

# GLOBAL NUCLEAR INITIATIVES

## FUTURE ROLE OF NUCLEAR POWER IN THE GLOBAL AND U.S. MARKETS



### Views on the Future Role of Nuclear Power in the Global and U.S. Markets (Deloitte's Annual Energy Conference).

Kristine L. Svinicki, Commissioner, U.S. Nuclear Regulatory Commission.

The emphasis on "global" in both of these themes is most appropriate. The United States has 104 operating nuclear power reactors, but there are 332 other nuclear plants operating beyond our borders. U.S. nuclear plants provide about 20% of our electricity, but 16 nations depend on nuclear for a greater percentage than the US, with France topping the list at three-quarters or more. In the U.S., there have been – and continue to be – a great many references to "The Nuclear Renaissance" to describe the creation of new reactor and plant designs, the filing of applications for new plant licenses, and the general interest in putting new nuclear generation on line in the United States. This renewed interest in domestic nuclear energy has resulted in a major increase in licensing activity at the NRC. So far, the NRC has received 17 license applications for 26 new nuclear power plants. These are the first licensing applications to be submitted for new plants in decades. NRC has also experienced a significant increase in licensing activities related to uranium recovery and fuel processing facilities.

The licensing and the safety reviews of nuclear designs involve significant time and resources for both the applicants and the regulator. Historically, all of those 104 nuclear plants in the current operating fleet were different enough so that the NRC had to analyze and review nearly every one practically from scratch, and the operating license reviews had to be done while

the plant was under construction with a public hearing after completion.

In 1989, the NRC began establishing a new combined construction permit and operating license – or "combined license" – application process which was further refined and updated with a rule-making last year. The new licensing process – which is now codified in NRC regulations referred to as "Part 52" – was envisioned as involving three steps: certifying a plant design, obtaining an early site permit, and then a combined license application pairing those first two. The intent was that reactor vendors would develop and finalize designs and get them certified by the NRC, while utilities would identify and analyze candidate sites, get them approved by the NRC, and bank them for future use. Utilities would then select a certified design, and apply to build at an already approved site. Since the NRC would already have reviewed both the site and the plant design, the combined license reviews would be reduced in scope potentially eliminating the need for a post-construction hearing. That hasn't quite happened yet, as none of the combined license applications received by the NRC – so far – reference both a certified design and an approved early site permit. Some do, though, reference an already certified design and all the others reference a design still undergoing NRC certification review.

Inside this issue:	
Future Role of Nuclear Power in the Global and U.S.	1-4
Nuclear New Briefs: International Nuclear Power Initiatives	1-3
Palo Verde Moved from Column IV to I	5
NWI Refocuses from Robinson to SONGS	6
NWI News Board	6

## Nuclear New Briefs: Nuclear Power Initiative Updates



### International meeting opened in Beijing 21 April 2009

- The global economic crisis "could delay the implementation or expansion of nuclear power programs in some countries for a limited period," Mohamed ElBaradei, director general of the International Atomic Energy Agency (IAEA), told the International Ministerial Conference on Nuclear Energy in Beijing. Reviewing the

current status of the world's nuclear energy industry, he said that "2008 was a somewhat paradoxical year for nuclear power. It was the first year since 1955 in which not a single new power reactor came on line, but it also saw construction start on no fewer than ten new reactors. This was the highest number since 1985, the year before the Chernobyl accident."

While noting the improved performance of the nuclear energy industry since the 1980s, ElBaradei noted that "we



## Nuclear New Briefs: International Nuclear Power Initiatives (Cont. from p.1)

still have vulnerabilities in safety, as well as in security." He said, "In some countries we see a troubling combination of old reactors, operators which are poorly managed or under-funded and weak regulators. This needs to be addressed. It is in all our interests to ensure that the highest safety standards are upheld everywhere." ElBaradei suggested that "new ideas and innovative thinking to address challenges to nuclear safety and security should be encouraged."

**Toshiba Names New President in Bid to Reverse Fortunes** (18 March 2009). Toshiba's reshuffle is the latest within Japan's struggling manufacturing industry, which is going through an unusual number of top management changes. It comes two days after Hitachi Co. announced its president will step down at the end of March as it heads for the biggest-ever loss by a Japanese manufacturer. Sony Corp. also replaced its president, handing CEO Howard Stringer additional responsibilities. Toyota Motor Corp, and Honda Motor Co. also announced top management changes this year. At a press conference on Wednesday,

Mr. Nishida said his stepping down as CEO had nothing to do with the company's current problems and that he had only intended to stay in the role for four years. His predecessor, Mr. Okamura, held the top job for five years. Mr. Sasaki, who led the company's acquisition of Westinghouse and whose motto is "perseverance will open the way," said his first priority will be to implement Toshiba's restructuring plan announced in January and return the company to profit in the coming fiscal year. The Westinghouse deal was considered a risky move in short-term, because it diverted financial resources away from the semiconductor business, an industry notorious for its heavy capital requirements, but Mr. Nishida saw the deal as an important part of a long-term plan.

**NRC: 83% of Power Plants Show Strong Performance** (19 March 2009). The Nuclear Regulatory Commission has issued annual assessment letters to the nation's 104 operating commercial nuclear power plants. All the plants continue to operate safely. "The 2008 year-end results show that about 83 percent of the plants are perform-

### *FUTURE ROLE OF NUCLEAR POWER IN THE GLOBAL AND U.S. MARKETS—(CONT. FROM P.1)*

Despite the significant number of new reactor applications and associated licensing activities, only one nuclear unit is currently under construction in the U.S., and that is Tennessee Valley Authority's Watts Bar Unit 2, which is a previously deferred unit now being completed. Both Watts Bar units received their construction permits in 1973. After a number of delays, Unit 1 went into operation in 1996, but the construction of Unit 2 had remained suspended since 1985. In late 2007, TVA decided to complete Unit 2 and construction resumed in 2008. Nuclear plant construction has, however, continued elsewhere. Over 40 more nuclear units are currently under construction in a dozen or more countries around the globe.

The decades-long absence of new nuclear plant construction in the U.S., however, led to significant attrition within the domestic infrastructure that built the previous generation of nuclear plants. Many of the companies active in the field decades ago have closed down, reorganized, or otherwise exited from the industry, while many of those that remained survived, in part, by down-sizing to a fraction of their former size and capabilities. One of the clearer examples of this involves nuclear plant reactor vessels. Of the current and previously operating U.S. plants, approximately 90% of the reactor vessels were manufactured in the United States. Following the Davis-Besse corrosion event, many U.S. utilities recently elected to replace the heads of those same reactor vessels. None of those replacement heads have been manufactured in the United States. The replacement vessel heads came from various international manufacturers; in other words, they came from elsewhere in the global economy that now supports the nuclear supply chain.

The declines in U.S. domestic capability were not limited to heavy forgings, however. According to data compiled by the American Society of Mechanical Engineers, the number of ASME Nuclear Certificates held by companies fell worldwide from nearly 600 in 1980, to under 200 in 2007. That decline was due almost entirely to the loss of American-held certificates, as the number of certificates held in other nations remained fairly steady at around 100.



## Nuclear New Briefs: International Nuclear Power Initiatives

(Cont. from page 2)

ing strongly enough that we're satisfied with our basic level of inspections at those sites." At the close of last year, only one reactor, Unit 3 at Palo Verde (Ariz.), required the NRC's highest level of attention. Three reactor units, Cooper (Neb.) and Units 1 and 2 at Palo Verde (Ariz.), required significant NRC attention. And another 14 reactor units, Units 1 and 2 at Byron (Ill.), Unit 1 at Comanche Peak (Texas), Unit 1 at Farley (Ala.), Unit 1 at Grand Gulf (Miss.), Unit 2 at Hatch (Ga.), Kewaunee (Wis.), Units 1 and 2 at McGuire (N.C.), Unit 2 at Nine Mile Point (N.Y.), Unit 1 at Oconee (S.C.), Palisades (Mich.), Unit 1 at Prairie Island (Minn.), and Unit 2 at San Onofre (Calif.), required additional attention beyond the basic level.

**France's nuke power poster child has a money melt-down** (19 March 2009). Areva, France's nationally-owned corporate atomic company, has plunged into a deep financial crisis led by a devastating shortage of cash. Electricite de France, the French national utility, has been raided by European Union officials charging that its price-fixing may be undermining competition throughout the continent.

**GE signs nuclear reactor agreement with India** (19 March 2009). A unit of General Electric Co. said Monday it signed preliminary agreements with two government-owned companies in India to build nuclear reactors to help meet India's energy production goals. The potential value of the deals was not disclosed.

GE Hitachi Nuclear Energy said it signed memoranda of understanding with Mumbai-based Nuclear Power Corp. of India, the country's lone nuclear utility operating 17 reactors, and Bharat Heavy Electricals Ltd., a New Delhi-based manufacturer and supplier of power generation equipment and components.

GE Hitachi and the two companies will plan for "a potential multiple-unit Advanced Boiling Water Reactor nuclear power station," the U.S. company said in a news release.

**Toshiba to Establish Nuclear Engineering Center in Charlotte, North Carolina** (28 April 2009). Toshiba Corporation announced that Toshiba America Nuclear Energy Corporation, a U.S.-based Toshiba Group company, will establish an engineering center in Charlotte, North

Carolina. The center will open this August, and will provide solid foundations for Toshiba Group's expansion of its nuclear power businesses and support for utility customers in the U.S. market. Major utilities in the United States have announced plans to build over 30 new nuclear power plants in coming years. Toshiba and Westinghouse, a Toshiba Group company, are responding by promoting marketing activities to win orders for both advanced boiling water reactors (ABWR) and leading-edge pressurized water reactors in the form of the Westinghouse AP1000(TM) nuclear power plant and their related systems. Toshiba and Westinghouse have been awarded EPC contracts for a combined total of eight units of nuclear power plants in the United States alone.

**Nuclear restart** ( 08 May 2009).

After almost 22 months of checks and repairs, nuclear operations are about to restart at the earthquake-hit Kashiwazaki Kariwa site in Japan. The nuclear power plant's seventh reactor is to start up again from 2pm on 9 May for a functional test of the entire power unit after approval from the mayors of Kawshiwazaki town, and Kariwa town as well as the governor of Niigata prefecture. The plant was hit very hard by the 6.8 magnitude Niigata Chuetsu offshore earthquake of 16 July 2007. The earthquake exceeded the plant's design basis - the levels of ground acceleration it should essentially withstand and restart operation quickly after - but did not approach its safe shutdown basis, up to which environmental protection must be maintained in the most extreme circumstances. At the time the earthquake struck three of the reactors were already shut down for maintenance, while the three in operation shutdown automatically as did one that was in the process of starting up. All of them remained in a safe state throughout the 6.8 magnitude earthquake, but there was widespread minor damage which necessitated absolutely exhaustive checks and many repairs. Some mildly radioactive cooling water was shaken from pools, many barrels of low-level waste were knocked over and an external transformer failed and caught fire. The site grounds also suffered, with widespread soil liquefaction and structural damage to office buildings.

## FUTURE ROLE OF NUCLEAR POWER IN THE GLOBAL AND U.S. MARKETS—(CONT. FROM P. 2)

On the future role of nuclear in the global economy, I noted that there were over 40 nuclear units currently under construction in other nations. As for the future role of nuclear in this country, the Department of Energy's Energy Information Administration estimates that electricity demand in the United States will increase by 50 percent in the next 30 years. Although these estimates predate the recent economic downturn, under these projections, if nuclear power were to maintain its current share of the electricity supply in this country, the industry would need a fleet of about 150 nuclear power plants, with an average output of 1,000 megawatts each. To reach that level, it would be necessary to build and bring on line nearly 50 more large, commercial power reactors to add to the 104 that are currently operating. And although I noted the EIA demand forecasts did not take into account the current economic slump, they also do not reflect possible carbon control legislation, which would, if enacted, certainly impact supply side planning and decisions by U.S. utilities. Upon satisfactory completion of construction, the NRC issues an operating license good for 40 years. The Oyster Creek Generating Station, a nuclear plant located in Ocean County, New Jersey, began its 41st year of operation after having its operating license renewed for an additional 20 years. Looked at another way, the nuclear generating capacity represented by Oyster Creek would have ceased, if the plant operator had not been able to satisfy and demonstrate compliance with the NRC's rigorous license renewal standards.

**"OUR STANDARDS MUST CONSISTENTLY DEMAND RIGOROUS ANALYSES, CONSERVATIVE DESIGNS, CAREFUL MAINTENANCE, THOROUGH TESTING, ROBUST CONSTRUCTION, AND SAFE OPERATION. WITHOUT A DEDICATION TO THESE STANDARDS, ANY FUTURE ROLE OF NUCLEAR POWER IN THE GLOBAL AND U.S. MARKETS WILL BE AT RISK.."**

This license renewal process represents the fruition of nearly three decades of work by the regulator, the regulated, and the public. Development began in 1982 when the NRC formally initiated a comprehensive nuclear plant aging research program to determine the feasibility of extending operating licenses, and the information that would be required to support it. Several public rulemakings followed over the next 14 years resulting in the highly structured process currently in use. Three more nuclear units will begin their 41st year of operation in 2009 (Nine Mile Point Unit 1 in August, Ginna in September, and Dresden Unit 2 in December). Next year, two additional plants will join them (H. B. Robinson Unit 2 and Point Beach Unit 1). In all, 52 nuclear units have been approved for license renewal and 20 more are currently under review by the NRC. Many others have announced their intention to seek license renewal, and already there is some discussion of whether a second round of license renewals might be pursued by plant operators, and what research might need to be done to support it. Nonetheless, license renewal is not being relied upon by industry as the sole means of serving future electricity demand. Consequently, the "Nuclear Renaissance" will still require new people and new infrastructure to replace both human and physical capital.

There are some signs that both are being regained. To begin with, the nuclear engineering programs at U.S. universities are graduating many more engineers and scientists than their low graduation rates of the late 1980s and early 1990s. Several utility companies and architect engineering firms have begun supporting or even partnering with educational institutions, including local technical colleges, to help assure a steady source of trained personnel. The current count of such institutions, according to industry representatives testifying before the Commission, is 42 technical colleges, as well as another 19 state-based workforce development efforts.

The number of ASME certificates has also risen, from the less than 200 figure I mentioned earlier to about 225 today. In the area of physical infrastructure development, industry officials have also announced investments. For example, Northrop Grumman and AREVA announced that they would partner to build a

300,000 square foot manufacturing and engineering facility in Newport News, Virginia, to support what the owners hope will become a significant demand for AREVA's new reactor design – the EPR. If they stay on schedule, they would be breaking ground this year. An even larger facility has been announced by another joint partnership – Westinghouse and the Shaw Power Group – to be built in Louisiana to support the new Westinghouse reactor design – the AP-1000.

At the NRC, we have established the Office of New Reactors and have been staffing up – which means our offices are getting a little cramped and we have had to locate some temporary office space – but we are meeting our goals. The NRC used to hire 30-50 new people per year. Recently, we have been hiring a net of 200 people per year over a three-year period. With the median age in the nuclear industry close to 50, retirement attrition makes sustaining any increase in staffing especially challenging. The personnel challenges may be even tougher for federal agencies. The Office of Personnel Management projects that, over the next five years, more than half a million federal employees – one-third of the entire workforce – are eligible to retire from government service.

The resurgence in interest in new nuclear power plants has only been made possible by the sustained safe and reliable performance of the current fleet of operating reactors. We must never lose sight of that fact. The NRC considers the oversight of the 104 currently licensed, operating reactors to be – by far – our essential mission. The great majority of our resources – inspections, reviews, and

***FUTURE ROLE OF NUCLEAR POWER IN THE GLOBAL AND U.S. MARKETS—(CONT. FROM P.4)***

oversight – remain focused on those facilities. We maintain resident inspector staffs at each operating reactor site, and vigorously monitor licensee performance. Just as a chain is only as strong as its weakest link, so, too, is the reputation and credibility of the nuclear industry dependent upon the continued safe operation of every one of its plants. The nuclear industry is now, and may always remain, just one accident away from retrenchment. We all – regulator and regulated alike – must remain vigilant and focused on safety. Our standards must consistently demand rigorous analyses, conservative designs, careful maintenance, thorough testing, robust construction, and safe operation. Without a dedication to these standards, any Future Role of Nuclear Power in the Global and U.S. Markets will be at risk.

***PALO VERDE MOVED FROM COLUMN IV TO I***

The US NRC performed extensive inspections at Palo Verde Nuclear Generating Station (PVNGS) to independently evaluate progress in improving the station's safety performance. On March 2, 2007, PVNGS Unit 3 entered the Multiple/Repetitive Degraded Cornerstone Column (Column IV) of the Action Matrix (NRC Manual Chapter 0305). On February 1, 2008, the NRC completed an extensive inspection (Inspection Procedure 95003) that revealed performance areas that required improvement. On February 15, 2008, the NRC issued a Confirmatory Action Letter (CAL) to PVNGS (ML080460653). The purpose of the CAL was to formally confirm commitments made by PVNGS regarding completion of actions to improve performance. The actions included: (1) root and contributing causes identified in PVNGS evaluations in response to the Yellow finding associated with the voided containment sump suction piping for all three units; (2) root and contributing causes identified in APS evaluations in response to the White finding associated with the Unit 3 Train A emergency diesel generator electrical relay failures; (3) problem identification and resolution performance issues; (4) human performance issues; (5) problems with implementation of engineering programs; (6) the potential for previous decisions to affect the quality of current evaluations associated with significant equipment problems; (7) the issues identified Arizona Public Service Company - during the PVNGS 2007 independent safety culture assessment; (8) problems associated with standards and expectations for performance and holding individuals accountable for nuclear safety; (9) definition and implementation of a change management process; (10) problems with the emergency preparedness program; (11) potential for latent and longstanding issues associated with equipment deficiencies; and (12) problems with backlog tracking systems and prioritization. In a letter dated February 5, 2009, APS informed the NRC that PVNGS had completed or demonstrated sufficient progress for all actions associated with the CAL. APS informed the NRC that performance in the areas addressed by the CAL have improved and APS performed systematic reviews to ensure the performance achieved is sustainable and the basis has been established for continued improvement after the CAL is closed.

Since the issuance of the CAL, the NRC has implemented significant additional inspection activities to independently confirm that the facility continues to be safely operated and that PVNGS actions to address the longstanding performance issues at PVNGS were effective. This additional effort included 5 team inspections to verify completion of specific actions and the effectiveness of these actions in addressing the performance issues. The results of these inspections were documented in the 2008 quarterly integrated inspection reports and in the Problem Identification and Resolution inspection report issued on March 20, 2009. Based on the results of these inspections, NRC has concluded that PVNGS has effectively addressed the causes that led to the safety performance decline and have notably improved safety performance. Also, APS has established programs and procedures which, if effectively implemented, provide a reasonable assurance that the performance improvements are sustainable. The commitments described in the CAL have been completed and these actions have been effective in addressing the specific performance issues. Therefore, CAL 4-07-004, dated February 15, 2008, is closed.

Additionally, the NRC is closing the substantive cross-cutting themes in both the human performance and problem identification and resolution areas that were discussed in the 2008 PVNGS Annual Assessment Letter. Throughout the assessment period the NRC observed improved performance as reflected by a significant reduction in the number of inspection findings in these areas. NRC has concluded that the corrective actions have been effective.

The NWI PVNGS team of Steve Pettinger, Bill McNeill, Karen Pettinger, Bill Lindsey, Roger Armitage, and Frank Tsakeres performed the Collective Evaluation for the 95-003 Inspection in 2007. Recently, NWI received feedback about their performance from the PVNGS Recovery ImPACT Manager who stated...“Not sure if you heard, Palo Verde just moved from column 4 to column 1. We could not have done it without you and your team. Congrats! You helped us get on track and identify the right issues.”.—Thanks to the entire NWI PVNGS team!

## NWI Refocuses from Robinson to SONGS



Terry Johnson, Terry Williams, Ernie Harkness, Dave Hoffman, Jackie Gawron, Larry Sanders Bill McNeill, Bill Lindsey, Marv Engen, Roger Armitage, Tim Bostwick, Rob Brixey, and Frank Tsakeres are assisting SONGS in operations training improvement initiatives. Starting in March, 2009, this team of experts have supported focused area self assessments, root causes, program procedural upgrades and mentoring line and training personnel as well as interface activities with INPO. Bill Lindsey has transitioned from supporting successful improvements at Robinson Plant

to now assisting the lead training performance improvement manager, Oscar Flores of SONGS. Shown to the right is SONGS Ops Manager Bruce MacKissock, Dave Hoffman and Frank Tsakeres at Sunday hot rod car show at Donut Dere-licts, Huntington Beach, CA.

# NWI News Board

- Bill Cheever, Bill McNeill, Mike Gallaway, Bill Stairs, and Frank Tsakeres assisted Monticello in assessing and implementing outage improvements during their recent EPU outage. Terry Johnson supported EPU training and Roger Armitage continues to support Operations training improvements.
- Ernie Harkness has been renewed for the second time to Entergy’s Nuclear Safety Review Board.
- Rob Brixey assisted Fermi on its successful NRC written license exam (100% pass on the exam, Sat submittal with no comments), Crystal River on its recent Operations Training assessment, and is the PM on Exelon’s New Rx projects.
- Terry Johnson, Terry Williams, Jackie Gawron, Ernie Harkness, Larry Sanders Bill McNeill, Bill Lindsey, Marv Engen, Roger Armitage, Rob Brixey, and Frank Tsakeres are assisting SONGS in operations training improvement initiatives.
- Dave Hoffman is assisting SONGS Operations in operations performance improvement and work execution.
- Tim Bostwick continues to help SONGS in numerous performance improvement areas.
- Mike Gettle and Ray Waldo are supporting Ontario’s Bruce Power by providing training support and oversight.
- Steve Pettinger continues to support AEP’s DC Cook training in simulator operations.
- Dan Slater and Dave Treadway are assisting APS’s Palo Verde in procedure development upgrades.
- Bill Lindsey completed his work at Robinson accomplishing their operations training program improvements.



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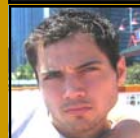
- AEP’s D.C. Cook Nuclear Power Plant
- APS’s Palo Verde Nuclear Station
- Bruce Power –Ontario, Canada
- Progress Energy’s Robinson and Crystal River Plants
- SCE’s San Onofre Nuclear Generating Station
- DTE’S Fermi Station
- Exelon’s New Reactor Development Group
- Xcel Energy’s Monticello Plant



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