

UTILITY WORKING CONFERENCE

The challenge of sustaining excellence

BOASTING ITS LARGEST attendance ever (402), this year's Utility Working Conference (UWC), held August 6–9, showed signs that it may be growing in duration as well as population. In addition to the two and a half days of plenary and technical sessions and a professional development workshop on root cause analysis the day after the formal meeting closed, a special workshop was held on Wednesday afternoon (after the meeting sessions, before the workshop) to cover advanced light-water reactor plant design and modular construction standardization. This extra workshop, which was organized by the University of Florida, was held in a meeting room in a different building from the conference center at the Amelia Island Plantation (north of Jacksonville, Fla.), where the other sessions and workshop took place.


While the UWC, which is organized by the ANS Operations and Power Division, traditionally addresses the nuts-and-bolts aspects of operating and maintaining nuclear power plants, the possibility of new reactor orders and construction in the coming years influenced several of the sessions this year. The term "utility working" may have previously applied, more or less by default, to the operation of existing reactors. There are now a great many people in utilities (and in electricity production organizations that are not traditional utilities) who are working on construction/operating license (COL) applications for new reactors. This trend influenced the meeting, with an extra plenary session titled "Expanding the Fleet" (taking into account new reactors, license renewal, and power uprates) and a number of technical sessions devoted to the utility-working aspects of new reactors. Nearly every speaker was quick to assert, however, the continuing importance of operating existing reactors as safely and productively as possible, and the need to prevent the quest for new reactors from diminishing the importance of the old ones as they continue to operate at an extremely high level.

Plant personnel, regulators, and speakers from other sectors of the nuclear power community stress the need to maintain the high level of performance that power reactors have achieved in recent years.

This publication, and this correspondent, have frequently sung that same refrain. For that reason, a conscious choice was made to cover technical sessions that focused on operating plants, rather than on preparations for new reactors. In our view, the opening plenary and the "expanding the fleet" session provided sufficient information on the progress of new reactor projects.

Sustaining excellence

The opening plenary was introduced by ANS President Harold McFarlane, who



praised the performance of the current fleet of reactors. He noted that ANS has shown an increase in organization members, which may indicate the positive state of the nuclear industry. He then introduced Duke Energy's chief nuclear officer, Brew Barron, who chaired the session and was also the general chair of the UWC. After some general remarks on how excellence could be defined, Barron presented the first speaker, Gregory Jaczko, one of the commissioners currently serving on the Nuclear Regulatory Commission.

Jaczko stressed the importance of maintaining public confidence in existing plant operations, both as an end in itself and as a precondition for the construction of new reactors. He noted the reports of uncontrolled tritium releases in the past several months and wondered if the favorable opinion of reactors by their neighbors remained high (he admitted, however, that he has seen no poll

results on this topic). The challenge in pursuing new reactors, Jaczko said, is to remain within one's resources and to be "wedded to safety, not shackled to schedules." He also said that the NRC's creation of a separate



Jaczko

the long run.

Office of New Reactors will challenge the agency in the short term, as people move into their new assignments, but he believes that keeping operating reactors as the whole mission of the Office of Nuclear Reactor Regulation will be worthwhile in the long run.

On the agency's push for the standardization of COL applications, Jaczko said that this might not be enough because he expects that most of the challenges for new projects will be site-specific, adding that priorities need to be set for each COL's site-specific aspects. He emphasized the importance of the separation of redundant safety trains in new reactors, noting that in current reactors the distance between different trains of cabling—and thus the ultimate effectiveness of redundant safety systems in the event of a fire—varies widely.

As an example of what he hopes the nuclear community can avoid in the next round of reactor licensing, construction, and operation, he showed one of his few slides: the cover page of a generic letter on sump strainer blockage that was published in 1985. Jaczko said that despite the attention paid to this in the past, the NRC had to devote more attention to it in 2004. Returning to fire protection, he said that since the

Browns Ferry-1 fire in 1975, the regulations in Appendix R have become a patchwork. He said he had recently visited the Harris and Seabrook reactors, and he noted that the latter has much greater safety train separation, and thus much simpler fire protection, while the personnel at the former are forced to develop work-arounds.

Security is another area that Jaczko believes should be addressed during design, with train separation a factor here as well because it could reduce the need for guards and weapons. He also suggested performance standards for emergency planning, taking into account each site's different needs (such as the differences in population density and mobility at Pilgrim and Wolf Creek). Finally, he mentioned the importance of settling as many issues as possible at the NRC level, because federal courts have few technical experts. With the NRC's knowledgeable staff, there would be the best chance of reaching fair and comprehensive decisions.

Sounding a similar tone was James Ellis, president and chief executive officer of the Institute of Nuclear Power Operations (INPO). There is no future without safety, he said, adding that power reactor licensees must ingrain safety into their organizational culture and ensure that the incoming generation of workers adopts this attitude. He praised recent achievements by the nuclear fleet, such as low generation costs (\$17.20/MWh in 2005, lowest of all fuels and significantly better than coal's \$22.10/MWh), strong performance during the ongoing nationwide heat wave, and an improvement over the past 10 years in total INPO/World Association of Nuclear Operators performance indicators from 62 points to 93.1. He added, however, that 26 000 workers are expected to retire or leave the industry in the next five years, and that there is a downside to the relative scarcity of reactor transients these days: The older workers who will soon be leaving gained useful experience from the many operating problems of the 1970s and 1980s, while younger workers have had less first-hand involvement with the actions needed to mitigate damage.

Asked if INPO has a role in risk management, Ellis said that the organization's only on-staff expert in probabilistic risk assessment recently retired, and he added that INPO now has 288 employees, down from about 500 15 years ago. He said that it is time to reverse that trend and make use of newer analytical tools. Asked about lessons learned from the vessel head erosion at Davis-Besse that led to a two-year shutdown and a management overhaul, Ellis said that INPO's analysis generally agreed with assessments by the NRC and others that complacency was a major root cause.

David Christian, senior vice president and chief nuclear officer of Dominion En-

ergy, echoed many of Ellis's concerns, and he wondered whether there has been a steep increase in plant personnel who have never had to respond to a reactor trip. He also praised INPO for issuing a warning that simulator exercises might become perfunctory and said that complacency is always a worry. Christian posed the question of whether indoctrination is sufficient to ingrain safety consciousness. As for the hardware side, he called the NRC maintenance rule "a good basis" for the long-term operation of reactors with renewed licenses, since there may be a bathtub-curve rise in equipment wearout. (The maintenance rule had been vocally opposed by many licensee executives when it first went into effect in 1991, on the grounds that maintenance was a matter of licensee asset management rather than nuclear safety, but since then licensees have adapted to its provisions and also embarked on license renewal.)

Bill Coley, chief executive of British Energy Group, spoke mainly on the recent energy review in the United Kingdom, which included an overall recommendation for new power reactors. He said that the review, carried out by the national government, called for the expansion not just of nuclear power but also of all other likely options, such as renewable energy and clean coal. Coley added, however, that he could not buy new reactors now, because the permitting process is unclear. He noted that the same process also impedes the construction of wind farms. A White Paper is to be completed around mid-2007 on measures to reduce the uncertainty, but those measures would then have to be put into full effect before British Energy could place orders. Underscoring his desire to have the entire process in place first, he said, "My greatest concern is that nuclear will be revived, and we'll do it wrong."

Coley made it clear that any new reactors built in the United Kingdom would be light-water reactors. Asked whether he anticipates problems in the adoption of LWRs, considering that personnel are mainly experienced with gas-cooled reactors, Coley said that he does not. He pointed out that all of the personnel at the U.K.'s only operating LWR, Sizewell B, had previously worked only on gas-cooled reactors, and the transition had gone smoothly.

Corrective action

Mike Verrilli, corporate self-evaluation supervisor for Progress Energy, chaired the session on corrective action programs (CAP), although he said that Progress

prefers the term "self-evaluation" to CAP. In his presentation, Verrilli said that since the merger that created Progress in 2003, the programs for all five reactors in the system have been integrated. The self-evaluation program goes beyond the usual limits of a CAP, according to Verrilli, in that it extends to areas such as root cause analysis. The program has been set up to be neither negative nor punitive, although Verrilli admitted that there is still some resistance among plant personnel to the writing of the condition reports (CR) on the unintended or off-normal events that call for such reports. He said that there have been many instances of "self-induced pain" to make the program work, noting that it had been necessary because of poor performance in the 1990s at Robinson and Brunswick. He did admit, however, that imposing the program from above may have interfered with some worthwhile practices, saying that in hindsight he now thinks the staff at Crystal River-3 should have been allowed to incorporate their old practices into the self-evaluation program.

Roman Estrada, corrective action and assessment manager of Nebraska Public Power District's Cooper reactor, reported on CAP backlog management. Estrada is also president of the CAP Owners Group, and thus was able to provide an industry-wide perspective. He said that the best performers in the industry have a ratio of corrective actions to CRs of 1.25 to 1.5, in which enough resources are devoted to a full understanding of what the CR indicates

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so that only a few meaningful actions need to be taken. Estrada said that at some reactors, a CR is followed by a large number of actions intended to cover every possible remedy, but even if this works, it can never be determined clearly which action or actions made the difference. Because there is generally a backlog of CRs to be addressed, priorities should be set so that the CRs that need root cause evaluations get the highest priority, and significant alterations are considered more important than enhancements. Estrada advised operators to be alert for situations in which issues are not even brought up because plant personnel think it would be too great a nuisance to follow up and fix them.

When the corrective action program itself is the problem, both plant performance and employee morale can suffer. Darin Benyak, director of regulatory assurance for PSEG Nuclear, said that employees who raise safety or operational issues lose faith if they see nothing being done by management to address them, and are then less likely to raise such issues at all. An ineffective CAP was found to be at the core of most employees' dissatisfaction. Hope Creek/Salem has been under extra watch from the NRC over cross-cutting issues that could affect safety-conscious work environment (SCWE). Benyak said that at the end of 2005, the NRC closed both cross-cutting issues related to the plant's problem identification and resolution program, and in June 2006, the NRC said that Hope Creek/Salem has seen substantial, sustainable improvement in SCWE.

Roughly echoing Estrada, consultant Kay Gallogly, of Human Performance Strategies, referred to an excess of corrective actions as "death by 10 000 paper cuts." In general discussion following her presentation (on causal analysis for managers), the speakers and many attendees responded to a skeptical comment by insisting that what is written in a root cause analysis is not personal opinion, but—as they see it—the only conclusion that could arise from the proper analysis of the information.

The ROP at age five

The NRC's Reactor Oversight Process (ROP), the agency's current system for assessing the performance and compliance of power reactors, has been in place for five years. The UWC gathered regulators and licensees to discuss the ROP's use thus far, what has been learned, and what is being done to improve the process. There was general agreement that the ROP's development has been worthwhile for all involved parties but that there have been many growing pains.

Bill Mookhoek, senior engineer for licensing at STP Nuclear Operating Company's South Texas Project, reported on ongoing efforts to replace the ROP performance indicator of "Scrams with loss of normal heat removal" with "Unplanned scrams with complications." Meetings and drafting sessions have been going on for some time, with NRC staffers and licensee personnel participating, because the existing indicator is seen by both sides as unclear and contradictory. It has been agreed that while any initiation of safety injection will be monitored closely by the NRC, one such initiation during the course of the year would receive no punitive treatment under the ROP, while a second initiation during a year would draw a "white" inspection finding, but not the more severe "yellow" or "red" findings.

A recent addition to the ROP—the Miti-

gating System Performance Index (MSPI)—was assessed in a paper written by Al Haeger, licensing administrator for Exelon, but presented by the session organizer, Greg Gibson, manager of programs and projects at Southern California Edison Company's San Onofre plant. In subsequent discussion, plant personnel agreed that the presence of MSPI has forced them to improve their plants' probabilistic risk assessments (PRA), but Mookhoek said that this took PRA work outside the usual process, altering priorities and causing other work to be deferred while PRAs were upgraded just to meet an ROP indicator. It was agreed that the next time a new indicator is proposed, there should be an ombudsman at the NRC to oversee it, and the agency's regional offices should be more involved.

The ROP also entails findings that are not strictly defined as elements of the action matrix, and even if a plant's formal performance indicators place it in one of the first two columns of the matrix (with no "degraded cornerstones"), it can still be under a close watch by the agency as though it were in the third or fourth columns. This has happened at Hope Creek/Salem because of the NRC's perception of a cross-cutting issue on SCWE. Bob Biggs, nuclear safety assurance coordinator for Entergy, gave a presentation on cross-cutting areas and assessment challenges. He said that there was little or no guidance when cross-cutting issues were first raised, nor clarity on how such issues would be defined as substantive. Even now, he said, it is not clear what must take place for a cross-cutting issue to be considered resolved.

In keeping with the fact that this is a working conference, with feedback and discussion encouraged, there was a wide variety of attendee comments during these and other presentations. Jim Andersen, chief of the NRC's Performance Assessment Branch, noted at one point that the ROP does not exist in a vacuum and can be influenced by outside factors. He said that inspections increased after the terrorist attacks on September 11, 2001, and that action items increased after the revelation in 2002 of vessel head erosion at Davis-Besse. And when Mookhoek observed that findings have become more frequent, even though significant events have trended downward, Andersen conceded the point but said that when the ROP began, the NRC was understaffed and could only skim the surface, and now it is inspecting at the level that should have existed all along.

Into the new era

Leading off the special panel session titled "Expanding the Fleet" was Luis Reyes, the NRC's executive director for Operations. He maintained that although no reactors have ever been licensed under 10 CFR Part 52 and the construction era for the existing fleet ended more than a decade ago, the NRC expects to be ready to review COL applications when they are submitted. He pointed out that the agency has not been completely dormant in the realm of new fa-

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ilities, arguing that recent licensing work for fuel cycle facilities (Private Fuel Services, the LES enrichment plant, and the mixed-oxide fuel fabrication plant) and the refurbishment of Browns Ferry-1 provided a newer generation of NRC personnel with some experience in licensing and construction (in the sense that Browns Ferry-1 is similar to a construction site). To handle the upcoming workload, Reyes said, the NRC will add 1200 new hires through fiscal year 2008, with about 25 percent being entry level and the rest mid-career. This led to some banter later in the session, as Reyes and Michael Wallace, president of Constellation Generation Group, joked that they'd be taking job applications after the session, competing for the mid-career professionals attending the UWC.

Wallace is also co-chief executive officer of UniStar Nuclear, Constellation's joint venture with Areva NP that is seeking to build and operate Areva's EPR pressurized water reactor in the United States. In his presentation, Wallace recalled his experience with the construction of the Byron and Braidwood plants in Illinois, which had been intended to be standardized. In the aftermath of the Three Mile Island-2 accident, however, the designs of the two plants diverged as regulation changes went into effect at different stages of the construction of each of the four reactors. He said that things will be different with the UniStar fleet, to the point where there would be no engineering department at any EPR site, and thus no modification work done by site staff. Instead, all engineering would be done through UniStar's central office. He also said that UniStar would soon select its turbine supplier for the U.S. EPR fleet as

currently envisioned. The level of standardization is such that if an investor does not like the choice of turbine, it should not invest in the EPR fleet, because these plants will not be customized.

Wallace said that the first EPR fleet is not foreseen as the only one and that later waves of U.S. EPRs might make use of technological advances that arise in the meantime, resembling the deployment of power reactors in France, with groups of reactors based on evolutions in the Framatome PWR design. Wallace also referred to there being five of the 1600-MWe EPRs in the U.S. fleet, and in response to a question he said that UniStar is planning one reactor each at two existing Constellation reactor sites—Calvert Cliffs in Maryland and Nine Mile Point in New York—plus three others for investors who have expressed interest. Wallace declined to identify these investors.

Jeffrey T. Gasser, executive vice president and chief nuclear officer of Southern Nuclear Operating Company, reported on his company's plans for two Westinghouse AP1000 PWRs at the Vogtle site in Georgia, where two PWRs are already in operation. He said that Southern's application for an early site permit for Vogtle was to be submitted to the NRC on August 15. (This did occur; see *NN*, Sept. 2006, p. 17). Demand growth in Southern's service area is

such that the addition of Vogtle-3 and -4, plus Southern's 45 percent share of one of Duke Energy's planned AP1000s, would roughly maintain nuclear's share in Southern's electricity production in the range of 18 percent.

Gasser joined the meeting's chorus that warned against letting new reactor projects distract from the operation of existing reactors. He recalled that when the first two Vogtle reactors were being built, Southern ended up diverting so many people and so much money to the project that operation suffered at Southern's existing two-unit Hatch plant. After stating that a formal commitment to build Vogtle-3 and -4 could not take place without the Georgia Public Service Commission's certification of the need for the project, which could occur in 2008, Gasser added that the prerequisite for all new reactors is the safe, reliable operation of the existing reactors.

Carol Berrigan, senior project manager for Advanced Reactor Licensing at the Nuclear Energy Institute (NEI), looked at the staffing and infrastructure challenges for new reactor projects. She restated many of the concerns expressed earlier in the meeting—an aging workforce and few suppliers for major components—and also noted that there are now only about 10 percent as many quality assurance programs adhering to 10 CFR Part 50 Appendix B as there

were at the height of the last wave of reactor construction. She said, however, that enrollment in university nuclear engineering programs is now the highest it has been since the early 1990s, and that in March the NEI joined with other energy organizations, including the Edison Electric Institute and the American Gas Association, to start the Center for Energy Workforce Development, to create new opportunities for young people seeking careers in craft fields.

During the subsequent question-and-answer period, Wallace was asked whether UniStar's arrangement for forgings for the first U.S. EPR constitutes a reactor order. Wallace conceded that UniStar was the first expected COL applicant to arrange for materials, but he said that the path to an actual order will be traveled by making many very small steps and that plans call for the formation of an enterprise to build a reactor—seen as the final step in committing to the plant—in about three years.

Gasser was asked whether Southern would backfit Vogtle-1 and -2 to make them compatible with Units 3 and 4, and perhaps licensable under 10 CFR Part 52. Gasser said this would be explored. He noted that an operator licensed to work at the first two units would have to go through separate training and qualification to work at the second two because of the design differences.—*E. Michael Blake* **■**