Expansion of China’s front-end facilities looming, analyst says

The expansion of China’s nuclear fleet into the next decade — more than doubling the current installed capacity — will be accompanied by a substantial expansion of that nation’s conversion, enrichment and fuel fabrication facilities, an analyst said October 5.

The Chinese government is “strongly promoting self-sufficiency” in all three segments, while also working to reduce China’s reliance on imported uranium, Jonathan Hinze, Ux Consulting’s executive vice president, international, told attendees at the Nuclear Energy Institute’s international uranium fuel seminar. This annual meeting was held October 5-7 in Beaver Creek, Colorado.

The effort to expand China’s front-end operational capacity is part of the government’s plan to support the operations of its burgeoning reactor fleet, Hinze said. From 26 units with an installed capacity of 23 GW today, the construction of another 25 or so units is expected to increase China’s nuclear fleet capacity to 53 GW by 2020, he said. Additional units are planned to lift the fleet’s total installed capacity to 96 GW by 2025, he said.

China’s conversion capacity is set to nearly triple by 2018, according to a slide that Hinze cited in his presentation that stated a second conversion plant at Lanzhou is “reportedly under construction” with a 9,000 GW today, the construction of another 25 or so units is expected to increase China's nuclear fleet capacity to 53 GW by 2020, he said. Additional units are planned to lift the fleet's total installed capacity to 96 GW by 2025, he said.

China’s conversion capacity is set to nearly triple by 2018, according to a slide that Hinze cited in his presentation that stated a second conversion plant at Lanzhou is “reportedly under construction” with a 9,000

Waste retrievability a must for German repository, according to official

A German final spent fuel repository should be built in such a way that the fuel can be retrieved, a member of the federal state of Lower Saxony’s parliament said in an interview October 6.

Although Germany is phasing out its nuclear units and plans to replace reactors with renewable energy, spent nuclear fuel “is still a source of potential energy so it might be effective in the future to retrieve it,” Ernst-Ingolf Angermann said. Angermann is a member of the working group on environment and climate protection of the Conservatives’ parliamentary group in Lower Saxony.

He said that being able to retrieve spent fuel is also a safety issue and that building a final repository where the fuel is not retrievable — that is, cannot be removed — would be “cheaper and less complicated.”

The repository issue has been controversial in Germany for years, particularly in Lower Saxony, where the Gorleben mine and salt dome are located and where Germany’s only central interim spent fuel storage facility is located.

Study of the salt dome as a geologic medium began in 1977. But in 2000, the government imposed a moratorium on study and excavation work at Gorleben. The moratorium was lifted in 2010 by German Chancellor Angela Merkel’s government.

In 2013, the federal government and the governments of the 16 federal states, including Lower Saxony, reached an agreement on starting a new site selection process for a final repository. At the same time, they agreed that no more spent fuel

Daily spot price gets ’bounce’ to near $37.50/lb

The spot price of uranium at midday October 9 was slightly below $37.50 a pound, up by more than $1 from the price Platts reported a week ago, but market sources described the increase as more of a “bounce” than indicative of a price trend.

“The spot price declined at end of September and then rose back up … and it seems like the same thing is happening at the end of the month on a regular basis,” one market source said in an October 9 interview.

He said such U3O8 spot price movements are a consequence of “traders arbitraging their contracts,” concluding deals for small volumes of material at a price below what had prevailed in the spot market several days earlier. The maneuver is aimed at getting a better deal, based on the month-end closing price, when buying U3O8 the next month.

“What we’ve seen again is a price bounce upwards,” he said, adding, “Nothing is driving the market upward.”

The daily U3O8 spot price was $37.25/lb nearly every trading day in September through September 24, according to price reporter TradeTech. The spot price declined to $36.75/lb September 28 and fell by 25-cent increments in each of the next two days, to

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PLATTS FORWARD URANIUM INDICATOR

<table>
<thead>
<tr>
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OTHER URANIUM PRICING INDICATORS

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<td>UF6 value ($/kgU as UF6)</td>
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<td>Ux Consulting (2)</td>
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<td></td>
<td>Spot conversion (U.S.) ($/kgU as UF6) (Sep 28)</td>
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1. TradeTech's Nuexco exchange value reflects the company's judgment of the price at which sales of significant quantities of yellowcake could be concluded as of the reporting date.
2. The Ux Consulting's price indicates, subject to the terms listed, the most competitive offer available of which Ux Consulting is aware. Those terms (Oct 5) are: quantity, above 100,000 lb; delivery, within three months.

SECONDARY SWU MARKET PRICE ESTIMATE (US$/SWU)

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<tr>
<th>Source</th>
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<td>Ux Consulting (Sep 28)</td>
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Editor's Note: Table updated from NF Uranium Pricing Supplement of October 2, 2015. The Uranium Pricing Supplement is issued biweekly on Fridays.

$36.25 on September 30, according to TradeTech reports.

The spot price was unchanged October 1 and rose by 35 cents to $36.60/lb October 2, according to TradeTech. It said the price was unchanged on October 5. TradeTech reported the daily spot price at $37/lb October 6-7 and said it was up 10 cents, coming in at $37.10/lb, October 8.

A second market source interviewed October 9 concurred that the U3O8 daily spot price decline at the end of September “was due mainly to arbitrage activities by traders.” The subsequent price increase is due to some sellers testing the market, he said. “They sense a little bit of pickup in activity and so are raising their offer prices by 5 and 10 cents to see what they can get,” he said.

The prevailing trend in the U3O8 daily spot market, the source said, is that “we’re heading toward the end of year when utilities and sellers look to close out their books.”

This market source said he does not foresee the daily spot price rising to $40/lb by year’s end, noting that “utility demand remains fairly weak.” He added, “Some traders have made commitments for deliveries by year end, but still, the [U3O8 spot] price remains about where it is now because there’s little urgency for utilities to buy in the near term.”

The first source, who works for a uranium producer, said that a trading company, with a contract for delivery of U3O8 at the end of October, has solicited bids “for X number of pounds at a price in the upper $30s.” He declined to identify the trading company.

“Based on interest rates, it probably can afford to buy [U3O8] at a price just south of $40 and still make small [profit] margins. Small margins is how they make their profits,” he said.

A third market source interviewed October 9 said he does not foresee any U3O8 daily spot market price upswing looming. “The spot price has been up and down and up, but the trading band has been very narrow and it’s holding there, and I don’t see much change over the next few months,” he said.

The reason for this, he said, is that the “primary buyers, the utilities, have a herd mentality. Few are buying [U3O8] because others aren’t buying much.” He added, “Once a utility has a significant need for material and jumps in to buy, it’s likely other utilities will follow suit and the [U3O8 spot] price will rise. When this is likely to happen no one knows.”

Seven transactions for more than 750,000 lb U3O8 were reported for the week ending October 2, TradeTech said in its weekly report. The same day it reported a weekly U3O8 spot price of $36.60/lb, down by 40 cents from September 25.

Price reporting company Ux Consulting on October 5 reported a weekly U3O8 spot price of $37/lb, up by 50 cents from September 28.

UxC on October 8 reported a Broker Average Price of $37.38/lb, up by 38 cents from the previous day. The bid-offer spread was $37/lb-$37.75/lb, with both the bid and offer up by 37 cents from October 7. The BAP is based on information from Evolution Markets and Numerco Ltd., UxC said.

In Platts' opinion, based on discussions with market sources, spot U3O8 transactions over the next week are likely to be concluded within a range of $36.75/lb-$37.75/lb.
Mid-term U3O8 market benefits utilities but carries risks: executives

The growth of the uranium mid-term market has helped to increase market liquidity, reduce excess supplies and provide relatively low-cost material to utilities, but it also increases the risk for tightened supplies early in the next decade, industry executives said at a fuel conference.

Producer, utility and financial intermediary participants in an October 6 session on the evolution of a mid-term market, which arose around 2007, said that this market is not likely to disappear any time soon. The session was part of the Nuclear Energy Institute's annual international uranium fuel seminar October 5-7 in Beaver Creek, Colorado.

The mid-term market is defined as one where U3O8 is purchased for delivery beyond the 12 months that define spot market transactions and up to two years or so in advance of delivery.

Purchases made for delivery beyond two years are defined as long-term deals.

Until 2007, 20% of the uranium supply contracts were negotiated for delivery within 12 months and 80% for delivery after that time, but now about one-third of all U3O8 sales between US buyers and sellers are concluded on the spot market and two-thirds are for longer duration, James Nevling, an Exelon Generation fuel buyer, said at the session.

Although none of the speakers could estimate how much of the overall uranium transactions are concluded as mid-term deals, they said these now account for a significant portion of the deals done for deliveries beyond 12 months.

The emergence of a mid-term U3O8 market changed the market's price dynamics, several speakers said during the conference and in interviews later that day. Prior to 2007, they said, the spot price of U3O8 virtually always was higher than the long-term price, reflecting a premium put on filling demand for near-term delivery. This market situation is commonly referred to as "backwardation."

Since 2007 or so, prices in the U3O8 market have essentially always been lower for spot transactions than for long-term ones, Dustin Garrow, managing principal of Nuclear Fuel Associates, said at the fuel seminar. Traders commonly refer to this market condition as "contango." Several speakers said the emergence of the mid-term U3O8 market was a key factor in changing the overall market to one where spot prices are lower than long-term ones, increasing challenges to uranium producers.

The mid-term market "really started with the beginning of the financial crisis in about February 2007," Garrow said. The severe economic downturn, which continued through 2009, saw U3O8 "spot prices fall below long-term prices, while very low interest rates gave rise to a carry trade with low- or no-cost financing," enabling a utility or financial intermediary to acquire the material and hold it for several years, Garrow said.

His company provides brokerage, trading, marketing, sales and financing services to the international nuclear fuel industry. Through September, Garrow had been executive general manager, marketing, for Paladin Energy.

Carry trade describes a trading strategy that entails borrowing money at a low interest rate and buying an asset that might provide a higher rate of return when it is sold.

The mid-term market was boosted by the entry late in the last decade of trading divisions of Deutsche Bank and Goldman Sachs, which bought and sold U3O8, Garrow said.

These companies exited uranium trading in late 2013, citing regulatory concerns, but participants at the session noted the mid-term U3O8 business has been picked up by other companies such as Traxys, a US-based commodities trading company; Japanese trading company Itochu and investment banking company Macquarie.

Kevin Smith, Traxys' managing director, uranium trading and market, said U3O8 trading activity by his company and others "brings much more liquidity to the market and helps producers" by arranging low-interest financing of U3O8 sales to utilities.

Several attendees at the session said in comments to the presenters that the mid-term market acts to depress the spot price of U3O8 by encouraging producers — who have seen the daily spot price fall by nearly half from $70/lb since early 2011 — to do deals for delivery beyond one year at prices substantially below the cost of uranium production. Most producers require a sales price of $50/lb-$70/lb to be profitable.

Exelon's Nevling, in response to audience comments, said "we're comfortable" in engaging in mid-term market activities, adding that "the only way for [spot market U3O8] prices to rise is for the large inventory to be used."

Traxys' Smith said traders' activities in the mid-term market "reflect the reality of this market," which he said is one of U3O8 oversupply. "We're not trying to undermine producers, but we are bringing the market into balance after a period of overproduction," he said.

Jonathan Hinze, Ux Consulting's executive vice president, international, said during an October 5 presentation at the NEI conference, that there is as much as 1 billion lb U3O8 in producer, utility, enricher and other entities' stockpiles that is surplus to current utility needs.

Hinze said in comments that it likely will be 2020 or later before the U3O8 inventories come into balance with utilities' demand.

Garrow, in comments made in response to audience questions, said that while the growth of a mid-term U3O8 market has added liquidity, the ongoing conclusion of these deals at relatively low prices makes it challenging for uranium producers to sustain production or increase it.

"The mid-term market, as a result, is pushing out further into the future that point when new production can come on," he said. This poses risks to utilities, because "there is a question as to what China intends to do in its future" U3O8 purchases "which poses a risk on the demand side" by utilities, Garrow said.

Hinze, in a slide presented October 5 at the NEI conference, indicated that China bought just over 65 million lb of natural and enriched uranium in 2013 and in 2014, and nearly 30 million lb from January through July.

"A problem on the producer side is that and due to [low U3O8 spot prices] they are pushing off the time when they can ramp up production," Garrow said.

Scott Melbye, executive vice president, Uranium Energy Corp., raised the supply sufficiency issue as well in comments made during
the session. In an interview following the session, Melbye said that the mid-term U3O8 market has had a "positive effect," noting that "for every pound that a trader sells in the forward, carry trade, he will buy 1 pound in the spot market."

However, he said that as a consequence, "the long-term price is being pulled down by the mid-term market," making it difficult for producers to ramp up production.

"The flip side is that the [current U3O8 price situation] is helping utilities like Exelon through tough times, but it's not helping producers," Melbye said. He said, "we'll get to a point in 2020, or maybe 2018, when we'll need more [U3O8] mine production ... but there could be a drastic shift in the market to one of shortfalls" in material.

— Jim Ostroff, Beaver Creek, Colorado

Obama nominates John Kotek to head DOE Office of Nuclear Energy

President Barack Obama has nominated John Kotek to be DOE assistant secretary for nuclear energy. The nomination was sent to the Senate October 5, the White House said in a statement.

Kotek currently is DOE principal deputy assistant secretary for nuclear energy, the second-highest position in the Office of Nuclear Energy and a post he has held since January.

The office's responsibilities include advancing nuclear power through the development of technologies to improve the reliability and safety of existing reactors and extend their operating lives, development of advanced reactor technologies and fuels, and management of spent nuclear fuel.

From 2007 to 2015, Kotek was principal and managing partner in the Idaho Office for Gallatin Public Affairs. During that time, from 2010 to 2012, he also was staff director of the Blue Ribbon Commission on America's Nuclear Future, which developed recommendations for a new national strategy on the management and disposal of nuclear waste and utility spent fuel.

Kotek was a member of the American Nuclear Society Board of Directors from 2007 to 2009 and was a senior consultant and manager for nuclear programs at Washington Policy and Analysis, Inc. from 2006 to 2007. He was deputy manager at DOE's Idaho Operations Office from 2003 to 2006 and a manager in the nuclear technology division at Argonne National Laboratory-West from 1999 to 2003. From 1989 to 1998, he worked in the Office of Nuclear Energy, Science and Technology at DOE in various capacities.

Kotek's nomination must be confirmed by the Senate.

Former NRC commissioner Peter Lyons served in the position from 2007 to 2015, Kotek currently is DOE principal deputy assistant secretary for nuclear energy, the second-highest position in the Office of Nuclear Energy and a post he has held since January.

France unlikely to take Japan's plutonium, Areva official says

France is unlikely to take plutonium recovered by reprocessing Japanese spent fuel and instead will deliver fabricated mixed-oxide, or MOX, fuel to Japan, an Areva official said last month.

The move could help put pressure on Japan to revise its national fuel cycle strategy, according to Japanese industry experts.

"We are ready to deliver MOX [to Japan]," Caroline Drevon, senior vice president at France's Areva, said on the sidelines of the annual World Nuclear Association Symposium September 11 in London.

Japanese power companies have contracts with Areva in France and BNFL plc and later Sellafield in England to reprocess their spent fuel and fabricate MOX fuel using the plutonium recovered for use in Japanese LWRs, in a move to kick start the country's fuel cycle program. The national fuel cycle project, however, stalled after 16 to 18 LWRs -- that Japanese power companies had planned in 2009 to run partially on MOX fuel by 2015 -- shut following the 2011 accident at Fukushima I.

All of the LWRs in the country are currently under safety review by Japan's Nuclear Regulation Authority, or NRA. All operational reactors in Japan were shut by September 2013 pending confirmation they meet NRA's stricter safety standards, gain local government approval and complete NRA pre-operational requirements. When Kyushu Electric Power Co.'s Sendai-1 restarted in August, it was the first nuclear unit in Japan to operate since 2013.

The Japanese government intends to reduce its dependency on nuclear power by having nuclear generation account for 20% to 22% of its total power output by 2030, down from about 30% before the Fukushima I accident.

Asked whether France could dispose of plutonium recovered from spent fuel from Japan, if Japan asked it to do so, Drevon said that France could not. She noted French law would bar that. France is expected to ship MOX fuel to Japan, she added.

France had about 16 metric tons of plutonium recovered from Japanese spent fuel at the end of 2014, according to data the Japan Atomic Energy Commission, or JAEC, released in July. The data also show that the UK had about 20 mt of Japanese plutonium, while Japan had 10.8 mt.

Areva extracted the plutonium from spent fuel and is storing the material at its La Hague reprocessing complex. That facility, which has a combined licensed capacity of 1,700 mt of spent fuel per year, sends some of the plutonium it recovers to the company's Melox facility at the Marcoule site, where it is used in the production of MOX fuel. Melox produced 134 mt of MOX fuel in 2014 (NF, 6 Jul, 3).

Japan sticking to existing strategy

Though most of the LWRs in Japan are not currently operating, the country's nuclear power industry is sticking to the existing national fuel cycle strategy.

"Operating [restarting] those [16 to 18] reactors will be behind schedule, but our policy of implementing a pluthermal program won't change," Makoto Yagi, chairman of the Federation of Power Companies of Japan, said at a September 18 news conference in Tokyo.

He did not elaborate on the schedule for implementing the strategy. Pluthermal is a word that combines plutonium and thermal and is another name for Japan's national fuel cycle strategy of burning MOX fuel in up to 18 LWRs in the country.

Some industry officials are skeptical about the feasibility of the plan. “It could be almost impossible” for the 16 to 18 reactors that plan to use MOX fuel to restart any time soon and for a fuel cycle program based on this strategy to work, Tatsujiro Suzuki, director of the Research Center for Nuclear Weapons Abolition at Nagasaki University
and former vice chairman of the Japan Atomic Energy Commission, or JAEC, said in an interview October 7.

The government and nuclear industry should consider alternative plans, such as halting reprocessing and disposing of spent fuel directly, according to Suzuki. Finding a site for the direct disposal of spent fuel, however, also could be challenging, it would require local consent.

Tetsuya Endo, former vice chairman of the JAEC and senior adjunct fellow at the Japan Institute of International Affairs, in an interview October 7 agreed with Suzuki, saying that the government and industry should revise the fuel cycle plan. Endo suggested reducing the number of LWRs targeted for restart and curbing plutonium production by the reprocessing spent fuel.

— Yuza Yamauchi, Tokyo

Many accident-tolerant fuels have low technical readiness: report

A number of proposed accident-tolerant fuels still have relatively low technological readiness levels, according to a research paper by the UK National Nuclear Laboratory that was presented at a conference in Zurich, Switzerland, September 13.

Daniel Mathers, the head of the laboratory’s fuel cycle division, said at the Top Fuel 2015 conference that the low level of technological readiness of so many accident-tolerant fuels meant that the additional work needed before the fuel can be used was “an urgent development priority.”

The report graded the level of technical readiness of various advanced nuclear fuels, using a scale of 1 to 10, with 1 representing the least technically ready fuels and 10 the most technically ready.

The research paper defined a category 1 fuel as one in which early research had defined basic elements of the fuel’s technology and in which “promising materials and/or geometry have been identified.” It said that a fuel rated as a 10 is already in “widespread, reliable and long-term operation in many actual systems” and there is “long-term use of the fuel within a commercial reactor fleet/fleets with many thousands of hours of operating experience and data.”

The research paper said that the technical readiness level of each fuel was determined from a literature search of “peer-reviewed journals, conference proceedings and reports produced by international nuclear organisations (IAEA, OECD NEA, WNA) as well as the work of national nuclear institutions.”

Further information was sought where appropriate "through attending various conferences and by contact with partners in the international nuclear community,” the report said.

Mathers said in an email September 21 that the work “was funded by the UK Department of Energy and Climate Change under an Initial UK National Nuclear R&D programme in 2013/14.”

Some of the highest ratings in the study were given to advanced mixed-oxide, or MOX, fuel and to advanced metal fuels. They were ranked 9 and 7, respectively.

The report concluded that, as a result of these findings, “consideration should be given to the widely reported difficulties that have been experienced in deploying new commercial-scale production facilities for even relatively well developed fuel materials with higher radioactivity such as MOX.”

— Oliver Adelman, London

Years needed to open interim storage facility: former DOE official

It could take the US about 13 to 14 years to have a spent fuel interim storage facility operational, former DOE official Christopher Kouts told a US House of Representatives subcommittee October 1.

That timetable includes four years to identify a potential storage site, four years to design the facility and prepare an application for a storage license, three years for NRC to review the application, two to three years to construct the facility and a year to ensure everything is working properly, Kouts told the House Energy and Commerce Subcommittee on Environment and the Economy.

In an apparent word of caution, Kouts added, “Let me say, nothing goes as planned.”

Kouts, who now is a managing partner in Kouts Consulting, was principal deputy director of DOE’s Office of Civilian Radioactive Waste Management from July 2007 through January 2010.

The office was responsible for managing activities associated with the disposal of high-level nuclear waste as well the transportation and interim storage of commercial spent fuel and HLW.

He was one of several witnesses testifying at the subcommittee’s hearing on challenges facing the transportation of utility spent fuel.

Spent fuel has been safely transported in the US and internationally for more than 40 years, Kouts told the subcommittee. “There have been accidents, but no accidents have released radioactive material,” he said.

“No amount of transportation planning can overcome the lack of a destination for this waste,” Kouts said.

Roughly 33 years after the Nuclear Waste Policy Act of 1982 was enacted codifying the DOE civilian nuclear waste program, the country does not have a facility to store or dispose of that waste. DOE dismantled its high-level waste repository program at Yucca Mountain in Nevada in 2010, two years after it submitted a repository license application to NRC.

NRC suspended all licensing activities associated with the Yucca Mountain application in 2011 but resumed the congressionally mandated application review two years later under a federal court order. The agency, however, is doing that work with limited carryover funds and did not seek any new funding for that work in fiscal 2016, which began October 1.

Yucca Mountain, by federal law, was the country’s only candidate...
site for a high-level nuclear waste repository. DOE attributed its abandonment of the project to the state of Nevada's unyielding opposition to the proposed disposal facility. But without a change in the law, the US lacks an alternate site to dispose of that waste and provisions tie DOE's ability to site and use an interim spent fuel storage facility to progress on the Yucca Mountain project.

Representative John Shimkus, the Illinois Republican who chairs the subcommittee and a long-time supporter of the Yucca Mountain project, said in his opening remarks at the hearing that while "Congress potentially considers amending the Nuclear Waste Policy Act, we must evaluate whether marginal safety gains from temporary consolidating used fuel justifies the financial costs to transport used fuel twice." 

"The nation's inventory of spent nuclear fuel from commercial power reactors — which amounts to about 72,000 metric tons — is stored at 75 sites in 33 states, generally where it was generated," Frank Rusco, director of natural resources and environment at the US Government Accountability Office, told the subcommittee. Transportation planning alone could take about 10 years, "in part because routes have to be agreed upon, first responders have to be trained, and critical elements of infrastructure and equipment need to be designed and deployed," Rusco said.

He added that DOE would need new legislative authority to engage in interim storage of utility spent fuel. Based on his experience with the Yucca Mountain program, Kouts noted it would have taken DOE 24 years to ship 70,000 mt of spent fuel to a Yucca Mountain repository at a rate of two to three shipments a week. The department had planned to make those shipments using dedicated trains — that is, trains that would not transport anything else. It could take 12-16 years to get the equipment and regulatory approvals to make the shipments, he said. It would have cost about $20 billion to ship spent fuel to a Yucca Mountain repository, Kouts said. The use of an interim storage facility would add to that cost, he said.

Waste bills
Representative Michael Conaway, a Texas Republican, introduced legislation in the House September 29 that would authorize DOE to use an NRC-licensed, private-sector facility for the interim storage of utility spent fuel. Conaway has 17 co-sponsors on the bill, 11 of whom are Texas Republicans.

Under the bill, HR 3643, the Nuclear Waste Policy Act would be amended to also authorize DOE to take title to the spent fuel and to spend money from the Nuclear Waste Fund, a federal trust fund, on the storage of the spent fuel. Low-level nuclear waste disposal company Waste Control Specialists wants to site and operate an interim spent fuel storage facility on its 14,000-acre site in Andrews County in Conaway's district. WSC has said its wants to submit a license application for such a facility to NRC by April (NF 16 Feb, 1). A volunteer could eliminate the search for a potential storage site.

Separately, a two-county effort to site an interim storage facility in southeast New Mexico also is underway. The Eddy-Lea Energy Alliance, an organization involving Eddy and Lea counties, wants to site such a facility on land that the two counties jointly own. It also might submit a license application to NRC next year (NF, 11 May, 1).

Unlike the House bill, legislation in the Senate — the Nuclear Waste Administration Act of 2015, S 854 — would move the nuclear waste program out of DOE to a separate entity that would use a consent-based process to site one or more interim storage facilities and one or more repositories. That bill is sponsored by Senators Lamar Alexander, a Tennessee Republican and chairman of the Senate Appropriations Subcommittee on Energy and Water Development; Dianne Feinstein of California, the senior Democrat on his subcommittee; Lisa Murkowski, an Alaska Republican and chairman of the Senate Energy and Natural Resources Committee; and Maria Cantwell of Washington, the energy committee's top Democrat.

Cracking issue
With no disposal facility on the horizon, spent fuel is likely to be kept in dry storage longer than originally expected, raising concerns at NRC about the need for cask materials management. At an NRC commission briefing October 1, NRC's Aladar Csontos said it is "known" that chloride-containing salts could cause stress corrosion cracking in stainless steel spent fuel canisters. NRC staff, he said, is "trying to determine when we'd expect this to happen."

Stress corrosion cracking would only be produced by deliquescence, a process in which salt deposits on the surface of a canister absorb moisture, creating a concentrated brine solution. But a myriad of other factors, such as humidity and canister temperature, have a role in whether deliquescence occurs (NF, 19 Jan, 1).

Csontos, chief of the division of spent fuel management, renewals and materials branch in NRC's Office of Nuclear Material Safety and Management, said that records show it could be decades before this would be a problem. It's not a near-term problem, he said.

Commissioner William Ostendorff cautioned against staff making that work more complicated than needed, noting that a lot of work has already been done on the issue of chloride-induced stress corrosion cracking. "I would say we probably have 85% to 90% of the knowledge we need to address this particular issue," he said.

Csontos agreed, noting that staff’s effort is focused on using operational experience to inform inspection programs. Staff is working with NRC Regions I and IV to develop inspection procedures on the issue, he said.

— Elaine Hiruo, Washington

NRC delays rulemaking on spent fuel and waste storage security

NRC commissioners voted October 6 to approve staff's recommendation to delay for five years the start of a proposed rulemaking on security for spent fuel and waste storage facilities. Chairman Stephen Burns and Commissioners Kristine Svinicki and William Ostendorff voted to approve the recommendation. Commissioner Jeffery Baran approved in part and disapproved in part, saying the rulemaking should be delayed for only 12 months.

The commission said in an October 6 staff requirements memorandum, or SRM, that "at the end of the five-year period, the staff should re-evaluate whether rulemaking in this area is warranted. However, the staff notes several scenarios, including its evaluation in the context of the Project Aim re-baselining, under which the staff..."
would accelerate this rulemaking."

The commission added that if staff determines such an acceleration is warranted, it "should provide the Commission with its basis for that determination before it reinitiates the rulemaking."

In 2007, the commission approved staff's proposal "to apply a radiological dose-based regulatory approach to all independent spent fuel storage facilities (ISFSIs) using release-fraction values specified by the NRC," staff said in a paper to the commission, Comscy-15-0024, dated September 11 and released October 6.

"Specifically, this dose-based approach would require licensees to demonstrate that the security at ISFSIs or monitored retrievable storage installations could effectively protect against releases, if any, resulting from specific security events bounded by the design basis threat for radiological sabotage," staff said. Security measures developed under such an approach "should be sufficiently robust that the estimated dose at the site boundary would not exceed 0.05 Sievert (5 rem)," staff said.

The commission also ordered staff "to develop new, risk-informed performance-based security requirements applicable to all ISFSIs to enhance existing security requirements, and to develop ISFSI-specific regulatory guidance supporting the implementation of the new regulations," the paper said.

After further review and stakeholder input, "staff conducted proof-of-concept testing to determine if certain postulated security scenarios were credible," the paper said. Ongoing analysis by staff of scenarios in which radioactive materials might be released, using the Melcor software package, is projected to be completed in December, it said.

Staff said in its paper that the rulemaking could safely be postponed because existing security orders and inspections already provide adequate protection of ISFSIs. Postponing the start of the rulemaking, it said, would allow staff to complete its Melcor analysis of release scenarios, take into account progress made on a related rulemaking on power reactor decommissioning (Inside NRC, 12 Jan, 1) and achieve "further clarity on the development of the domestic spent nuclear fuel management strategy," including potential construction of one or more consolidated interim storage facilities that have been proposed.

Also, expenditures on the rulemaking, including development of guidance, "need[s] to be evaluated in light of competing agency priorities," staff said.

Staff proposed in its paper that completion of the technical basis being developed to support the rulemaking be postponed from December 2015 to December 2020 and that issuance of a final rule be postponed from December 2015 to December 2020 and that issuance of a final rule be postponed from December 2018 to December 2023.

Burns said in comments attached to his vote sheet that he agreed with staff's proposed revised schedule. He also said he agreed with staff's assessment that current security orders and inspections provide adequate protection, a point that Svinicki and Ostendorff also made in their comments.

Baran said that "while delaying this security rulemaking ultimately may make sense, I disapprove a five-year delay at this time." He said that "it would be better to consider such proposals in the context of the agency's ongoing Project Aim 2020, which seeks to increase NRC's efficiency and tailor the size of staff to the workload expected over the next five years.

Baran said he supports a 12-month postponement of the rulemaking, adding that any staff request for further postponement should be included in a "re-baselining assessment" of all agency work being conducted as part of Project Aim that is due to be delivered to the commission in April.

The Nuclear Energy Institute said in comments filed with NRC this summer that it considers the proposed rulemaking unnecessary because security of US nuclear facilities is already adequately protected and agency and industry resources could be better used on other tasks.

"It is unclear why any new or revised regulation is needed in this area," John Butler, senior director, strategic programs at NEI, said in the July 20 comments. "Security orders currently in place provide adequate protection for facilities storing SNF and high-level radioactive waste and should be codified with no additional requirements."

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**SCE receives state approval to for San Onofre storage facility**

The California Coastal Commission approved Southern California Edison's application October 6 for a coastal development permit to build a spent fuel storage installation at the shuttered San Onofre-2 and -3, which are undergoing decommissioning.

The installation, in which stainless steel spent fuel canisters would be placed vertically into concrete modules that are partially underground, was authorized by the commission for 20 years. It will be used to store 2,668 spent fuel assemblies that have been in pools at the plant since the two reactors permanently shut in 2012 as a result of problems with their replacement steam generators.

SCE selected Holtec International in December to construct its Hi-Storm Umax storage facility, beginning in early 2018. Holtec will load all used fuel and non-fuel waste from San Onofre-2 and -3 into the vertical system. The facility would accommodate up to 75 Hi-Storm Umax dry storage modules and would be built near existing dry storage installations at San Onofre.

SCE spokeswoman Maureen Brown said in an October 7 email that although the facility was originally described as being below ground, about half the length of the canister would be below grade, or below ground level, and half would be above.

A sloped berm is built up around the above grade portion. So the term partially below ground is more precise, she said.

The commission, in its original staff report dated September 25, said that the Holtec Hi-Storm Umax system is expected to provide better performance during seismic events, provide better security and reduce radiation doses at the site boundary. The storage facility would be 100 feet inland of the seawall along the central portion of the site.

Brown said that the transfer of the spent fuel assemblies into dry storage is expected to be completed by mid-2019. According to the commission's staff report, the dry storage facility would be operated until 2049. SCE assumes that DOE would take title to the spent fuel by then.

San Onofre-2 and -3 would then be fully decommissioned and the site restored by 2051, according to SCE's decommissioning plan.

The staff report noted, however, that uncertainty about when a
China's capacity to manufacture PWR fuel "is likely to double by 2025," Hinze said during his presentation. Currently, PWR fuel is manufactured at the Baotou and Yibin facilities, which have a total PWR capacity of about 1,700 mtU, according to a slide he presented at the meeting.

China had a 2018 target completion date and would operate alongside the existing Lanzhou plant, with a 5,000 mtU nominal installed capacity, the slide said. It noted that the new plant is being built by a subsidiary of China National Nuclear Corporation.

Hinze said in an October 7 email, "Conversion plants typically can't operate at full nominal capacity, so they usually only attain no more than 90% for production." He also said in the email that due to technical issues, Lanzhou today has an operating installed capacity of around 4,000 mtU.

Hinze said in his presentation that China's installed enrichment capacity is set for a 40% increase, as well, noting in a slide that about 2 million separative work units, or SWU, of installed capacity would be added by 2017 via expansions of enrichment capacity at four sites — Heping, Emeishan, Lanzhou and Hanzhong — that today have an aggregate 4.8 million SWU installed capacity. SWU is a standard measure of uranium enrichment services. This expansion will boost total enrichment capacity to 6.8 million SWU. Enrichment plant production is "pretty much the same as nominal capacity," Hinze said in his October 7 email.

An "unknown," Hinze said during his presentation, is the extent of China's SWU "export intentions" in future years. "China has excess SWU production" for its current needs, he said, adding that China would likely export 1 million to 2 million SWU a year.

Reactors worldwide will consume about 57 million SWU in 2015, according to a post on the World Nuclear Association website.

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Hinze said during his presentation that China’s “Achilles Heel is its uranium supply,” noting that its current goal of producing sufficient uranium to meet one-third of its domestic needs “is not realistic.”

The goal also calls for China to meet one-third of its U3O8 needs by spot market purchases and another third via joint ventures with uranium exploration companies, he said.

Hinze said that China could increase its uranium production from 4.2 million lb this year to about 8 million lb by 2030, adding that going forward, China could meet its U3O8 needs by buying more of the material on the spot market and increasing sourcing from foreign mining operations, although he did not provide specific forecasts.

He noted in a slide presented at the meeting that China General Nuclear has two joint ventures in Kazakhstan that produce about 3.3 million lb U3O8 annually for the company, as well as ownership in the Husab mine in Namibia, still under development, with an estimated capacity of 15 million lb a year.

— Jim Ostroff, Beaver Creek, Colorado

German repository
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would be sent to Gorleben. A 24-member commission appointed by parliament is developing criteria for the selection of to select a site for a spent fuel repository. The commission is to have the plan ready by the end of June. Originally, the deadline was the end of 2015.

Critics of the process have questioned whether the commission would simply rubber stamp Gorleben or consider other sites under the new selection process.

Angermann said that he believes “it is a sincere process” and that other sites will be considered but that Gorleben might be chosen after all.

In a statement October 8, Rita Schwarzeluhr-Sutter, parliamentary state secretary in the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, said that siting a repository needs to be done based on a credible scientific basis “so that people can be convinced of the safety of a repository.”

— Ariane Sains, Rethem, Germany