



Worldwide Commercial Nuclear Industry Updates

Industrial Accident at Arkansas Nuclear One



A significant industrial accident occurred at Arkansas Nuclear Energy officials confirmed that one person was killed, and three others injured in an accident at Arkansas Nuclear One in Russellville, and that no nuclear material was released during the incident. The event occurred at approximately 7:45 a.m., March 31, 2013. The injured employees were transported to a nearby hospital. The accident occurred when a generator stator weighing approximately 525 tons fell as it was being moved from turbine building. Unit 1 was in a refueling outage and Unit 2, which was operating at full power at the time, automatically shut down due to an electrical fault caused by the accident. Energy officials stated that both units are in a "stable shutdown condition" and there is no danger to the public. The plant was in an unusual event classification, the lowest of four emergency classifications designated by the Nuclear Regulatory Commission. The area surrounding ANO was placed at emergency Level 4 because of the potential for local impact, but no call to evacuate was issued by the Arkansas Department of Health. Additional staff were brought to the site to manage the situation. The site terminated the Unusual Event at 18:21 CST that same day. Unit 1 remained in a flooded up condition with primary system temperature at 80 degrees F. Unit 2 was placed in Mode 4. Shutdown cool-

ing (SDC) was placed in service at 0420 CST and both trains of SDC were placed in service. Primary coolant temperature on Unit 2 was at 256 degrees. The Unit 1 containment hatch was off at the time of the event, but was restored shortly after the event occurred. Initially, Unit 1 vital buses were powered from emergency diesel generators (EDGs). For Unit 2, one vital bus remained on its respective EDG, while the other vital bus was supplied from offsite power. The second Unit 2 vital bus was energized by offsite power on April 1, 2013. Personnel ran cable for a Unit 1 connection to offsite power completing the cable runs, terminations, and testing. The site had diesel fuel oil and had more deliveries scheduled to support longer-term operations. According to the corporate response center contact, the engineering resources to support the forensics were mobilized. Some evacuation signs were posted throughout the community showing emergency evacuation routes. Recovery actions have been initiated including removal of the dropped stator and repair of electrical systems and structural supports.

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Crack Forces Shutdown of Nuclear Reactor at Shearon Harris

May 17, 2013 - A quarter-inch crack in a reactor sensor at the Shearon Harris nuclear plant in southwest Wake County has forced Duke Energy to take the plant offline, officials said. No radioactive material leaked from the plant, and the public health and safety is not in danger, spokeswoman Kim Crawford said. "There are no indications that there was any leakage," Crawford said. "We made the conservative decision to

take the unit offline and make the repair." Crawford said she couldn't say how long the reactor would be out of commission, but she said the utility has plenty of capacity and wouldn't need to purchase electricity from outside sources to meet demand. "We're not anticipating any issues," she said. "While our plant is offline, we'll continue to serve our customers."

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Market Distortions Dragging Down Nuclear Plants

May 14, 2013 - Competitive electricity markets like PJM Interconnection LLC and the Midcontinent Independent System Operator Inc. are being distorted by subsidies, blocking investments in nuclear power, be they new nuclear plants or boosts in capacity at existing plants, the head of Exelon Corp. Chris Crane, said at the Nuclear Energy Institute's conference in Washington, D.C., on May 14. The experience of Exelon's Clinton plant in De Witt County, Ill., illustrates how low and even negative power prices have assailed merchant nuclear plants. Market analysts such as UBS Securities LLC have predicted the plant may have to close for economic reasons. Exelon CEO Christopher Crane's remarks at the conference hinted at that possibility. "How long can you run a plant that is just bleeding money?" Crane said of Clinton, a single-unit, 1,078-MW plant that began commercial operation in 1987.

Clinton and the rest of the company's fleet face negative power prices about 14% of the time, Exelon said. Meanwhile, Dominion Resources Inc. earlier this month shut its Kewaunee nuclear plant in Wisconsin because of low power prices and expiring power purchase agreements. Crane blamed "manipulation of the markets by subsidized generation," particularly wind power, as the main reason for nuclear plants' troubles. Illinois' renewable portfolio standard, which requires a certain amount of power to come from sources such as wind turbines, is artificially supplying too much renewable generation because the standard was based on a prediction that electricity load would grow by 40%, according to Crane. "The load today is less than when the standard was set," he said. As a result, even though the plant is running "perfectly" from an operations standpoint, Clinton is in the red. The company is moving to refuel the plant every 12 months instead of every 24 months to run it less often. Since the plant was refueled last fall, the new schedule will not begin until the next refueling outage in 2015, according to Exelon spokesman Craig Nesbit. Exelon also has had to "pull back" on \$2.5 billion in investments, the CEO said. That number includes projects to increase capacity at nuclear plants and new renewable projects that the company is planning but has had to temporarily suspend for economic reasons, Nesbit said.

The company plans to uprate its nuclear fleet by 1,100 MW by 2021, but two of those projects, a 270-MW uprate at the Limerick plant in Pennsylvania and a 300-MW one at the LaSalle plant in Illinois, have been deferred until an unspecified date, according to Nesbit. The projects cost an estimated \$1.02 billion.

Again, Crane said that subsidies for other sources of generation were making the nuclear expansions uneconomic. "It's not that the renewables are cheaper than any other generating source in the stack ... it's just that they are getting their revenue stream from different places instead of the competitive market itself," he said. But Crane, joined by the heads of Southern Co. and FirstEnergy Corp. in a panel at a conference, also expressed misgivings about the very structure of the competitive markets. Their comments supported the lesson seen several years ago when Constellation Energy Group Inc., since acquired by Exelon, reversed course on building new nuclear generation in a deregulated market by withdrawing from the project to construct a new unit at its Calvert Cliffs plant in Maryland. Meanwhile, regulated utilities such as Southern Co. are moving ahead with new plants in Georgia and South Carolina. "You need to have a great deal of certainty over time. That's really not achievable in a merchant market," Southern CEO Thomas Fanning said. In a regulated market, "we can look at an optimal solution over a series of decades for the benefit of our customers that balances nuclear, coal, gas, renewables and energy efficiency and we can deploy those investments in a rational way." Crane agreed that the lack of a structure for long-term contracts for new power plants in PJM and MISO makes new construction difficult. "In near-term, it is not positive

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Building Steam in Chinese Nuclear



At Fangjiashan 2 a steam generator is raised to verti-

May 14, 2013 - Steam generators have been installed at new nuclear power reactors in Ningde and Fangjiashan in Fujian and Zhejiang provinces respectively.

Four CPR-1000 pressurized water reactors are planned for Ningde. The first began operation last month, while on 3 May the third unit finished installing its 345 tonne steam generators on schedule for startup at the end of this year. By 2015 all four reactors should be in operation at Ningde, with authorities considering adding two more advanced ACPR-1000 units.

A similar operation to install steam generators was completed at Fangjiashan 2 on 7 May. That site, which is adjacent to the Qinshan and Qinshan Phase II nuclear power plants, is only currently slated for two CPR-1000s. These are expected to start operation in December this year and October next year. Steam generators are major components in a pressurized water reactor system which transfer heat from the primary reactor coolant circuit to a secondary circuit, turning water into steam to drive a turbine and generator.

Across China some 28 nuclear power reactors are under construction. National plans will see China's fleet surpass that of France in terms of generating capacity by around 2020 and reach double the size of the current American fleet by 2030. *Researched and written by World Nuclear News.*

Europe's Still Going Nuclear: Per Platts Survey

May 16, 2013 - Europe is likely to be home to more nuclear power plants in the future, even though high costs and public criticism will remain significant roadblocks for the industry, according to a Platts survey. Political risk, long construction periods, regulatory uncertainty, and safety concerns were also highlighted as hurdles. One thing the industry isn't lacking: confidence. Eighty percent of those polled said nuclear power would succeed in gaining a larger share of the continent power generation mix. Energy news and price-reporting provider Platts said it polled more than 100 builders, consultants, regulators and others in the nuclear power industry in Europe. Some of the challenges are as old as the industry and will likely remain so, but will be highlighted as new units come along, Platts said. There is also concern about about climate change, energy diversity, and safety and its costs in the wake of the 2011 Fukushima nuclear accident in Japan, it said. Europe had 185 nuclear power plants as of January, the European Nuclear Society said on its [website](#). Seventeen units are under construction — one each in Finland and France, two each in Ukraine and Slovakia, and 11 in Russia.



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Germany's Clean Energy Plans Founded on Dirty Coal

May 10, 2013 - Germany's planned transition to green energy has taken a knock with the announcement in late April that coal-fired plants produced 6% more power in 2012. Most of the coal burned in German power stations is lignite, or brown coal, a dirty and heavily polluting fuel source. Industry association Debriv also said the country mined 5.1% more brown coal in 2012 than in the previous year. Brown coal has a CO₂ intensity of 1,153 grams per kWh versus 428 grams for natural gas, according to figures from the OekoInstitut, Germany's institute of applied ecology. Germany's green energy policies subsidise renewable wind and solar energy, and following the Fukushima disaster last year, the government said it would close all its nuclear power plants by 2022. While brown coal mining grows, Germany also plans to phase out the use of the less polluting black coal by 2018, which provides around 20% of the country's power using mostly imported supplies. Brown coal-fired plants produced 159 billion kilowatt hours (kWh) accounting for 25.7% of Germany's power production, industry figures showed.

Johannes Teyssen, Chief Executive of German utility E.ON, said in April: "Gas-fired capacity is being crowded out by wind and solar and, paradoxically, by coal-fired capacity." E.ON uses lignite for 6% of its output, against 31% for the German arm of Swedish utility Vattenfall and 36% for RWE, according to a recent Reuters report. RWE's Neurath and Niederaussem lignite power stations are the second and third largest CO₂-emitting installations in the European Union. New German coal plants with about 5,300 megawatts of capacity will start generating power in 2013, the IWR renewable energy institute says. Power generators currently can earn more than 20 euros per MWh for benchmark 2014 power derived from brown coal while gas makes a loss of almost 14 euros per MWh. While Germany's carbon output held steady in 2012 helped by improved energy efficiency, its broader emissions (of gases monitored under the Kyoto Protocol) rose 1.6% partly due to pollution from brown coal. According to Forbes, these coal plants will emit over one million times more carbon this year than all of the nuclear plants would have over the next 20 years, and cost over twice as much to run as any one of the them. Germany's present strategy seems unlikely to allow the country to reduce carbon emissions anywhere near the goal of 40% by 2020, while proving ruinously expensive.

Time for a rethink on the nuclear plant closures, perhaps?

CONTE 2013—NWI Supports ANS Topical Meeting



The 2013, Conference on Nuclear Training and Education (CONTE), An International Forum for the Discussion of Issues Facing Nuclear Energy Training and Education, was held in Jacksonville, FL on February 3-6, 2013. NWI and others supported this biannual topical meeting sponsored by the American Nuclear Society (ANS). Focus on the Impact of Fukushima on US accredited training programs as well as Nuclear Security and Personnel Training and Qualifications in light of the aging workforce were discussed via open forum and tech sessions. See www.ans.org for further details.

Market Distortions Dragging Down Nuclear Plants

(CONT FROM Pg. 2)

for significant investments in technology," he said. But efforts to build less capital-intensive nuclear reactors could change the math for new nuclear. The U.S. Department of Energy is funding the development of prospective new reactors called small modular reactors, or SMRs. "We see the shorter capital cycle and the potential advantage of an SMR being the only thing that can come in and save the day," Crane said. But the technology is a "decade or so away," he noted. An example of an SMR is the proposed 180-MW Generation mPower reactor that Babcock & Wilcox Co. hopes to install at Tennessee Valley Authority's Clinch River plant after moving the proposed design through the Nuclear Regulatory Commission.



Crack Forces Shutdown of Nuclear Reactor at Shearon Harris

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Shearon Harris provides power to about 550,000 customers, and industry sources said not operating the reactor could cost Duke \$1 million a day. According to information Duke filed with the Nuclear Regulatory Commission, ultrasonic tests of the reactor were taken a year ago when Shearon Harris was taken offline for refueling. A secondary review of those tests this week revealed the "primary water stress corrosion cracking" on a temperature sensor near where control rods attach to the reactor head.

"Initial evaluation indicates that the flaw is not through wall, and there is no evidence of leakage based on inspections performed on the top of the reactor vessel head during the spring

2012 refueling outage," the NRC event report states.

Without repairs, a small crack could widen and allow water that keeps the reactor cool to escape, putting the plant at risk of a possible release of radiation.

The NRC plans to send inspectors to Shearon Harris to review the situation with Duke officials.

Such cracking is common for aging nuclear plants, according to the NRC, but agency officials and others question why Duke and Progress Energy, which operated Shearon Harris before being acquired by Duke last July, waited a year before addressing the issue.



Sale Idea Cost TVA \$500 Million

May. 15, 2013 - Sen. Lamar Alexander says President Barack Obama's plan to consider selling the Tennessee Valley Authority has already cost hundreds of millions of dollars — even if the nation's largest public utility is never sold. The Tennessee Republican said TVA bonds lost about \$500 million in value after the president's announcement last month, largely because of uncertainty over whether the utility would be sold. Alexander said customers in the seven states served by the TVA will likely pay more for electricity as a result. Alexander said at a Senate hearing Wednesday that the Obama administration should have discussed the sale idea privately with TVA officials instead of raising it publicly, adding that most people in the region oppose selling the TVA.

U.S. officials say no decisions have been made. WASHINGTON (AP).



Safety Upgrades Could Cost \$40 Million per Nuclear Unit

Dominion expects to spend \$30 million to \$40 million per unit on safety enhancements and hazard evaluations of its nuclear fleet in response to the Fukushima I accident in Japan, a company official told members of the US Nuclear Regulatory Commission during a briefing Tuesday. After an earthquake and tsunami caused meltdowns at three of the six Fukushima I reactors in March 2011, the US nuclear power industry developed a plan it calls FLEX, purchasing additional equipment such as pumps and generators to increase assurance that electrical supply and fuel cooling can be maintained during a severe accident. In March 2012, NRC issued orders requiring nuclear plants to document and upgrade their ability to withstand extreme external events, such as earthquakes and floods, and to operate safety and cooling systems after the loss of electric power, known as station blackout.

About 65% of Dominion's post-Fukushima expenditures will go toward implementation of FLEX and the addition of instrumentation to spent fuel pools at each of its four nuclear power plants, David Heacock, president and chief nuclear officer of Dominion Nuclear, told commissioners during the briefing at agency headquarters in Rockville, Maryland. Dominion operates seven power reactors. The North Anna and Surry plants in Virginia and the Millstone plant in Connecticut each have two reactors. The company's single-unit Kewaunee plant in Wisconsin will shut permanently next month, a decision Dominion has said was due to low natural gas prices and sagging power prices in regional markets. It offered Kewaunee for sale in 2011 but was unable to find a buyer.

The remaining 35% of Dominion's post-Fukushima costs are related to the re-evaluation of seismic and flooding hazards required by NRC, Heacock told commissioners. Heacock did not compare Dominion's planned expenditures to those of other US nuclear utilities. The Nuclear Energy Institute did not respond immediately to an inquiry about estimated costs of post-Fukushima actions for the industry as a whole. An NEI official said in March that no such cost estimate is yet available. Exelon has said in regulatory filings that it expects to spend a total of about \$350 million on such actions for its 17-unit nuclear fleet, the country's largest.

Heacock said Tuesday that some upgrades which might appear simple are proving to be very costly. Hydraulic connections added to allow the emergency introduction of additional cooling water, for example, cost \$900,000 each, because cutting into a reactor coolant system pipe classified as ASME Category I required safety analyses of the piping systems to be revised for the entire unit, he said. Nine to 10 such connections were required at each site, he said. Eight electrical connections added at each site to provide emergency electricity supply cost \$700,000 per connection, he said. The addition of spent fuel pool instrumentation, to monitor water levels and other data, will cost \$3 million per pool.

"Walkdowns" to assess plant-specific vulnerabilities to seismic events and flooding, conducted in 2011 response to an NRC bulletin issued after the Fukushima I accident, cost \$2 million per site, Heacock said. Ongoing re-evaluations of seismic vulnerabilities in response to an NRC information request in March 2012 will cost an additional \$5 million per site at North Anna and Surry, \$10 million at Millstone, he said. A "protected 10,000 square foot building" will be built at each plant to house FLEX and other emergency response equipment at an estimated cost of \$10 million per site, Heacock said.

NRC Commissioner William Magwood said on the sidelines after the meeting that Dominion's cost estimates were "new" and "informative" for him. NRC and industry officials told commissioners during the briefing that the country's 103 nuclear power reactors are on track to implement post-Fukushima upgrades required by NRC orders by the end of 2016.

UAE's Nuclear Energy Program

May 15, 2013. - The UAE's \$20 billion (Dh73.5 billion) civilian nuclear program is on schedule with the country's first nuclear reactor slated to start operations in 2017. As matters stand, construction of the UAE's first nuclear energy reactor continues to progress, with the installation of the Containment Liner Plate (CLP) in the reactor containment building for Barakah Unit 1. The CLP is one of the many defense-in-depth barriers that ensure the safety of nuclear energy plants. The UAE is currently working on plans to have four nuclear power reactors operational in Barakah by 2020, to generate 5.6 GWe of electricity. The first plant has been under construction since July 2012. The Emirates Nuclear Energy Corp (ENEC) has applied to the country's nuclear regulator for a licence to build the oil-exporting country's third and fourth nuclear reactors.

In December 2009, the UAE awarded a group led by Korea Electric Power Corp (KEPCo) a contract to build four 1,400 megawatt nuclear reactors to meet surging demand for electricity. The UAE's Federal Authority of Nuclear Regulation (FANR) granted ENEC a license for the construction of the first two reactors last July. The nuclear energy generated at the plants would help meet significant portion of the UAE's energy needs, saving up to 12 million tonnes in carbon emissions every year. The Director-General of the International Atomic Energy Agency (IAEA), Yukiya Amano, recently reviewed the UAE's nuclear power program during a visit to the country. Noting the progress achieved in the construction of the Barakah nuclear facility, Amano stressed the importance of the UAE project, as the first country in 27 years to start construction of its first nuclear power plant. He stated at the time that the IAEA has supported the UAE program since it was launched in 2008, and that the agency would continue to work closely in cooperation with the UAE. He said the UAE's safe and consistent progress in the introduction of nuclear power can serve as a model for other countries considering a nuclear power program. *2013 Gulf News.*



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- Assisting Monticello in preparation for their upcoming EPU outage in the design engineering and project management areas.
- Supporting Oversight & Chemistry activities at Grand Gulf.
- Providing CAP/recovery / Engineering support at PPL's Susquehanna Steam Electric Station.
- Supporting Entergy's Nuclear Safety Review Board.
- Offering CAP expertise and insights to OPPD Ft. Calhoun and TVA Browns Ferry nuclear plants.
- Conducting NPPD Cooper Independent Nuclear Safety Culture Assessment support.
- Providing project closure support for causal analysis and CAP recovery activities for Ft. Calhoun Station.
- Supporting upgrade activities for River Bend Maintenance & Technical Training improvement efforts.
- Providing project management support at Xcel Energy's Prairie Island Nuclear Power Plant.

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- TVA's Browns Ferry Nuclear Plant
- Xcel Energy's Monticello & Prairie Island Plants



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