Platts
S&P Global
Commodity Insights

Nuclear Fuel

Volume 48 / Issue 15 / July 21, 2023

US uranium producers restarting mines due to rising demand

- Five US producers announce mine restarts
- US U3O8 production was 2,511,000 lb in 1Q 2023

An increase in the price of uranium — coupled with expectations of growing demand, a potential supply gap and a need for domestically produced uranium — have resulted in several announcements of new mining projects and restarts that could bolster US uranium production from recent historic lows.

Several US companies are actively seeking to restart mines that have been shut for several years due to poor market conditions. Now, higher prices and renewed demand from utilities have spurred producers to restart idled assets or resume development of new ones.

"It might not be this year or next year, but we're seeing indications of US uranium mining growing more substantially than it's been in the last decade," said Nima Ashkeboussi, head of nuclear fuel for the Nuclear Energy Institute, in an interview July 20.

Texas-based producer enCore Energy Corp.'s Rosita in-situ recovery facility in the state will begin production in the third quarter of this year, the company's CEO Paul Goranson

(continued on page 8)

New interest seen in reprocessing of spent fuel for advanced reactor use

- Economic benefit to reprocessing seen for reactors using HALEU
- Several companies developing various reprocessing approaches
- Lawyer says investors see opportunities in nuclear waste

There has been a shift in perceptions about reprocessing of nuclear fuel in recent years, with growing interest in smaller-scale use of the technology to provide fuel for advanced reactors, several industry officials said.

One part of that is that the economics of reprocessing spent fuel are expected to be different for advanced reactors dependent on high-assay low-enriched fuel than for the lower enrichment levels of the current fleet, they said.

Fuel costs for smaller reactors can be higher because of neutron losses in such a core. And units using HALEU, which is enriched to more than 5% but less than 20% U-235, must utilize much more enrichment than used in light-water reactors. Most advanced reactor developers anticipate using HALEU in some form in their designs.

"For HALEU, it would be cheaper to acquire recycled than

(continued on page 9)

Platts U3O8 Daily Spot Delivery Assessments ($/lb)

Delivery	17-Jul	18-Jul	19-Jul	20-Jul	21-Jul	Prev. Wk. 14-Jul	Weekly Change
Current month	**55.60**	**55.85**	**56.10**	**56.20**	**56.20**	**55.60**	**0.60** ▲
Month 2	55.60	55.85	56.10	56.20	56.20	55.60	0.60 ▲
Month 3	56.00	56.25	56.50	56.45	56.45	56.00	0.45 ▲
Month 4	56.40	56.60	56.85	56.80	56.70	56.40	0.30 ▲
Month 5	56.80	56.90	57.15	57.10	56.95	56.80	0.15 ▲
Month 6	57.10	57.15	57.40	57.35	57.15	57.10	0.05 ▲
Month 7	57.35	57.40	57.65	57.60	57.40	57.35	0.05 ▲
Month 8	57.65	57.70	57.95	57.90	57.70	57.65	0.05 ▲
Month 9	57.85	57.90	58.15	58.10	57.90	57.85	0.05 ▲
Month 10	58.10	58.15	58.40	58.35	58.15	58.10	0.05 ▲
Month 11	58.35	58.40	58.65	58.60	58.40	58.35	0.05 ▲
Month 12	58.55	58.60	58.85	58.80	58.60	58.55	0.05 ▲
12-month avg.	57.11	57.23	57.48	57.45	57.32	57.11	0.21 ▲
Differentials							
Canada-France	0.00	0.00	0.00	0.00	0.00	0.00	0.00 –
Canada-US	0.00	0.00	0.00	0.00	0.00	0.00	0.00 –

U3O8 spot price increases as deals done for September, December delivery

- Three deals during week totaled 300,000 lb U3O8
- Price either rose or was unchanged day to day all week

The U3O8 spot price rose 60 cents a pound week on week after a slow start as industry participants gathered for an annual nuclear fuel supply conference, with deals continuing to be transacted for delivery in future months.

Platts assessed the current month U3O8 spot price to Canada at 1pm ET July 21 at $56.20/lb. That is 60 cents higher than the price assessed July 14 at $55.60/lb, 90 cents higher than the $55.30/lb assessed July 7 at $55.30 and $4.35/lb, or 8.38%, higher than the $51.85/lb assessed six months ago Feb. 21.

This is the second week on week increase in the spot price following five weeks of declining prices.

The price remained flat at $55.60/lb July 14 to July 17. Sources attributed the slow market July 14 and 15 to travel to and

Inside this issue

participation in the Nuclear Energy Institute's Nuclear Fuel Supply Forum July 18 in Washington.

There were only four firm spot bids and three firm offers heard July 17 and July 18, compared to six firm bids and eight firm offers heard in the latter part of the week following the conclusion of the conference.

The price remained flat or increased each day of the week, starting with a 25 cent rise from $55.60/lb July 17 to $55.85/lb July 18. The price then increased another 25 cents to $56.10/lb July 19 and an additional 10 cents to $56.20/lb July 20.

Regarding the 60-cent week on week price increase, one intermediary said July 21, "I don't think [the market] really changed much in terms of sentiment."

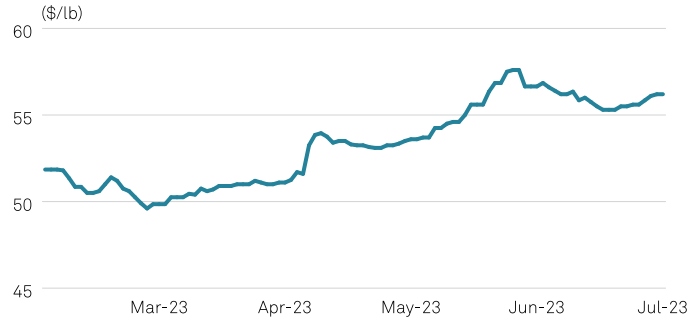
There were three deals done the week of July 17 with both spot and forward month deliveries. The first deal was done July 18 after 1 pm ET at $56.10/lb for delivery in August, the second was done July 19 after 1 pm ET at $56.15/lb for delivery in September and the third deal was done July 20 at $56.95/lb for delivery in

Spot Uranium Heards

Date	
7/21/2023	U3O8 July/Aug: Broker offer heard at $56.25/lb to Canada for 100k lb
7/21/2023	U3O8 Dec: Broker offer heard at $57.25/lb to Canada for 100k lb
7/21/2023	U3O8 July/Aug: Intermediary sees tradeable value at $56.25/lb to any location for 100k lb
7/21/2023	U3O8 Dec: Intermediary sees tradeable value at $57/lb to any location for 100k lb
7/21/2023	U3O8 July/Aug: Intermediary sees tradeable value at $56.15/lb to any location for 100k lb
7/21/2023	U3O8 Dec: Broker bid heard at $57/lb to US for 100k lb
7/21/2023	U3O8 Jul: US-Canada differential intraday 0 cents/lb at 10:30 am ET for 100k lb
7/21/2023	U3O8 Jul: France-Canada differential intraday 0 cents/lb at 10:30 am ET for 100k lb
7/21/2023	U3O8 Jul/Aug: Intraday value $56.20/lb 10:30 am ET delivered Canada for 100k lb
7/21/2023	U3O8 Aug: Broker offer heard at $56.50/lb to Canada for 100k lb
7/21/2023	U3O8 Aug: Broker bid heard at $56.10/lb to Canada for 100k lb
7/20/2023	U3O8 Oct/Nov: Broker offer heard at $57.50/lb to Canada for 100k lb
7/20/2023	U3O8 Nov/Dec: Broker bid heard at $56.75/lb to Canada for 100k lb
7/20/2023	U3O8 Aug: Broker bid heard at $56.15/lb to Canada for 100k lb
7/20/2023	U3O8 Aug: Broker bid heard at $56.10/lb to Canada for 100k lb
7/20/2023	U3O8 Aug: Broker bid heard at $56.10/lb to Canada for 100k lb
7/20/2023	U3O8 Nov/Dec: Broker offer heard at $57.75/lb to Canada for 100k lb
7/20/2023	U3O8 Aug: Broker offer heard at $56.50/lb to Canada for 100k lb
7/20/2023	U3O8 Aug: Broker offer heard at $56.35/lb to Canada for 100k lb
7/20/2023	U3O8 Aug: Broker offer heard at $56.50/lb to Canada for 100k lb
7/20/2023	U3O8 Jul: US-Canada differential intraday 0 cents/lb at 10:30 am ET for 100k lb
7/20/2023	U3O8 Jul: France-Canada differential intraday 0 cents/lb at 10:30 am ET for 100k lb
7/20/2023	U3O8 Jul/Aug: Intraday value $56.10/lb 10:30 am ET delivered Canada for 100k lb
7/19/2023	U3O8 Dec: Deal heard done at $56.95/lb to Canada for 100k lb
7/19/2023	U3O8 Aug: Broker offer heard at $56.25/lb to Canada for 100k lb
7/19/2023	U3O8 Sep: Broker bid heard at $56.15/lb to Canada for 100k lb
7/19/2023	U3O8 Sep: Deal heard done at $56.15/lb to Canada for 100k lb
7/19/2023	U3O8 Aug: Broker offer heard at $56.50/lb to Canada for 100k lb
7/19/2023	U3O8 Aug: Broker offer heard at $56.30/lb, location unspecified, for 100k lb
7/19/2023	U3O8 Aug: Broker bid heard at $56/lb, location unspecified, for 100k lb
7/19/2023	U3O8 Jul: US-Canada differential intraday 0 cents/lb at 10:30 am ET for 100k lb
7/19/2023	U3O8 Jul: France-Canada differential intraday 0 cents/lb at 10:30 am ET for 100k lb
7/19/2023	U3O8 Jul/Aug: Intraday value $56.10/lb 10:30 am ET delivered Canada for 100k lb
7/19/2023	(Corrected) U3O8 Aug: Deal heard done Jul 18 at $56.10/lb to Canada for 100k lb
7/18/2023	U3O8 Aug: Bid heard at $55.50/lb, location unspecified, for 100k lb
7/18/2023	U3O8 Aug: Bid heard at $55.75/lb to Canada for 100k lb
7/18/2023	U3O8 Dec: Bid heard at $56.75/lb to France, Canada for 100k lb
7/18/2023	U3O8 Aug: Indication of buying interest heard at $55.25-$55.50/lb to Canada for 100k lb
7/18/2023	U3O8 Aug: Offer heard at $56/lb to Canada, France for 100k lb
7/18/2023	U3O8 Dec: Offer heard at $57.25/lb to France, Canada for 100k lb
7/18/2023	U3O8 Aug: Offer heard at $56/lb, location unspecified, for 100k lb
7/18/2023	U3O8 Aug: Offer heard at $56.25/lb to Canada for 100k lb
7/18/2023	U3O8 Jul/Aug: Intraday value $55.60/lb 10:30 am ET delivered Canada for 100k lb
7/18/2023	U3O8 Jul: US-Canada differential intraday 0 cents/lb at 10:30 am ET for 100k lb
7/18/2023	U3O8 Jul: France-Canada differential intraday 0 cents/lb at 10:30 am ET for 100k lb
7/17/2023	U3O8 Jul/Aug: Indication of selling interest heard at $56.25/lb, location unspecified, for 100k lb
7/17/2023	U3O8 Jul/Aug: Indication of buying interest heard at $55.25/lb, location unspecified, for 100k lb
7/17/2023	U3O8 Jul: US-Canada differential intraday 0 cents/lb at 10:30 am ET for 100k lb
7/17/2023	U3O8 Jul: France-Canada differential intraday 0 cents/lb at 10:30 am ET for 100k lb
7/17/2023	U3O8 Jul/Aug: Intraday value $55.60/lb 10:30 am ET delivered Canada for 100k lb

December. Each trade was done for delivery to Canada and had a combined total of 300,000 lb.

Platts U3O8 spot price, current month



Source: S&P Global Commodity Insights

The 12-month average spot price assessed by Platts July 21 was $57.32 /lb.

Platts is part of S&P Global Commodity Insights.

— Jennifer Gray

Peninsula's Lance restart delayed by end of uranium processing contract

- Company to accelerate in-house expansion plan
- Scheduled to deliver 700,000 lb U3O8 to utilities in 2023
- Holds uncommitted inventory of 210,000 lb

Australia's Peninsula Energy announced July 19 that it is delaying the restart of its Lance in situ recovery operation in Wyoming, after the company that processes the operation's uranium ore ended the processing contract after eight years.

US-based Uranium Energy Corp., the company that had processed uranium solution from Lance into dry yellowcake, at its Irigaray Central Processing Plant, also in Wyoming, notified Peninsula "that it is terminating the [processing] agreement," Peninsula said in its statement.

The development "is frankly disappointing," Peninsula Managing Director Wayne Heili said in a conference call July 19 to discuss the contract's termination. "They've not provided a reason for the termination in their notice."

Signed in 2015, the processing agreement between Peninsula, its US subsidiary Strata Energy and UEC contains a mutual provision for a 270-day notice of contract cancellation.

"To Peninsula, this was unanticipated," Heili said during the call. "We have been working directly with the UEC team over the last several years ... to restart production at Lance. We financially supported the maintenance and upkeep of that processing facility during our down period to ensure its availability."

But Peninsula has decided to stop using the UEC plant, making the restart delay "unavoidable," he said.

Instead, Peninsula said in its statement it will accelerate development of the Ross Central Processing Plant's resin processing and yellowcake production, an expansion stage described in a 2022 definitive feasibility study which had envisioned "an approximate two-year period of third-party processing."

The study updates a 2018 feasibility study, in which Strata concluded that switching to a low-pH lixiviant, the liquid medium used to extract uranium from ore in ISR, would improve production and profit at Lance.

"You don't want to run [a low pH wellfield] ... switch it off

Platts
S&P Global
Commodity Insights

Nuclear Fuel

ISSN: 0048-105X

Contact Client Services: ci.support@spglobal.com;
Americas: +1-800-752-8878; Europe & Middle East: +44-20-7176-6111;
Asia Pacific: +65-6530-6430

Senior Managing Editor
William Freebairn (william.freebairn@spglobal.com)

Managing Editor
Steven Dolley (steven.dolley@spglobal.com)

Senior Editor
Andrea Jennetta (andrea.jennetta@spglobal.com)

Editor
Mary Catherine Hancock (marycatherine.hancock@spglobal.com)

European Managing Editor
Oliver Adelman (oliver.adelman@spglobal.com)

Contact the editors: nuclear@spglobal.com

Global Head of Generating Fuels & Electric Power Pricing
Francis Browne

President of S&P Global Commodity Insights
Saugata Saha

Advertising
Tel: +1-720-264-6618

Manager, Advertisement Sales
Bob Botelho

Nuclear Fuel is published every other Friday by S&P Global Commodity Insights, a division of S&P Global, registered office: 55 Water Street, 37th Floor, New York, N.Y. 10038.

Officers of the Corporation: Richard E. Thornburgh, Non-Executive Chairman; Doug Peterson, President and Chief Executive Officer; Ewout Steenbergen, Executive Vice President, Chief Financial Officer; Steve Kemps, Executive Vice President, General Counsel

and then try to restart it again," Heili said. "To do that poises a very real risk that the remaining recoverable mineral will be sequestered and unrecoverable."

"And we can't let that happen," Heili added.

In a May investor presentation, Peninsula said the restart was scheduled for mid-2023. Like other US uranium production centers, Lance has been idled for several years due to low U3O8 prices. With the price rebound, such operations will resume production this year.

Contract portfolio

Regarding its contract portfolio, Heili said Peninsula is "reevaluating our ability to meet those nearer-term delivery requirements" to utilities.

Some of the company's utility contracts require Peninsula to source U3O8 from its own production, instead of delivering uranium purchased in the spot market.

And some contracts have clauses and remedies that take effect Peninsula is unable to meet obligations, Heili said, adding, "They're not company-wrecking kinds of clauses."

"We've been in touch with our customers," and "I believe utilities will be able to offer some flexibility to us," he said.

Peninsula said in its May investor presentation that it has sales contracts in place for up to 5.25 million lb through 2033, with "major utilities in both the United States and Europe." Those contracts use a mix of base-escalated and market-based pricing, with a floor of $45/lb and a ceiling of $80/lb.

Peninsula is scheduled to deliver 700,000 lb in 2023, according to the presentation. It said the company had "strong" first-quarter 2023 sales of 500,000 lb, including 300,000 lb to the US Department of Energy.

Work is underway "on requirements to bring forward this timetable for the construction of additional process plant circuits to enable in-house yellowcake production," Peninsula said July 19.

A "full evaluation of the capital and timing requirements of the revised business plan is underway and will be advised to the market once completed," the company noted.

Peninsula said it has a cash balance of $21.5 million at the end of the first quarter, as well as "a strategic inventory balance" of uncommitted material of 210,000 lb U3O8, valued at $11.8 million at an assumed price of $56/lb.

— Andrea Jennetta

Rosatom to expand uranium mining in Tanzania, Namibia

Rosatom plans to start mining uranium in Tanzania in 2023 to 2025 and in Namibia by 2029, the Russian state nuclear company's press office disclosed in the run-up to the second Russia-Africa summit, Russian state news outlet Ria Novosti reported July 19.

In Tanzania, Rosatom is working on the Mkuju River project with the Nyota uranium deposit, one of the largest in the world with a resource base of 152 million metric tons of ore, Rosatom said.

At the pilot stage, Rosatom estimates 5 metric tons of U3O8 production per year, Rosatom said. The company did not provide a timeframe for the pilot operation. Commercial operation would see production jump to 3,000 mt per year, it said.

The ore mining and processing capacity at the deposit are 85% complete and slated to begin operation by the end of 2023, Rosatom said.

Rosatom also shared plans to commence uranium mining in Namibia at a deposit discovered by Headspring Investments, a part of Rosatom's international mining division Uranium One, the Rosatom press office stated in a separate statement.

Exploration works at the deposit are expected to last through 2026, and the mining is scheduled to begin in 2029 with an annual output of 3,000 mtU over 25 years, Rosatom said, estimating the investment cost of the project at $500 million. Namibia is home to around 7% of the world's uranium reserves, the company estimated.

The Namibian government granted Rosatom exploration rights in 2019. In December 2022, the authorities ordered Rosatom to suspend exploration works over concerns about potential contamination of underground water. The Agricultural Ministry explained that the Russian company failed to prove that in-situ leaching, which Rosatom intended to use in the future mining operation, was safe for the environment.

In March 2023, Uranium One challenged the decision, launching review proceedings in the High Court of Namibia to get water use permits required for mining. No further information about the progress of the hearings has been made public.

— Vladislav Vorotnikov

TerraPower, Centrus look to boost enrichment capacity for HALEU supply

TerraPower and enriched uranium supplier Centrus have expanded an agreement under which Centrus would build capacity to supply high-assay low-enriched uranium to the advanced reactor developer, the two companies said July 17.

TerraPower and Centrus had said in 2021 they would work to produce HALEU for the first Natrium sodium fast reactor being developed by TerraPower and GE-Hitachi Nuclear Energy. High-assay low-enriched uranium, or HALEU, is enriched to between 5% and 20% U-235 and is proposed to be used as fuel by most advanced reactor developers.

The new agreement could result in Centrus adding cascades to produce more HALEU needed for the first 345-MW Natrium, which is scheduled to be operational by 2030, the companies said in a statement. Capacity could be brought online within 42 months of securing funding to do so, a TerraPower representative said in an email response to questions.

"This agreement is the private sector taking the first step and is focused on jump-starting the process so that construction of new capacity begins," TerraPower said.

TerraPower delayed deployment of the Natrium project by about two years because of delays in the availability of HALEU.

Russia's state nuclear company Rosatom is the only commercial supplier of HALEU, and companies like TerraPower have said they will not acquire Russian HALEU since the February 2022 invasion of Ukraine.

"American HALEU production is vital for deploying U.S.-designed advanced nuclear reactors," Centrus CEO Dan Poneman said in the statement.

Centrus has developed centrifuge technology and is ramping up production with US Department of Energy support.

The US Nuclear Regulatory Commission on June 12 authorized the start of production at Centrus' enrichment facility, at the site of the former Portsmouth gaseous diffusion uranium enrichment plant, now decommissioned.

In a statement June 15 Centrus said construction of the enrichment cascade and most of the support systems "is now complete, and Centrus has also finished initial testing of these systems." Centrus said it will now complete construction of an on-site HALEU storage area and conduct final testing activities before operation.

Centrus said construction was started in 2019 under a DOE contract. Last November Centrus secured a cost-share award valued at $150 million from DOE to produce up to 20 kgU of HALEU by the end of 2023 and 900 kgU of HALEU by Dec. 31, 2024.

Centrus said in June that it is "investigating the possibility to scale up the Piketon facility with additional centrifuge cascades for expanded HALEU production — provided that sufficient funding or offtake contracts can be secured."

The company said a commercial-scale HALEU cascade, consisting of 120 individual centrifuge machines, with a combined capacity of roughly 6 metric tons of uranium per year, "could be brought online within about 42 months of securing the funding to do so."

Terms or pricing for any enrichment services agreement were not disclosed.

— William Freebairn

NRC to inspect Triso-X fuel facility as construction begins in advance of licensing

The US Nuclear Regulatory Commission has said it will inspect construction activities that have begun on X-energy's Triso-X fuel fabrication facility, noting any such work is undertaken at the company's risk if the agency later requires changes in the design or does not approve the license.

In a July 3 letter made public July 11, NRC said Triso-X, an X-energy subsidiary developing the Triso fuel facility in Tennessee, has planned to begin construction before staff make a decision on the environmental or safety reviews of the application to possess and use nuclear material at the plant. NRC said for any such construction, Triso-X would have to accept the risk that NRC could deny the application, require design changes or construction rework or delay the project.

Triso fuel, first developed more than 60 years ago, is comprised of uranium or uranium oxycarbide kernels that are covered with layers of carbon and silicon carbide and embedded in a matrix. It is proposed to be used by many advanced reactor designs, including X-energy's Xe-100 high-temperature gas-cooled reactor planned for construction at a Dow Chemical site in Texas.

In November NRC accepted for a full technical review X-energy subsidiary Triso-X's license application to operate a facility to fabricate Triso fuel in Oak Ridge, Tennessee. The NRC review is scheduled to be completed by June 2025, assuming Triso-X responds to requests for additional information promptly and completely and provides needed additional information about I&C systems by August, the agency said at the time.

Triso-X has said it would construct the facility in parallel with NRC's review.

Triso-X said in October that it had begun construction of the facility, which it said would be the first commercial advanced nuclear fuel facility in North America. The $300 million investment will produce Triso fuel, and the fuel facility is being supported by the Department of Energy's Advanced Reactor Demonstration Program.

Triso-X submitted its license application to NRC in April 2022.

Work before licenses issued not unprecedented

Other fuel facilities have similarly started work before NRC licenses are issued. NRC issued a similar letter to Urenco subsidiary Louisiana Energy Services in 2012 when the company sought an expansion of the enrichment capacity of the site, now known as Urenco USA.

NRC said in the July 3 letter that agency inspectors will need to observe some construction activities carried out before the license is issued, especially activities involving structural steel and concrete as well as welding, piping, electrical and mechanical components.

However, the agency noted, no operations involving NRC-regulated nuclear material can take place until a license is issued and Triso-X has received a letter from the agency authorizing possession of licensed material.

— William Freebairn

Bulgaria reviewing US nuclear fuel design to replace Russian supply

- Bulgaria, like other countries, seeks to reduce reliance on Russia
- New fuel review typically takes five to six months
- Westinghouse fuel could be used as soon as 2024

Licensing work has begun on using non-Russian fuel for the first time at Bulgaria's Kozloduy nuclear plant.

On July 20, the Bulgarian Nuclear Regulation Agency, or BNRA, received a formal application from Kozloduy NPP, to authorize the use of a new fuel from US company Westinghouse, in the 1-GW Russian-designed Kozloduy-5, a VVER-1000 reactor.

The application was supplemented with over 80 documents, totaling more than 8,400 pages, primarily comprising technical documentation and safety analyses. "The licensing process for

this new nuclear fuel type starts with the submission of this application," the agency said in a statement.

During the initial stage, BNRA will verify whether all the necessary documents are in place and compliant with legal requirements. To keep the public informed, the agency created a dedicated page on its website, where it will provide updates about the Westinghouse fuel licensing process.

State-owned nuclear plant operator Kozloduy NPP operates the two-unit Kozloduy plant. TVEL, a subsidiary of the Russian state nuclear company Rosatom, has been the sole fuel supplier for the plant to date.

Since the Russian invasion of Ukraine in February 2022, many Eastern European operators of Russian-designed nuclear units have sought to diversify their fuel supply away from TVEL, which was in many cases the only licensed supplier for those reactors. The Robust Westinghouse Fuel Assembly, or RWFA, fuel design, was initially employed for the VVER-1000 units in Ukraine.

Kozloduy NPP and Westinghouse have signed a 10-year supply contract for fresh nuclear fuel supplies for the 1-GW Kozloduy-5, the US company said in a Dec. 22 statement. "The fuel will be supplied out of Westinghouse's fabrication site in Västerås, Sweden, and is the only fully independent alternative to Russian supply," the company said.

Nuclear fuel supplies will require an intergovernmental agreement between Bulgaria and the US.

"There is a high degree of readiness to sign an intergovernmental agreement with the USA for the supply of fresh nuclear fuel for Kozloduy-5, but first a consultation procedure with the European Commission must be completed," said Bulgaria's energy minister Rumen Radev. This procedure is required when nuclear energy transactions involve non-EU countries, Radev told the Bulgarian news agency BTA July 21.

Radev anticipates the European Commission procedures will conclude by early fall. The minister said in the statement that Westinghouse has already assured Bulgarian authorities that fuel deliveries will happen on time.

BNRA's fuel licensing procedures generally last five to six months, according to Radev's statement. He also noted that changing a nuclear fuel vendor is not unprecedented in the EU, as Westinghouse fuel assemblies are already in use in the Czech Republic and Ukraine.

Nuclear fuel supplies to Kozloduy NPP have not been suspended, and the contract with Rosatom expires in 2025, Radev said in a July 18 address to parliament, BTA reported. Westinghouse fuel will start to be used in April 2024, provided the regulator issues a license by then, Radev said.

— Vladimir Pekic

Canadian organization makes waste management recommendations to government

Canada's Nuclear Waste Management Organization has recommended that certain nonfuel high-level radioactive waste be disposed of in a deep geological repository and low-level radioactive waste place in near-surface disposal facilities.

"The integrated strategy is the first of its kind for Canada and is informed by more than two years of engagement with Canadians, Indigenous peoples, and waste generators and owners, as well as detailed studies of both technical considerations and international best practices," the organization said in an undated July statement.

On June 30 the recommendations were submitted to Minister of Natural Resources Jonathan Wilkinson for consideration, and the NWMO said its work in the siting process for a deep geological repository for used nuclear fuel continues and is separate from the development and considerations of the strategy.

The NWMO said it was asked to develop an integrated strategy for radioactive waste as part of the Canadian government's radioactive waste policy review. The organization said that while there are long-term disposal plans for the majority of the country's radioactive waste, gaps exists, particularly with some low, intermediate and nonfuel high-level wastes.

The NWMO recommended that low-level waste be put in near-surface disposal facilities, managed by waste generators and waste owners. Low-level waste mostly comes from power plants and medical, academic, industrial and other commercial applications of radioactive materials.

The organization recommended that intermediate-level waste and nonfuel high-level waste from medical isotope production be disposed of in a deep geological repository with management by the NWMO. "This recommendation would include a consent-based siting process," the statement said.

Intermediate waste includes used components such as filters, resins, and pumps from power plants, research reactors and medical isotope manufacturers, according to the recommendations.

The NWMO also said its integrated strategy includes a number of principles to support effective implementation of the recommendations, including obtaining through the siting process the consent of the local communities and Indigenous peoples in whose territory future facilities will be planned; the design of facilities should prioritize the protection of water; long-term caretaking should be established for disposal facilities; and the need "to take action now and not defer to future generations."

— Michael McAuliffe

IAEA says radioactive water discharge plans in Japan meet safety standards

An International Atomic Energy Agency safety review has concluded that Tokyo Electric Power Co.'s plans to release treated radioactive water from its Fukushima I plant into the Pacific are "consistent with IAEA safety standards," a July 4 IAEA report said.

The final report before the start of water discharge was delivered July 4 by Rafael Mariano Grossi, the IAEA director general, to Fumio Kishida, the Japanese prime minister.

The discharge "would have a negligible radiological impact on

people and the environment," the report also said.

It noted the water, stored at Fukushima I following the March 2011 accident at the plant, has been treated through an Advanced Liquid Processing System to remove all radioactivity, aside from tritium. Tepco said on its website that it had stored 1.33 million cubic meters (353 million gallons) of the treated water as of June 29.

The IAEA has said it will take Tepco an estimated 30 years to complete the releases.

Tepco plans to dilute the tritium concentrations in the water to below 1,500 becquerels per liter before discharge. Japanese nuclear power operators are allowed to release 60,000 becquerels per liter of tritium.

Grossi will visit Fukushima I July 5 and then visit South Korea between July 7 and 9 to discuss the contents of the report, Yoshimasa Hayashi, the Japanese foreign minister, said during a July 4 press conference after meeting Grossi.

Hirokazu Matsuno, chief cabinet secretary, said in a press briefing July 4 that the prime minister will soon make a final decision as to when Tepco can start discharges after ministers scrutinize the latest IAEA report.

Tepco said June 26 it had conducted a trial operation of the whole water discharge system June 12-26, alternately discharging fresh water and seawater through a tunnel under the seabed that is 1,030 meters (3,378 feet) long and 2.5 meters in width.

Nuclear Regulation Authority said June 30 its inspectors had completed three-days of pre-operational inspections of the system.

Professional fishermen remain opposed to the tritiated water discharges. In a June 22 statement, the National Federation of Fisheries Cooperative Associations said that it is "opposed to the Tepco plan."

The federation also said its members "seriously pay attention" to the Yen 50 billion ($347 million) fund created and managed by the Japanese government's Agency for Natural Resources and Energy to buy up Fukushima fish if prices on wholesale markets fall due to rumors of the fish being radioactively contaminated.

— Shota Ushio

UK government selects NNL, Japan's JAEA to develop gas-cooled reactor

The UK government's Department for Energy Security and Net Zero has selected the country's National Nuclear Laboratory and the Japan Atomic Energy Agency to implement the second phase of an ongoing project to develop a high temperature gas-cooled demonstration reactor, JAEA said in a July 19 statement.

The second phase includes basic design of the reactor and evaluation of its economic feasibility, and is scheduled to be completed by March 2025, JAEA said.

The UK department has earmarked GBP 15 million (about $19 million) for this phase, JAEA said. The third phase will consist of receiving permission for, constructing and operating the reactor in the early 2030s.

The first phase, in which JAEA also participated, was devoted to studies of the reactor concept from September to February.

The department also said NNL and JAEA will work in the second phase on development of coated particle fuel. In JAEA's 30-MWt HTGR at Oarai, near Tokai, which has operated periodically since its startup in 1998, the fuel is coated with four layers, including carbon and silicon carbide.

JAEA said on its website that the four-layer fuel coating would be more accident tolerant, capable of containing fission products and withstanding up to 1,600 degrees C (2,918 F). The highest temperature reached by the helium gas coolant, or product gas, at the reactor outlet would be less than 950 C, JAEA said.

— Shota Ushio

Skoda JS to supply spent nuclear fuel containers for CEZ's Temelin plant

Czech power company CEZ said in a July 7 statement that it had selected nuclear engineering and services company Skoda JS to supply it with spent fuel containers for its two 1,086-MW Temelin reactors in south Bohemia.

Skoda JS, the current supplier under a 2015 contract, was chosen following a public tender with the latest deal valued at "several billion" koruna, CEZ said in the statement. Additional financial details were not provided. CEZ acquired Skoda JS from Russian engineering group OMS in November.

CEZ explained in the statement that the Skoda JS containers will be able to store fuel supplied by Temelin's new fuel suppliers, US-based Westinghouse and French fuel supplier Framatome. The Czech company in April 2022 announced that Westinghouse and Framatome would supply Temelin's fuel starting in 2024 in a move to replace Russian supplier TVEL following that country's invasion of Ukraine.

"The possibility of storing fuel assemblies from different producers was one of the conditions of the latest tender," CEZ's nuclear power division director, Bohdan Zronek, said in the statement.

"The first deliveries [of containers] will take place from 2029," CEZ explained, adding that in total Skoda JS will provide 60 containers, at a rate of between two and six containers a year, under the new contract.

Skoda JS still requires authorization for use of its new containers from the Czech nuclear regulator, the State Office for Nuclear Safety, CEZ said.

Skoda JS General Manager Frantisek Krcek said in the statement that the new containers are broadly similar to those being supplied under the existing contract. "They are the same type of duel use containers, allowing both transport and storage. They differ only in some technical details," he said.

CEZ stores spent fuel at its two nuclear power plants, Temelin and the four-unit Dukovany. The current Temelin storage facility, in operation since 2010, has an overall capacity for 152 containers and currently holds 63 containers with between four and six new containers added every year.

— Chris Johnstone

US uranium producers restarting mines due to rising demand ...from page 1

said May 25.

Rosita has an annual capacity of 800,000 lb U3O8, with the potential to increase to 2,000,000 lb U3O8 a year, according to the company's website. Rosita was closed in 1999 due to depressed market prices. Modernizations and refurbishments began in July 2021.

EnCore also owns the Alta Mesa project in Texas, which is expected to resume production in first quarter 2024. Alta Mesa produced nearly 5 million lb U3O8 between 2005 and 2013, when production was put on standby due to low uranium prices, according to the company.

EnCore has said it has signed four long-term sales agreements since 2021, totaling 4.5 million lb.

Ur-Energy announced May 30 the successful startup of production at its Lost Creek ISR facility in Wyoming. Lost Creek's production will be sold into the company's remaining 2023 contracts in the second half of the year. Beginning in 2024, Ur-Energy has said its quantity under contract is about 600,000 lb annually.

Lost Creek, which produced between 2013 and 2021, had cut its output to almost zero due to market conditions. It has a capacity of 1.2 million lb per year but will target annual production of 600,000 lb initially, the company has said.

Energy Fuels Inc. announced May 9 it had made significant progress in preparing four of the conventional uranium and uranium/vanadium mines "including significant workforce expansion ... rehabilitation and development of surface and underground infrastructure." The company said it plans to recommence production at its mines and ISR facilities, starting this year.

The company owns conventional uranium/vanadium mines in Wyoming, Utah and Arizona including the Pinyon Plane mine, the Sheep Mountain project, the Henry Mountains complex, the Roca Honda project, the La Sal complex, the EZ complex, the Wate Project and the Whirlwind mine, as well as White Mesa uranium mill in Utah which restarted production in 2022.

Their ISR operations consist of the Hank project, Jane Dough project, Nichols Ranch mine and plant, the West North Butte project, North Rolling Pin and the Arkose Mining Venture, all facilities are located in Wyoming.

Energy Fuels also said it had secured three long-term uranium contracts with US utilities.

Uranium Energy Corp. announced July 18 it was in the process of restarting two ISR operations, Burke Hollow and Palangana, both in Texas.

Burke Hollow's inferred mineral resource is 7.09 million lb at a weighted average grade of 0.088% U3O8, according to UEC. Palangana is a past producing facility with an annual capacity of 2 million lb.

UEC also said it would be accelerating steps required to restart production at its Christenson Ranch ISR project in Wyoming, "enabling a faster restart." The facility was placed on standby in 2018 for care and maintenance.

"We expect a [global] 500 million pound gap, cumulatively, between production and current consumption by 2033," Scott Melbye, president of the Uranium Producers of America and executive vice president of Uranium Energy Corp., said in an interview July 20. "That's a half a billion pounds that is going to have to come from somewhere."

However, restarting production is not without risk, as was shown when Australia's Peninsula Energy announced July 19 that it would be delaying the restart of its Lance ISR operation in Wyoming, after the company that processes the operation's uranium ore unilaterally ended the processing contract after eight years.

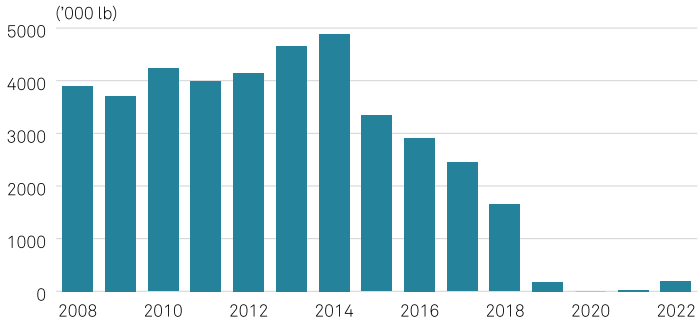
Peninsula Energy said in its statement that it will accelerate development of the Ross Central Processing Plant's resin processing and yellowcake production, during which it envisions "an approximate two-year period of third-party processing."

US U3O8 production low but rose year on year in 2022

US production of U3O8 in the first quarter of 2023 totaled 2,511 lb, 75% lower than first quarter 2022, the US Energy Information Administration said in its quarterly uranium production report released May 18.

US annual production peaked in 2014 at almost 4.9 million lb and then declined to a low of 21,000 lb in 2021, EIA said in its report.

US U3O8 production



Note: 2020 data not reported by EIA
Source: US Energy Information Administration

The US produced 194,000 lb in 2022, more than nine times the 21,000 lb reported to have been produced a year earlier, due to the restart of production at Energy Fuels' White Mesa uranium mill in Utah, EIA said in its annual US uranium production report May 31.

"Overall, for where the price of uranium is today, many US uranium projects are cost-competitive, especially when you add in the geopolitical risks you avoid by going with US production," Ashkeboussi said July 20.

The U3O8 price assessed July 20 by Platts was $56.20/lb. That represents a $10.20/lb, or 22.2%, year on year increase from the July 20, 2022, spot price of $46/lb.

"The spot price is at $56/lb now, which is great but it's still not at that level that really incentives a lot of production. I don't think

industry will turn on until we see the market above [$60/lb], but we're getting close," Melbye said.

— Mary catherine Hancock

New interest seen in reprocessing of spent fuel for advanced reactor use ...from page 1

enriched," Jackie Siebens, then-director of policy for advanced reactor developer Oklo, said June 13 at the American Nuclear Society's annual meeting. Oklo is developing a 15-MW sodium fast reactor design that it would deploy and operate, profiting from the sale of power from the units.

The company is planning to build a pilot-scale facility to reprocess spent fuel using electrorefining technology to meet the fuel needs of its reactors, said Siebens, who left the company at the end of June. Such a facility could be online by the end of the decade, Siebens added.

Oklo submitted a licensing project plan for the reprocessing plant to the US Nuclear Regulatory Commission in January. The company was part of $4.9 million project with US Department of Energy funding that seeks to convert up to 97% of spent uranium oxide fuel into a metal form.

Such facilities are coming sooner than most people think, Siebens added, noting that "the attitude to recycling has changed."

"We need both — we need fresh enriched fuel, but we need recycled too," she said.

Amy Roma, a partner with law firm Hogan Lovells and leader of its global energy practice, said there is renewed interest in reprocessing spent fuel and re-using recovered materials in advanced reactors.

"In the US there's been a significant shift in the conversation around recycling, including not calling it reprocessing," Roma noted during the same ANS meeting session.

There are misconceptions that reprocessing is not legal in the US, or that the Nuclear Regulatory Commission is unable to license a reprocessing facility, Roma said. Neither is the case. An executive order prohibiting reprocessing of US-origin spent fuel, dating back to the Gerald Ford and Jimmy Carter administrations, was reversed by President Ronald Reagan in 1981. The NRC has said that despite deciding to end an ongoing rulemaking to develop a new licensing process for such facilities, the agency has and could in the future license them under existing rules.

A growing number of advanced reactor developers in addition to Oklo are considering recycling spent fuel.

Moltex, which is developing a molten salt reactor for potential deployment in New Brunswick and elsewhere, is also seeking to reprocess material itself for fuel. The company said in March the Canadian government has expanded certain clean energy tax credits in the country to include facilities that recycle spent fuel.

Moltex has said it plans a "waste to stable salt" facility where spent fuel from the country's existing Candu reactors could be processed to produce fuel salt for its waste-burning stable salt reactor. Its process is more cost-effective than traditional reprocessing, the company says on its website, because its molten salt reactor design, which transmutes actinides during operation, can accept a stream of fuel that can be less pure and requires less refining than reprocessing conventional reactor fuel.

Italian reactor startup Newcleo has said it wants reprocessing and fabrication of mixed-oxide fuel to be key elements of its plans for a series of lead-cooled fast reactors.

US-based start-up Curio has said it plans to build a reprocessing facility that will profit by selling the radioisotopes recovered. This will include re-use of the material in advanced reactor fuel. as well as in thermoelectric generators used for spacecraft, company officials have said.

On its website Curio said it using technology that does not rely on organic solvents and reagent used in previous large-scale reprocessing plants and which result in a new waste stream. The output of the company's process could be used to fabricate metallic, oxide or molten salt fuel, it noted.

CEO Ed McGinnis said in an interview in February 2022 that the Curio design is a chemistry-based process that does not separate out transuranics, unlike the traditional Purex, or plutonium-uranium extraction process, used in most past and current reprocessing plants. McGinnis said the design will use proven reprocessing processes such as fluorination and pyroprocessing in the Curio recycling plant.

"We're seeing significant private sector interest in developing new waste disposal options, including recycling," Roma said.

— William Freebairn