risk for thousands of scenarios that may exist in a given system, assumptions still need to be made to facilitate having this in the PRA, this is a problem we are working on by streaming processes
-Something we do not know very much about is how seismic waves travel from its source to the plants, this limits the accuracy of the PRA models, learning more about this will decrease the amount of conservatism with seismic risk assessment

Typically, when people hear making PRA models more realistic means that it means removing conservatism. In some ways this is true but there are still many conservatisms even in the most realistic PRA models.
Fire PRA is a large area where we are trying to improve on the modeling techniques.
Uncertainty analyses for fire PRA are not as useful as we may have previously thought. They only tell us what we want them to tell us based on the variables that are manipulated.
EPRI has put together a course for determining fragility analysis.
Currently using SQURTS shake table tests to determine fragility analysis.
EPRI offers computer based training modules for PRA beginners.

Key Learnings

-Risk Professional training program has beginning to be implemented to help make more realistic PRA's

Q&A

1. Related to Human reliability analysis where is the industry on the acceptable method for HRA?
2. What are we doing to change the institutional deterministic mindset?
3. Sites are looking at implementing 50.69 now, do you know how the changing reg guides will affect that?

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3. The changes that are proposed to the regulatory guides should only help clarify to make the implementation of 50.69 more successful. "

What is slowing the increased use of risk insights...?

Mike Tschiltz (Direction, Risk Assessment, NEI)

Session Notes

-Need to figure out how to be more efficient in implementation
-Everything involved with this is under the day to day radar, so it is difficult to get this moving, it requires active work to move towards completion

The work to enhance risk-informed decision making is a lot of behind the scenes work that does not get much of a spotlight.

Q&A

1: NEI 16-06, HRA is very conservative for FLEX, later we expect to have better understanding for how we can credit FLEX
2: Interested in any ideas of what we can do to accomplish this, it is something we need to consider and work on

Challenges and Strategies for Advancing Risk-Informed Applications

Doug True (Executive Vice President of Power, Jenson Hughes)

Session Notes

There are fundamental differences between the PRA perspective and the deterministic perspective. As such people tend to try to throw up road blocks against PRA that may not be valid.
The realistic PRA analysis cannot rely on conservatisms that have typically been used in deterministic approaches.

-Cultural issues limiting understanding of PRA models
-Probabilistic decision provides a much more realistic model of the correct risk level however, it is difficult to make a correct determination
-Deterministic decision making is not as accurate but it is very easy to make a correct determination

Key Learnings

We need more clarity on Defense in Depth"

BREAKOUT SESSION 7: Innovative Cross-Functional Engagement Using Risk Informed Initiatives to Deliver the Nuclear Promise (Cross Listed with RISK MANAGEMENT)

Session Organizer: Faramarz Pournia (Engineering Director, Southern Nuclear)

Risk-informed applications represent unique tools to reduce cost and remove unnecessary burden allowing plants to “shed some excess weight”. However, industry remains well short of realizing the full potential of risk-informed initiatives. SFCP is little more than half-implemented after ten years, RICT is just getting started, and use of 50.69 remains well below its merit. Common hurdles such as communication challenges, perceived technical complexity and existing inter-organizational interfaces dissuade organizations from adopting the initiatives. Overcoming these challenges involves engaging the right stakeholders, identifying target opportunities, sustaining program ownership, and promoting results achieved. Much is at stake in delivering the Nuclear Promise and the time to fully utilize all of the risk-informed tools available to us is now.

Organizational Engagement/Ownership

Mike Kitlan (Manager Nuclear Engineering, Duke Energy)

Session Notes

-Even back in 1999 this vision of getting Risk Informed Initiatives was out there
-Back then the NRC was questioning whether the industry would commit to this, and they did but it did not happen
-We worked on approving this initiative years ago because the NRC was very receptive, but now it has been sitting on a shelf not being used because there is no interest, this has to change because it is an available cost saving option
-We need to provide more guidance documents to help explain the process so that it can be implemented more effectively
-You have to monitor the health of the program to understand your performance improvements and cost savings
-Have you made a conscious decision or commitment to take on this initiative yet? This is something that needs to be pursued now, you cannot wait to reap the benefits
-You have to pay up front as an investment to start making savings, it will pay off if you do it right

The original risk-informed tech spec vision was presented in 1999.
2009 quote - "NRC staff is taking seriously the 4b and 5b submittals and will be ready, will the industry be ready?"
As an industry we have not adequately pursued initiatives that are available to us because the utilities have not taken ownership.
Stakeholder buy in is the hardest key to success, communication is very important. Need to show the benefit to the site/fleet/personnel involved in implementing the change. In most cases PRA is not the end user, but they are typically a contributor in development.

Key Learnings

-We have laid the framework and have everything ready but we still have not used it, this is something we need to take advantage of this
-All benefits to the entire site and fleet need to be shown up front or else no one will want to do more work if it does not personally help them at all
-PRA is not the end user, but a key player, do not jump to give this to PRA as the owner of these initiatives

Q&A

Q1: It's often about cash flow… Short term strategy to avoid reducing head count to deliver the nuclear promise?
Q2: How would someone best bring an idea to a nuke utility that would help deliver the nuclear promise? Are they invited?
Q3: What next risk initiative you would go to at south Texas project?

A1. We are implementing these initiative to improve safety as a result there is the potential that sites can function with less personnel but that is by far not the goal of these initiatives.
A2. Take a look at the current list of 13 initiatives and approach the CNO that is sponsoring that initiative.
A3. Risk informed security and emergency response (Rick Grantom)"

Budgeting for Risk Informed Applications

Owen Scott (Risk Informed Engineering Department Manager, Southern Nuclear)

Session Notes

-Funding is important not just up front, we need to get funding and keep it with
2-5 year programs

Need to have plans with clear goals that the organization can get behind.
Must understand the full cost, it is not a one-time cost project but there will be costs of maintaining these risk-informed processes.

Q&A

1. It's often about cash flow, what is the short term strategy to achieve these goals?
2. How would someone best bring an idea to a nuclear utility that would contribute to DNP?
3. What would be the next big initiative that STP should go after?

1. We are implementing these initiative to improve safety as a result there is the potential that sites can function with less personnel but that is by far not the goal of these initiatives.
2. Take a look at the current list of 13 initiatives and approach the CNO that is sponsoring that initiative.
3. Risk informed security and emergency response (Rick Grantom)

Regulatory Engagement & Project Management of Risk Informed Applications

Rick Grantom (President, CRG, LLC)

Session Notes
-It is very difficult to communicate risk to other individuals; people usually can't put all the elements together in a way they can understand
-Risk needs to be a part of the business, it needs to be in all the line organizations
-When we talk about anything in this industry like safety or scheduling, things tend to get done, we need to be more actively talking about risk to help more initiatives get moving
-We have to be teaching and engaging all the time at all levels to have an equal understanding among all players: management, corporate, PRA, etc
-People need to be held accountable to force progress, it is a tough thing for management to do, but they need to require deadlines and hold other managers accountable if deadlines are not met just like any other critical item
-If you don't make any procedure changes, you will not see any benefits

It is very difficult to communicate risk to individuals. People understand the components of risk (consequences, probability, initiators) but it is hard to put these components together.
When you talk about risk more, the understanding of risk improves. The same as with safety, the more we talk about safety the better safety culture you develop.
Risk is the tool to optimize safety and site efficiency.
You have to give the management team the tools that they need to achieve the end goal. Then you have to hold them accountable for those goals.
You have to change procedures and performance indicators to make an actual difference.

Key Learnings
-Need an overall plan to approve 4B, 5B, 50.69, all specifically addressed as to when you want to have them approved and implemented to get these things moving, this is necessary as opposed to having them all individually planned
-Risk initiatives need to be packaged cohesively

Q&A
1: Attrition so far has been fine because of the amount of retirements; risk may not be the main driver behind this but it is very important
to demonstrate that cost savings can be implemented, we have to be honest with ourselves as well
2: Risk involved security, and emergency response"

*No Slide show, only some comments
Brad Adams (,)

Session Notes
4 important points:
-Education and knowledge in the organizations of the benefits of risk assessments for the company as well as application
-Rigor in a changed management process, more work needs to be done on the back end, and leadership has to advocate for these initiatives
-Have to figure out how to make it core business for the organization, otherwise it will not get done
-Need meaningful performance indicators that have to be simple and have to add value

Education and knowledge of the organization related to risk is very important.
Rigor in the change management process.
Have to make this core business for the organization. This cannot be maintained as a level of effort activity.
We need meaningful performance indicators that are simple and add value.

Key Learnings

1: Change is difficult on us, but the fact is that we need to change the way we think and operate in nuclear, as an industry we need to incorporate risk into our core business to avoid having to reduce headcount
2: Approach the organization that is relevant maybe a manager, and bring the idea to them, if it is a great idea it will be received very well,

MAINTENANCE/WORK MANAGEMENT

BREAKOUT SESSION 1: INPO Review of 2015 & 2016 Trends in Work Management and Maintenance

Session Organizer: Pete Arthur (Principal Evaluator - A/WM, INPO), Bryant Hearne (Principal Evaluator - MA, INPO)

This session starts with a presentation by INPO on the current trends in performance. The session then opens to a discussion of what is working and not working by plant personnel in the areas discussed by INPO. Participants will take away from this session a deep understanding of industry performance in general and specific information and contact personnel they can talk to about what is working and what is not working in the areas discussed by INPO.

INPO 2016 Performance Update

Pete Arthur (Principal Evaluator – A/WM, INPO)

Session Notes

- MNT Fundamentals is a focus item; reduces rework, improves efficiency, reduces cost. Bring MNT focus back to skills necessary to keep the plant operating optimally. ""MNT Fundamentals is key.""

- Nuclear Professionals AFI largely focused on PU&A.

- Mid-level management (Superintendents) now a focus for degraded performance contributions (MA.2); previously focused on first-line supervisors. Not as much concern with supplemental personnel in 2016 as compared to prior years. "Supplementals are only as good as the site." Upward trend in AFI causes for ""managers & supervisors monitor and reinforce standards"" in 2016 compared to 2013.

- Industry-wide improvement has not been made to reduce MNT technical fundamental AFIs. Increase in MNT leadership as AFI causes. Gaps in excellence are with reinforcement of standards/expectations; however, actions are centered around revising existing documents (people vs. process). *Behavior-based AFIs cannot be fixed with process improvements. Actions need to be centered around how to change worker behaviors.*

- Mechanical MNT has largest industry share (~50% of ICES records) of AFI-triggering events (mostly latent). Unit transients largely caused by Electrical/I&C. *Some stations don't fully understand the difference between MNT fundamentals and HU standards.* No apparent correlation between changes in workforce demographics (i.e., age). Gaps are largely in worker accountability (individual contributor and supervisor/Superintendent level).

- FME concerns (six new leaking units developed in first half of 2016, many likely due to debris). ""FME not going away.""

- INPO loanee (MNT evaluator) pool will have significant gaps in 2017; needs resources committed this fall (October) for training to facilitate 2017 needs (start time February).

- Palo Verde has revised CAP to include worker accountability program to the same degree as process/equipment deficiencies. RNP involves training in event investigations to perform in-line performance analysis. Beaver Valley finds vast majority of events have no training solution (workers knew the standard but elected not to follow it). Southern (Farley) training uses scenarios involving failed components, requiring workers to use skills and knowledge of standards to address.

- Superintendent is categorized as the first line supervision. Human performance and place keeping is not looked at as much as previously. Much less of a focus area. Technical fundamentals are the focus as of now.

- Following an event; you should first look at the standards, procedures and work orders. Workers should have background knowledge. Not always the process but there should be knowledge and ability to perform the work. The thought process is to change the standard instead of the aligning the worker. This isn't a best practice. Behavior based AFIs will not be fixed by changing the process.

- Issues are normally with seasoned workers that have the confidence and tend to disregard the procedure. New to nuclear workers are usually not the problem.

Key Learnings

MNT Fundamentals deficiencies are resulting in an increasing number of AFIs.

Mid-level MNT management (Superintendents) can affect line execution of processes and standards.

Personnel behavior-based AFIs cannot be effectively addressed by process improvements.

It is NOT the process. It is the behaviors around the process.

Majority of worker events were due to non-compliance with known standards rather than a lack of knowledge.

Improvements and changes to INPO monitoring of MNT/WM has resulted in lower AFIs in 2016 compared to previous years, alignment with WANO evaluation criteria, and notable efficiency gains in AP-928.

Recommendations:

Consider accountability model procedures (like Salem and Pilgrim) that standardize worker accountability across all organizations.

Review AP-928, Revision 4 for efficiency improvements and adopt enhancements as desired.

Review 2016 changes to INPO evaluation criteria/nomenclature.

Q&A

Q1: why is this not an organizational effectiveness issue

Q2: How many inspections fed the 2016 AFIs?

Q3: Any insights on why focus on HU behaviors is lacking?

Q4: What strengths is INPO seeing in MNT?

Q5: How does INPO judge whether a deficiency in organizational capability to prepare for work is attributable to WM versus Organizational Effectiveness?
A1: OR, or the plant manager or site Vice President. Questions to ask yourself: Are the standards set? Is senior management and line managers engaged? Someone has to get the line managers engaged if they are not doing their job. Assessment of functional areas. Work management need to be aware of their problems and working towards a solution. Exemplary - probably INPO 1, strong - probably INPO 2. Evaluator doesn't get a vote on the rating. They present the findings. Transitioned to WANO terminology. Overall across the industry, WM is doing well.

A2: Depends on the AFI. Tight and focused AFIs with minimal impact to the station Are good. Even lower level AFIs can have a significant impact to the plant. The behavior following the AFI is what determines the INPO rating and not the number of AFIs. With the new evaluation process, the evaluator comes with the knowledge of what is going on at the site. The new process is being assessed because it is believed that the WM process is not being investigated heavily enough. Nineteen (19) to-date, thirteen (13) remaining in 2016. Of the nineteen, MNT ratings were eleven (11) 1's, five (5) 2's, and three (3) 3's.

A3: Easier to change a document vs. a worker. Some organizations culturally hesitant to consider worker accountability.

A4: Document will be provided post-meeting; available on INPO website.

A5: Depends on whether there are issues with standards, engagement of senior management. Those would lead to OR vs. WM."

2016 Work Management Performance Update

Bryant Hearne (Principal Evaluator- MA, INPO)

Session Notes

Work Management AFIs lower in 2016 vs. 2015. Two (2) AFIs to-date in 2016 vs. twelve (12) for all of 2015. Some of those changes due to changes in assigning events from WM to MNT. INPO transitioned to WANO terminology in 2016. ""Overall WM is doing well."" Number of AFIs does not necessarily correlate to overall INPO rating; consequence/severity/scope of AFIs more significant.

New evaluation process; Week 1 is MNT and WM; Week 2 is big issues (OR, team effectiveness, cross-functional areas). There will likely be more focus on WM in future INPO evaluations based on results of industry feedback and INPO self-assessments. New evaluation process has no Performance Deficiencies (must reach threshold of AFI) or Beneficial Practices. Overall driver for evaluation process change is to align INPO and WANO criteria/nomenclature.

Sequence of WM process is more important than the timing. Not necessary to follow AP-928 explicitly.

Still expect tracking of Tier 3 PIs even if they are not reported via CDE. Probably good idea to formally document Tier 3 reviews (in a team setting) and ensure review frequency is maintained. Expect Safety System Performance Tier 3 KPI to be elevated to Tier 2 once INPO standardizes criteria.

LEAN review of AP-928 largely revealed that the issues do not manifest from the process but from personnel behaviors. Some efficiency changes made to AP-928 in Rev. 4; 46 process steps vs. 75 in Rev. 3. 2016 WM Focus Areas: Operational Risk, Safety System Work Windows, Resource Management, FIN Team (effectiveness/productivity), Inefficiencies (PM improvements, use of Minor Maintenance, graded approach to prep).

- Learning organization so that errors are not occurring simultaneously. Critical components should be limited to being deep in grace. Schedule fidelity shows the amount of risk mitigation and engagement. Schedule needs detail so that it isn't left to the work group to ensure that things were in place. Must get feedback from the craftsman. Added details can help the people in the field complete the tasks. This drives organization accountability.

- Process alignment - AP-928, this is a great tool. Lays out a sequence to follow. Timing isn't very important. Planning after t-6 is going to stress the organization. Tier 3 PIs. INPO is still looking at these although they aren't reported to INPO. Must keep track of these although they are not required. CLs and DLs are not going to make or break the organization but they needed to be tracked. (DL

- deficiency on a piece of equipment that isn't going to be used).

- Team of folks to be involved in the review

- individual contributors and system engineer. Doing the reviews and not documenting is going to be an issue. Should be reviewed every 6 months. Scope stability is not reported to INPO. Timing is not very important as long as it is effective for the organization. Where is the scope being lost, what happens then, and what are we doing to fix this are key?

- Safely system performance - not reported to INPO because we all do it slightly different. Within the next few years it will be determined which to report to INPO. Must come up with a standard without changing the PI program itself. Ap-928 rev 4 Incorporated lessons learned from rev 3.

- LEAN process learning - is it not the process, it is the behaviors around the process. strength at one site, and make it an AFI at another site in the same fleet. The process is good. Feedback needs to be provided by the craftsman. Critique helps improve the behaviors. Screening process - the place to identify key attributes

Key Learnings

MNT Fundamentals deficiencies are resulting in an increasing number of AFIs.

Mid-level MNT management (Superintendents) can affect line execution of processes and standards.

Personnel behavior-based AFIs cannot be effectively addressed by process improvements.

It is NOT the process. It is the behaviors around the process.

Majority of worker events were due to non-compliance with known standards rather than a lack of knowledge.

Improvements and changes to INPO monitoring of MNT/WM has resulted in lower AFIs in 2016 compared to previous years, alignment with WANO evaluation criteria, and notable efficiency gains in AP-928.

Recommendations:

Consider accountability model procedures (like Salem and Pilgrim) that standardize worker accountability across all organizations.

Review AP-928, Revision 4 for efficiency improvements and adopt enhancements as desired.

Review 2016 changes to INPO evaluation criteria/nomenclature.

Q&A

Q1: why is this not an organizational effectiveness issue

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BREAKOUT SESSION 2: Direction of Delivering the Nuclear Promise Work Management Planning and Execution Teams

Session Organizer: Gwen Bookheimer (Planning Manager, Electrical and I&C, TVA), Jon Anderson (CEO, ACA Inc)

This session starts with a presentation of the actions being taken by the Nuclear Promise Work Management and Maintenance teams. This discussion will describe the areas their teams are working on and their timelines. The presenter will then request “deck plate” input to help their teams with the development of their Promise areas. This session is your opportunity to understand where the Promise is going and to have your voice heard by the Work Management and Maintenance Promise teams.

Terry Maund (Delivering the Nuclear Promise (Work Management), INPO)

DNP Big Picture MA/WM/OPS/ENG

Terry Maund (Organizational Effectiveness Leader, INPO)

Session Notes

- Efficiency Bulletin (EB) are important for industry alignment with INPO. EBs are endorsed by INPO, EPRI, and NEI. Alignment helps ensure no punitive impact to utility from implementing DNP changes.

- Most WM DNP items are Blue Improvement Opportunity (action expected at all sites, not necessary for broad industry viability). CNO steering team establishes accountability levels. The chief nuclear officer (CNO) will determine the classification of the EB (red, green, blue).

- nEBs will not conflict with INPO PO&Cs.

- 65% of all plant work to be classified as Minor Maintenance going forward.

- Future EB's are intended to grant more authority to first-line supervisors and workers to regain efficiencies in work execution (e.g., clearances, FME, rework tracking/trending). Some additional risk is introduced in some of the EBs but this must be accepted to gain value from DNP effort.

- Several EB proposals based on benchmarking with other high-risk industries (notably airlines).

- 50% reduction in number of critical components expected after adoption of relevant EB; reclassified equipment will return to MNT purview.

- Organizational changes (embedding component SMEs with MNT teams, embedding OPS/RP, Supply Chain, etc.) are proposed to streamline support. QC will likely remain separate.

- Changes to OJT/TPE will focus on evaluating skill of worker rather than evaluation of HU tool usage. Initial MNT training planning on being significantly reduced and focused primarily on OJT."

- DIF training analysis is being evaluated to change from every 2 years to every 6 years. Continuing training EB will remove frequency of training requirement. Continuing training should take place depending on need and performance.

- EB focused on non-critical components, associated PMs and replacement. There is a plan to redefine "Critical components". There will be a 50% reduction and those removed will be owned by maintenance. June 2017.

- Differences: teams organized by component types. No longer mech/elec/I&C. Experts will report to maintenance. Organization will own the PMs (frequency, scope, Etc. Many of the engineering roles will become Maintenance. Work management will have a 2-year cycle for scheduling and FIN will take on all new work.

Key Learnings

INPO a stakeholder in DNP EBs. EBs will not conflict with INPO PO&Cs. Benchmarking with non-nuclear industry (airlines) helped frame several EB topics. Implemented EBs will result in potentially large reductions or re-classifications to MNT activities. Some risk must be accepted to achieve value.

Significant changes proposed to station organizations to streamline MNT ownership of equipment and necessary support to perform field work and make rapid decisions with minimal handoffs.

Recommendations:

Conduct backlog reviews and eliminate work if it has low/no value.

Communicate existing efficiencies to DNP teams (via INPO, utility reps., etc.) for potential inclusion in EBs.

Ensure organization is engaged in evaluating/implementing EBs as soon as possible after issuance.

Q&A

Q1: Will a ""RED"" EB determine how INPO evaluates?

Q2: Does Delta do continuing training?

Q3: Is there a plan to streamline in-processing and CBTs?

Q4. How is OPS represented in INPO DNP efforts?

Q5. What is timeline for critical component EB issuance?

Q6. What is timeline for reorganization EB/communication?

A1: No. The classification of the EB does not determine how INPO evaluates. The actions taken to resolve the issues are what is evaluated.

A2: There is no initial training program. Their continuing training is considered OJT.

A3: Cross functional team to evaluate this and have a discussion with CNOs in Sept 2016 prior to implementation. Workers will become "Trained" and not "Qualified". If there are software issues, suddenly no one can verify qualifications.

A4. OPS does not have a dedicated team; several OPS representatives assigned to teams to provide insights. Cross-disciplinary reviews from OPS staff are performed on relevant EBs.

A5. Implementation expected June 2017, approval as soon as August 2016.

A6. Not presently decided. Projected sometime in first half of 2017.

BREAKOUT SESSION 3: Efficiencies Gained through Maintenance and Work Management Through Collaboration Between Efficiency Bulletins and Electronic Work Packages

Session Organizer: Scott Ackerman (Electrical Maintenance First Line Supervisor, SCANA)

To reduce our costs Work Management needs to get smaller and our craft less dependent on work steps and paperwork. This session will help us understand how others are effectively using minor maintenance, implementing a graded approach to walkdowns, and eliminating administrative changes to preventative work orders to reduce the cost of performing simple, low risk tasks on the organization. This will help us to ensure that our resources are focused on maintaining critical equipment and decreasing operational vulnerabilities. Additionally the use of electronic work orders in collaboration with the application of efficiency bulletins will provide participants with best of the best practices from those utilities that are already applying these efficiencies and technologies.

Discussion of EB's issued on PMs, graded approach to walk downs, and minor maintenance

John Horn & John McDonald (Fleet Maintenance Director / Fleet Work Control Manger, Southern Nuclear)

Session Notes

- Graded approach to walkdowns, base need on review criteria. Three-tiered approach for frequency/scope of walkdown.

- EB 16-15b (Utilizing Minor Maintenance) is the highest value EB for gaining organizational value/efficiency. Subset of minor maintenance (tool pouch maintenance) requires no work instructions or initiating document. Minor maintenance opportunities are high exiting a refueling outage.

- FIN teams should be using minor/tool pouch maintenance options with high frequency.

- Overall goal/benefit is to increase volume of minor/tool pouch maintenance work requests and simultaneously lower full-blown maintenance planning. Stations should target 60% minor maintenance.

- Improvements in Job Plan templates (which also reduces reliance on procedures) has allowed reduction in Planner staffing from 24/site to 21/site (Southern Nuclear).

- Digital upgrades and asset management (e.g., electronic work packages, real time equipment performance data, complete divestment from paper). Electronic Work Packages (eWPs) have multiple advantages, ranging from reduced labor/material associated with assembling paper work packages, increasing field time due to reduced administrative burden, and zero possibility of losing custody of package (all cloud/server based). 155 minutes removed from average task lifecycle. All activities time-stamped automatically. eWP cornerstone for Exelon's digital plant vision. High level sponsorship vital to driving success and eliminating barriers (e.g., WLAN in the plant, portable media device access inside firewall, allowing multiple users to access tablets). Training was vital to change management (worker acclimation). Clearance/tagging not yet integrated into eWP; transition to ESOMS will permit inclusion into eWP.

- Minor maintenance (no or minimal work instructions.) Not complex work activities. Critical data is needed in the work package. The intention is to expand what is classified as minor maintenance. More safety related equipment tasks considered as minor maintenance.

- Minor maintenance (MM) is considered emergent work coming in on a daily basis. There is a system in place to track work completed in tool pouch. A software was created to help with WM. Target value of 60 percent of the work orders that are coming in (goes to FIN and to the shop) to go to MM. All work comes in as a condition report. Either goes to a Tool pouch or to a work order.

- A completion ratio is a useless indicator. This doesn't reflect the volume of tool pouch and minor maintenance tasks that are being completed.

- Job plan templates for all PMs. Therefore, these routine tasks have a template and can be easily managed when changes are made. There are 24 planners per site with a plan to eliminate 3 per site. Two groups of 11 and 2 modification planners. All of the sites are dual unit with the exception of Vogtle that will eventually be a 4-unit site. ""

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Key Learnings
Key Lessons:

EB for graded approach to walkdowns introduces a three-tier approach for determining frequency/scope of walkdowns.

EB 16-15b expands use of minor maintenance (and tool pouch maintenance) with goal of enveloping 60% of maintenance per site.

Use of standardized Job Plan templates can reduce need for procedures and allow reduction in Planner staffing.

Electronic Work Packages (eWPs) reduce logistical burden compared to assembly, control, and retention of classic paper work packages. High level (management) sponsorship vital to driving success of eWP conversion,
notably for plant modifications necessary to support.

Recommendations:

Review EB 16-15b and adopt recommendations to expand scope work classified as minor maintenance.

Review Exelon presentation and contact relevant SMEs for eWP conversion project OE.

Q&A
Will scheduled minor maintenance tasks be counted towards metric for WM?

When is work classified minor maintenance?

How does the work get entered into the WM system? Process?
Yes, if it enters the WM process it will be counted as any other. If FIN teams handle it internally it will not.

After a condition report is generated (if applicable), in the initial scoping phase.

Condition report generated or a request made in tool pouch. It will be determined from there if it is minor maintenance (MM). FIN should be the first to take on MM. Hatch has good performance on MM. Vogtle plant is using work orders and not MM."

Delivering the Nuclear Promise Through Innovation
Dale Shaw (Sr. Program Manager, Exelon Nuclear)

Session Notes
- Staff an organization for innovation. Sponsor and support innovation fairs for other business to come see what's going on. Electronic work packages, digital asset management, 50 % less maintenance, electronic data mining, sensors in the plant. This is to reduce critical PM frequencies.

- Key Processes: does not save wrench time, but it allows the craftsman to get out in the field sooner. eWP eliminates the need to ensure documents are valid because it is performed electronically. No paper generated because everything is digital. All steps are time stamped. Work package won't allow a step to be skipped.

- 130 iPads assigned to personnel. These are considered as a work tool that is assigned to a team. No contaminated iPads yet. They can be dropped in the zip lock bags to protect them. Clearance and tagging has not been implemented into the iPads yet. Waiting for the eSOMS mobile app.

Key Learnings
Key Lessons:

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Q&A

Q1. Is tagging permitted for minor and tool pouch maintenance?

Q2. What Work Management System is Exelon using? Will OPS perform plant manipulations using eWPs?

Q3. Can a supervisor see where the technician is at the in the procedure while out in the field?

Q4. Has there been a resistance to change throughout the workforce?

A1. Minor maintenance, yes. Tool pouch only if non-power block equipment.

A2. Exelon uses Passport. OPS may use eWPs for AO rounds/surveillances but likely not for plant manipulations

A3. Yes, it will sync with the server when connected to Wi-Fi. You can see place keeping, photos that have been taken and status as the technician in the field performs the work. Supervisors, engineers, and OCC can see the eWP. The entire fleet has access to work packages.

A4. Differs at each plant. Technology savvy people tend to like the change, not really a difference between young and old. Relied heavily on training. No qualification for this because it is considered a work tool. Usually took 6-8 weeks to install at a plant."

BREAKOUT SESSION 4: Operations, Work Management, and Maintenance Working Together to Improve New Work Screening and an Expanded Role for FIN Teams (Cross Listed with OPERATIONS/OPS TRAINING)

Session Organizer: Gwen Bookheimer, (Planning Manager, Electrical and I&C, TVA), Mark Utz (Manager, Corporate Work Management, Exelon Nuclear), Gary Dudek (Operations CFAM, Southern Nuclear)

This is going to be an exciting session that includes Operations, Work Management and Maintenance working together to understand the Promise changes in the work order screening process to ensure that impacts on Maintenance are minimized. This session will also include discussions of the expanded role of the FIN Teams to do much more work than today. This discussion will include discussions by personnel that who have already expanded the role of their FIN teams and how they achieved that change.

FIN Team Implementation Today

Scott Brasfield (Maintenance Support Manager, PG&E)

Session Notes

- FIN team
  - SRO: Watch bill position, can NEVER be open. FIN team M-Th with night complement
  - Minimum staffing required by watch bill
- Changed the procedures/processes to classify 70% of all maintenance as minor maintenance
- Trends on misuse of "tool pouch"
- Efficiency bulletin on FIN
  - Look at success of FIN team, closeouts per person per week (<1 at many places, ideal is 10)

- FIN Team SRO key member, cannot be empty. One to two people as the FIN Team senior reactor operator.

- Have a Watch Bill and never drop below minimum staffing. This is a challenge to keep minimum staffing. Staff FIN and keeps the pressure off of the shops.

- Monday through Thursday day shift full team, smaller night shift team to address turnover items and perform walkdowns/prep work for day shift.

- Work screening meeting at 0915.

- FIN Team includes three ROs to primarily establish clearances. Night shift has no OPS coverage.

- Rotating shift techs but they aren't relied on for FIN team. Daily Review Team (DRT) meeting is a big part of the success and only look at equipment issues. Another screening group that screens for non-equipment problems. Chaired by cycle managers. If an items gets complicated, it's a bring back for the next day to gather more information.

- FIN Teams lists have gone away. Items are dedicated to the process and eventually those numbers come down and go away. FIN is performing 70% of MM and TP work. 95% of new work is being completed by FIN. True measure of work completion is how much per person per week. This will show why productivity is low.

- PG&E finding far more success (completed vs. generated) with minor maintenance versus tool pouch.

- Work management system has a "bring back" feature that permits electronic response (request for reassignment, due date etc.) that sends item back to screening team to avoid inefficient offline discussion across multiple organizations.

- One single point of contact with Engineering, RP, Procurement for FIN teams (not members).

- Organizational response to FIN teams has been favorable; high morale associated with "getting things done fast.

Key Learnings

- This process is going back to how it was years ago. Our workers want to repair our work. TP will help workers get work finished sooner because it is easier. Don't let bias be communicated down to workers because then you become the problem.

- Focus on making MM as easy as possible. There are trends on misuse of TP.

Key Lessons:

AP-928 Revision 4 establishes guidelines for New Work Screening Process that drives enhanced classification of work. Goal is to maximize work assigned to FIN process and classified as tool pouch or minor maintenance.

Meeting effectiveness is driven primarily by correct quorum membership (notably MNT Planning) and pre-meeting reviews/research. Meeting agendas should be prioritized by work severity; any questions should be treated as bring-backs.

Encourage FIN, when possible, to complete work as tool pouch/minor maintenance and complete it prior to first screening meeting.

Operations advocacy and leadership in accountability for work management/execution vital to a successful, high efficiency organization. Shift Management participation in T-week meetings, Plant Health Committees, etc. can drive high performance.

Recommendations:

Review AP-928 Revision 4 for New Work Screening Process guidelines and implement as appropriate.

Consider organizational changes to maximize use of FIN process, classification of work as minor maintenance or tool pouch, and empower organization to complete work as efficiently as process permits.

Establish easily-accessible metrics to trend generated/completed work requests by classification and assignments to FIN group vs. shop/MNT.

Ensure Operations is engaged throughout the entire work management process and appropriately staffed in FIN team.

Q&A

FORMAT: Presentations with Q&A throughout - open format
- Night shift crews have ERO component?
- # people commitment for jobs?
- engineering involvement?
- No ERO for maintenance FIN team members
- varies with size of job
- engineering FIN team with single POC with direct interface, single POC with procurement

Q0: Are OPS personnel other than SMs and AOs advocating WM efficiency?

Q1: Do you have a 24-hour FIN?

Q2: Quals tied to FIN Team SRO?

Q3: Dedicated ops support beyond shift workers during nights?

Q4: How is priority determined? By DRT?

Q5: Percentage converts to number?

Q6: Engineering involvement?

Q7: FIN SRO communicate with Shift managers?

Q8: Have you reduced headcount?

A0: Yes; NLOs/AOs can be empowered to advocate via screening meetings, Plant Health Committees, T-meetings, OPS focus meetings, etc.

A1: No. FIN team is Monday through Thursday, day shift.

A2: No. Supported by OPS and aligned with OPS leadership.

A3: No. Nightshirt is only the regular OPS crews.

A4: Matrix in place. Drives the priority.

A5: Usually between 20-50 items per week.

A6: ENG FIN team, single point of contact with procurement.

A7: Hold discussions during turnover meeting and Daily OPS focus meeting. They have open communication between each other.

A8: No. They stay busy. The maintenance organization is losing people because they plan to close after license ends. 2024 and 2025. Goal is to never back away from nuclear professional attitude.

New Work Screening Process

Gary Dudek (Operations CFAM, SNC)

Session Notes

- Having the right people!
  - objective is to get the work done quickly but also to only "touch it one time" - do the right work
- Objective/Mission: Driving as much work as possible through FIN process and classification of maintenance (and keep it that way) throughout the repair process for efficient and cost effective work
  - Goal: 95% of work completed by FIN

Q&A

- Ops risk review in this meeting? Have to have SRO?
- FIN process includes what?
- no, SRO is not required, but is probably most critical. Can also provide "pre-approval" for quick dispatch of maintenance
- high and low characterized work

New Work Screening Process

Mark Utz (Corporate Work Management Manager, Exelon Nuclear)

Session Notes

AP-928 Rev 3 was a very detailed product; industry feedback and a need for streamlined process necessitated revision with major efficiency gains.

Relooking at the process of how work is getting completed. Focusing in on the behavior of the craftsman and reevaluation of the t-week process. Focus on T-Week process, removal of required meetings, condensed timelines, very purposeful milestones, introducing concept of new work screening committee. "Effective and efficient in moving the work from being initiated, classified, in the right hands, and fixed." Condensing timeline to be more deliberate. For Exelon, there weren't the right people doing the screening and work didn't go to the right place at the right time. Committee to look at the process and reevaluate. The new process is going back to how it was reviewed back in the day.

Classification process vital: FIN process, minor maintenance, tool pouch, or full maintenance work package. Goal is to drive as much as possible to FIN, minor maintenance, or tool pouch. Classification and priority is done upfront. Then the look is for cost efficiency. Driving as much work as possible through the FIN process. Keep work classified as minor maintenance (MM) or tool pouch (TP).

Important to have the right people involved in work screening and classification. Need to continue to be diligent in review of Operational Risk and classification of Online vs. Outage activity. Materials person is a valuable asset to have on the work screening team. Within Exelon, there is a guidance coming to specify if work should be completed online or during an outage. This is to expedite the completion of work.

Exelon is developing additional guidance for determining activity timing.

FIN process is the most efficient method to accomplish maintenance. FIN process doesn't necessarily mean a "giant FIN team," common MNT organizations can be equipped to operate within FIN process. FIN process can be used in future work windows in addition to immediate/emergent activities.

Flexibility is key to maintain as much work in FIN process as possible (goal 75%).

Screening process in AP-928 Rev. 4 will drive an independent screening meeting daily. Screening team quorum membership important to maximizing work classified correctly. Some plants hold meetings midday (1200), others early (0630/0730). Depending on how much work is done in advance, meetings can be as short as ten minutes, no more than thirty.

FIN to assume ownership of all work unless determined otherwise.

MNT Planner key member of screening quorum. First half of meeting for review of new work; second half for "bring backs" and follow-up items. Pre-meeting reviews/research is critical to meeting effectiveness (e.g., need for walkdowns/additional investigations, reactivity management, PRA impacts, EC/modification, MRule, material issues). A new daily work screening meeting. Quorum members shall be seasoned and aware of how work is scheduled. It should be assumed that new work will go to FIN team unless determined otherwise. Pre-meeting review research preparation is critical to having an effective meeting. Adds to efficiency of the meeting.

OE: meeting agenda should be prioritized by work severity, any questions should be treated as bring-backs to avoid efficiency losses.

Encourage FIN, when possible, to "tool pouch/minor maintenance" work and complete it prior to first screening meeting.

Establish metrics to trend generated/completed work requests classified as tool pouch, minor maintenance, full work package and assignments to FIN group vs. shop/MNT.

Coordination with CAP screening team is vital to ensuring that full work package requests aren't being pre-emptively generated. MNT Planner representative on screening team can help prevent this.

Key Learnings

- Drive as much work as possible into the FIN process

- There won't be a problem to schedule FIN work, and schedule work to a work week window and still allow FIN to own it.
- Maintenance planners are vital to success of new work screening meeting. Have the right people.

- OE, If you have an early meeting, know the cut off so that everyone is reviewing the same items.
- Cycle manager of the meeting should ensure that high priority items are discussed first.

- 24 HR delay of screening meeting helps because it can cause FIN to take care of the work before it is discussed.
- Pre approval allows the maintenance folks to get right to work. Key role for SRO.

- Must have a knowledgeable SRO and maintenance planning rep in this meeting. They must push things to be considered MM. Let FIN get the work completed. - Use the FIN SRO for this meeting. They generally have the right frame of mind.

Key Lessons:

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Encourage FIN, when possible, to complete work as tool pouch/minor maintenance and complete it prior to first screening meeting.

Operations advocacy and leadership in accountability for work management/execution vital to a successful, high efficiency organization. Shift Management participation in T-week meetings, Plant Health Committees, etc. can drive high performance.

Recommendations:

Review AP-928 Revision 4 for New Work Screening Process guidelines and implement as appropriate.

Consider organizational changes to maximize use of FIN process, classification of work as minor maintenance or tool pouch, and empower organization to complete work as efficiently as process permits.

Establish easily-accessible metrics to trend generated/completed work requests by classification and assignments to FIN group vs. shop/MNT.

Ensure Operations is engaged throughout the entire work management process and appropriately staffed in FIN team.
Q&A
Q0: How much OPS ownership in WM is present on day of execution? Knowledge of work/schedule, clearances, status, equipment availability, etc.

Q1; cross qualify maintenance techs?

Q2: ops risk review during this meeting?

Q3: went from 2 meetings to 1, single entry system (condition report), this directive changes this again.

Q4: What do you mean by FIN process?

Q5: FIN process include CL and DLs?

Q6: Maintenance accountability?
A0: For every major equipment unavailability window, periodic updates are required to OPS at agreed-upon frequency. Tools in place to communicate via OPS Work Liaisons.

A1: yes, over the long haul. Ensure that you have the right people involved.

A2: no. You don't have to have an SRO, but he would be the most critical person to be involved in the meeting.

A3: It was elected to separate this because it was found to be more effective.

A4: Grow to this. The movement of getting newest work to FIN. Must be staffed with the right people.

A5: yes.

A6: Generally, the shops want to work on a planned and scheduled work order. The alignment doesn't exist yet in the shops. There has to be a handle on CAP. Ensure that condition review groups have an understanding of where the station needs to be.

Operations Leading Work Management

Darrell Perkins (Senior Operations Manager, Entergy)

Session Notes

- Ops ownership of work management/maintenance
  - Ensure that SM has ownership

At sites experiencing difficultly effectively using WM process, OPS will often use emergent work process to ensure necessary work is completed. Elevated emergent work metrics can be indicative of this problem.

FIN team prioritization/efficiency, trust in work management system, and Shift Managers (SM) holding site accountable for WM contribute to efficiency.

SM attendance in Plant Health Committee can be valuable, in addition to Reactor Operators; can advocate for work considered valuable to OPS.

- Operation Work Liaisons (OWLs) leading the work management system (WMS). The shift managers were not attending T minus meeting. This wasn't not helpful

- Tools: Passive Risk Indicators; gives the shift manager an idea of what is happening in the plant. Shift managers were not going to plant health meetings. This has been aligned so that they are aware of plant health. Work Order of Interest; helps to fix the plant in a timelier manner

Key Learnings

- Work management standpoint, don't rely on a list. Trust the process. OPs person should have confidence on delivery date.

- OPS should be leading the station. There standards should be held to the highest level.

- Priority of OPs concern is coded as C7, the item comes off OPS morning report, but WM agrees not to move it without approval of OPS.

Key Lessons:

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Ensure Operations is engaged throughout the entire work management process and appropriately staffed in FIN team.

Q&A

- What forms do you look at?
- How much ownership on ops crew on day of execution?
- Plant health, ops focus
- for every major outage, have a lead depending on how important, can give updates every 2-4 hours. If going through turnover, OT scheduled for return to service

Q0: Is there an ERO component to the FIN teams?

Q1: Time to take crews to buy in to this?

Q3: AOs involved?

Q4: What meetings are they attending?

Q5: How much ownership is there on the OPs group on the day of implementation?

A0: Partially; some MNT staff (specifically night) are ERO members.

A1: Held a meeting. Very emotional for shift managers, maintenance managers, etc. If FIN can't work it within time frame, then it goes in the schedule. Introduced by a white paper and gave a month to review. 100% accepted upfront.

A2: Yes, they go to plant health meetings also. They are willing to give feedback during the meeting which has deemed helpful.

A3: Plant health, ops focus, t meetings, etc

A4: This is a part of OPs ownership. There is a lead that sends out an update to site lead team on the status of jobs. Critical path jobs have overtime schedule to return the item to service.

BREAKOUT SESSION 5: Improving Maintenance Availability and Productivity by Effective Use of the Demand/Supply Model, T-week Process and Long Term Planning

Session Organizer: Jon Anderson (CEO, ACA Inc.)

Room: Cumberland B

The first step to understanding the gap between the amount of work to be performed and the number of Maintenance resources to do that work is developing the Demand and Supply Maintenance Resources Model. This model details the demand (work) and supply (people) and provides insights to how those gas can be closed. This session will include a discussion of how the model can be developed and once developed how the model can be used in many different ways to help improve Maintenance Productivity. In this session there will be
discussions on how the T-week process was streamlined in anticipation of the Nuclear Promise. This session will identify changes that reduced maintenance burden of the T-week process (such as graded approach to walkdowns) affording the opportunity to better utilize resources to perform work.

Strategic Application of the Demand-Supply Model: Site Integration and Forecasting

Joe Klecha (Vogtle 3&4 Supplier Compliance Director, Southern Nuclear)

Session Notes

Accurate forecast of supply and demand enhances focus on nuclear safety by increasing equipment reliability (ER).

Model needs to be owned equally between Maintenance (MNT) and Work Management (WM).

Data fidelity needs to be assured (PM feedback, database management). Supply (personnel) assumptions need to be adjusted for local and fleet outage support, training, FIN support, management, etc.

Varying supply-demand model assumptions (sensitivity studies) can help convergence on a model best suited for a particular site.

Industry experience indicates that electrical MNT groups experience larger supply-demand gaps upon analysis, caused from large increase in electrical work implemented in mid-2000s.

Demand curves can be normalized (constant) over the year or varied based on expected changes (i.e., outages); dependent upon quality and resolution of data.

Upon initial convergence on viable model, model revised and executed on six-month frequency; extension to 12-month frequency once the model stabilized.

Need to take decisive action based on model results to achieve value added (e.g., changing training durations, moving work between external and internal resources, hiring cycle changes, accelerating/decelerating PM backlog reduction).

Extension of model to longer time periods (e.g., 5 years) can prepare resource pipeline for losses.

Controlled guideline/procedure for development and execution of supply-demand model is highly recommended. Can make model web based for simplified access/input/data retrieval. Should be regularly revised and used by site leaders. Integrate with HR and training. Any model is useless if it's not used by senior managers and incorporated into business planning process.

Supply / Demand model. Should be used to drive changes, training programs, etc. Issue started by having too much work and not enough people to do it. This model is owned equally by maintenance and work management. Started with the AP-928 supply/demand model.

Models were adjusted based on experiences and needs as they arise. Mechanical maintenance was in the best shape and electrical maintenance had the biggest gap. 2010-11, many PMs were added and EPRI changes and were mostly electrical work.

Model shows that the training cycle was too long. Started to outsource breakers or replace them to become more efficient.

Key Learnings

- Model shall be owned by maintenance and work management to get proper buy in. Maintenance perform supply modeling and WM perform demand model. Regularly revised by site leaders
- If you are not driving actions from the use of your model then there is no gain
- Not only maintenance and work management but also important to have input from senior leadership.

Key Learnings:
- Accurate forecast of supply and demand enhances focus on nuclear safety by increasing equipment reliability (ER). Model needs to be owned equally between Maintenance (MNT) and Work Management (WM). Data fidelity needs to be assured (PM feedback, database management, supply/demand assumptions, HR/payroll data). Any model is useless if it's not used by senior managers and incorporated into business planning process.

Recommendations:
- Controlled guideline/procedure for development and execution of supply-demand model is highly recommended, including end-use of models for organizational adjustments/changes.
- Site models should be benchmarked/assessed between one another and revised to incorporate best practices.

Q&A

Q0: How are weekly demand hours/FTEs calculated using a broader (non-weekly) model?

Q1: How to determine man loads for planners?

A0: Model can be ""good enough"" to provide an average loading for outlook purposes (i.e., T-20 or sooner). Some manual adjustment will always be needed based on known, upcoming changes that model cannot be expected to incorporate.

A1: Take the WOs that were corrective work orders and take an average.

Demand/Supply Model (Exelon)

Tom Morris (Corporate On-Line Work Control Manager, Exelon Nuclear)

Session Notes

Site models should be benchmarked/assessed between one another. Comparison from site to site to do peer challenging. This deemed beneficial for the fleet. It is vital to have tribal knowledge of historical data.

Challenge calls are conducted based on model outputs, with corporate involvement, to make high level adjustments in work management/resource allocation and adopt fleet best practices. After demand and supply data is received, corporate will review for fleet best practices. Forward back to site to incorporate.

Reviews performed annually led by MNT and WM.

Displaying results in terms of FTE cost ($) can help convey need for change.

Look at actual annual vacation hours per department to know how many sick days a shop has. This helps with the model.

Key Learnings

- Demand model is performed weekly. The agreed upon FTE are each week. This has minor fluctuations.
- Increase FIN team, get them doing productive work. Eliminate some of the walk downs being performed by FTEs.
- Fleet best practice, work together across sites to implement best practices.

Key Learnings:
- Accurate forecast of supply and demand enhances focus on nuclear safety by increasing equipment reliability (ER). Model needs to be owned equally between Maintenance (MNT) and Work Management (WM). Data fidelity needs to be assured (PM feedback, database management, supply/demand assumptions, HR/payroll data). Any model is useless if it's not used by senior managers and incorporated into business planning process.

Recommendations:
- Controlled guideline/procedure for development and execution of supply-demand model is highly recommended, including end-use of models for organizational adjustments/changes.
- Site models should be benchmarked/assessed between one another and revised to incorporate best practices.

Q&A
Q0: How is FTE worth adjusted for worker experience?

Q1: What percentage per FTE? Does this account for people on vacation, training?

Q2: 6.4 million dollar savings result from what?

A0: Models can be programmed to adjust for less experienced FTEs (i.e., 0.5 for experience < 2 years' service). Preference varies by utility.

A1: 95% per discipline. Yes, this is looked at in the supply model for nonproductive time.

A2: More workers assigned to productive work. They need to be in the plant fixing equipment.
"

Demand/Supply Model (Duke)
Will Hammond (CFAM On-line Work Management, Duke Energy)

Session Notes
Some utilities have models in place but are not being leveraged to any effect to help MNT improve productivity.

In order to maximize value, PMs require reduction/elimination, task duration reductions have to be aggressive, non-field work (administrative) tasks have to be minimized or deleted, models have to take into account on-going industry initiatives.

Model outputs need to be in a format optimal for leadership use (i.e., monthly/weekly resource cycle graphs).

Some analysis of supply-demand deficits has discovered ""conservative"" use of resources outside of nominal process, e.g., 100% walkdown of work order packages in lieu of using graded approach to walkdowns.

Alignment across all organizations necessary to maximize value.

Aggressive implementation of Efficiency Bulletins (EBs) needs to be pursued.

- The model existed but people weren't using it. Consistent modeling but the expectations aren't clear on how to help maintenance improve. It is not likely that the work force will get bigger; either stay the same or decrease.

- Durations in the system for tasks are longer than actual. Needed to be condensed.

- Going forward: predictable model for cycle plans. Broken down by the week per crew. Eliminate unnecessary 100% walk downs. These bodies should be working on the plant.

- Maintenance should be able to provide what the model anticipates. If not, then the model wasn't used to leverage maintenance to deliver. Deltas shall be discussed at T+1. Common occurrence at Duke. Committed resources at T-18 and these things still change between then and execution week.

- Look at payroll hours provided by HR, and compare them to the amount of man hours available. Usually around 51%. What may be the right thing for an individual and his crew doesn't always help the company as a whole. We must become more efficient.

Key Learnings
- The model should anticipate the schedule. Minor changes should occur.

- Challenge planning. Unsure that the graded approach to walk downs is being implemented.

- Long range planning tool. Demonstrates what was performed, what wasn't, and why.

Key Learnings:

Accurate forecast of supply and demand enhances focus on nuclear safety by increasing equipment reliability (ER). Model needs to be owned equally between Maintenance (MNT) and Work Management (WM). Data fidelity needs to be assured (PM feedback, database management, supply/demand assumptions, HR/payroll data). Any model is useless if it's not used by senior managers and incorporated into business planning process.

Recommendations:

Controlled guideline/procedure for development and execution of supply-demand model is highly recommended, including end-use of models for organizational adjustments/changes.

Site models should be benchmarked/assessed between one another and revised to incorporate best practices.

Q&A
Q1: Not all FTEs are created equal. Where is consideration taken for quals for the job?

Q2: How to process work that may have a parts hold in the schedule? Keep in the process or take at risk?

A1: Duke: There is a calculation. 0-2 years' experience, you don't get 100% FTE. 50% until you are over 2 years.

A2: Different ways to handle that. Not modeled into the equation. If it is important work, you keep it in the schedule. It is not a perfect situation. Trying to make long range planners have the ability to load schedules properly. "

BREAKOUT SESSION 6: Changes in Component Classifications and The Promise Approach to Maintaining the PM Program (Cross Listed with ENGINEERING/EQUIPMENT RELIABILITY)

Session Organizer: Jon Anderson (CEO, ACA Inc), Nally Osburn (Fleet Equipment Reliability, Duke Energy), Mark Utz (Manager, Corporate Work Management, Exelon Nuclear)

You are maintenance and suddenly 95% of the components at your plant are non-critical. Finally, you can rid yourself of all those pesky PM's and start saving manpower. Be careful what you wish for! Changing PM strategies in such a way to maintain the required amount of component reliability for the minimum amount of cost is a tricky business, and not well understood by the nuclear industry as "reliability at any cost" has always prevailed throughout the industry. This session is designed to give you the sense of the next steps to take in keeping your plant safe and reducing your costs. This session will start with a discussion about critical component classifications and then move into a discussion of real results from the Promise approach to manage the PM Program.

Nuclear Promise Component Cluster

Rich Weisband (Sr Staff Engineer, Exelon Nuclear)

Session Notes
Goal is to develop a new critical component definition/classification.

Proposed new definition: credible single active component failure will directly result in: reactor trip/scram (single point vulnerability), significant power transient >= 20%, MSPI monitored component failure, single failure that results in loss of core, reactor coolant, or SFP heat removal, containment isolation/temperature/pressure, reactivity control, vital AC electrical power, single failure that results in loss of mRule high safety significance function.

Other previous criteria (e.g., half scram, unplanned shutdown LCO actions < 72 hours) now reclassified as non-critical. These will still hit other performance indicators.

Prior to component reclassification (will be in Efficiency Bulletin) the technical authority needs to perform a review (typically System Engineer, possibly Maintenance, depends on site).

Guidance will be added to AP-913.

New non-critical population will include many important components, cannot lose sight of maintaining their reliability. Change should not negatively ERI, but thresholds should be re-evaluated.

Change will result in more consistent industry standard for component classification.

Potential for cost reductions through optimizing supply management (critical spares), MNT work controls and work packages and CAP burden.

AP-913 consequential failure event definition will change accordingly; utilities will need to perform a historical review of previously classified AP-913 failures and reclassify in ICES, if needed.

Vogtle Units 3 and 4 (AP 1000) building their component classification from the ground up; OPS involvement is highly recommended.

- Redefining what is considered critical components to reduce the number that exist. The intention is to raise the specifications of what is considered a critical component.

- What's no longer a critical component

- there are indications and monitors in place to track this items. Continue to monitor performance of the equipment by monitoring the indicators. The technical authority Is a reviewer whom is typically the system engineer.

- What is truly unacceptable to fail: this is where you want to put your maintenance resources. Look at a historical review to identify where and why failures existed in the past.

Key Learnings

- Vogtle 3&4: reviewing criticality. Using cross functional teams to review. It is important to have an operations review.

- Exelon: It is a criteria to have an operations review of these critical component.

Key Lessons:

AP-913 revision introduces significant changes in criteria for critical component classification.

Significant amount of components now classified as critical will become non-critical; important to realize that these components are still important to operation and will still affect other Performance Indicators. Review by Technical Authority (typically Engineering or Maintenance) will be needed prior to reclassification.

Potential for cost reductions through optimizing supply management (critical spares), MNT work controls and work packages and CAP burden.

Use of software tools can significantly aid in achieving maximum reliability for the least cost. Palo Verde pilot program has resulted in major work reductions with no commensurate increases in corrective maintenance. Resource commitments needed to manage data and process changes to PMs, work execution packages, etc.

Recommendations:

Review revision to AP-913 and prepare sites for potential changes to critical component classification.

Pre-emptively engage system owners (Technical Authority) on potential for critical component reclassification and resulting changes to model work orders for PM.

Evaluate Palo Verde pilot program for changes to work paradigm based on component reclassification.

Q&A

Q1: How does this classification change correspond/relate to 50.69?
A1: Can be done independently. They don't have cross functions. 50.69 is a different view of things, not much overlap. Looking at safety related equipment and can result in reduced regulatory burden. Component classification changes are independent of 50.69.

Q2: Has a pilot been performed on this? Elaborate.
A2: Yes, haven't gotten very far. Limited detail. MSPI aren't specifically flagged yet. Exelon pilot effort at one site for component reclassification. Preliminary feedback from pilot effort is favorable.

PMP-003 Value Based Maintenance, Reducing Costs

John Langskov (System Engineering, Palo Verde, APS)

Session Notes

Palo Verde impact of AP-913 changes. 24% of components currently scoped as critical/low critical; preliminary scoping could shift classification as low as 4%. Not necessarily optimal; there is a point of convergence in the relationship between maximum reliability and minimum total maintenance cost (particularly minimum cost from corrective maintenance). Important to find the equilibrium. ""This isn't about cutting PMs to reduce the maintenance burden.""

Need tools to help make decisions. Maintenance feedback is not helpful in this regard.

Software tools used by Palo Verde pilot team: Preventance, EPRI licensed content, uses advanced analytical methods to calculate a net benefit on current strategies and changes to strategies, contains templates outside of explicitly nuclear assets (i.e., cranes). Qlik, highly rated business intelligence analytic software, load in work history of sites, output datasets that can be sorted by components/subcomponents, failures, work tasks, costs of corrective maintenance vs. preventive maintenance, man-hours, etc.

Planned software improvements include integration of INPO ICES data.

Improved analytics has resulted in more efficient work planning, T-24 meetings eliminated as a direct consequence, 120 MNT positions will not be filled upon normal attrition losses. Significant resource commitments needed to manage data, process changes to PMs, work windows, etc., for maximum value. Palo Verde team consists of nine (9) FTEs. More time is spent changing work mechanisms than data analysis. Start with non-critical components first.

- Critical equipment is no longer critical, what do you do?

- Maintenance Cost curve: Few PM tasks = most equipment is run to failure. This is not cost effective. Started adding more PMs and capability favors improved. Once INPO got involved, there were even more PMs introduced. This is how we became inefficient and not getting the cost savings.

- May not be a critical failure, but it still falls in tech spec space.

- The program looks at cost, consequence of failure, production, and returns how much money each PM will make the company. Entire work histories loaded into Qlik. Allows you to look at PM cost and CM cost by component type and system. The tool will show how many man hours are spent in the field.

- No longer have T-24 meeting. The next 120 retirements of maintenance staff guys will not warrant new hires. Down 175k man hours. Improving craftsmanship processes. Corrective maintenance numbers are down.

- Resetting the baseline based on reliability and economics.

Key Learnings

- Understand the consequence of the PM before you cut it. The intention is to fall between the point of minimum total maintenance cost and the point of maximum reliability.

- Organizational infrastructure: If you don't have people in place to form teams, you will not experience success. Have at least one expert using Qlik, and one expert per discipline. The more staffing, the quicker to implement. Start in the non-critical arena.

- Achieving the amount of required reliability for the least cost. Run to failure isn't always cost effective.

- One size doesn't fit all. Not from site to site or from component to component. Consequences are different depending on the cost. The tool allows you to look at all the cost for your site. All associated cost should be factored into the maintenance strategy. - Gives the opportunity to exercise flexibility. Find a monitoring method that detects failures so that you don't risk as much up planned failures.

Key Lessons:

AP-913 revision introduces significant changes in criteria for critical component classification.

Significant amount of components now classified as critical will become non-critical; important to realize that these components are still important to operation and will still affect other Performance Indicators. Review by Technical Authority (typically Engineering or Maintenance) will be needed prior to reclassification.

Potential for cost reductions through optimizing supply management (critical spares), MNT work controls and work packages and CAP burden.

Use of software tools can significantly aid in achieving maximum reliability for the least cost. Palo Verde pilot program has resulted in major work reductions with no commensurate increases in corrective maintenance. Resource commitments needed to manage data and process changes to PMs, work execution packages, etc.

Recommendations:

Review revision to AP-913 and prepare sites for potential changes to critical component classification.

Pre-emptively engage system owners (Technical Authority) on potential for critical component reclassification and resulting changes to model work orders for PM.

Evaluate Palo Verde pilot program for changes to work paradigm based on component reclassification.

Q&A
Q0: Will EPRI classification templates be revised or replaced?
A0: Templates will be revised, target for end of 2016.

Q1: Why is feedback from maintenance not the best tool to use?
A1: Must look at the age of the components and not only the PM feedback. Monitoring the feedback and basing it off of past PMs is counterintuitive when considering components.

Q2: Does EPRI provide the software?
A2: EPRI does not own the software. You can buy it and load it in. Free version can be downloaded. Intention is to make everyone's data available to everyone. EPRI templates will get updated with this.

Q3: Based on Palo Verde data to populate database?
A3: Yes, by data migration. Everyone has different cost because the business models are different.

BREAKOUT SESSION 7: Open Discussion & Future DNP Activities for Work Management and Maintenance

Session Organizer: Pete Arthur (Principal Evaluator - A/WM, INPO), Bryant Hearne (Principal Evaluator - MA, INPO)

This session will include an open discussion of challenges that stations are facing. INPO will kick off the discussion and turn it over to participants to bring up for discussion the challenges that they are facing. Discussion by other participants will help to provide solutions that work for them. This session will also include a wrap up of the discussions related to the Nuclear Promise initiatives discussed during the track.

Round table discussion on Maintenance and Work management challenges

Pete Arthur (Principal Evaluator - A/WM, INPO) & Bryant Hearne (Principal Evaluator - MA, INPO)

Session Notes

Palo Verde (Ops Manager) - draft EB on pre-authorization work, how are other utilities thinking about implementation?

Exelon - apply a 'sunset clause' to somewhat limit timeframe for pre-authorization work (one/two weeks?)

INPO - there will be some guidance in EB about screening for pre-authorization work, but most utilities already have good criteria established. Expect EB issuance in November, webinar by end of year. Columbia is considered a strong plant for classifying work for OPS/Work Control interface (tiered communication protocol). Goal is to narrow OPS focus on work that truly merits their attention/awareness

[Unknown] - Will INPO revise relevant AP to include this guidance? INPO - they have considered it, no concrete plans at present.

[Unknown] - Graded approach to require workers to quickly brief with OPS/Work Control Center before being released for lower-classified work. Still avoid standing in line for 30+ minutes at the WCC for things like shop work

[Unknown] - Efficient to classify communication requirement during screening process

[Unknown] - Part of DNP inevitably risks some learning opportunities, e.g. a misclassification of minor maintenance, something not communicated to OPS. Important for sites to not "knee jerk" back to old practices. Leadership needs to be strong in moments like this. Learn from it and move on. Same with possible [temporary] increase in rework during learning phase. Focus on fundamentals for MNT techs vital[Unknown] - Is there is a sequence/prioritization to EB issuance? Seems that Component Classification is most important to some INPO - "Yes and no." DNP steering committee - reclassification of critical components deemed high priority. Reduction of non-critical PMs follows. Important that EBs issued do not result in "rework" by revisiting same topics/programs multiple times. EBs that have "immediate gains" are being pushed first (those with available tools or likely to provide relatively accelerated value added). Next DNP steering committee in September, expect a "critical path schedule" for EB milestones for the next year

Duke/McGuire - Use of FIN teams and minor maintenance classification appear to be some of the most powerful tools available to increase efficiency. What utilities have a strong culture that supports FIN organizations? [Unknown] - Farley, SNC has a FIN charter that may be of interest to others

[Unknown] - Calvert Cliffs has a strong relationship between FIN and OPS

INPO - Plenty of correlations between FIN success and SRO on team. Helps as liaison to OPS. "Devil is in the details." FIN staff need to be dedicated to FIN and not still attached to shops. "Leaders and self-starters" OPG (Ontario) - try to do way too much work than they can accomplish. Looking for sites that are strong with controlling additive work scope (enhancements vs deficiencies) Everybody appears to have that problem

Nicole Flippin (Duke/Catawba) - problem not solved, good idea to look at income side, Catawba has been looking at backlog side, meetings with MNT/WC/ENG to slot backlog by priority. ENG has been helpful in this effort.

Unknown - Plant Health Committee (PHC) is leveraged to help with scope control/reduction

Diablo Canyon - Also use PHC; they have a "check book" that limits the magnitude of additive scope per year ANO - Revamping equipment reliability (ER) program. Assign owners to work scope changes. Also track issues and hold owners accountable via PHC. Make sure that SMEs are engaged before deleting work. Damage done to engineering programs when long-term work was deleted without owner concurrence

[Unknown] - Addressing schedule stability/adherence is an important first step in correcting work control issues INPO - Anyone doing well in MNT ownership? Steve Moore (Duke/Robinson) - One site had an AFI but is considered a strength now. Benchmarked Palo Verde as a strong performer. Allowed MNT to perform benchmarks prior to outage (vs. ENG), helped with ownership and engagement. Let craft workers get out in the industry

D.C. Cook - Last August received AFI in Mech MNT fundamentals. Previously had a AFI on work instruction use and adherence. Benchmarked Palo Verde. Schedule adherence does not need to be a concern of individual contributors; their priority is getting the job done right the first time; have a strong questioning attitude. Training on focus items (fitting assembly, leak prevention). Last refueling outage (Fall 2015) had no Mech MNT rework due to fittings, lowest amount of overall rework compared to other MNT groups, INPO

- EB on T-week process will be issued. Meeting reduction is an executive priority. Challenge to all sites to execute reductions as much as possible

Susquehanna - phased out 1400 meeting, originally went to phone call. As long as updates to work week managers are strong, meeting is unnecessary. Still an option on a discretionary basis. Haven't had this meeting in two months

Calvert Cliffs also eliminated 1400 meeting for last six weeks. Possibly an end-week meeting on Friday if need

Jon Anderson (Track Leader) - Any concerns with implementing all of these changes (51 EBs, etc.) in such a short timeframe? Duke/McGuire - concerned with change management. Have to somehow divide out into smaller, manageable pieces

SNC - Workforce buy-in/engagement vital to success. Vogtle 1/2 calling it a "weight loss program" and asking individual contributors to bring up low/no-value added work

INPO - Have to go prioritize changes as best as you can. Solid fundamentals (FIN teams) have to be in place. EBs aren't really inventing any new ideas; they are highlighting existing best practices for value added

[Unknown] - concerns about "backwards motion" when challenges are encountered in implementation, i.e., tendency for leadership to add process when an event occurs

- INPO Work Management meetings: wrap these meetings up with lessons learned.

- Screening process should engage more than 1 or two folks. Should engage the SRO.

- If you are on the FIN team, be dedicated to it. Shop and electrical briefs aren't going to assist with FIN work. FIN should be filled with leaders and self-starters.

- EB coming out on the T-week process. Executives are looking for reduction of meetings. Scope freeze can take place when the station decides. Challenge the organization for having the 1400 meeting. Is it necessary if there is alignment? (Calvert); no meeting if the updates are provided to the work week manager. Held on Thursday to discuss the weekend.

- There must be a sense of urgency. Luxury to the regulated utilities because there. Must save the plants that are in unregulated markets. Get on top of things as fast as you can. Must get as many small items out of the way now because there is a large majority of change coming forward.

- Stop making administrative changes to PMs. If you don't make the change, the CNOs will eliminate planners so that you don't have the personnel to make those changes. Make the recommended changes before the cuts happen. Need to teach equipment reliability to system engineers. Need to understand basic ER theory.

Key Learnings

- Take advantage of the work screening meeting to discuss the grade of the meeting and determine the level of the task. Control room should be focusing on the important task.

- How to handle when things don't go as planned. Take accountability for these and stick to the process. Leadership should ensure that the craftsman understand that a level of technical knowledge is required to perform the task. It should not always require more technical detail.

- We are used to blaming the procedure or work instructions. A lot of errors happen because of knowledge gaps and training issues. Don't be quick to change the process. MM is designed to allow the craftsman to make a mistake. The mistake shall be appropriately categorized.

- (RNP- Duke) Re-engage the organization. Attend EPRI meetings and benchmarks to turn around craft. Engage vendors to get tools to improve performance. Get the craft out in the industry to see what is being done and require changes. Support the implementation of these tools. Depend on the people that know the task and support their recommendations.

- (BC Cook Station) AFI in mechanical maintenance fundamentals. Schedule adherence isn't the problem of the craftsman. The job of the craftsman is to get the job done right the first time. Allow the leadership to worry about the schedule adherence.

- The amount of change coming forward is scary but is a requirement. Will have to revamp organizations before the EB is released, otherwise there will not be success. Non-regulated sites are in survival mode. Must grab the hearts and minds of the craftsman and work force. (Vogtle); Weight Loss Program. Initiative to reducing tasks that have low/no value added. Allow the craftsman to bring these things forward. Increase the energy of the workforce.

Q&A

Q1: OPS Manager; issues implementing screening processes?

Q2: Will this tool be a checklist form?

Q3: Sequencing of EBs coming out? Is there a thought process?

Q4: (McGuire- Duke) Diablo has a guidance for the FIN team, who else is doing it well? How to get buy in from operations.

Q5: Trying to do more work than they can accomplish. How do you control the enhancement scope? Budget for PMs? Incoming work disturbs the on-line work schedule.

Q6: How many EBs have been changing processes?

A1: An event takes place and the station moves away from the pre authorization. There will be minimal guidance on the pre-release process. There will be one coming out in the EB. Most teams already have a criterion but aren't using it. This will probably be issues in October.

A2: This is a maintenance tool but will require OPS Input. Many tasks (schedule 'C') that do not require a release. Take a look at the work package at T-8, evaluate again at T-3, and determine the grade of the task.

A3: There are some immediate efficiencies and gains and that helps determine when an EB is published. Some EBs are released together because they are related. Implementing culture changes are a big deal. The conversations are different now.

A4: Southern Company agrees to have a good model. The alignment issue is with operations. Southern has a FIN chart available Calvert Cliffs believes that they have a good FIN team. FIN teams cycles around the amount of support from OPS. Leadership by OPS has to be dedicated to this change. INPO web page has a list of strengths from the FIN team. It starts with the SRO, who may be filling in for the SRO, etc., FIN SROs are exclusively doing FIN work. High performing FIN teams needs a FIN SRO that has only this responsibility. Entergy will bring in supplemental workers to help FIN when necessary.

A5: (everyone has this issue): (Catawba - Duke); meeting with maintenance, engineering and work control to discuss budget. Work thru the prioritization of existing backlog. Schedule adherence needs to be in the high 90% so that the culture is to get work completed. If the schedule adherence is low, it creates a culture not to get work completed. (Diablo Canyon); use weekly plant health meeting. They have a checkbook that looks over the entire station for arising issues. (Arkansas nuclear one); revamping equipment reliability program. Track WOs of interest and hold people accountable for meeting the schedule expectation. Don't allow items to be dormant in the system. Caution; don't scrub the schedule without engaging the originator of a task. May need more knowledge of programs that it will impact.

A6: These EBs are telling us to do what we said we were already doing. (Energy); We must protect ourselves from ourselves. Protect items from CAP to ensure we don't get into a backwards motion.

OPERATIONS/OPS TRAINING

BREAKOUT SESSION 1: Crediting FLEX/Mitigating Strategies in Risk-Informed Applications (Cross Listed with RISK MANAGEMENT)

Session Organizer: Don Vanover (Jensen Hughes)

Nuclear Plant sites have made a considerable investment in FLEX equipment and storage facilities over the last few years. In support of implementing the “Nuclear Promise”, crediting FLEX (or other available portable) equipment can play an important role in risk-informed applications that can reduce operating costs. This track will discuss industry efforts and NRC understanding for crediting these mitigating strategies during normal plant operations (e.g. for online and outage configuration risk models) and risk-informed applications such as NOEDs, SDPs, MSPI and other risk-informed applications.

FLEX-in-Risk-Informed-Decision-Making-Task-Force

Tom Zachariah (Project Manager, Risk Assessment, NEI)

Session Notes

NEI 16-06, Crediting Strategies in Risk Informed Decision Making, will be issued later on this year.

- DNP:NEI Efficiency Bulletin 16-06
  - Tiered approach – Don’t necessarily have to put it in probabilistic risk assessment (PRA)
  - Qualitative > Semi-Quantitative > PRA for risk informed applications (what do > indicate? greater than or leads to? use -> for leads to)o PRA evaluation stops at 24 hours, off site equipment may not be viable for inclusion
  - Take SOME level credit without enhancement to existing methods
  - Industry developing database to collect data for PMs for FLEX equipment for inclusion into PRA model
  - Human Reliability Analysis (HRA) – extend them to be more specific to FLEX equipment
- Any talk about annual or semi-annual surveillance included as part of FLEX PMs for credit?
  - Collect all data from all sites by component type and group them as much as possible. Should be following EPRI maintenance templates for FLEX
  - 2000 surveillance testing at response center equipment. Justification to extend test frequencies
- Has there been any initial OE for FLEX equipment by vendor, etc?
  - No OE submitted to stay away from certain vendors. Turbine generators not familiar to our industry. Challenged with battery life. Failures due to inadequate test procedures
- NEI is working on ability to include non-credited installed equipment, portable onsite equipment, and portable offsite equipment in PRA.
- Looking to reduce FLEX Equipment PMs by 2018 when enough data on their reliability is achieved.
- Lots of lessons learned about battery management (not leaving equipment powered on, not leaving the key in the ignition, etc).

The paths to sharing OE on these failures exists, but it accomplished via informal not-entirely weekly & not-entirely industry-wide conference calls.

Q&A

A1. Is there any discussion about surveillances of commercial grade equipment that would allow you to credit them? / Any talk about annual or semi-annual surveillance included as part of FLEX PMs for credit?
Q1. Is there any OE about the surveillances, is there types of FLEX equipment that plants should avoid? / Has there been any initial OE for FLEX equipment by vendor, etc?

A1. At this time EPRI maintenance practices are focused on FLEX equipment. At some point in time that data may be applied to other equipment. / Collect all data from all sites by component type and group them as much as possible. Should be following EPRI maintenance templates for FLEX. 2000 surveillance testing at response center equipment. Justification to extend test frequencies
A2. Nothing specific, some maintenance practices have shown to not be effective such as proper ways to maintain battery systems that have very infrequent use. / No OE submitted to stay away from certain vendors. Turbine generators not familiar to our industry. Challenged with battery life. Failures due to inadequate test procedures

Crediting FLEX and Mitigating Strategies in PRA Models

Don Vanover (Vice President, Jensen Hughes)

Session Notes

Non-FLEX equipment has impact on PRA model and must be accounted for in addition to FLEX. Procedures change (LOOP, SBO). Doing new things we haven't done before. Factor everything in to represent the as built as operated plant

- Looking at risk decreases by crediting FLEX equipment for accident scenarios
- Establishment of time margin – FLEX equipment has enough time margin
  - Can feed into PRA model for timing and HRA
  - Alternate uses of FLEX equipment outside of validation study – must be re-evaluated for timing margins fir availability, etc, to mitigate accident scenario
- QUESTION: Some plants have short time to do load shedding, etc, are we looking at how to extend those times? NRC may have concern going to ELAP too quickly
  - Some plants look at if it's worth getting new batteries. 90% confident can get actions done in time, increasing confidence to 95% may not be worth it depending on what you're looking at.
- Address qualitative considerations based on judgement calls in procedures
  - External hazards – high confidence of declaration of ELAP, etc
- Address unique actions
  - Only credit subset of information for FLEX strategies
- Potential Impacts
  - Benefit to SBO scenarios with FLEX equipment
  - Impact from major plant mods
- From a perspective of CDF, what % can we incorporate FLEX
  - Not going to help with LOCA/ATWS, but will benefit from a couple % up to ~30%
  - Can potentially turn orange windows to green
- During analysis, did you find anything that you had to go back and change the FLEX strategy? Additional analyses?
  - No, validation studies were thorough and provided a lot of info for PRA, but may have been applied differently

Q&A

Q1. For Plants that have a very short time for a load shed, are you looking at a way to extend this time frame?
Q2. From a core damage frequency look, what would including FLEX in PRA do for you?
Q3. Have these analyses identified anything that needs to be changed in the FLEX strategies?
A1. As long as the required actions can be performed in the time frame there is little benefit to extending the time.
A2. It is dependent by site but it can be as much as 30% reduction in risk.
A3. No

Other Planned Uses of FLEX Equipment at Palo Verde

Mike Powell (Director of Fukushima Initiatives, APS)

Session Notes

- Site thinking on concepts for how to use FLEX equipment
- Behind on other items, but see the need to prioritize
- Safety injection
  - Use portable FLEX pump to fill accumulators and for check valve testing (not implemented yet) because B train sees more wear and A train cannot be used

- Mobile Boration System
  - FLEX+ - achieve 3000ppm sooner, save 5-8 hours at front end of outage
- Seismic with respect to mounting, etc vs seismic with respect to function – which is PV's equipment?
  - Mounting, etc.
- When crediting equipment as seismic, DB SSE, evaluation in place to show intended safety function not lost?
  - Not taking credit as SR, failure mode that affects SR system? No.

Key Learnings

FLEX+ equipment to use to remain green during outages
Use FLEX equipment online or during outages

Q&A

When you're crediting the FLEX equipment as seismic, are you implying seismic mounting or function?
The equipment is seismically mounted it is not designed to function during a seismic event. It is seismic robust per NEI 12-06 bu the equipment has not been seismically qualified. The connections do not affect the safety related equipment.

Improving Outage Efficiency and Risk with FLEX Portable Equipment

Gene Elimar (Shift Manager-Operations Support, APS)

Session Notes

- Use FLEX equipment to reduce risk online or in outage
- NEI-12-06 – only had to look at Seismic and extreme heat. Took exception and installed alternate header to pump water into SFP from DWST and RWST. Two independent nozzle headers
  - Use these to reduce risk in outage – n+1, allowed PV to stay green instead of going orange
  - Pre-staged equipment still meets seismic qual for FLEX as available/protected
- External connections to plant, hard pipe to injection point.
  - Primary and alternate location to put RC into RCS
- Added temporary makeup check-off to list to stay green on reactivity control throughout outage
  - Used SG pump to get credit
- Inventory control check-off to remain green
- FLEX+ OR FLEX DID equipment
  - Seismic spray ponds
  - Interface panels to go to LC, mod to connect to 480V buses
  - LOSP – DG picks up the bus
    - SBO turbine generators for BO loads
    - Transfer switch on 4160 bus, put FLEX DG on
- No AFW pumps, use FLEX SG pump
- Maintenance procedure allows PV to pre-stage FLEX equipment
- Push back or questions on exception to 12-06?
  - NRC agreed, basically an enhancement but still a deviation
- SSE + 10%
- More about the DG's,
  - Normally stored in FLEX building, can pre-stage on deployment pad (seismic straps, etc) in front of DG building, two 4160V cables available
  - Defined pathway? Yes, all roads are "FLEX"
  - Tractor trailer moves DG's (yard trucks) is part of FLEX deployment equipment
- Create a trip initiator with FLEX equipment?
  - Lots of eyes to ensure that they wouldn't trip
  - Separate
- FLEX equipment part of MRule? Letting you credit but not including in MRule?
  - Evaluation in a4, test as FLEX equipment, not in MRule (doesn't meet criteria). Covered under EPRI template
  - Highly likely to succeed
  - Risk evaluation
- Time validate pre-staged?
  - FLEX equipment serves dual purpose
  - No true validation for FLEX strategy, still implement in time to credit for risk
- How are you taking credit from a FLEX perspective AND a risk perspective?
  - Requirements to demonstrate capability, engineering analysis
  - Re-scheduled maintenance to be able to use during outage
- FLEX storage building? When you take out FLEX equipment to reduce outage risk, aren't you increasing non-outage related accidents?
  - Seismic qualified pad with seismic straps and building

- Staged in case of a FLEX event at least 1 week before unit goes into outage
- "Operable but partially protected"
- Take credit for other items to protect FLEX equipment. THINK OUTSIDE OF THE BOX

In all cases equipment was pre-deployed.
Maintenance procedures were developed to govern the use of this equipment to reduce risk.

Key Learnings
Site thinking on concepts for how to use FLEX equipment, Behind on other items, but see the need to prioritize items like SI

Q&A
Q1. Is the FLEX equipment formally part of the Maintenance Rule?
Q2. Do you run the pumps to validate that the system will work?
Q3. When you stage the equipment, you have reduced the outage risk, but what effect have you taken on the non-outage risk by removing it from its storage location?
A1. No, it is maintained per the EPRI FLEX guidelines.
A2. The only validation that is done is the EPRI maintenance. Pumps are run to ensure they meet the pump curve, but no water is delivered through the entire system.
A3. When it is staged for the outage, the equipment is being installed in its FLEX implementation location. The equipment must still be protected from all external events when its staged so that it is still available. May need to consider the equipment being partially protected and see how that effects risk. Especially considering that it would only be staged during an outage, a relatively short time.

No presentation; Ops perspective
Jerry Pierce (, Duke Energy)

Session Notes
- B5B is now part of FLEX
  - Had to revalidate times
  - More training
  - Outage risk management procedure changes. Next outage all equipment installed – looking to take credit for DID

NEI 16-08: Maximizing the Benifit of Portable Equipment
Tom Zachariah (Project Manager, Risk Assessment, NEI)

Session Notes
This presentation is the most thought that has been put into this process. Very early stages of development.
This is to look at using the FLEX equipment that the sites have made a significant investment into for more than just what its original intent was for beyond design basis events.
By actually staging this equipment for defense in depth purposes, the plant gets more experience using this equipment and connecting it to the plant. Providing even more assurance that the FLEX strategies will work the way that they were designed.

- Still in process! Need feedback, etc., looking for diversified group
- Areas of Benefit
  - Cutsets analyzed to determine where improvements could be made with portable equipment
  - Don't want to negatively impact FLEX program
  - NEI working with NRC to recognize safety benefits of FLEX equipment to expand on more than compliance
- Good idea? We've spent so much on equipment, and installed connections, etc., to utilize for other purposes for DID
  - Find a way to improve risk when taking equipment OOS
- White paper to go to for how to use this to ensure we're all moving in the same direction?
  - No one white paper, 16-08 out next year
  - What kind of considerations to look at
- Complexity – SDP questions, target sets, cyber
  - WHAT CAN I TAKE CREDIT FOR?
  - Permanently installed equipment not available
- Assurance of reliability goes up with more "hook-ups", ops trained, etc., will help to gain margin
- Document evaluation in advance

Key Learnings
Still looking for diversified input from the industry on how to utilize portable equipment
FLEX equipment may be able to be used, and increase reliability, by utilization in outages or online maintenance

BREAKOUT SESSION 2: Operational Focus Metrics

Session Organizer: Clint Six (Director, Corporate Operations, Exelon Nuclear)

Measuring a site's operational focus is often subjective and based on what happens at Operational Focus meetings. Is there a better way to measure operational focus through objective metrics? This discussion
will center around the answer to that question.

Predicting Operational Focus

James "Bubba" Edwards (Operations Manager, Wolf Creek)

Session Notes

- Looking at different metrics for performance indicators. Speaker uses CFAM Metric Rev. 1. All indicators are lagging, so response to this is late (""reactive indicators"", but what most plants track)
- PROACTIVE indicators related to maintenance pipeline. Performing maintenance in the future is dependent on timeliness of initial qualification of maintenance personnel. Direct impact to plant maintenance.
- Initial license class throughput. Cost ~$500,000 to send operators through license class. Need 4 out of 5 operators to complete license class to fit plans, etc.
- Need to stay ahead of staffing indicator for Ops and Ops training to ensure that you can maintain your plant
- SROC is also important, some plants have gotten rid of program, but certain positions or programs cannot be filled without SROC

Key Learnings

- Upper management do not go more than 4 weeks without observations of initial license candidates

Q&A

- What is recommended to help with initial training timeline?
- Metrics looking at direct SRO or AO>RO>SRO?
- proactive indicators, proper staffing of training personnel
- both

Tools for Operational Focus and Managing Risk

Alan Raush (Operations Specialist, Exelon Nuclear)

Session Notes

- Exelon has several methods for tracking operational focus
- How well a station is communicating items like protected equipment to other work groups on site is a concern
- Group brainstorm session: Potential Operational Focus improvement actions/tools
  - SM teach ""why"" (describe/show potential consequence)
  - Consider simulator scenario - significance/impact; aggregate impact
  - Concept of conditionally critical
  - SM: offshift with FIN for effectiveness
  - ILT/cert throughput (non-academic loss actions)
  - n+5 or n + 7, what's your attrition, throughput? # SROs for class, put 5 extra SROs in class, then export to different groups at the end of the SRO class
  - Maintenance and Ops metric; maintenance speaks to ops
  - Do people know the top PRA systems and actions

Key Learnings

-""Bingo Chart"" Actions and improvements initiative spreadsheet tool on common SharePoint. As station completed item, items would be marked complete, reviewed by management. Every plant is required to update and maintain this sheet.
- Operational Focus Site Evaluation Template: Planning template for work. Evaluation attributes with measurement criteria for attributes, and evaluation results. Operations screens work, meeting held 2 weeks prior to implementation, mitigation plan put together for activties with risk associated with them. Management observes; Identifying risk, the right mitigation plan, ready to implement? Value added from PJB, 2 minute drill, etc.? Addresses challenges across multiple groups and questions that need to be answered before work begins to ensure all groups are informed of risk of upcoming activities

Q&A

- How do you handle MCR tags?
- same as EPRI standard, use for online and outage"

BREAKOUT SESSION 3: Operations Human Performances/Crew Performance Management

Session Organizer: Jerry Pierce (Operations Manager, Brunswick, Duke Energy)

A working discussion of both human performance tools and application of Operator Fundamentals to reduce operational events caused by Operations human performance problems without excessive burden. This session will consider the balance between the importance of crew performance management and the administrative burden that can be associated with the management of crew notebooks.

no presentation - open discussion

James "Bubba" Edwards (Operations Manager, Wolf Creek)

Session Notes

- Allowed division to occur between Ops and Ops Training following unsuccessful Ops exam
  - continue to divide as failure rate continued to remain poor (33%; 25% following year)
  - Build a team
  - Celebrate success
- Allowing processes to cover for lack of management oversight; nothing about a process takes the place of a good employee

Q&A

- How to drive crews to be critical of performance - what works?
- CPE to SM. Teach them to be self-critical and self-identify issues/deficiencies and correct them in future training. Accountability and discipline"

Human Performance Tools and Operator Fundamentals

Sara Lange (Operations Manager, Ameren)

Session Notes

- Both are tools that will help operators make the right choice in response to events
- Topic from INPO: PROFICIENCY. If you don't use it, you lose it. Ensure that operators have a good working knowledge of tasks, etc. to perform work efficiently
- Crew notebooks: identify gaps and associate it to an operator fundamental
- Crew Performance Management: SM in charge of each crew's notebook, identify gaps/deficiencies with operator fundamentals, how they plan to close it, and (after training) if it was effective

Key Learnings

- Use training to help close gaps. Utilize AO's on scenarios with CR operators. Have AO's sit in the booth or in a conference room, simulator progresses event and AO's participate by calling the simulator to report

Q&A

- Gradual trends downward or start the process at the first sign of issues?
- SM responsibility to identify gaps and personnel who need refresher to stop downward trend.

Crew Ownership and Performance Improvement

Eric Swain (Shift Operations Superintendent, Exelon Nuclear)

Session Notes

- Alignment from the top down for department performance success
  - Crews come up with improvement plans
- Crew/training notebooks are tedious, maintenance of notebook is difficult; moving to electronic database
- Need consistency in job performance

Q&A

- When do you have an event based MRM?
- What is the training notebook?
- Following a trip, etc., something went wrong and it shouldn't have - go back and figure out if it could have been prevented
- simulator evaluations, etc., for review"

BREAKOUT SESSION 4: Operations, Work Management, and Maintenance Working Together to Improve New Work Screening and an Expanded Role for FIN Teams (Cross Listed with MAINTENANCE/WORK MANAGEMENT)

Session Organizer: Gwen Bookheimer, (Planning Manager, Electrical and I&C, TVA), Mark Utz (Manager, Corporate Work Management, Exelon Nuclear), Gary Dudek (Operations CFAM, Southern Nuclear)

This is going to be an exciting session that includes Operations, Work Management and Maintenance working together to understand the Promise changes in the work order screening process to ensure that impacts on Maintenance are minimized. This session will also include discussions of the expanded role of the FIN Teams to do much more work than today. This discussion will include discussions by personnel that who have already expanded the role of their FIN teams and how they achieved that change.

FIN Team Implementation Today

Scott Brasfield (Maintenance Support Manager, PG&E)

Session Notes

- FIN team
  - SRO: Watch bill position, can NEVER be open. FIN team M-Th with night complement
  - Minimum staffing required by watch bill
- Changed the procedures/processes to classify 70% of all maintenance as minor maintenance
- Trends on misuse of "tool pouch"
- Efficiency bulletin on FIN
  - Look at success of FIN team, closeouts per person per week (<1 at many places, ideal is 10)

- FIN Team SRO key member, cannot be empty. One to two people as the FIN Team senior reactor operator.

- Have a Watch Bill and never drop below minimum staffing. This is a challenge to keep minimum staffing. Staff FIN and keeps the pressure off of the shops.

- Monday through Thursday day shift full team, smaller night shift team to address turnover items and perform walkdowns/prep work for day shift.

- Work screening meeting at 0915.

- FIN Team includes three ROs to primarily establish clearances. Night shift has no OPS coverage.

- Rotating shift techs but they aren't relied on for FIN team. Daily Review Team (DRT) meeting is a big part of the success and only look at equipment issues. Another screening group that screens for non-equipment problems. Chaired by cycle managers. If an items gets complicated, it's a bring back for the next day to gather more information.

- FIN Teams lists have gone away. Items are dedicated to the process and eventually those numbers come down and go away. FIN is performing 70% of MM and TP work. 95% of new work is being completed by FIN. True measure of work completion is how much per person per week. This will show why productivity is low.

- PG&E finding far more success (completed vs. generated) with minor maintenance versus tool pouch.

- Work management system has a "bring back" feature that permits electronic response (request for reassignment, due date etc.) that sends item back to screening team to avoid inefficient offline discussion across multiple organizations.

- One single point of contact with Engineering, RP, Procurement for FIN teams (not members).

- Organizational response to FIN teams has been favorable; high morale associated with "getting things done fast.

Key Learnings

- This process is going back to how it was years ago. Our workers want to repair our work. TP will help workers get work finished sooner because it is easier. Don't let bias be communicated down to workers because then you become the problem.

- Focus on making MM as easy as possible. There are trends on misuse of TP.

Key Lessons:

AP-928 Revision 4 establishes guidelines for New Work Screening Process that drives enhanced classification of work. Goal is to maximize work assigned to FIN process and classified as tool pouch or minor maintenance.

Meeting effectiveness is driven primarily by correct quorum membership (notably MNT Planning) and pre-meeting reviews/research. Meeting agendas should be prioritized by work severity; any questions should be treated as bring-backs.

Encourage FIN, when possible, to complete work as tool pouch/minor maintenance and complete it prior to first screening meeting.

Operations advocacy and leadership in accountability for work management/execution vital to a successful, high efficiency organization. Shift Management participation in T-week meetings, Plant Health Committees, etc. can drive high performance.

Recommendations:

Review AP-928 Revision 4 for New Work Screening Process guidelines and implement as appropriate.

Consider organizational changes to maximize use of FIN process, classification of work as minor maintenance or tool pouch, and empower organization to complete work as efficiently as process permits.

Establish easily-accessible metrics to trend generated/completed work requests by classification and assignments to FIN group vs. shop/MNT.

Ensure Operations is engaged throughout the entire work management process and appropriately staffed in FIN team.

Q&A

FORMAT: Presentations with Q&A throughout - open format
- Night shift crews have ERO component?
- # people commitment for jobs?
- engineering involvement?
- No ERO for maintenance FIN team members
- varies with size of job
- engineering FIN team with single POC with direct interface, single POC with procurement

Q0: Are OPS personnel other than SMs and AOs advocating WM efficiency?

Q1: Do you have a 24 hour FIN?

Q2: Quals tied to FIN Team SRO?

Q3: Dedicated ops support beyond shift workers during nights?

Q4: How is priority determined? By DRT?

Q5: Percentage converts to number?

Q6: Engineering involvement?

Q7: FIN SRO communicate with Shift managers?

Q8: Have you reduced headcount?

A0: Yes; NLOs/AOs can be empowered to advocate via screening meetings, Plant Health Committees, T-meetings, OPS focus meetings, etc.

A1: No. FIN team is Monday though Thursday, day shift.

A2: No. Supported by OPS and aligned with OPS leadership.

A3: No. Nightshirt is only the regular OPS crews.

A4: Matrix in place. Drives the priority.

A5: Usually between 20-50 items per week.

A6: ENG FIN team, single point of contact with procurement.

A7: Hold discussions during turnover meeting and Daily OPS focus meeting. They have open communication between each other.

A8: No. They stay busy. The maintenance organization is losing people because they plan to close after license ends. 2024 and 2025. Goal is to never back away from nuclear professional attitude.

New Work Screening Process

Gary Dudek (Operations CFAM, SNC)

Session Notes

- Having the right people!
  - objective is to get the work done quickly but also to only "touch it one time" - do the right work
- Objective/Mission: Driving as much work as possible through FIN process and classification of maintenance (and keep it that way) throughout the repair process for efficient and cost effective work
  - Goal: 95% of work completed by FIN

Q&A

- Ops risk review in this meeting? Have to have SRO?
- FIN process includes what?
- no, SRO is not required, but is probably most critical. Can also provide "pre-approval" for quick dispatch of maintenance
- high and low characterized work

New Work Screening Process

Mark Utz (Corporate Work Management Manager, Exelon Nuclear)

Session Notes

AP-928 Rev 3 was a very detailed product; industry feedback and a need for streamlined process necessitated revision with major efficiency gains.

Relooking at the process of how work is getting completed. Focusing in on the behavior of the craftsman and reevaluation of the t-week process. Focus on T-Week process, removal of required meetings, condensed timelines, very purposeful milestones, introducing concept of new work screening committee. "Effective and efficient in moving the work from being initiated, classified, in the right hands, and fixed." Condensing timeline to be more deliberate. For Exelon, there weren't the right people doing the screening and work didn't go to the right place at the right time. Committee to look at the process and reevaluate. The new process is going back to how it was reviewed back in the day.

Classification process vital: FIN process, minor maintenance, tool pouch, or full maintenance work package. Goal is to drive as much as possible to FIN, minor maintenance, or tool pouch. Classification and priority is done upfront. Then the look is for cost efficiency. Driving as much work as possible through the FIN process. Keep work classified as minor maintenance (MM) or tool pouch (TP).

Important to have the right people involved in work screening and classification. Need to continue to be diligent in review of Operational Risk and classification of Online vs. Outage activity. Materials person is a valuable asset to have on the work screening team. Within Exelon, There is a guidance coming to specify if work should be completed online or during an outage. This is to expedite the completion of work.

Exelon is developing additional guidance for determining activity timing.

FIN process is the most efficient method to accomplish maintenance. FIN process doesn't necessarily mean a "giant FIN team," common MNT organizations can be equipped to operate within FIN process. FIN process can be used in future work windows in addition to immediate/emergent activities.

Flexibility is key to maintain as much work in FIN process as possible (goal 75%).

Screening process in AP-928 Rev. 4 will drive an independent screening meeting daily. Screening team quorum membership important to maximizing work classified correctly. Some plants hold meetings midday (1200), others early (0630/0730). Depending on how much work is done in advance, meetings can be as short as ten minutes, no more than thirty.

FIN to assume ownership of all work unless determined otherwise.

MNT Planner key member of screening quorum. First half of meeting for review of new work; second half for "bring backs" and follow-up items. Pre-meeting reviews/research is critical to meeting effectiveness (e.g., need for walkdowns/additional investigations, reactivity management, PRA impacts, EC/modification, MRule, material issues). A new daily work screening meeting. Quorum members shall be seasoned and aware of how work is scheduled. It should be assumed that new work will go to FIN team unless determined otherwise. Pre-meeting review research preparation is critical to having an effective meeting. Adds to efficiency of the meeting.

OE: meeting agenda should be prioritized by work severity, any questions should be treated as bring-backs to avoid efficiency losses.

Encourage FIN, when possible, to "tool pouch/minor maintenance" work and complete it prior to first screening meeting.

Establish metrics to trend generated/completed work requests classified as tool pouch, minor maintenance, full work package and assignments to FIN group vs. shop/MNT.

Coordination with CAP screening team is vital to ensuring that full work package requests aren't being pre-emptively generated. MNT Planner representative on screening team can help prevent this.

Key Learnings

- Drive as much work as possible into the FIN process

- There won't be a problem to schedule FIN work, and schedule work to an a work week window and still allow FIN to own it. - Maintenance planners are vital to success of new work screening meeting. Have the right people.

- OE, If you have an early meeting, know the cut off so that everyone is reviewing the same items. - Cycle manager of the meeting should ensure that high priority items are discussed first.

- 24 HR delay of screening meeting helps because it can cause FIN to take care of the work before it is discussed.
- Pre approval allows the maintenance folks to get right to work. Key role for SRO.

- Must have a knowledgeable SRO and maintenance planning rep in this meeting. They must push things to be considered MM. Let FIN get the work completed. - Use the FIN SRO for this meeting. They generally have the right frame of mind.

Key Lessons:

AP-928 Revision 4 establishes guidelines for New Work Screening Process that drives enhanced classification of work. Goal is to maximize work assigned to FIN process and classified as tool pouch or minor maintenance.

Meeting effectiveness is driven primarily by correct quorum membership (notably MNT Planning) and pre-meeting reviews/research. Meeting agendas should be prioritized by work severity; any questions should be treated as bring-backs.

Encourage FIN, when possible, to complete work as tool pouch/minor maintenance and complete it prior to first screening meeting.

Operations advocacy and leadership in accountability for work management/execution vital to a successful, high efficiency organization. Shift Management participation in T-week meetings, Plant Health Committees, etc. can drive high performance.

Recommendations:

Review AP-928 Revision 4 for New Work Screening Process guidelines and implement as appropriate.

Consider organizational changes to maximize use of FIN process, classification of work as minor maintenance or tool pouch, and empower organization to complete work as efficiently as process permits.

Establish easily-accessible metrics to trend generated/completed work requests by classification and assignments to FIN group vs. shop/MNT.

Ensure Operations is engaged throughout the entire work management process and appropriately staffed in FIN team.
Q&A
Q0: How much OPS ownership in WM is present on day of execution? Knowledge of work/schedule, clearances, status, equipment availability, etc.

Q1; cross qualify maintenance techs?

Q2: ops risk review during this meeting?

Q3: went from 2 meetings to 1, single entry system (condition report), this directive changes this again.

Q4: What do you mean by FIN process?

Q5: FIN process include CL and DLs?

Q6: Maintenance accountability?
A0: For every major equipment unavailability window, periodic updates are required to OPS at agreed-upon frequency. Tools in place to communicate via OPS Work Liasons.

A1: yes, over the long haul. Ensure that you have the right people involved.

A2: no. You don't have to have an SRO, but he would be the most critical person to be involved in the meeting.

A3: It was elected to separate this because it was found to be more effective.

A4: Grow to this. The movement of getting newest work to FIN. Must be staffed with the right people.

A5: yes.

A6: Generally the shops want to work on a planned and scheduled work order. The alignment doesn't exist yet in the shops. There has to be a handle on CAP. Ensure that condition review groups have an understanding of where the station needs to be.

Operations Leading Work Management

Darrell Perkins (Senior Operations Manager, Entergy)

Session Notes

- Ops ownership of work management/maintenance
    - Ensure that SM has ownership

At sites experiencing difficultly effectively using WM process, OPS will often use emergent work process to ensure necessary work is completed. Elevated emergent work metrics can be indicative of this problem.

FIN team prioritization/efficiency, trust in work management system, and Shift Managers (SM) holding site accountable for WM contribute to efficiency.

SM attendance in Plant Health Committee can be valuable, in addition to Reactor Operators; can advocate for work considered valuable to OPS.

- Operation Work Liaisons (OWLs) leading the work management system (WMS). The shift managers were not attending T minus meeting. This wasn't not helpful

- Tools: Passive Risk Indicators; gives the shift manager an idea of what is happening in the plant. Shift managers were not going to plant health meetings. This has been aligned so that they are aware of plant health. Work Order of Interest; helps to fix the plant in a more timely manner

Key Learnings

- Work management standpoint, don't rely on a list. Trust the process. OPs person should have confidence on delivery date.

- OPS should be leading the station. There standards should be held to the highest level.

- Priority of OPs concern is coded as C7, the item comes off OPS morning report, but WM agrees not to move it without approval of

OPS.

Key Lessons:

AP-928 Revision 4 establishes guidelines for New Work Screening Process that drives enhanced classification of work. Goal is to maximize work assigned to FIN process and classified as tool pouch or minor maintenance.

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Establish easily-accessible metrics to trend generated/completed work requests by classification and assignments to FIN group vs. shop/MNT.

Ensure Operations is engaged throughout the entire work management process and appropriately staffed in FIN team.

Q&A
- What forms do you look at?
- How much ownership on ops crew on day of execution?
- Plant health, ops focus
- for every major outage, have a lead depending on how important, can give updates every 2-4 hours. If going through turnover, OT scheduled for return to service

Q0: Is there an ERO component to the FIN teams?

Q1: Time to take crews to buy in to this ?

Q3: AOs involved?

Q4: What meetings are they attending?

Q5: How much ownership is there on the OPs group on the day of implementation?

A0: Partially; some MNT staff (specifically night) are ERO members.

A1: Held a meeting. Very emotional for shift managers, maintenance managers, etc. If FIN can't work it within time frame, then it goes in the schedule. Introduced by a white paper and gave a month to review. 100% accepted upfront.

A2: Yes, they go to plant health meetings also. They are willing to give feedback during the meeting which has deemed helpful.

A3: Plant health, ops focus, t meetings, etc

A4: This is a part of OPs ownership. There is a lead that sends out a update to site lead team on the status of jobs. Critical path jobs have overtime schedule to return the item to service.

BREAKOUT SESSION 5: Operations Staffing

Session Organizer: Mike Spellman (Control Room Supervisor, Shearon Harris, Duke Energy)

Consistent with the Delivering the Nuclear Promise initiative is the need to minimize costs, fully staff the operating shifts and feed the rest of the organization. What is the right model and level of staffing for single and multi-unit sites?

Session 4: Operations Staffing

Tom Van Wyen (Ops Training CFAM Mid-Atlantic, Exelon Nuclear)

Session Notes

- look at metrics
- Ops focused and Ops lead - the plant comes first. SM is advocate and they need to be supported, including staffing
  - people going to leave one way or the other - if you don't promote them, they will ""promote themselves"" either within the company or outside. Staffing plan will promote them before they promote themselves
  - Qualifications are an issue; need qualified staff not just numbers, knowledgeable AND fully staffed
  - Quality of life: work-life balance, etc.
- Reduce in-class initial training for AOs, MCR operators
- KT&R
  - identify at risk individuals/depts/etc and criticality of position for all departments on site. Get a rating to develop programs to ensure knowledge is passed on/recorded/etc.
  - margin management utilized
- Overlapping ops classes

Q&A

- Allow ex-navy nukes in license class as substitute for degree?
- +# take into account for throughput attrition?
- Does Exelon use a lot of direct RO's? Initial hire?
- Yes
- Yes
- no, haven't done that yet as a company, has happened once"

Operations Staffing and Workforce Planning

Dave Pitsley (Operations Manager, Robinson NPP, Duke Energy)

Session Notes

- Identify gaps/positions that need be addressed for DNP
- n + 5 for SROs
  - need margin in ops staffing
- Duke is looking to cut O & M costs by cutting across the board
- DNP challenges: need to look at eliminating tasks/meetings/etc. to cut costs, combining jobs, spreading out work, utilizing technology that can be credited so that you no longer need a dedicated person for that task, centralize functions, etc.

Q&A

- How big is license class?
- 10 year plan? how often do you revisit the plan?
-15, 10 SROs, 5 ROs, 14/15 pass
- PV has 15 year plan. Trend it, look at last 5 years, look ahead at 5 years"

Current US Nuclear Operations Staffing

Chuck Goodnight (Goodnight Consulting)

Session Notes

- looking at nuclear staffing issues since ~1986
- 45 standard functions (includes everything!)
- Top performing plants have more operators on shift than other plants that do not perform as well
  - "Top performer": 3 year avg capacity factor, avg staff per MW, ROP score (column 1 low score is good)
  - Correlation between top performers and ops staffing? top performers tend to have more ops and less support staff
  - divide up the data to find correlations of staffing vs performance
- Only looks at first line supervisors and below
- When you look at plant design for staffing
  - Plant design: every plant is unique. Different designs - staffing is different
  - Cultural differences/expectations: do your operators stay in ops forever or move to other areas to use that expertise elsewhere with an ops focus
- Have to develop your people just as much as you have maintain your ops
- Must train to procedures in Ops, ops need to see ALL procedures and have experience in the simulator

Operations Staffing Survey Summary

Mike Spellman (Control Room Supervisor, Harris NPP, Duke Energy)

Session Notes

- Challenges and insights
  - Three areas were highlighted
  - tough to replace SRO in short term
  - important for every team to have an SRO, but can't create over dependence on SRO
- site management support for filling positions with those who have SRO
- off-shift assignments for operators not in training

BREAKOUT SESSION 6: ILT Candidate Success Forecasting

Session Organizer: Darrell Perkins (Senior Operations Manager, ANO, Entergy)

Many sites have developed complex (and somewhat burden-some) systems for tracking and forecasting license candidate success. This session will focus on aligning with the Nuclear Promise initiative and measuring and monitoring only those items that provide good forecasting. This discussion will include: forecasting, classroom execution, mentoring, monitoring and selection.

ILT

Darrell Perkins (Senior Operations Manager, Entergy)

Session Notes

- SROs are all upgrades, no direct SROs; some from engineering but must go through NLO
- Monitoring
  - forecasting, trending, etc., of candidates
- 14-16 months for class depends on several factors (outages, etc)
  - how long supporting outage
  - be on shift 520 hours as extra person
- track mentor interactions between SRO/SRO candidate and RO/RO candidate

ILT Candidate Success Forecasting

Mike Maness (Ops Training Superintendent, Exelon Nuclear)

Session Notes

- Redesigning the process
  - flowpath to license hasn't really changed since training received simulators
  - Millennials learn differently than other generations and current classes don't work as well; lots of interactions, videos, glasstop simulators, etc
  - Blackboard system/distance learning: cuts back cost on instructor course load
  - need to be less formal, but still understand the how and why
- Traditional phased approach for generic ILT flow
  - redesign will still have phases but will incorporate hands on learning at the start (i.e. students will go into the simulator as soon as possible)
  - Can account for attrition in the next 5 years without replacement using this system
  - incorporate tech specs into systems
  - learn by functional area; learn procedures for that panel, area, etc.
- Incorporate quizzes to quickly identify weak areas as class progresses to address immediately
- Comprehensive exams utilized sooner to better prepare for audit/NRC exams
- Proposed ILT flow
  - Direct RO/SRO will go through pre-class with tests - not weed-out! Just for familiarity
  - Utilize contractors/outside resources teach GFES, also considering Blackboard for GFES and giving them info as soon as selected for a pre-scheduled audit test to determine drive of students

Q&A

1- GFES - self paced or contractor taught?
2- total length of time of class shortening? Still stop for outage?
3- Expand on Blackboard system?
4- what is training for instructors through redesign?
5- how will continuing training work as old design?
1- currently contractor taught, looking to move to Blackboard and be self-paced as pre-selection criteria

2- highly recommended to not stop during an outage per INPO ACAD. Tier 1: no change in length, resequencing; hoping to get to shorter class, gradual change
3- online system; forum style for classes
4- currently have mixed staff of instructors; older generations will struggle a little more with technology and will require more extensive training on the new system
5- will take old style open reference exams for CT"

BREAKOUT SESSION 7: Streamlining The CPE

Session Organizer: Bruce Hennigan (Manager, Operations Training Program, Exelon Nuclear)

The CPE process may have opportunities for driving efficiency and better aligning to the Delivering the Nuclear Promise initiative. This session will include a discussion of best practices for CPE readiness that remain in balance with current training and shift commitments. This discussion will include: simulator training, knowledge initiatives, and walkthrough activities.

Streamlining the CPE Process

Bruce Hennigan (Exelon Operations Training Program Manager, Exelon Nuclear)

Session Notes

- Trying to reduce the burden on the site
  - won't have as much of an impact to utilities (going from 3 scenarios to 2 scenarios)
  - How can we make that better?
- Premise of ODSI-3 basis: minimum of 2 crews possibly 3 being evaluated in 2-3 hour scenario
  - develop 10 outlines and submit to lead, narrow down to 3 and validate all, use 2 with a backup
  - Evaluate 6 scenarios with one JPM each for AO's
  - Projected >50k savings per plant evaluation
- Proposed ideas
  - one scenario each crew (with a backup) - 2 crews and each gets a different scenario
  - not having a separate CPE week, do it during INPO plant evaluation instead; sites that require 3 crews would have to figure out when to evaluate final crew
  - incorporate CPE style evaluations as part of training
- In a given year, 5-6 training cycles
  - most likely will have an outage sometime in the year, will affect the training cycle
  - training material must be developed/evaluated
  - arrange schedule with CPE evaluations such that E&A occurs in the middle of the evaluation cycle

DISCUSSION

- Current Method - Improvements?
  - worthwhile to look at periodicity for evaluations - looking at 1 scenario during INPO visit; significant reduction in validation, etc.
- Proposed Options Pros/Cons
  - in field JPM's may be going away due to no value added as said by INPO
  - more than 2 crews: challenges with E&A weeks schedule
- Other options? New ideas
  - Scenario Outlines done by someone other than licensed operator instructor
  - struggle is adjustments in scenarios based on lead evaluator preference (day to day abnormal events or large events, what evaluator looks for , etc.)
  - Utilize recording equipment and make it available to all crews for review of performance (not DNP, but successful)
- Critiques
  - Struggles with how to get them done (time, etc.)
  - Concerns with level of criticality of post-evaluation critiques
  - Provide the scenario guide to the crew after the evaluation for clarification

Key Learnings

- 3 CPE style evaluations per year per crew
- Provide the scenario guide to the crew after the evaluation for clarification during critique

Q&A

- Utilize non-ops people in scenarios?
- things like operability issues happen much more than planned events, think that's what is going to be looking for in future scenarios. Depending on what scenario content is, tie in different groups to make scenario more realistic. Need to utilize decision making skills in simulator.

RISK MANAGEMENT

BREAKOUT SESSION 1: Crediting FLEX/Mitigating Strategies in Risk-Informed Applications (Cross Listed with OPERATIONS/OPS TRAINING)

Session Organizer: Don Vanover (Jensen Hughes)

Nuclear Plant sites have made a considerable investment in FLEX equipment and storage facilities over the last few years. In support of implementing the "Nuclear Promise", crediting FLEX (or other available portable) equipment can play an important role in risk-informed applications that can reduce operating costs. This track will discuss industry efforts and NRC understanding for crediting these mitigating strategies during normal plant operations (e.g. for online and outage configuration risk models) and risk-informed applications such as NOEDs, SDPs, MSPI and other risk-informed applications.

FLEX-in-Risk-Informed-Decision-Making-Task-Force

Tom Zachariah (Project Manager, Risk Assessment, NEI)

Session Notes

NEI 16-06, Crediting Strategies in Risk Informed Decision Making, will be issued later on this year.

- DNP:NEI Efficieny Bulletin 16-06
  - Tiered approach – Don't necessarily have to put it in probabilistic risk assessment (PRA)
  - Qualitative > Semi-Quantitative > PRA for risk informed applications (what do > indicate? greater than or leads to? use -> for leads to)o PRA evaluation stops at 24 hours, off site equipment may not be viable for inclusion
  - Take SOME level credit without enhancement to existing methods
  - Industry developing database to collect data for PMs for FLEX equipment for inclusion into PRA model
  - Human Reliability Analysis (HRA) – extend them to be more specific to FLEX equipment
- Any talk about annual or semi-annual surveillance included as part of FLEX PMs for credit?
  - Collect all data from all sites by component type and group them as much as possible. Should be following EPRI maintenance templates for FLEX
  - 2000 surveillance testing at response center equipment. Justification to extend test frequencies
- Has there been any initial OE for FLEX equipment by vendor, etc?
  - No OE submitted to stay away from certain vendors. Turbine generators not familiar to our industry. Challenged with battery life. Failures due to inadequate test procedures
- NEI is working on ability to include non-credited installed equipment, portable onsite equipment, and portable offsite equipment in PRA.
- Looking to reduce FLEX Equipment PMs by 2018 when enough data on their reliability is achieved.
- Lots of lessons learned about battery management (not leaving equipment powered on, not leaving the key in the ignition, etc). The paths to sharing OE on these failures exists, but it accomplished via informal not-entirely weekly & not-entirely industry-wide conference calls.

Q&A

A1. Is there any discussion about surveillances of commercial grade equipment that would allow you to credit them? / Any talk about annual or semi-annual surveillance included as part of FLEX PMs for credit?
Q1. Is there any OE about the surveillances, is there types of FLEX equipment that plants should avoid? / Has there been any initial OE for FLEX equipment by vendor, etc?

A1. At this time EPRI maintenance practices are focused on FLEX equipment. At some point in time that data may be applied to other equipment. / Collect all data from all sites by component type and group them as much as possible. Should be following EPRI maintenance templates for FLEX. 2000 surveillance testing at response center equipment. Justification to extend test frequencies
A2. Nothing specific, some maintenance practices have shown to not be effective such as proper ways to maintain battery systems that have very infrequent use. / No OE submitted to stay away from certain vendors. Turbine generators not familiar to our industry. Challenged with battery life. Failures due to inadequate test procedures

Crediting FLEX and Mitigating Strategies in PRA Models

Don Vanover (Vice President, Jensen Hughes)

Session Notes

Non-FLEX equipment has impact on PRA model and must be accounted for in addition to FLEX. Procedures change (LOOP, SBO). Doing new things we haven't done before. Factor everything in to represent the as built as operated plant

- Looking at risk decreases by crediting FLEX equipment for accident scenarios
- Establishment of time margin – FLEX equipment has enough time margin

- Can feed into PRA model for timing and HRA
- Alternate uses of FLEX equipment outside of validation study – must be re-evaluated for timing margins fir availability, etc, to mitigate accident scenario

• QUESTION: Some plants have short time to do load shedding, etc, are we looking at how to extend those times? NRC may have concern going to ELAP too quickly
- Some plants look at if it's worth getting new batteries. 90% confident can get actions done in time, increasing confidence to 95% may not be worth it depending on what you're looking at.

• Address qualitative considerations based on judgement calls in procedures
- External hazards – high confidence of declaration of ELAP, etc

• Address unique actions
- Only credit subset of information for FLEX strategies

• Potential Impacts
- Benefit to SBO scenarios with FLEX equipment
- Impact from major plant mods

• From a perspective of CDF, what % can we incorporate FLEX
- Not going to help with LOCA/ATWS, but will benefit from a couple % up to ~30%
- Can potentially turn orange windows to green

• During analysis, did you find anything that you had to go back and change the FLEX strategy? Additional analyses?
- No, validation studies were thorough and provided a lot of info for PRA, but may have been applied differently

Q&A

Q1. For Plants that have a very short time for a load shed, are you looking at a way to extend this time frame?
Q2. From a core damage frequency look, what would include FLEX in PRA do for you?
Q3. Have these analyses identified anything that needs to be changed in the FLEX strategies?
A1. As long as the required actions can be performed in the time frame there is little benefit to extending the time.
A2. It is dependent by site but it can be as much as 30% reduction in risk.
A3. No

Other Planned Uses of FLEX Equipment at Palo Verde

Mike Powell (Director of Fukushima Initiatives, APS)

Session Notes

- Site thinking on concepts for how to use FLEX equipment
- Behind on other items, but see the need to prioritize
- Safety injection
  - Use portable FLEX pump to fill accumulators and for check valve testing (not implemented yet) because B train sees more wear and A train cannot be used
- Mobile Boration System
  - FLEX+ - achieve 3000ppm sooner, save 5-8 hours at front end of outage
- Seismic with respect to mounting, etc vs seismic with respect to function – which is PV's equipment?
  - Mounting, etc.
- When crediting equipment as seismic, DB SSE, evaluation in place to show intended safety function not lost?
  - Not taking credit as SR, failure mode that affects SR system? No.

Key Learnings

FLEX+ equipment to use to remain green during outages
Use FLEX equipment online or during outages

Q&A

When your crediting the FLEX equipment as seismic, are you implying seismic mounting or function?
The equipment is seismically mounted it is not designed to function during a seismic event. It is seismic robust per NEI 12-06 bu the equipment has not been seismically qualified. The connections do not affect the safety related equipment.

Improving Outage Efficiency and Risk with FLEX Portable Equipment

Gene Elimar (Shift Manager-Operations Support, APS)

Session Notes

- Use FLEX equipment to reduce risk online or in outage
- NEI-12-06 – only had to look at Seismic and extreme heat. Took exception and installed alternate header to pump water into SFP from DWST and RWST. Two independent nozzle headers
  - Use these to reduce risk in outage – n+1, allowed PV to stay green instead of going orange

- Pre-staged equipment still meets seismic qual for FLEX as available/protected
- External connections to plant, hard pipe to injection point.
  - Primary and alternate location to put RC into RCS
- Added temporary makeup check-off to list to stay green on reactivity control throughout outage
  - Used SG pump to get credit
- Inventory control check-off to remain green
- FLEX+ OR FLEX DID equipment
  - Seismic spray ponds
  - Interface panels to go to LC, mod to connect to 480V buses
  - LOSP – DG picks up the bus
    - SBO turbine generators for BO loads
    - Transfer switch on 4160 bus, put FLEX DG on
- No AFW pumps, use FLEX SG pump
- Maintenance procedure allows PV to pre-stage FLEX equipment
- Push back or questions on exception to 12-06?
  - NRC agreed, basically an enhancement but still a deviation
- SSE + 10%
- More about the DG's,
  - Normally stored in FLEX building, can pre-stage on deployment pad (seismic straps, etc) in front of DG building, two 4160V cables available
  - Defined pathway? Yes, all roads are "FLEX"
  - Tractor trailer moves DG's (yard trucks) is part of FLEX deployment equipment
- Create a trip initiator with FLEX equipment?
  - Lots of eyes to ensure that they wouldn't trip
  - Separate
- FLEX equipment part of MRule? Letting you credit but not including in MRule?
  - Evaluation in a4, test as FLEX equipment, not in MRule (doesn't meet criteria). Covered under EPRI template
  - Highly likely to succeed
  - Risk evaluation
- Time validate pre-staged?
  - FLEX equipment serves dual purpose
  - No true validation for FLEX strategy, still implement in time to credit for risk
- How are you taking credit from a FLEX perspective AND a risk perspective?
  - Requirements to demonstrate capability, engineering analysis
  - Re-scheduled maintenance to be able to use during outage
- FLEX storage building? When you take out FLEX equipment to reduce outage risk, aren't you increasing non-outage related accidents?
  - Seismic qualified pad with seismic straps and building
  - Staged in case of a FLEX event at least 1 week before unit goes into outage
  - "Operable but partially protected"
  - Take credit for other items to protect FLEX equipment. THINK OUTSIDE OF THE BOX

In all cases equipment was pre-deployed.
Maintenance procedures were developed to govern the use of this equipment to reduce risk.

Key Learnings

Site thinking on concepts for how to use FLEX equipment, Behind on other items, but see the need to prioritize items like SI

Q&A

Q1. Is the FLEX equipment formally part of the Maintenance Rule?
Q2. Do you run the pumps to validate that the system will work?
Q3. When you stage the equipment, you have reduced the outage risk, but what effect have you taken on the non-outage risk by removing it from its storage location?
A1. No, it is maintained per the EPRI FLEX guidelines.
A2. The only validation that is done is the EPRI maintenance. Pumps are run to ensure they meet the pump curve, but no water is delivered through the entire system.
A3. When it is staged for the outage, the equipment is being installed in its FLEX implementation location. The equipment must still be protected from all external events when its staged so that it is still available. May need to consider the equipment being partially protected and see how that effects risk. Especially considering that it would only be staged during an outage, a relatively short time.

No presentation; Ops perspective

Jerry Pierce (, Duke Energy)

Session Notes

- B5B is now part of FLEX
  - o Had to revalidate times
  - o More training
  - o Outage risk management procedure changes. Next outage all equipment installed – looking to take credit for DID

NEI 16-08: Maximizing the Benefit of Portable Equipment

Tom Zachariah (Project Manager, Risk Assessment, NEI)

Session Notes

This presentation is the most thought that has been put into this process. Very early stages of development.
This is to look at using the FLEX equipment that the sites have made a significant investment into for more than just what its original intent was for beyond design basis events.
By actually staging this equipment for defense in depth purposes, the plant gets more experience using this equipment and connecting it to the plant. Providing even more assurance that the FLEX strategies will work the way that they were designed.

- Still in process! Need feedback, etc., looking for diversified group
- Areas of Benefit
  - o Cutsets analyzed to determine where improvements could be made with portable equipment
  - o Don't want to negatively impact FLEX program
  - o NEI working with NRC to recognize safety benefits of FLEX equipment to expand on more than compliance
- Good idea? We've spent so much on equipment, and installed connections, etc., to utilize for other purposes for DID
  - o Find a way to improve risk when taking equipment OOS
- White paper to go to for how to use this to ensure we're all moving in the same direction?
  - o No one white paper, 16-08 out next year
  - o What kind of considerations to look at
- Complexity – SDP questions, target sets, cyber
  - o WHAT CAN I TAKE CREDIT FOR?
  - o Permanently installed equipment not available
- Assurance of reliability goes up with more "hook-ups", ops trained, etc., will help to gain margin
- Document evaluation in advance

Key Learnings

Still looking for diversified input from the industry on how to utilize portable equipment
FLEX equipment may be able to be used, and increase reliability, by utilization in outages or online maintenance

BREAKOUT SESSION 2: Risk Informed Approaches for Legacy Design Issues (Cross Listed with REGULATORY RELATIONS)

Session Organizer: Anil Julka (Manager, FPL)

This session will provide insights on using risk informed approaches to address legacy design vulnerabilities. Often times, design issues are identified due to unclear language in licensing documents or different interpretations by the reader. By using risk insights, we can make informed design decisions and balance the resources spent on tasks that are indeed improving safety. Examples include the impact of tornado missiles to nuclear plants, BWR suction strainer performance, and open phase relay design considerations. Full-blown PRA approaches (i.e. RG 1.200) are not necessarily required but risk informed approaches do warrant knowledge and understanding of PRA techniques by engineers.

Risk-Informed Regulation Without the Baggage: Using Insights to Improve Operations

Victoria Anderson (Senior Project Manager, Risk Assessment, NEI)

Session Notes

R.G. 1.200 provides an approach for demonstrating PRA technical adequacy for licensing applications. It is very important to keep peer reviews of PRA up-to-date. There is a new process being piloted for closing out findings. It is important that PRAs include clear criteria for eliminating event initiators.

Regulatory Guide 1.200 only applies for licensing applications.

Tornado Missile Protection (TMP)

Jack Grobe (Director, Strategic Projects, Exelon Nuclear)

Session Notes
Tornado protection expectorations have evolved since plant construction. NRC issued Regulatory Issue Summary (RIS) in June 2015 and an Enforcement Guidance Memorandum (EGM) in June 2015. TORMIS is a tool available to numerous utilities. A consistent tool is needed to support NRC reviews. Tornado Missile Risk Evaluator (TMRE) is being developed for industry guidance. TMRE involves modifying the internal events PRA, determine change in core damage frequency associated with the SSCs having nonconforming tornado missile protection, compare to the Standard Review Plan (SRP) acceptance criteria, and submit RG 1.174 LAR. Engineering building design conditions compared to current design standards. Exposure areas, separation of safety equipment, coverage are considered. Targets are either robust (few missile types) or less robust (more missile types). Missile Impact Parameter is missile hit probability per missile per exposed target area for each tornado intensity. TMP nonconforming conditions have low safety significance. TMRE focus groups for each site are being requested.

During the original design of these plants there was not clear instruction for design/licensing basis relative to tornado missiles.

About 6 sites across the industry have probabilistic TORMIS models as part of their design basis.

Tornado Missile Risk Evaluator (TMRE), guidance document and workshop to be issued early 2017.

Test plant for TMRE was modeled with 29 vulnerabilities.

The TMRE can be performed in 140 hours of work due to the simplified MIP that bounds all sites.

Focus group will be held in late September to lay out many of these details.

Key Learnings
Cost and risk of vulnerabilities need to be looked at and approached with safety significance as a priority.

An approach for the Utilization of FLEX equipment for Risk Mitigation at Duke Energy
Robert Isbell (Lead PRA Engineer, Duke Energy)

Session Notes
2 recent examples:

1. During routine testing of Motor Driven Auxiliary Feedwater (MDAFW) pumps, cooling water flow through lube oil heat exchangers was found to be below required minimum limit, due to a valve failure. To lessen the impact on this failure the PRA model was modified to credit a FLEX pump to supply AFW. The result of this evaluation supported the disposition of the event's risk significance.

2. Rebuild of both Emergency Service Water Pumps is required. Duration of maintenance too long for outage. Maintenance window expected to be 10-12 days. Technical Specification allowed outage time (AOT) is only 3 days. Actions taken include the staging of FLEX equipment for supplemental cooling where required, development of Operator Actions, which have been included in the PRA Model. PRA model update approach is standard.

At the time of utilizing the FLEX equipment to reduce risk, the FLEX equipment had been installed in the plant but had not been incorporated into the PRA model.

Operator intensive to model the actions required on their part to implement the FLEX equipment.

Actual walkthrough and performance of the operator actions was required -- tabletop was not sufficient.

Risk Informed Evaluation of Post-LOCA BWR Suction Strainer Performance
Larry Naron (Senior Manager, Base PRA Models and Risk Tools, Exelon Nuclear)

Session Notes
Boiling Water Reactors began evaluation of strainers for post-LOCA debris removal in early 90s. PWRs began similar evaluation in late 90s. Differences in plant design results in different potential issues. Risk-informed approach goals include use of a computer model to model each possible issue. Then, site PRA model can use this model output to calculate risk numbers. Defense-in-depth strategies were developed. Results of the analysis were used with RG 1.1.74.

NRC Insights on Risk-Informing Legacy Design Issues
John Lubinski (Director, Division of License Renewal, NRC)

Session Notes
NRC is evaluating its processes and determining whether they are adequate for resolving low risk design issues. They are looking at a process similar to a NOED over a longer time period. The Risk-informed approach (deterministic and risk informed) is meant to be integrated; normally occurs in series. NRC Challenges include the need to update procedures to address risk insights, R.G. 1.174 defense in depth guidance needs to be updated, NRC engagement on PRA models, and credit for FLEX equipment.

Past risk informed processes did not meld the two methods together, deterministic and probabilistic at the same time.

The goal is to be applying the appropriate about of resources to address the level of risk that this issue poses to the station.

Key Learnings
Industry needs to provide examples.

We do not need to implement modifications at any cost to address low risk issues. We must as an industry apply the appropriate resources commensurate with the risk significance of the issue.

Q&A
How will culture be changed? / How do you address the cultural issues to allow the NRC to approve probabilistic methodologies for low risk issues?
Examples are needed to prove its usefulness. NRC may need to rely more on engineering judgement. The NRC is trying to get everyone to understand the safety significance of the issue and from that point of view be able to rule on if the solution is appropriate.

Is there a level of risk that does not result in any necessary action? Is 10 CFR 50.59 an option?
No, the NRC has discussed this and there is not a point at which they would be comfertable establishing a level like this. There is an opening that on a case by case issue one could apply to be exempt from having to address a specific issue. NRC is considering allowing exemptions for certain low risk issues that call into question operability. Initiating events may screen out. 10 CFR 50.59 would result in a longer resolution time.

BREAKOUT SESSION 3: Realism in Fire PRA Modeling
Session Organizer: Victoria Anderson (Senior Project Manager, Risk Assessment, NEI)

With many utilities developing Fire PRAs for regulatory application, the industry is examining additional areas where these can be used to improve operational efficiencies. In particular, technical specification initiatives such as TSTF-505 (Risk-Informed Completion Times) - which can be used to better manage equipment out of service windows - calls for the use of Fire PRA results. While many of the Fire PRAs developed to date remain conservative, risk-informed regulatory applications deliver the most operational and safety benefit when based upon realistic models, and it is therefore critical that the pursuit of realistic Fire PRAs continue. This session will cover specific model aspects undergoing improvements, as well as the regulatory and operational implications of remaining conservatisms.

Harold Stiles (Lead Engineer, PSA, Duke Energy)
Greg Zucal (Senior Engineer, Jensen Hughes Power Services)

Fire PRA Insights on the Use of Conditional Probabilities for Plant Trip due to Operator Discretion
Harold Stiles (Lead Engineer, PSA, Duke Energy)

Session Notes
Need to determine a probability for operator actions such that it can be predicted when or if they would scram the unit under specific conditions. Not just assume that the operator would trip the plant automatically. By inputting operator actions into the PRA you are still carrying some conservatism but you are no longer incorporating gross conservatism as has been traditionally done when assuming the operator will trip the unit.

Q&A
Q1. Where do the numbers come from for operator actions?
Q2. What is the background of the operators used to gather this information?
Q3. Has the NRC reviewed the method for incorporating operation responses in PRA?
Q4. Are you including the results of the operators input to the PRA in operator training to ensure that they stay within the inputs that are used in the PRA model?

A1. The numbers are industry standards.
A2. The operators are seasoned SROs.
A3. Yes
A4. No

It's Not Just NFPA 805 The Importance of Moving Forward with Continued Improvements to Fire PRA

Victoria Anderson (Senior Project Manager, Risk Assessment, NEI)

Session Notes

It we maintain the fire PRA realistic then it will allow for external events to be rolled into the PRA model without exceeding acceptance limits.

Very Early Warning Smoke Detection Systems PRA Application

Bruce Morgen (Director of Risk Services, EPM, Inc.)

Session Notes

NUREG-2180 has not been issued yet, has been through tabletops and is still in development.
Currently do not have research that proves the incipient detection will give more than 5 min. warning before a fire.

Key Learnings

Fast changes are happening on this topic and it is something to constantly keep up to date on.

Q&A

Q1. Is the context that incipient detection is already installed?
Q2. Is the NRC considering non-nuclear OE for the incipient fire detection?
A1. Yes, many of the plants have incipient detection installed as the initial implementation of NFPA 805.
A2. No, other applications of this system does not have the support that the nuclear industry has and that their configurations are different.

BREAKOUT SESSION 4: Efficiently Realizing the Promise of Risk Informed Engineering Programs (50.69) (Cross Listed with ENGINEERING/EQUIPMENT RELIABILITY)

Session Organizer: Tom Zachariah (Project Manager, Risk Assessment, NEI)

In support of implementing the “Nuclear Promise” this track includes sessions with the early adopters of 10 CFR 50.69, “Risk-informed Categorization and Treatment of Structures, Systems and Components for Nuclear Power Reactors”. The scope and breadth of what this risk-informed initiative can do to help reduce costs is considerable. Results and lessons learned from pilots that are already under way will be discussed and will include sessions related to understanding actions being taken to cut 30% of plant operating costs. This session will be combined with other tracks to provide a broad based, multi-discipline understanding of the topics being discussed.

Forming a Cost-Competitive Industry with Risk Informed Engineering Programs

Tom Zachariah (Project Manager, Risk Assessment, NEI)

Session Notes

Bob introduction: 50.69 has the ability to allow us to save money that most efficiency bulletins and focus on the high risk components. As you listen to the presentations focus on how we can bring the industry together to implement 50,69 to save on our nuclear costs.

The 50.69 process has the most potential to DNP to allow us to focus on the truly high risk safety related products. This is a direct input to reduce cost to meet the DNP initiative as an industry.
This process is not to expensive.

Tom Zachariah Discussion: This initiative is to reduce the work burned on the low risk component. Maintain safety and improve efficiency. Improvement to be demonstrated by the south Texas project and south nuclear as the pilot plants. 50.69 provides a Scoping Rule to the industry, that scopes all the low safety significant SSCs. Designed to be methodical and strategic. every step is up to the licensee. The submittal by the rule requires 4: Categorization Process, Risk analyses, PRA Peer Review Results, Risk Sensitivity study process. Currently we are working with the NRC to streamline the process. The next step for the Task Working Group: is to develop NEI 16-09 Implementation Guide.

The purpose is to reduce focus on low safety significant portions and focus on the high safety significance.
South Texas Project and Vogtle have both implemented 50.69.
These two plants have shown that 3/4 of the systems fall into low safety significance. As part of the 50.69 rule it scopes these low safety significant systems out of many programs.
Alternate treatments are licensee controlled and only have to show confidence but do not have to NRC directed actions.
Must do entire systems but do not have to do all systems in the plant. Cannot perform 50.69 on individual components.
Must have all hazards evaluated but do not need to have a PRA analysis of all hazards. IPEEE seismic evaluation is acceptable to address seismic.
The next step for the task force is to develop the implementation guidance (NEI 16-09: Risk Informed Engineering Programs 50.69)
There is a need to coordinate submittals across the industry to ensure that we do not overwhelm the NRC and cause delays for plants that are ready to implement.
The review periods are very excessive, Vogtle has passed 4 years in this process. NEI is involved in trying to get the review interface streamlined."

Key Learnings
Summary: trying to convince the industry to submit for a 50.69. Not Submitting 50.69 leaves significant operational savings on the table every year for the industry. It's a tool that gives Licensees control.

Q&A
See presentation for list of frequently asked questions.

Are we looking at submitting a single LAR for the industry instead of site by site?
There is discussion about a fleet approach within Excelon but the industry approach does not look to be plausible.

Is there an obligation to apply 50.69 to non-safety systems?
There is no obligation to apply 50.69 to any specific system, you are allowed to select the systems that you want to apply 50.69. The only requirement is that you apply the methodology to the entire system including the non-safety portions of the system.

Will the guide include the business case/strategy for implementing 50.69?
The guide will include the methodology for selecting the appropriate systems to apply 50.69 to.

When will the guide be issued?
The goal is to issue the guide early 2017.

Overview of Exempted Programs and Alternate Treatment
Pat O'Regan (Technical Executive, EPRI)

Session Notes
Pat O'Regan- Discussed Programs and processes of what is in the 50.69. Limited to specific programs. some programs are exempted, "special treatment" requirement are removed from scope of a RIEP (10CFR50.69) application. Currently the industry is working on developing guidance documents and updating currently available information for better industry understanding. NRC has a specific definition for "Special Treatment" defining SSC requirements and particular examination techniques. In particular the NRC has specific requirements on what we can and can not do. Pat provided an example Repair Replacement and discussed the NRC requirements and 50.69 applicability.

There are a few EPRI technical reports available to assist in implementation of 50.69.
50.69 is a safety rule, this is demonstrated how the rule treats high risk components.
The burden reduction is only available for ASME Class 2 and 3 components. Class 1 components will not see a benefit from 50.69.

Need to focus on where we are spending our money to determine where 50.69 is oging to be effective.

Key Learnings
Summary: 50.69 is a safety rule that helps us scopes all the low safety significant SSCs. Working with the Industry and NRC to better understand and identify the requirements and alternatives.

Q&A
Any changes to the piping code would only apply to the maintenance process, would not affect the design code of record?
Correct

If a component is not part of the PRA do you still have to model it?
You are not required to model those components that are not included in the PRA.

Q. when performing modifications, How is performing Equivalency evaluation handled with the reduction of classification? A. We will have to meet the functional design and the design change process, however the specification is a lot less.

Risk Informed Categorization- Overview

Ralph Chackal (Senior Consultant, AER Inc.)

Session Notes

Ralph Chackal- Discussed the process of how you categorized SSCs. Tracks for the process (qualitative, functions, etc.) can be processed in parallel, then following would be PRA model and other models such as Fire model. Once a System is selected all the components in the systems have to be evaluated. Electrical systems provide a challenge. Ralph Chackal provided an example of what system selection criteria would look like. System Functions would include system boundary and components, sub-divide functions would provide granularity. For System Function Risk- Integrated assessment/weighted assessment would allow you to evaluate both models resolution if each of the model have a different outcome. Defense-in-Depth: strategy for multiple independent and redundant layers of defense to compensate for potential human and mechanical failures.

It is recommended that for the electrical power systems that you categorize the loads prior to doing those systems.

You can do an integrated weighted assessment to evaluate a reduced risk, this is something that can be done in a single day for a component.

The periodic inspection portion of this requirement is counter to the DNP initiative. Though there is overall savings, invoking periodic inspections exposes the industry to additional efforts. At some point in the future it may be worth investigating removing the periodic inspection requirement but this is the best improvement that we have at this time.

Q&A

The IDP has the ability to overrule due to considerations, how is this documented?
The NEI 16-09 will consider layout the requirements for documenting the exemption considerations for components.

Q1. What is the benefit you saw in having a Fire model vs.
not having a Fire model?

Q2. Follow up question- if you determine a fire
model, do you have to use it?

50.69 Lessons Learned from Southern Nuclear.

Vish Patel (Risk Modeling Manager, Risk Informed Engineering, Southern Nuclear)

Session Notes

Vish Patel- discussed project lesson learned. Project kicked off 1/26/2011, this was before the nuclear promise roll out. Highlights of the Project and best practices are:
-All components within a system, developed a controlled database in the management program for component determination.
-Results after all the categorization are officially put and documented in a controlled database.
-Developed a defined criteria to determine the differences between the project and program development.
-Selected Three Systems for initial phase: Containment Spray System, Chemical and Volume Control System, Radiation Monitoring System.
-Remember: Classification is different than categorization. -50.69 does NOT change the classification.
All of the results were documented in PDMS.
Licensing, program, and system engineers need to be heavily involved in the process to develop the LAR and categorization of componets per 50.69.
Took over 2 years to receive NRC approval for the LAR.
The owners group is looking to see if work for specific systems can be performed generically.

Key Learnings

Key- keeping licensing folks and program engineers/system engineers informed and
involved in the 50.69 process. Provide Training!!

Q&A

What is the most impactful benefit on the CVCS system?
At this time the alternate treatments have not been applied yet. But they will be soon procuring commercial valves to use in the system.

BREAKOUT SESSION 5: PRA Model Technical Adequacy vs. Perfection

Session Organizer: Bob Rishel (Director, Probabilistic Risk Assessment, Duke Energy)

PRA models are used for a wide spectrum of activities and a growing number of regulatory applications. These models accrue considerable benefits in terms of safety, operational flexibility and resources. Model updates have evolved towards realism and stability, and the ANS/ASME Standard for model technical adequacy has served the industry well. This industry has invested considerably in their development and quality, with a high degree of confidence which in turn should be reflected in licensing activities. After several decades of methodological developments and many applications, PRA models are indeed useful; yet questions persist about technical adequacy. Models do not need to be perfect ... so are they good enough for risk-informed applications?

The Best is the Enemy of the Good

Harold Stiles (Lead Engineer, PSA, Duke Energy)

Session Notes

This is a unique idea in our industry that someting can be good enough and not constantly pursue improvement.

Simulation-Based PRA Using the Risk-Informed Safety margins Characterization Framework

Dr. Curtis Smith (Directorate Fellow, INL)

Session Notes

Sustainability is a key concept that has several different facets to it.
These evaluations are very complex that use these programs to perform the detailed analysis.
They are working the validation process so that industry can use these methods.

Q&A

Have you done any kind of benchmarking on the models that have been created?
Yes, some models have been compared to site PRA but as the model becomes more complicated the dynamic model starts to diverge from the static model.

Striving for Excellence ... A PRA Journey of More than 35 Years

Gene Kelly (Sr Engineering Manger, Corporate Engineering and Risk, Exelon Nuclear)

Session Notes

Models will never be perfect, you can always improve the model.
We have these models to make risk informed decisions.
We need to recognize the difference between going for perfection and striving for excellence.

Q&A

How do you know when the model is good enough to be used?
It would be defined by the users of the information. If the plants are able to make informed decisions from the model then in most cases its good enough."

PRA Technical Adequacy - An Example of What vs How

Bruce A. Morgen (Director, Risk Services Division, EPM)

Session Notes

Ran out of time and had to speed through presentation.

BREAKOUT SESSION 6: Removing the Roadblocks to a Risk Informed Future (Cross Listed with EXECUTIVE)

Session Organizer: Doug True (Executive VP, Jensen Hughes Power Services)

The U.S. industry has been actively employing risk-informed thinking for over 20 years. A risk-informed view illuminates where a plant may have safety weaknesses as well as robustness, a distinction not possible with deterministic techniques alone. Achieving the benefits of such views requires an understanding of the strengths and weaknesses of the deterministic and probabilistic approaches, and openness to the technical value brought by the different perspectives. Experience shows that a risk-informed process leads to improved safety ... it is time to take maximum advantage to help us understand where best to spend our resources in Delivering the Nuclear Promise.

Pressurized Water Reactor Owners Group (PWROG) Risk Aggregation Pilot

Roy Linthicum (Chairman, Risk Management Subcommittee, PWR Owners Group, Exelon Nuclear)

Session Notes

-The mean of many distributions can be equal but the distributions can be very different and depending on how you use the mean in your determinations you can be very wrong
-Pilot will be done by the end of 2016
-Aggregation needs to be used among all business

Not all means are the same unless you understand the uncertainties associated with the data then you can merge the PRA models into useful information.
The final report will be shared with the NRC and EPRI.

Q&A

Q1: Where are we for the acceptable use of FLEX equipment in HRA with the NRC?
Q2: What are we doing to bridge the gap between NRC and Vendor institutional?

A2: Decision makers need to be educated on each side

Q1. Related to Human reliability analysis where is the industry on the acceptable method for HRA?
Q2. What are we doing to change the institutional deterministic mindset?
Q3. Sites are looking at implementing 50.69 now, do you know how the changing reg guides will affect that?

A1. Working on NEI 16-06 that will include existing methods to address HRA analysis. EPRI has been working to use existing methods to apply for these current issues such as external events. Some methods may need to modified to adequately address the issue. It has been a challenge to get alignment with the NRC but maybe late 2017 for the guidance.
A2. We have to have a risk-informed safety culture that includes training on risk-informed guidance documents. We have to get decision makers educated. The NRC is working on an education campaign at all levels of the NRC organization to integrate risk-informed decision making into the NRC culture. At this time, they see defense in depth the ill-defined issue and how far does defense in depth needs to go.
A3. The changes that are proposed to the regulatory guides should only help clarify to make the implementation of 50.69 more successful.

Overcoming Technical Roadblocks to a Risk-Informed Future

Stuart Lewis (Program Manager, EPRI)

Session Notes

-Main focus areas are Fire and Seismic PRAs
-Improving realism in PRA models and reducing conservatism with estimating, PRA models are already conservative by nature
-Making too conservative of estimations can also make understanding the system and the PRA model difficult because the model and reality become more disconnected
-It is impossible to make more realistic estimations of risk for thousands of scenarios that may exist in a given system, assumptions still need to be made to facilitate having this in the PRA, this is a problem we are working on by streaming processes
-Something we do not know very much about is how seismic waves travel from its source to the plants, this limits the accuracy of the PRA models, learning more about this will decrease the amount of conservatism with seismic risk assessment

Typically, when people hear making PRA models more realistic means that it means removing conservatism. In some ways this is true but there are still many conservatisms even in the most realistic PRA models.
Fire PRA is a large area where we are trying to improve on the modeling techniques.
Uncertainty analyses for fire PRA are not as useful as we may have previously thought. They only tell us what we want them to tell us based on the variables that are manipulated.
EPRI has put together a course for determining fragility analysis.
Currently using SQURTS shake table tests to determine fragility analysis.
EPRI offers computer based training modules for PRA beginners.

Key Learnings

-Risk Professional training program has beginning to be implemented to help make more realistic PRA's

Q&A

1. Related to Human reliability analysis where is the industry on the acceptable method for HRA?
2. What are we doing to change the institutional deterministic mindset?
3. Sites are looking at implementing 50.69 now, do you know how the changing reg guides will affect that?

1. Working on NEI 16-06 that will include existing methods to address HRA analysis. EPRI has been working to use existing methods to apply for these current issues such as external events. Some methods may need to modified to adequately address the issue. It has been a challenge to get alignment with the NRC but maybe late 2017 for the guidance.
2. We have to have a risk-informed safety culture that includes training on risk-informed guidance documents. We have to get decision makers educated. The NRC is working on an education campaign at all levels of the NRC organization to integrate risk-informed decision making into the NRC culture. At this time, they see defense in depth the ill-defined issue and how far does defense in depth needs to go.
3. The changes that are proposed to the regulatory guides should only help clarify to make the implementation of 50.69 more successful. "

What is slowing the increased use of risk insights...?

Mike Tschiltz (Direction, Risk Assessment, NEI)

Session Notes

-Need to figure out how to be more efficient in implementation
-Everything involved with this is under the day to day radar, so it is difficult to get this moving, it requires active work to move towards completion

The work to enhance risk-informed decision making is a lot of behind the scenes work that does not get much of a spotlight.

Q&A

1: NEI 16-06, HRA is very conservative for FLEX, later we expect to have better understanding for how we can credit FLEX
2: Interested in any ideas of what we can do to accomplish this, it is something we need to consider and work on

Challenges and Strategies for Advancing Risk-Informed Applications

Doug True (Executive Vice President of Power, Jenson Hughes)

Session Notes

There are fundamental differences between the PRA perspective and the deterministic perspective. As such people tend to try to throw up road blocks against PRA that may not be valid.
The realistic PRA analysis cannot rely on conservatisms that have typically been used in deterministic approaches.

-Cultural issues limiting understanding of PRA models
-Probabilistic decision provides a much more realistic model of the correct risk level however, it is difficult to make a correct determination
-Deterministic decision making is not as accurate but it is very easy to make a correct determination

Key Learnings

We need more clarity on Defense in Depth"

BREAKOUT SESSION 7: Innovative Cross-Functional Engagement Using Risk Informed Initiatives to Deliver the Nuclear Promise (Cross Listed with EXECUTIVE)

Session Organizer: Faramarz Pournia (Engineering Director, Southern Nuclear)

Risk-informed applications represent unique tools to reduce cost and remove unnecessary burden allowing plants to “shed some excess weight”. However, industry remains well short of realizing the full potential of risk-informed initiatives. SFCP is little more than half-implemented after ten years, RICT is just getting started, and use of 50.69 remains well below its merit. Common hurdles such as communication challenges, perceived technical complexity and existing inter-organizational interfaces dissuade organizations from adopting the initiatives. Overcoming these challenges involves engaging the right stakeholders, identifying target opportunities, sustaining program ownership, and promoting results achieved. Much is at stake in delivering the Nuclear Promise and the time to fully utilize all of the risk-informed tools available to us is now.

Organizational Engagement/Ownership

Mike Kitlan (Manager Nuclear Engineering, Duke Energy)

Session Notes

-Even back in 1999 this vision of getting Risk Informed Initiatives was out there
-Back then the NRC was questioning whether the industry would commit to this, and they did but it did not happen
-We worked on approving this initiative years ago because the NRC was very receptive, but now it has been sitting on a shelf not being used because there is no interest, this has to change because it is an available cost saving option
-We need to provide more guidance documents to help explain the process so that it can be implemented more effectively
-You have to monitor the health of the program to understand your performance improvements and cost savings
-Have you made a conscious decision or commitment to take on this initiative yet? This is something that needs to be pursued now, you cannot wait to reap the benefits
-You have to pay up front as an investment to start making savings, it will pay off if you do it right

The original risk-informed tech spec vision was presented in 1999.
2009 quote - "NRC staff is taking seriously the 4b and 5b submittals and will be ready, will the industry be ready?"
As an industry we have not adequately pursued initiatives that are available to us because the utilities have not taken ownership.
Stakeholder buy in is the hardest key to success, communication is very important. Need to show the benefit to the site/fleet/personnel involved in implementing the change. In most cases PRA is not the end user, but they are typically a contributor in development.

Key Learnings

-We have laid the framework and have everything ready but we still have not used it, this is something we need to take advantage of this
-All benefits to the entire site and fleet need to be shown up front or else no one will want to do more work if it does not personally help them at all
-PRA is not the end user, but a key player, do not jump to give this to PRA as the owner of these initiatives

Q&A

Q1: It's often about cash flow… Short term strategy to avoid reducing head count to deliver the nuclear promise?
Q2: How would someone best bring an idea to a nuke utility that would help deliver the nuclear promise? Are they invited?
Q3: What next risk initiative you would go to at south Texas project?

A1. We are implementing these initiative to improve safety as a result there is the potential that sites can function with less personnel but that is by far not the goal of these initiatives.
A2. Take a look at the current list of 13 initiatives and approach the CNO that is sponsoring that initiative.
A3. Risk informed security and emergency response (Rick Grantom)"

Budgeting for Risk Informed Applications

Owen Scott (Risk Informed Engineering Department Manager, Southern Nuclear)

Session Notes

-Funding is important not just up front, we need to get funding and keep it with
2-5 year programs

Need to have plans with clear goals that the organization can get behind.
Must understand the full cost, it is not a one-time cost project but there will be costs of maintaining these risk-informed processes.

Q&A

1. It's often about cash flow, what is the short term strategy to achieve these goals?
2. How would someone best bring an idea to a nuclear utility that would contribute to DNP?
3. What would be the next big initiative that STP should go after?

1. We are implementing these initiative to improve safety as a result there is the potential that sites can function with less personnel but that is by far not the goal of these initiatives.
2. Take a look at the current list of 13 initiatives and approach the CNO that is sponsoring that initiative.
3. Risk informed security and emergency response (Rick Grantom)

Regulatory Engagement & Project Management of Risk Informed Applications

Rick Grantom (President, CRG, LLC)

Session Notes
-It is very difficult to communicate risk to other individuals, people usually can't put all the elements together in a way they can understand
-Risk needs to be a part of the business, it needs to be in all the line organizations
-When we talk about anything in this industry like safety or scheduling, things tend to get done, we need to be more actively talking about risk to help more initiatives get moving
-We have to be teaching and engaging all the time at all levels to have an equal understanding among all players: management, corporate, PRA, etc
-People need to be held accountable to force progress, it is a tough thing for management to do, but they need to require deadlines and hold other managers accountable if deadlines are not met just like any other critical item
-If you dont make any procedure changes, you will not see any benefits

It is very difficult to communicate risk to individuals. People understand the components of risk (consequences, probability, initiators) but it is hard to put these components together.
When you talk about risk more, the understanding of risk improves. The same as with safety, the more we talk about safety the better safety culture you develop.
Risk is the tool to optimize safety and site efficiency.
You have to give the management team the tools that they need to achieve the end goal. Then you have to hold them accountable for those goals.
You have to change procedures and performance indicators to make an actual difference.

Key Learnings
-Need an overall plan to approve 4B, 5B, 50.69, all specifically addressed as to when you want to have them approved and implemented to get these things moving, this is necessary as opposed to having them all individually planned
-Risk initiatives need to be packaged cohesively

Q&A
1: Attrition so far has been fine because of the amount of retirements; risk may not be the main driver behind this but it is very important
to demonstrate that cost savings can be implemented, we have to be honest with ourselves as well
2: Risk involved security, and emergency response"

*No Slide show, only some comments
Brad Adams (,)

Session Notes
4 important points:
-Education and knowledge in the organizations of the benefits of risk assessments for the company as well as application
-Rigor in a changed management process, more work needs to be done on the back end, and leadership has to advocate for these initiatives
-Have to figure out how to make it core business for the organization, otherwise it will not get done
-Need meaningful performance indicators that have to be simple and have to add value

Education and knowledge of the organization related to risk is very important.
Rigor in the change management process.
Have to make this core business for the organization. This can not be maintained as a level of effort activity.
We need meaningful performance indicators that are simple and add value.

Key Learnings

1: Change is difficult on us, but the fact is that we need to change the way we think and operate in nuclear, as an industry we need to incorporate risk into our core business to avoid having to reduce headcount
2: Approach the organization that is relevant maybe a manager, and bring the idea to them, if it is a great idea it will be received very well,

ORGANIZATIONAL EFFECTIVENESS/PERFORMANCE IMPROVEMENT

BREAKOUT SESSION 1: Leading an Organization to its Next Level of Performance

Session Organizer: Reiko Perleberg (Corporate Performance Improvement Supervisor, Southern Nuclear)

Is your organization ready to advance to its next performance level? Are you tapping into 100% of employee potential? Has your organization embraced the 15-005 leadership and team effectiveness philosophy and are you really getting results? If you are stuck on a performance plateau, it is time to implement a results-based proven approach of working together to build an engaged team to achieve excellent results. Based on a foundation of effective leadership, David Vineyard, Site Vice President - Plant Hatch, walks you through a proven leadership and teamwork model that is taking his Plant Hatch team to new heights.

Leading an Organization to the Next Level of Performance

David Vineyard (Site Vice President, Plant Hatch, Southern Nuclear)

Session Notes

Leadership is all about teamwork. You can't have one without the other.

Balance leads to success. Things like observation database and grading observations shifted focus from the primary function of observing to the process of how well the documented observations look. Focus should be on teach and coaching, not the documentation of it.

Management (monitoring, organizing, etc.) is process, leadership (inspiring, listening, etc.) is people. Management is filling out performance review forms, leadership is coaching and training. Leadership is all about results, with the right behaviors.

The leadership process is a function of the leader, the follower, the goals, and the situation at the time. It is active, exerts influence, requires effort, and is related to goals. Leadership is active and dynamic, checklists restrict this. People are unique, how we motivate them, get results from them, and evaluate them varies from person to person and a checklist cannot encompass all aspects of the person or how we lead them.

The leadership model is not nuclear, it is leadership. Leadership in itself does not need to be tied to nuclear.

Establish the team. The team can be anything from a group of people hanging a clearance to an entire department. Know and use the resources, communicate, and understand the characteristics and needs of the group and its members. We've overprescribed 3 way communication which has shifted our focus from engagement and thinking about the communication to the words. The words are only 7% of communication, and as an industry we've focused too heavily on them. There are many other aspect of communication (body language, tone, eyes, etc.). Eyes don't lie. They're an important part of communication that can be used to communicate emotion, understanding, agreement, etc. Three way communcation has reduce our ability to understand and communicate effectively.

Develop capabilities - Plan, Control Performance, Effective Teaching, Being in the Field, Teaching and Coaching, Representing the Group (always representing the highest team you meet with, this prevents the silo effect), Evaluating, Sharing Leadership (sometimes directive, sometimes joining, and anywhere in between).

Get the job done. Be engaged, counsel on the job, not after. "Sermons we see" by Edgar Guest - important poem about leading by example.

Engaged leaders lead to engaged employees.

Teambuilding games provide many benefits, and one of them is that they are an important and effective way improve leadership. It's a good idea to build leadership and teamwork in periodic non-nuclear activities.

Key Learnings

Do not get tied up in data and metrics. Leaders need to get in the field and be involved with their employees.

Q&A

Techniques to make this sustainable?
Behaviors - this training goes to all levels of the organization which engages employees at all levels. Delivering results goes a long way in getting buy-in. Success breeds success.

BREAKOUT SESSION 2: Using CAP to Advance Safety, Reliability and Economic Performance

Session Organizer: Reiko Perleberg (Corporate Performance Improvement Supervisor, Southern Nuclear)

You will not get this information anywhere else. Are you interested in Performance Improvement? You have to say Yes, of course. Have you heard of DNP? Even if you say yes or no, this session helps you understand what CAP-001 is all about. Tim Steele, Southern Nuclear CAP-001 Industry Champion, John Grabnar, FirstEnergy and CAP-002 Industry Champion walk you through the intent and implementation of Reducing the Cumulative Impact from the Corrective Action Program. Tim and John have experience with CAP-001 at three fleets. Here is an opportunity to learn about DNP and how it can be leveraged to gain substantial performance improvement while making your nuclear facility more efficient.

Using CAP to Advance Safety, Reliability, and Economic Performance

Tim Steele (Performance Improvement Manager, Southern Nuclear)

Session Notes

CAP-001
Delivering the Nuclear Promise (DNP) is about safety and reliability primarily. It is also about efficiency and cost reduction, but not at the expense of safety and reliability.

We do not want to jeopardize our strong culture for raising concerns and identifying deficiencies. Over the years we've grown to analyze deficiencies that do not justify analysis. CAP-001 adjusts course back to analyzing important issues and only fixing issues that are not as important.

-Non-CAQ use other management systems and processes.
-CAQ may or may not require analysis.
-SCAQ no changes, still analyze.

Goal is to empower leaders to fix issues on the spot, in the field when appropriate (not just process-driven).

In order for this to work, we need to display that our leaders are going to lead, and they're going to fix issues when people identify them. We still need to respond and fix issues, even if they're not being driven by the CAP process.

Two years ago we got the green light to pursue leaning up CAP, but no one wanted to be first. CAP-001 is pushing us to take the next step and start implementing the changes.

We need to differentiate between Condition Reporting and CAP, there are many things that can be identified and processed via Condition Reporting that do not have to be addressed by the CAP process.

Q&A

Q1. Is INPO/NRC on board with these changes?

Q2. Training accreditation requires documentation of people late for training, what will happen if we stop using CAP to track this?

Q3. What is going to prevent creep taking us back to where we are now?

Q4. How are we approaching the behavioral aspect of these changes?

A1. INPO pushed us into a single condition reporting system where everything goes into CAP, now we're being told to break it up but all of the other mechanisms we had in place have grown obsolete and are no longer used. ….Each station needs to work with its resident inspector on an individual basis.

A2. Other options are available to track late trainees, it doesn't need to be done inside CAP. INPO is on board with these changes.

A3. Creep is natural, but we'll be checking standards and forming a team to keep us in check.

A4. We have to talk often and early. Leadership has to be on board to champion these changes. We need to drive out process and replace it with leadership. It all comes down to us fixing things in the field and on the spot, and only using CAP for what is required.
"

Using CAP to Advance Safety, Reliability, and Economic Performance

John Grabnar (Director, Fleet Operations Support, FENOC)

Session Notes
CAP-002
We're not going to stop writing Condition Reports. It is imperative the workforce continues to write Condition Reports, then the screening committees will determine if it goes into CAP or is resolved using other methods or processes.

A key issue that we still need to address is how we decide to adopt or not adopt new best practices and recommendations.

Overriding theme of reducing process and paperwork and replace it with a focus on actual fixes and high quality improvements.

Single entry systems are still okay, and encouraged to be used. Going forward non-CAQ items should have a much more efficient method of processing that should be much less burdensome than that required for CAQ items.

An industry definition is being developed for CAQ and is in the draft version of NEI 16-07, CAP Enhancements for Improving Safety and Efficiency.

Q&A
Q1. Is there concern with a loss of expertise in performing Root Causes with them being reduced significantly?

Q2. There is more confusion and pushback from the site than we're getting from the regulators.

A1. This is a concern. Some fleets are reorganizing to create a small group of qualified and proficient individuals.

A2. This is all new with a lot of issues that we're working through. We've got a difficult road ahead, but we need to keep driving to get back to the basis for CAP. "

BREAKOUT SESSION 3: The Real Benefits of Implementing CAP-001/2016 TIP Award How to Implement At Your Station

Session Organizer: Becky Salvadore (Director, Performance Improvement, Exelon Nuclear), Jack Popielarski (Fleet Assessment OR SME, ExelonNuclear)

Did you ever think that taking an efficiency bulletin to heart and implementing it would save the equivalent time of four full time employees. Want to know how? Join Don Wheeler, Performance Improvement Director, Palo Verde, as he walks you through the steps of implementing CAP-001, Reducing Cumulative Impact from the Corrective Action Program. Don is an engaging speaker and facilitator who will help you learn what it takes to get a large site to think about CAP differently. It is not easy to get people to want to change – attend this session and benefit from Palo Verde's experience.

Conduct of Performance Improvement INPO 14-004
Don Wheeler (Director, Performance Improvement, Palo Verde, APS)

Session Notes
Written documents changed very little, the leadership changed to get them involved and hold them accountable.

Condition Report initiators are able to stay involved through the process that resolves the issues they raise (using customized software tools built to meet the needs of the organization).

HU errors are evaluated and addressed outside of Condition Reports/CAP when the causes are low level with no underlying cause for greater concern, like the person had a bad day.

Use data, analyze it, and find ways to improve. Don't wait for a machine to spit out a trend.

Key Learnings
PI cannot be improved simply by throwing people, time, and effort at it. That may work in the short run during a recovery period, but it is not a sustainable practice.

Palo Verde is able to rigorously and brutally reduce the number of condition reports by first screening if a condition is CLB or not, then if it is if there is an EOC, and only then if it is CAQ. Everything else, even fatalities would not be CAQ.

ABB Ventyx CAS is about to issue the newest version 9 of their CAP module. The industry is about to issue an industry-wide definition of what CAQ means. It will be how Palo Verde defines it.

CAP Screening has reduced workload to the point that they have voluntarily taken on additional excellence activities like reviewing operability decisions, operations logs, etc.

Palo Verde has implemented a practice similar to CrimeStat that identifies time periods of high industrial safety risk based upon previous OE and then focuses efforts on preventing those from occurring. This recognizes the decoupling of industrial safety from nuclear safety as periods of high PRA risk are often not the time when industrial accidents happen.

Q&A

Q1. CAQ criteria varies among sites and companies.

Q2. How did you train your management team to not use ""management actions"" to do the same things we did when we treated everything as CAQ?

A1. That's true. Palo Verde has drawn the line between CAQ and non-CAQ at the Current Licensing Basis. The industry is developing a standard definition for CAQ. This only works if leaders do the right thing.

A2. Senior management group reviews the high level management actions to keep things in check hold leaders accountable."

NextEra Energy Nuclear Fleet: Changing for Good

Pam Metz (Director of Planning and Strategy, NextEra)

Key Learnings

Low Value work reduction, Standardization, ReOrg (all engineers except system engineers report to Nuclear Fleet Corporate office/HQ), Secondary side engineers share LL with non-nuclear side of generation department

MNT component reclassification (over-classification of 8% of all components) resulted in lots of time savings.

Program and Design Engineers are still based at sites, but report to Nuclear Fleet Corporate office/HQ.

Next Era implemented a centralized monitoring system that spans the nuclear and non-nuclear system as well as the regulated and non-regulated territories.

BREAKOUT SESSION 4: The Human Performance Cutting Edge - What Works Best to Reduce Errors and Events

Session Organizer: Dick Cole (Human Performance Mentor, AEP-HOPE Consulting)

Join us for a session where we hear the latest news from members of the Industry Human Performance Working Group and other experienced practitioners. John Waid, Human Performance Section Leader Palo Verde and Chantelle Hurst, HU CFAM, Duke Energy, lead a discussion on best practices, industry initiatives, and how to improve the efficiency of your HU efforts by focusing on fundamental tools, effective coaching, and recognizing pre-event triggers. Dick Cole, working with AEP Generation Resources, will provide lessons learned from taking HU best practices to non-nuclear utilities.

Put Performance Back in Humans

John Waid (Human Performance Section Leader, Palo Verde, APS)

Session Notes

Implemented Tiered Clock Resets to help learn from the small mistakes to avoid the big mistakes.

People learn best from positive reinforcement, so positive clock resets were introduced.

Departments have the ability to create customizable clock resets at their level.

Moved away from evaluating 37 different HU tools and providing negative feedback when any of them were not used properly. Instead engagement in the task and ownership of the results is reinforced.

We were putting front line leaders in positions without adequate leadership training or skills. We developed dynamic leadership activities to build up leadership skills on the front line.

We (Palo Verde) used to be a very top-driven plant. We've put together employee engagement groups to tackle problems, and now the front line owns the issues.

Key Learnings
Get employees engaged and get leaders involved.

Q&A
Q1. Concern about focus on implementing HU tools and not enough focus on fundamentals of the task.

Q2. How do you help people identify the difference between focusing on performance of the HU tools associated with the task and performance of the task itself?

A1. The tools became a weapon. We're pursuing things like Core 4 to focus on the basics of HU tools which should help with proficiency in fundamentals of the task.

A2. It all boils down to engagement in the task and refocusing efforts away from evaluating the tools to the results of the performance of the task. It's all about engagement.

The Human Performance Cutting Edge
Chantelle Hurst (Human Performance CFAM, Duke Energy)

Session Notes
Implementing new HU tools like tiered approach to pre-job briefs, Core 4, and care to coach (peer coaching) has brought a reduction in clock resets.

Implemented the Core 4 to focus the most critical HU assets:
Take a Minute
Task Preview/Job Briefs
Correct Component Verifications and Assumptions
Procedure and Work Instructions Use and Adherence

Prompt Investigations have been able to take the place of causal evaluations in some cases.

The Care to Coach program has brought about a culture change where individual contributors and excited and engaged in peer coaching.

Crew Learnings provide opportunities for teams to discuss both positive and negative items.

Q&A
Q1. Were all supervisors and managers trained on Core 4?

Q2. Describe how the rewards and recognition work.

Q3. What is the threshold or criteria to determine risk for pre-job briefs?

Q4. How well does not establishing criteria work? In my experience people gravitate towards the safest and least efficient higher level brief.

Q5. How often are (Prompt Investigation Response Team) PIRTs held, and how is that shared with the Fleet?

Q6. How do you keep this fresh?

Q7. Is proficiency being incorporated in PJBs? INPO is looking for workers to be able to self-identify when they're not proficient in a task.

A1. The training was focused on the core groups of Maintenance, Ops, Chemistry, etc., but other groups like Major Projects and Security have adopted the program.

A2. We give away free lunches for demonstrations of good behavior.

A3. We didn't establish criteria, we left it up to individual supervisors to determine risk on a case-by-case basis.

A4. We've had to make some adjustments and had to verbally clarify the standards.

A5. About 1 PIRT per site per month. A Fleet call is made following the PIRT with all interested parties to discuss the findings.

A6. We do a lot of communications. We encourage people to do new and different things like videos. We encourage friendly competition.

A7. Yes, that's an important part of Task Preview/PJB. "

BREAKOUT SESSION 5: Amping up Organizational Effectiveness - Case Studies & Techniques from Utilities and Industry SMEs

Session Organizer: Becky Salvadore (Director, Performance Improvement, Exelon Nuclear), Jack Popielarski (Fleet Assessment OR SME, Exelon Nuclear)

If you have ever scratched your head and wondered if you were going after Organizational Effectiveness correctly, then this session is for you. Join Mark Rigsby, Duke Energy, and Dr. Mike Quinn, WorkPlace Cornerstone, as they walk you through the problems they have overcome. They will offer tips and techniques for addressing Org Eff issues we encounter and sometimes confound us as we implement Efficiency Bulletins. The speakers have a wide range of experience and approaches to solving organizational effectiveness problems. These differences maximize the benchmarking you will get from this session.

Organizational Excellence - Improving Alignment, Accountability, and Performance

Mark Rigsby (Org Effectiveness CFAM, Duke Energy)

Session Notes

Leaders can be found throughout the organization, whether they're appointed or not. They are the people who influence those around them to do good things.

Communication is key to building and maintaining trust between people and groups.

Spend less time recording data and building trends and databases, and more time getting in the field and interacting with the workers.

Transparency and collaboration build trust.

It's important to not only communicate the fleet's position, but also to listen to the site's feedback. Have an open forum for feedback, including critical feedback.

Duke uses a large amount of data and indicators to build graphs and reports to rank and trend CFAMs.

Key Learnings

Data, indicators, and trends are not enough. Leaders need to be interacting with their employees. Communication and trust are critical to organization effectiveness.

Q&A

Q1. Are CFAMs (Functional Area Managers) rotational?

Q2. Describe "unconditional support."

Q3. Who gets involved in disparities of opinions in CFAM ratings?

Q4. Do General Managers challenge CFAM ratings?

Q5. How does support and perform fit in with CFAM ratings?

Q6. What is the value of CFAMs in support and perform?

Q7. Was there anything done to determine how the site with the highest CFAM rating so quickly declined to the lowest? Was the CFAM rating missing issues that existed when the site was rated high?

A1. No.

A2. We get alignment, then the team supports the final decision.

A3. We challenge the individual CFAMs on their awareness and understanding of the issues. Actions are the developed and followed up on as needed.

A4. Yes, the approval process routes the ""one page"" of CFAM ratings through the general managers to allow them to provide input and see what's coming.

A5. We work with the leadership team of the site that needs help to develop action plans, get alignment on goals, and recovery.

A6. We help the site develop action plans and take ownership of the issues. Then we step back and perform our normal oversight function.

A7. Yes, we considered that a missed opportunity and have made adjustments to how we rate the sites. One of the problems was that the CFAMs were not as personally involved with the sites and were relying too heavily on data and KPIs."

Delivering the Nuclear Promise: The Rold of Performance Improvement and Organizational Effectiveness

Dr. Mike Quinn (, Workplace Cornerstone)

Session Notes

Slides contain all relevant information from this session.

BREAKOUT SESSION 6: Organizational Performance Model - An Integrated Approach to Assessments and Performance Improvement

Session Organizer: Becky Salvadore (Director, Performance Improvement, Exelon Nuclear), Jack Popielarski (Fleet Assessment OR SME, Exelon Nuclear)

Learn from the pros and hear cutting edge techniques and Exelon's early warning system for identifying early signs of decline and fostering improvement through targeted solutions. Through the DNP focus area of Oversight and Assessment, Exelon has eliminated oversight redundancy. Learn what works and what looked good in design but didn't get the expected results when implemented (aka operating experience). Nuclear operators will not survive in today's environment if faced with costly declines or cyclical plant performance. Exelon's OR&IPA organization has set out to improve performance across our fleet with focus on Organizational Effectiveness and Leadership by providing a comprehensive view of performance, using both analytical and performance-based assessments to monitor performance and organizational health.

New Organizational Performance Model - An Integrated Approach to Assessments and Performance Improvement

Mike Smith (Director Fleet Assessment, Exelon Nuclear)

Session Notes

There is constant monitoring. When there are no assessments in progress, there is constant communication and monitoring of the sites.

Robust career development is an important element to sustaining the organization through retirements. The quality of the people in the organization is more important than the model you put them in.

Exelon takes an INPO-like approach to assessments, even using the same language.

Improved data analysis which includes ease of entry and making the information easy to access.

One of the best attributes of assessments being separate from oversight is the ability to provide coaching and recommendations. We don't direct actions, but we're a part of the dialogue that determines the solutions.

An old effectiveness measure was the number of inspection reports that NOS wrote, which was not a good measure. DNP is helping us to move away from ineffective measures like this.

Q&A

Q1. What's the next phase after pulling assessments out of the Oversight group?

Q2. How are performance improvement plans developed?

Q3. Do you use people from INPO on mid-cycle assessments?

Q4. After gaps are identified, do the sites have additional evaluation to do?

Q5. Have the sites been able to scale back on site-level benchmarking and self-assessments?

Q6. Do the assessors stay at their sites or have to travel much?

A1. It's a work in progress. Not sure where it will lead.

A2. Each performance improvement plan is developed individually, and we monitor them continuously and document the status every 6 months in assessments. We typically add related gaps on top of the AFIs that INPO identifies. We want to detect early signs of decline.

A3. The assessment group writes the report, gives it to the site, and the site gives it to INPO. All communications between INPO and assessments goes through the site.

A4. It's a mixed bag. We give the sites a lot of information, but sometimes they want to look for more. We leave it up to the sites to determine what level of analysis they want to do.

A5. They are looking into cutting back self-assessments, but they haven't done it yet.

A6. Yes and no. A lot of them stay at their sites, but also have to travel to assess other sites.

BREAKOUT SESSION 7: CNO Presentation - Using Training to Advance Safety, Reliability, and Economic Performance

Session Organizer: Hank Nelson (Director, Executive Projects, Palo Verde, APS)

Training professionals and anyone wanting to lean their training programs need to attend this session. Randy Edington, CNO-Arizona Public Service (Palo Verde) is one of our industry's strongest supporters of training to improve performance. You will not get this opportunity to talk to the Training Cumulative Impact Initiative Owner anywhere else. Randy will walk you through NEI Efficiency Bulletin 16-11, Training Cumulative Impact Strategies, to help you understand how to streamline administrative activities and improve the quality and efficiency of training. If time permits, Randy will answer your questions on Efficiency Bulletin 16-07, Training Task List Reviews. Learn the details of the DNP Training Project Plan. Get helpful insights on implementing this project at your site from your industry peers and committee members. You will get personal executive-level views on why this Delivering the Nuclear Promise Initiative is important to sustain and improve our industry.

Delivering the Nuclear Promise Organizational Effectiveness and Performance Improvement

Randy Edington (Palo Verde Executive VP and CNO, Pinnacle West)

Session Notes

People are the solution, not the problem. When there are problems, it's a lack of focus and alignment, and that's a leadership problem.

What is our job? "We safely and efficiently generate electricity for the long term." Without this, we don't have an industry.

DNP is very necessary. It's dangerous, but it's necessary. There will be mistakes, and our job is to mitigate them. Everything is on the table. We need to determine if we can do that, but then we need to determine if we should do it.

The industry has been moving together in unity through the ups and the downs, but now we have new plants being built, plants that are going to run for a very long time, and plants that are near shutting down. The industry is moving apart due to these different directions.

In the late '90s early '00s we started building up cumulative effects. INPO was identifying AFIs that required a disproportionate amount of work to gain very little value in many cases.

We need to be asking "What is our core business?" and moving back to that. Anything beyond what supports that needs to be critically challenged. We also need to be asking "Why do we do this the way we do?" Sometimes it's worth keeping, sometimes there's no good reason, but it's important to be finding this out.

We have added a lot of good things, but many of these things are not justified by the cost and the cost is becoming too great.

We need to maintain high quality people and equipment, but our challenge is to do it in a more efficient and cost effective way. Right now we know what to do to ensure high quality, but moving forward we need to develop new methods to maintain quality with less bureaucracy.

Training is one of our Core functions, but it's not just training, it's training and knowledge. The best training department can't provide everything we need, but it provides a learning environment that fosters the pursuit of knowledge.

We need to be careful to not swing the pendulum too far, and reduce standards to the point where quality is affected enough to impact our core business. If we get this wrong, there is potential that the costs due to mistakes or failures could outweigh any gains we make.

Plants with the best integrated knowledge are in the best position to face challenges. My core driver is to have integrated plant knowledge across the entire organization. Training and knowledge are core to our business.

We need to strive for excellence. Good KPI numbers by themselves mean nothing without excellence. Excellence brings good numbers, but not always the other way around.

Determine what is core to you, and make it better. There may still be ways to save money in these core areas, but do not sacrifice quality of core items.

Key Learnings

It is imperative to protect the core business as we move forward with efficiency gains in DNP.

Q&A

Q1. Explain hard hat ready. Does it allow trained professionals to move among plants without additional training?

Q2. Are we looking at moving training to an industry level?

Q3. Expound on integrated plant knowledge.

Q4. How do you deal with retention of skill, especially among the younger generation?

A1. There are some areas that works this way. People may be hard hat ready in some jobs that are more limited, and might need to get additional training to be considered hard hat ready in other areas. It is easier to establish hard hat ready standards in certain jobs or skill sets such as the ones that share a lot of commonality among sites. We're still working through this, so some things may be added or taken away.

A2. That is on the table for the future. We have a lot that we're working through now that we need to focus on before we take on additional items like industry training.

A3. We use oral boards across disciplines as a driver to encourage peope to learn the "why?" behind things. It changes their outlook and approach from day one. We seek to break down silos, and build teamwork among groups working towards a common goal. Integrated plant knowledge is huge in sustainability. I measure success as the plant continuing to improve 5 years after I leave because of what I did. The basis and benefits of integrated plant knowledge run deep and I would be happy to discuss this more in depth outside of this meeting.

A4. We have a 95% retention rate, and I believe it's because we get the young generation involved at levels that are not typical and were not offered in our early careers. They sit on hiring boards, they're involved in decision making. We engage them at the ground level and our goal is to develop them. This makes them feel that they're a valued part of our organization, and they stay.