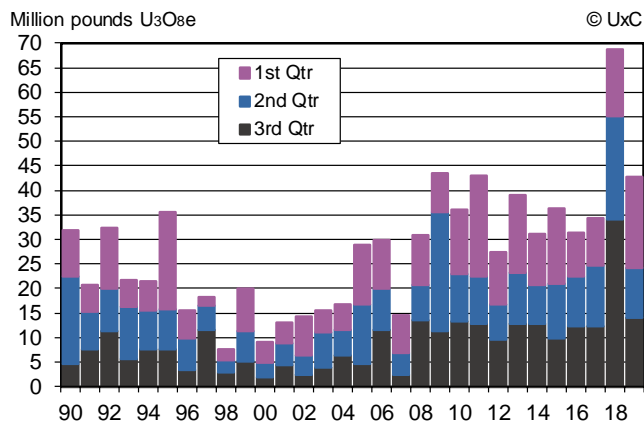


Third Quarter Spot Uranium Review

While the third quarter (Q3) of 2019 did not set all-time records as reported in the same period of 2018, the quarter experienced moderate activity and slightly higher-than-average volume levels. However, Q3 2019 was generally characterized by lackluster price movements. Coming off June's very slow market with low volume, the quarter also posted the lowest monthly number of transactions for the year in August. And, while the 232 investigation was put behind us in mid-July, which resulted in a slight increase in the number of transactions late in the month, a projected increase in overall activity that some market participants were expecting did not emerge. Instead, other political issues continued to play a role in shaping, or in this case, potentially curtailing a revival in spot activity. As a result, spot prices fell and generally remained flat during the quarter. Outside of one notable exception, spot prices floated around the \$25 level for most of the quarter. Below are some highlights of the third quarter spot uranium market.

Price – The spot uranium price started the third quarter at \$24.55 per pound, and while down slightly from June's \$24.70 month-end price, the spot price quickly increased during July to peak in the middle of the month at \$26.15 per pound – the highest point for the year since the end of March. During the months leading up to July, market participants abstained from the market to await the result of the 232 investigation, and prices flattened as spot activity slowed. As the projected announcement date approached, the spot price started increasing a few days in advance and through the Monday following the White House announcement. However, as quick as the price increased, the market responded

Comparison of Quarterly Spot Volumes



Ux Price Indicators					
Weekly Ux U₃O₈ Price[®] (10/28/19)		\$24.00 (-\$0.60)			
Ux 3-Yr U ₃ O ₈ Price		\$28.00	Ux 5-Yr U ₃ O ₈ Price		\$31.50
Month-end (10/28/19) *Calculated values					
U ₃ O ₈	Spot	\$24.00	Conversion	NA Spot	\$21.00
	Spot MAP*	\$24.73		NA Term	\$17.75
	3-Yr Forward	\$28.00		EU Spot	\$20.75
	5-Yr Forward	\$31.50		EU Term	\$17.50
	Long-Term	\$32.00			
UF ₆ Spot	NA Price	\$84.00	SWU	Spot	\$47.00
	NA Value*	\$83.71		Long-Term	\$49.00
	EU Value*	\$83.46		EUP	NA Spot*
		NA Term*	\$1,341		

with yet another quick downturn in price to \$25.25 by the next Monday. July ultimately ended at \$25.50 per pound. And, even though spot volumes remained moderate, with multiple larger-sized transactions increasing Q3 volumes from lower Q2 levels, overall

Ux Weekly Uranium Spot Prices



spot activity and active demand was rather limited during much of the third quarter. As a result, pricing during August and September remained in a narrow band in the low \$25 range with one exception. During the third week of September, following the WNA Symposium, new spot demand entered the market from multiple entities, including producer purchases, and the spot price peaked at \$25.80 in September before ending the month at \$25.65 per pound.

While last year at this time there were also pricing differentials with respect to delivery location, this year a differential is still present but there is a shift in how the most recent range developed. In 2018, it was noted that although transaction prices were reported in a narrower range during the third quarter, purchases at Cameco were able to command a general

premium for as much as \$0.50 per pound, although that premium fell somewhat near the end of September 2018. At that time the majority of the transactions booked during the quarter were for ConverDyn and Orano delivery. For Q3 2019, the primary demand and much of the transacted activity shifted to Cameco and Orano, and declining activity at ConverDyn resulted in a discount associated with offers for that location. Later in the quarter, as overall activity fell, offers for Orano delivery started reflecting similar discounts to ConverDyn, with Cameco remaining the preferred delivery location.

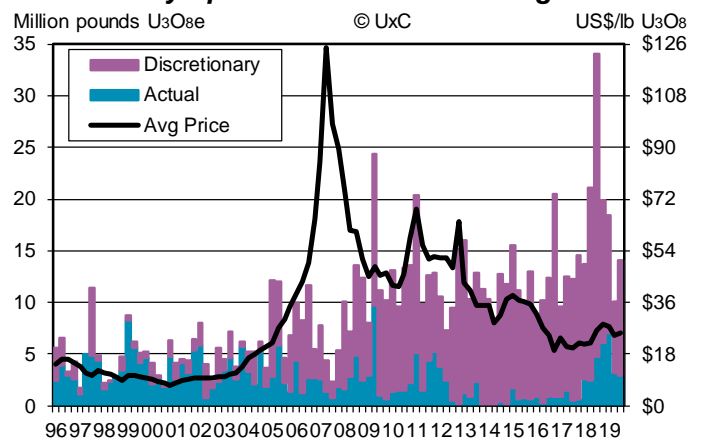
Volume – A total of 68 spot transactions were reported as awarded during the third quarter involving 14.1 million pounds U₃O₈ equivalent, up from the second quarter’s 10.1 million pounds U₃O₈e (57 transactions), but down from the first quarter’s 18.4 million pounds (101 transactions). As shown in the chart on the previous page, the year-to-date total for the first three quarters of 2019 is 226 transactions involving 42.7 million pounds U₃O₈e, down from the same period of 2018’s 329 transactions involving 69.8 million pounds U₃O₈e and record setting pace posted this time last year. However, while this year’s activity falls well behind last year’s pace, it is still on track as one of the highest spot volume years in history.

Although the number of transactions rose from 57 in the second quarter to 68 in the third quarter, the average delivery size also increased to 207,000 pounds compared to the 178,000-pound average transaction size during the second quarter. Looking at average delivery lead time, the first quarter averaged 2.1 months, the second quarter increased to 2.8 months, and the third quarter slipped back to 2.3 months. Similar trends were witnessed during the same time period in 2016, 2017, and 2018, and although the current annual delivery average of 2.3 months has slipped from 2018’s slight increase to 3.8 months, it is more similar to 2016’s 2.4 and 2017’s 2.5-month annual averages.

Form – Spot activity involving enriched uranium product (EUP) continues to be limited as there have been only three spot transactions reported thus far this year, one of which occurred during the third quarter, accounting for just over 3% of the overall uranium annual volume. UF₆ activity also picked up slightly during Q3 accounting for 15% of the quarterly volume (2.2 million pounds U₃O₈e), and moving the overall annual volume share to just over 10%. However, U₃O₈ remains the preferred form accounting for about 82% of the third quarter volume (11.6 million pounds U₃O₈).

Buyers & Sellers – While producer purchases remained active during Q3, this group’s spot purchase volume has declined from an average of over 4.2 million pounds U₃O₈ per quarter from Q2 2018 through Q1 2019 to just over one million pounds over the past two quarters, and a 9% share for the third quarter. Utility activity picked back up, moving from 3.2 million pounds in Q2 to over 4.8 million pounds in Q3 (a 34% share). Intermediaries and others represented the largest third quarter share at about 57% of the overall volume. It should be noted that both investment and hedge funds are included in this group, but both have also played a smaller purchase role for the quarter and most of the year compared to

Quarterly Spot Volume vs. Ux Average Price



Uranium Spot Market Statistics

(Million pounds U₃O₈ equivalent)

	2016			2017					2018					2019			
	3Q	4Q	Yr.	1Q	2Q	3Q	4Q	Yr.	1Q	2Q	3Q	4Q	Yr.	1Q	2Q	3Q	Yr.
Total Volume	12.4	20.5	51.9	9.6	12.4	12.3	14.5	48.9	13.7	21.1	34.0	19.9	88.7	18.4	10.1	14.1	44.1
# Transactions	67	100	309	70	80	91	115	356	97	103	129	113	442	101	57	68	237
Leadtime (mths)	2.1	2.4	2.8	1.6	3.2	1.9	2.9	2.5	3.4	5.2	3.1	3.5	3.8	2.1	2.8	2.3	2.2
Form																	
U ₃ O ₈ Total	10.3	16.4	43.5	9.5	10.0	11.5	12.5	43.5	10.9	19.6	31.0	17.2	78.8	17.1	8.2	11.6	38.3
UF ₆ Total	2.1	3.6	7.9	0.2	2.5	0.8	1.6	5.0	1.6	1.5	2.5	0.4	5.9	1.1	1.2	2.2	4.4
EUP Total	0.0	0.5	0.5	0.0	0.0	0.0	0.4	0.4	1.2	0.0	0.5	2.3	4.0	0.2	0.7	0.4	1.3
Need																	
Actual	0.8	0.9	2.8	0.8	1.5	0.5	0.7	3.5	2.5	2.5	4.7	6.1	15.8	7.1	3.1	2.9	13.2
Discretionary	11.5	19.6	49.1	8.8	11.0	11.8	13.8	45.4	11.2	18.6	29.3	13.7	72.9	11.3	7.0	11.2	30.1
Method																	
On-market	1.2	1.2	3.8	1.0	1.0	0.8	1.4	4.1	2.0	1.9	2.0	3.0	8.9	2.7	2.6	5.1	10.5
Off-market	11.1	19.3	48.1	8.7	11.5	11.5	13.2	44.8	11.7	19.2	32.0	16.8	79.8	15.7	7.5	9.0	32.8

2018. On the sales side, third quarter volume was more traditionally split between intermediaries/others at just over 73% and producers at just under 27%, and almost identical splits as posted in the first and second quarters.

Fourth Quarter Outlook – Based on current and expected demand, spot activity is likely to continue to be limited, although volume could remain more moderate as has been the case over the past quarter. As the October 10th deadline for the Nuclear Fuel Working Group report submission to President Trump was extended by 30 days, most market participants have shifted their near-term focus to whether Iran nuclear-related waivers in the U.S. are renewed by the end of the month. In the meantime, the market remains extremely quiet as most buyers have continued to curtail almost all demand interest. Until the next round of demand emerges, spot prices are likely to remain under downward pressure or flat.

News Briefs

EU agrees to extend deadline for Brexit until January 31; PM seeks December 12 election

Today (Monday), during an ambassadors' meeting, EU leaders reached an agreement to give the UK until January 31, 2020 to exit the European Union. The previous deadline for Brexit to be completed was this Thursday. Although UK Prime Minister Boris Johnson had vowed to get the UK out of the EU by October 31, he was required by Parliament to seek a three-month extension. Under the extension, the UK has the option of leaving the EU on either December 1 or January 1 if a withdraw agreement is ratified in time by both the EU and UK Parliaments.

Johnson is now seeking approval from the UK Parliament for an early general election on December 12. Parliament is expected to vote on his request later today, but two-thirds of its members must agree for an election to be held. Two opposition parties, the Liberal Democrats and the Scottish National Party, have proposed a general election on December 9. Their proposal would only need the support of a majority of Parliament and Johnson has indicated that he will support the December 9 proposal if his own bid for a general election is unable to gain approval. Earlier in October, Johnson reached an agreement for Brexit with the EU, but Parliament has so far been unwilling to ratify the deal.

Eletronuclear shortlists Russian, Chinese, and French companies for Angra 3 completion

On October 23, *Reuters* reported that Eletronuclear President Leonam Guimaraes said the Brazilian nuclear utility has narrowed the field for partners to complete the partially-built Angra 3 nuclear power plant located outside of Rio de Janeiro, Brazil. The company will now continue negotiations to finish Angra 3 with China National Nuclear Corp. (CNNC), France's EDF, or Russia's Rosatom. Guimaraes added that Eletronuclear will decide by the end of this year

Industry Calendar

- December 5-6, 2019
Nuclear Industry Summit Latin America 2019
PEAK Events
<http://nuclearlatin.org/>
Buenos Aires, Argentina
- January 14-15, 2020
Applications for SMRs and Advanced Reactors
Strategic Communications
<http://www.stratcoms.com/SMRsARs2020/>
Dubai, UAE
- January 22, 2020
NEI Fuel Supply Forum
Nuclear Energy Institute
<http://www.nei.org/Conferences>
Washington, DC, USA
- March 4-5, 2020
Nuclear Power Plants Expo & Summit
Republic of Turkey MENR
<https://www.nuclearpowerplantsexpo.com/>
Pullman Istanbul Airport Hotel, Istanbul, Turkey
- April 20-22, 2020
World Nuclear Fuel Cycle 2020
NEI/WNA
<https://www.world-nuclear.org/events/world-nuclear-fuel-cycle.aspx>
Stockholm, Sweden
- June 22-25, 2020
UxC Nuclear Fuel Training Seminar
UxC
https://www.uxc.com/p/products/uxc_seminar.aspx
InterContinental Buckhead, Atlanta, GA, USA
Details are available at:
<https://www.uxc.com/c/data-industry/Calendar.aspx>

whether to establish a subsidiary joint venture company to complete the reactor or if the vendor will become a minority shareholder in the project. "We are looking for an international partnership to invest in the completion of Angra 3 and that partner would own part of the plant until the end of its life," he said adding that the unit is expected to cost \$3.7 billion to complete.

Guimaraes said that Angra 3 is 70% finished and 80% of the nuclear reactor equipment has been bought. Eletronuclear is currently spending ~\$6.2 million per year on maintenance and insurance for the construction site and nuclear technology. He added that while U.S.-based Westinghouse and France's Framatome were also initially interested in the project, Guimaraes said those companies are reactor vendors and the company is currently interested in finding an integrated partner to complete Angra 3. It should be noted that EDF is the majority owner of Framatome, which would likely also be involved in the project if EDF ends up as the selected partner by Eletronuclear. South Korea's KEPCO and China's State Power Investment Corp. (SPIC) both showed interest in the project to complete Angra 3, but were not interested in exploring a partnership.

ASN rules that EDF reactors with Saint-Marcel components may continue operating

France's Nuclear Safety Authority (ASN) announced October 24 that it will allow EDF to continue operating reactors fitted with questionable welds in nuclear pressure equipment. In early September (*UxW33-37*), EDF notified ASN of a manufacturing discrepancy regarding welds to nuclear equipment, mainly steam generators fabricated at Framatome's Saint-Marcel plant. Framatome said it found that the processes implemented at the Saint-Marcel facility led to a loss of control on temperatures throughout the circumference of 18 steam generators manufactured and installed since 2008. EDF and Framatome's own investigations later determined the affected welds do not adversely affect the components' fitness for service, thus and would not require immediate action (*UxW33-38*).

In its latest release, ASN said it agreed with both EDF and Framatome's contention that the affected components will not hinder operations at the reactors in question, but the regulator did order EDF to carry out characterizations of the affected welds during the units' scheduled 2020 maintenance and refueling outages. Furthermore, EDF is to initiate a work program to characterize the operations carried out at the time of manufacture and the phenomena observed for the different components, which will be used to feed associated testing and investigations. Finally, ASN asked Framatome and EDF for a thorough analysis of the root causes of the welding issues.

However, despite the fact that reactors with welding anomalies will not be taken offline, EDF has revised its previous forecast for its annual nuclear output in France for 2019 downward from 395 TWh to a new estimate of approximately 390 TWh. The company stated that with multiple ten-year reactor inspections "the 2019 industrial campaign was hailed as being particularly complex." Outages at multiple reactors in France including Flamanville 2 and Paluel 4 will be extended. Flamanville 1 has been offline for emergency diesel generator maintenance work, and weather conditions have also contributed to lower output at other reactors in the country. Despite the downward revision in output, EDF has not changed its existing financial target for the year. Additionally, its expectations for 2020 remain unchanged.

Finally, it deserves noting that while the French regulator has concluded that the issue of possible weld anomalies in Saint-Marcel components will not require shutdowns of reactors in France, several units outside of France are also believed to be affected. Whether regulators in other countries, such as Finland or Switzerland, will follow ASN's lead remains to be seen.

Ohio anti-nuclear subsidies referendum group misses deadline; appeals to federal court

It was widely reported that Ohioans Against Corporate Bailouts (OACB), a group funded largely by oil & gas interests along with environmental advocacy groups, missed the

October 21 deadline to collect and submit enough signatures to put the controversial House Bill 6 (HB 6) rescission referendum on the November 2020 election ballot. HB 6 was passed through the Ohio state legislature and signed by the Governor in July 2019 to award a subsidy to FirstEnergy Solutions' (FES) two marginal Ohio nuclear plants at Davis-Besse and Perry, thereby preventing their premature shutdown. OACB said they did not collect enough signatures by the October 21 deadline to qualify HB 6 for a referendum, adding that their petition drive was met with heavy opposition in the form of ads, mailers, and canvassers from pro-HB 6 opposition groups. "The bottom line is that the smear campaign and the lies and deceit of the House Bill 6 supporters were successful in confusing Ohioans and discouraging them from signing our petition," said OACB spokesman Gene Pierce to *Statehouse News Bureau*. OACB had gathered only 221,092 signatures by the deadline, well short of the 265,774 signatures required to put HB 6 up to a vote.

OACB sought a temporary injunction on the October 21 deadline to allow for an additional 38 days to gather the remaining signatures needed to put HB 6 on the ballot. The group submitted that injunction to federal U.S. District Court Judge Edmund A. Sargus, who ruled on October 23 in a 29-page summary that he rejected OACB's request for additional time, noting that the group submitted the matter to a federal court – not the Ohio state court as it should have. "The court has jurisdiction to decide cases and controversies arising only under federal law," the judge wrote. "As the parties agree, this court does not have jurisdiction over any claim that the secretary of state or the Ohio General Assembly has violated the referendum provisions of the Ohio Constitution." Therefore, OACB spokesman Pierce said in a statement, "We're disappointed, but we're exploring our options with the Ohio Supreme Court."

Spokesman for the pro-HB 6 Ohioans for Energy Security Carlo LoParo called the court's decision and lapsed deadline to gather the required signatures "a victory for the new law." HB 6 offers \$150 million in subsidies beginning in 2021 to FirstEnergy Solutions to keep the Davis-Besse and Perry nuclear power plants online. FES previously stated it would close those two plants in 2020 if they were not awarded a subsidy. HB 6 was particularly contentious as it also eliminates requirements for Ohioans to invest in energy efficiency programs and weakens overall renewable energy-focused policies in the state.

UK Secretary of Business and Energy defers planning consent for Wylfa Newydd

It has been widely reported that UK Secretary for Business, Energy, and Industrial Strategy Andrea Leadsom has postponed a decision on whether to issue a development consent order for the proposed dual-reactor Wylfa Newydd nuclear power station on the Welsh island of Anglesey. Although Leadsom had previously been expected to approve the development consent order by October 23, she is now seeking out

more information before making a decision, which is now expected by March 31. Issues Leadsom has expressed concern over include the impact on protected locations, construction noise, biodiversity, and the possibility of flooding.

Leadsom now expects to decide whether to issue the development consent order within six months and has set a deadline of December 31 for stakeholders to provide more information. In addition to more information from the applicant, she is also seeking opinions from Natural Resources Wales, the Anglesey County Council, and the UK Office for Nuclear Regulation. “The applicant and other interested parties will be given until 31 Dec 2019 to respond to our request for further information,” said a spokesman for the Department of Business, Energy, and Industrial Strategy as quoted by the *Daily Post*. “This will then be assessed, potentially including public consultation, and a final decision taken on or before 31 March 2020.”

In January, Hitachi, the parent company of Wylfa Newydd developer Horizon Nuclear Power, suspended the project due to cost concerns and an inability to reach an agreement with the UK government. Horizon previously stated that the decision on whether to grant the consent order would heavily influence the project’s future. The company has expressed disappointment in the delay. “We have seen the letter from the Secretary of State regarding our Development Consent Order for Wylfa Newydd and are now reviewing it in detail,” said a spokesman for Horizon as quoted by the *Daily Post*. “Clearly we are disappointed not to have had the determination today but will now work towards addressing the points it raises.”

RASU JSC and Framatome-Siemens consortium sign contract for Paks-II equipment

On October 23, Rosatom subsidiary, Rusatom Automated Control Systems JSC (RASU JSC), announced that it and a consortium comprised of France’s Framatome and Germany’s Siemens signed an agreement to manufacture, deliver, and commission automated process control systems for Units 5 & 6 of the Paks nuclear power plant (Paks-II) in Hungary. The agreement envisions the Framatome-Siemens consortium will manufacture and supply the equipment for automated process control systems, as well as conduct its certification and qualifications, including compliance with information security requirements. RASU JSC is responsible for the technical management and integration of work at all stages of the project, including the supervision of equipment and systems of process control systems.

The four existing reactors at the Paks nuclear power plant in Hungary provide approximately 40% of the country’s electricity supply. The Paks-II project envisions the construction of two VVER-1200s to comprise Units 5 & 6 at the site. In June (*UxW33-25*), Rosatom reported that a ceremony was held at the Paks-II construction site to commemorate the start of erecting the first buildings at the proposed plant site. Hungary’s government has stated that if the Paks-II expansion

fails, the country will face serious power supply problems within 10 years.

Report finds that Czech Republic needs more reactors

Recently, the Minister of Industry and Trade for the Czech Republic, Karel Havlicek, stated that the nation needs to build new reactors at the Temelin nuclear power plant in addition, to a new unit at the Dukovany plant in order to reduce dependency on imported electricity. The Czech Republic’s current energy policy calls for increasing nuclear power’s share of electricity generation from the current level of approximately 30% to an eventual level of 46% to 58%. According to a statement from the Ministry of Trade and Industry, the nation will need additional nuclear capacity in order to help compensate for a phase-out of its coal plants “We are taking concrete steps for this,” said Havlicek. “In accordance with European legislation, we are preparing the so-called strategic reserves for the years 2025-2035. Above all, however, we have a clear timetable for the completion of nuclear sources, according to which we intensively and continuously prepare the construction of a new block of the Dukovany nuclear power plant. And over the next five years, discussion must be opened over other blocks in Temelin... The strategic construction of new nuclear units in the Czech Republic cannot be abandoned.”

SNC-Lavalin consortium wins turnkey nuclear engineering contract in Romania

On October 28, SNC-Lavalin subsidiary, CANDU Energy Inc., and its consortium partner Ansaldo Nucleare SPA were awarded a C\$13.9 million contract for engineering services for performing condition assessments of systems, structures, and components for Unit 1 of the Cernavoda nuclear power plant in Romania. The project represents a key step for Cernavoda’s operator, SNN, in preparation for the reactor’s life extension program. “The condition assessment services award is a great example of our commitment to support SNN throughout this critical preparatory stage as they ramp up for the refurbishment of Unit 1,” said SNC-Lavalin President, Nuclear Sandy Taylor. “We have brought the original designers of Cernavoda Unit 1 together through our strategic partnership with Ansaldo, which is key to the success of this project.”

Cernavoda 1 is a CANDU 6-type reactor and the first CANDU operational in Europe. The unit is expected to be shut down in 2026 for two years of refurbishment, which will extend its life by an additional 30 years. The project’s feasibility study is expected to be completed in 2021.

Saskatchewan government considering nuclear power to replace fossil fuel capacity

According to an article from the *Saskatoon StarPhoenix*, the government of the Canadian province of Saskatchewan is considering the development of nuclear power to replace

older fossil fuel plants. In response to a growing concern over emissions, the construction of small modular reactors (SMRs) is among the options being considered to provide baseload electricity over the long-term. “Nuclear power has virtually no emissions relative to (liquefied natural gas), which has some emissions, relative to carbon capture and storage, which does have some emissions. It really starts to change the conversation,” said Saskatchewan’s premier, Scott Moe. Saskatchewan Power Corp. has set a goal of attaining a 40% emissions reduction below its 2005 level within the next ten years, and Scott Moe sees the potential for emissions to be reduced even further if nuclear power is added to other low emissions possibilities now under consideration. However, the province has not yet determined a schedule for when new reactors could be built or the cost that would be involved.

Orano inks €100 million supply services deal with EDF

Orano reported October 21 that it signed a contract worth €100 million with EDF to supply services for its Paluel, Civaux, and Gravelines nuclear power plants in France until 2024, with an option of two additional years. In conjunction with Samsic and ARIS, Orano is responsible for all industrial logistics to support Paluel and Civaux with radiation protection, waste management and conditioning, and equipment management, etc. Orano will also partner with ARIS at Gravelines to install and remove thermal insulators and scaffolding at four of the site’s six units during maintenance and refueling outages.

Orano Group Dismantling and Services Director Alain Vandercruyssen said, “This contract is a reflection of our ambition to grow our services offering for the nuclear industry. The trust placed in us by EDF, the world’s leading nuclear operator, is a mark of recognition of the daily expertise demonstrated by our teams in the nuclear sector, whether in terms of site logistics or maintenance of sensitive equipment.”

Rosatom holds first Russia-Africa Summit and Economic Forum in Sochi

Rosatom hosted the first ever Russia-Africa Summit and Economic Forum in Sochi, Russia on October 23-24. The event featured representatives from all 54 countries of the African continent. Russian President Vladimir Putin and Rosatom Director General Alexei Likhachev took part in several bilateral meetings during the Forum and signed several nuclear cooperation agreements with many African nations. Key agreements, among several others, include a nuclear science and technology center construction deal and an Intergovernmental Agreement on cooperation in the peaceful uses of atomic energy between Russia and Ethiopia.

October 29 deadline for U.S. Iran sanctions waiver renewal looms

The nuclear fuel market is anxiously awaiting news regarding a decision due Oct. 29 by the Trump Administration on

Canadian Monthly Uranium Shipments

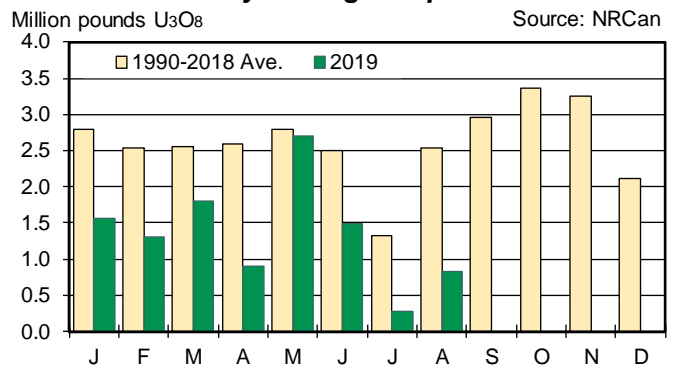
(million pounds U₃O₈)

	2011	2012	2013	2014	2015	2016	2017	2018	2019
J	2.24	2.53	1.59	2.66	2.77	3.60	2.81	6.07	1.56
F	2.12	2.03	2.02	3.70	1.42	2.75	2.06	1.39	1.31
M	1.04	2.19	2.38	2.77	1.87	2.06	2.22	0.96	1.80
A	1.57	1.47	1.53	1.77	3.07	3.10	2.98	2.44	0.90
M	2.48	1.50	0.28	1.38	2.43	2.54	3.18	2.19	2.71
J	2.32	1.99	0.14	0.39	0.64	2.51	5.18	1.82	1.49
J	0.36	0.80	0.88	1.75	2.06	3.09	1.07	1.18	0.28
A	2.06	1.33	1.09	2.32	3.94	3.79	0.61	0.12	0.83
S	2.47	2.50	3.42	1.09	4.52	3.10	1.87	1.76	
O	2.39	3.48	3.22	2.59	5.13	4.40	2.64	1.59	
N	1.58	3.21	1.37	3.79	3.40	3.88	2.90	1.74	
D	2.80	1.73	2.60	1.21	3.26	1.91	1.97	1.71	
	23.44	24.75	20.51	25.43	34.52	36.75	29.50	22.97	10.86

Note: Values reported are of mine shipments and do not reflect deliveries to end users.

Source: Natural Resources Canada

2019 Canadian Monthly U Shipments vs. Monthly Average Shipments



whether a renewal of the current waiver of sanctions on entities involved in commercial nuclear trade with Iran is granted. If the waiver is not renewed, companies, such as Russia’s Rosatom, that are active in Iran, including supplying fuel and services to the Bushehr nuclear power plant, could be sanctioned by the U.S. government, leading to a possible complete ban on U.S. commerce with Rosatom. U.S. utilities currently purchase roughly 20% of their enriched uranium requirements from Russia. Rosatom subsidiaries TENEX and Uranium One could both be affected by resulting Iran-related sanctions, although the implementation of any sanctions by the U.S. Departments of Treasury and State remain unclear at this time.

German government confirms URENCO-TENEX tails re-enrichment contract

In response to a question by German Member of Parliament Hubertus Zdebel of *Die Linke* party regarding recent news reports of depleted uranium (DU) shipments by rail from URENCO’s Gronau plant to Russia, Bundestag State Secretary Florian Pronold responded that Germany’s Ministry of Economic Affairs, Innovation, Digitalisation and Energy (MWIDE) approved a contract signed in 2018 by URENCO Enrichment Co. Ltd. (UEC) and its European subsidiaries in Germany, Netherlands, and UK with Tradewill Ltd., a subsidiary of Russia’s TENEX in relation to this issue. The original contract is said to involve the shipments of DU (below 0.50

²³⁵U w/o) in the amount of 6,000 tonnes for shipment in the years 2019 and 2020. However, in 2019, URENCO informed MWIDE of an amendment to this contract that involves an additional combined 6,000 tonnes of DU to be shipped from all three URENCO European plants to Russia over the period 2019-2022. The contract is said to call for resulting upgraded (i.e., re-enriched) UF₆ from Russia to be shipped back to URENCO and the remaining waste product (i.e., lower assay DU) to remain in Russia for final disposal.

COMINAK to cease production activities in March 2021

Compagnie Minière d'Akouta (COMINAK) in Niger reported October 23 that reserve depletion of the Akouta mine will lead to the project's shutdown in March 2021. COMINAK, which has been operating the Akouta, Akola, and Eba uranium deposits in Arlit, Niger, is divided between SOPAMIN (Niger, 31%), Orano (France, 34%), OURD (Japan, 25%), and ENUSA (Spain, 10%). The project partners stated that the decision to close the mine is based on economics. "Faced with very high operating costs and the sharp drop in uranium prices, COMINAK has been running a deficit since 2017 despite the implementation of savings plans," read COMINAK's press release, adding that it has informed the Ministry of Mines of Niger about the shutdown decision.

In May (UxW33-19), Niger's Minister of Mines Hassane Barazé cautioned that the outlook for Orano's majority-owned COMINAK mine "... is very difficult, very worrying, and it could eventually close." Barazé noted the spot price is in a range of 35,000-36,000 CFA per kgU (~US\$23.06-US\$23.71 per pound U₃O₈) while production costs at COMINAK range from CFA 49,000-50,000 per kgU (~US\$32.24-US\$32.93 per pound U₃O₈). In 2018, however, Orano reportedly agreed to increase its purchase price by a few euros, but this was still insufficient at a reported 45,000 CFA per kgU (US\$29.64 per pound U₃O₈). In 2018, Orano's COMINAK mine produced 2.9 million pounds U₃O₈, down from nearly 3.5 million pounds U₃O₈ in 2017.

Vimy completes equity raising for A\$3.9 million

Vimy Resources Ltd. announced Oct. 23 that it raised gross proceeds of A\$3.9 million through a placement to institutional and sophisticated investors. Morgans Corporate Ltd. and Euroz Securities Ltd. acted as joint lead managers and joint bookrunners together with Bacchus Capital Advisers Ltd. who acted as financial adviser to the placement in respect of international investors. Proceeds from the capital raising will be used to progress the Alligator River and Mulga Rock uranium projects, as well as to strengthen Vimy's balance sheet.

Azincourt amends terms of Option to acquire Peruvian uranium-lithium projects

Azincourt Energy Corp. announced October 22 that it reached an agreement with 1177865 B.C. Ltd. to amend the option under which Azincourt has the right to acquire a series

of three uranium-lithium exploration projects in the Picotani volcanic field in Puno, Peru. The projects cover a combined area of 7,400 hectares of prospective exploration targets for volcanic hosted supergene/surficial uranium and lithium on the Picotani Plateau, consisting of the Escalera project comprised of six concessions totaling 5,500 hectares, the Lithuania concession covering 899 hectares, and the Condorlit concession covering 999 hectares.

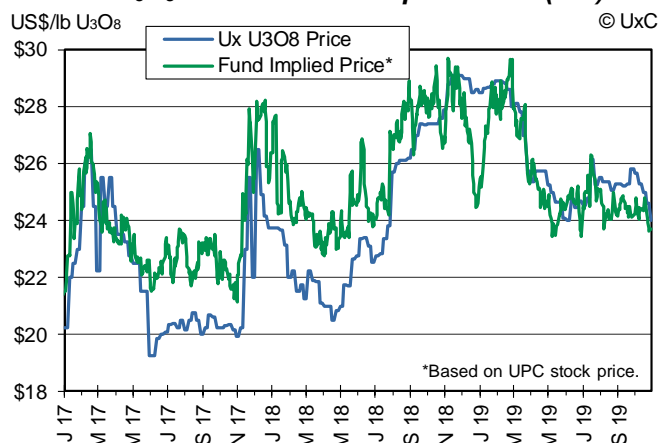
Under the terms of the amendment, Azincourt has agreed to issue the Optionor 4,000,000 common shares in lieu of a cash payment of C\$150,000, and the requirement to incur exploration expenditures of at least C\$250,000 in the initial 12 months of the Option. Also, the Optionor is entitled to receive a further 1,000,000 common shares in accordance with the existing terms of the Option. The amendment will allow the company to retain control of the project, while conserving available capital for its planned 2019-2020 winter work program at the East Preston uranium project, located in the western Athabasca basin in northern Saskatchewan, Canada.

Uranium Royalty Corp. files preliminary prospectus for IPO

On October 28, Uranium Royalty Corp. (URC) announced that it filed a preliminary prospectus with the securities regulatory authorities in each of the provinces and territories of Canada, other than Quebec, for a proposed initial public offering (IPO) of 13,340,000 units of the company at C\$1.50 per unit for gross proceeds of C\$20,010,000. Each unit is comprised of one common share of URC plus one common share purchase warrant, which entitles the holder to purchase one common share at an exercise price of C\$2.00 per share for a period of five years from the date of issuance. The IPO will be managed by a syndicate of agents including Haywood Securities, BMO Capital Markets, and TD Securities, among other co-agents.

URC, headed by CEO Scott Melbye, is a pure-play uranium royalty company focused on gaining exposure to uranium prices by making strategic investments in uranium interests, including royalties, streams, debt, and equity investments in uranium companies, as well as through holdings of physical uranium.

Ux U₃O₈ Price vs. Fund Implied Price (FIP)



The Market

Uranium Spot & Forward Market

This week, many market participants are conducting face-to-face meetings at NEI's International Uranium Fuel Seminar in Nashville. And while normally the market tends to see increased spot activity between the September WNA and October NEI conferences, and sometimes a further increase going into November, the market has uncharacteristically almost ground to a halt this year. Spot demand seems to have evaporated since the beginning of the month, and even attempts by multiple sellers to entice buyers back to the market with attractive pricing (regardless of location) have been met with only limited serious interest.

However, given the recent price reductions by sellers, multiple transactions were booked last week with pricing well under the \$25 level, and essentially each subsequent deal being done at a slightly lower level. Based on this recent activity as well as currently available bids and offers, the Ux U₃O₈ Price falls to \$24.00 per pound, down \$0.60 for the week and down \$1.65 for the month. With this latest weekly decline, the Ux U₃O₈ Monthly Average Price (MAP) for September slips to \$24.73 per pound, down \$0.40 for the month. The Ux 3-Year and 5-Year U₃O₈ Forward Prices also fall to \$28.00 and \$31.50 per pound, respectively (see chart on page 11).

While overall spot activity has been limited this month, new demand emerged last week as a non-U.S. utility submitted its formal request for up to 400 tU₃O₈ (~880,000 pounds U₃O₈) with Cameco or Orano delivery in January through March 2020. Offers are due December 6. A non-U.S. utility is nearing a selection for 220 tU (~572,000 pounds U₃O₈) with delivery in 2020. Another utility is seeking spot delivery

of uranium contained in EUP. Several other utilities are also likely to enter the market over the near-term for a combination of both spot and mid-term delivery. Furthermore, a few U.S. utilities are considering options to purchase backup material, including EUP, related to the potential disruptions of Russian deliveries due to the Iran sanctions.

UxC Broker Average Price

The UxC Broker Average Price (BAP) started the week on Tuesday unchanged at \$28.62 per pound. However, the indicator's flat trend soon eroded through the remainder of the week, ultimately finishing Friday at \$24.23, down \$0.27 on the day. Today's UxC BAP is \$24.10 per pound, down \$0.13 from Friday and down \$0.52 from last Monday's \$24.62. The BA Bid is \$23.88, down \$0.74 from last week's \$24.25 and the BA Offer is \$24.32, down \$0.68 from last Monday's \$25.00.

Fund Implied Price (FIP)

Fund Implied Prices (FIP) started the week off down \$0.28 to \$24.00 per pound. By week's end on Friday, the FIP trended further south to \$23.63, down \$0.12 on the day. Today's FIP is \$23.70, up \$0.07 on the day but down \$0.58 from last Monday's \$24.28. The latest FIP information can be found in the chart on page 7.

U₃O₈ Futures Market

The CME Group futures market for uranium remained dormant as no new contract volume was booked during the week. Pricing was negative as the strip fell by an average of 1% by Friday. With no new volume, the 2019 annum total remains unchanged at 10,601 contracts (2,650,250 pounds U₃O₈). Total open interest is also unchanged for the week at 2,406 contracts (601,500 pounds U₃O₈).

UxC Market Statistics

Monthly (Oct)	Spot		Term	
	Volume	# Deals	Volume	# Deals
U ₃ O ₈ e (million lbs)	1.4	11	0	0
Conv. (thousand kgU)	W	1	0	0
SWU (thousand SWU)	0	0	0	0
2019 Y-T-D	Spot		Term	
	Volume	# Deals	Volume	# Deals
U ₃ O ₈ e (million lbs)	44.1	237	>68,000	26
Conv. (thousand kgU)	4,497	33	>22,000	18
SWU (thousand SWU)	933	8	>22,000	12

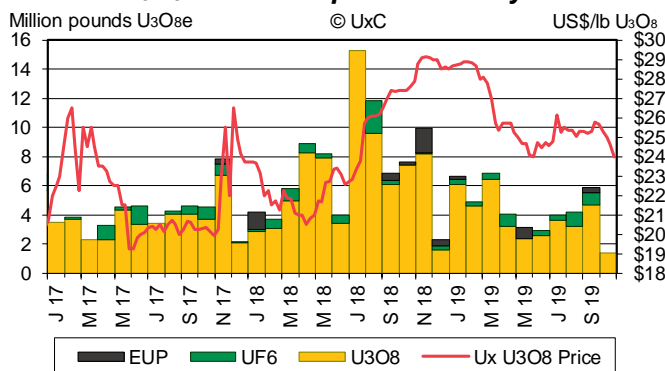
Key: N/A – Not available. W – Withheld due to client confidentiality.

UxC Leading Price Indicators

Three-month forward looking price indicators, with publication delayed one month. Readings as of Sept 2019.

Uranium (Range: -17 to +17)	+1 [up 1 point]
Conversion (Range: -16 to +16)	+7 [unchanged]
Enrichment (Range: -18 to +18)	+2 [up 1 point]

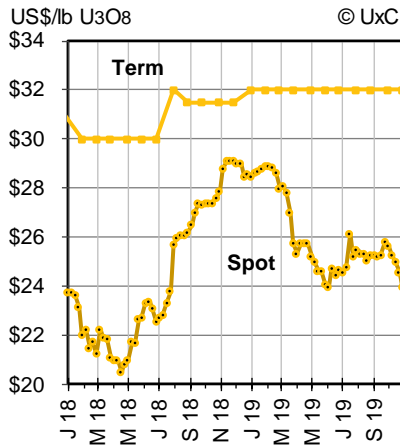
Ux U₃O₈ Price vs. Spot Volume by Form



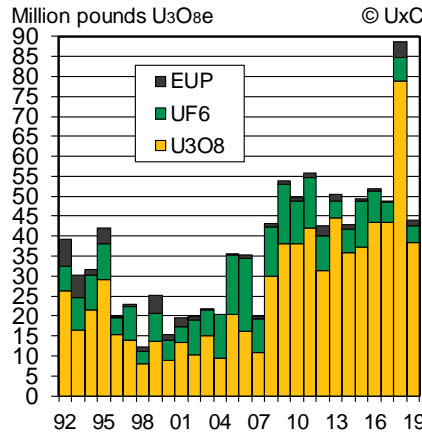
Old Ammunition

A couple came to the police department, wanting to dispose of some ammunition. They handed the desk officer a wooden box and said that it contained two shells an uncle had given them as souvenirs from World War II. "We didn't know what to do with them," the woman explained. "So all these years, we've kept the shells in the bottom drawer of the china cabinet, away from our children." The officer assured the couple he'd dispose of the ammunition safely. But when he took one out of the box the top came off, revealing a strange black substance. His suspicions aroused, the officer removed the top of the other shell and found a hard white substance. There was no doubt about it. They were souvenir salt and pepper shakers.

Ux U₃O₈ Prices



Annual Spot Uranium Volumes



Ux Price Indicators (€ Equiv[†])

Weekly (10/28/19) 1 US\$ = .90072€		
Ux U₃O₈ Price	\$24.00	€21.62
Ux 3-Yr Forward	\$28.00	€25.22
Ux 5-Yr Forward	\$31.50	€28.37
Mth-end (10/28/19) 1 US\$ = .90072€		
U₃O₈	Spot	\$24.00 €21.62
	Spot MAP [†]	\$24.73 €22.27
	3-Yr Forward	\$28.00 €25.22
	5-Yr Forward	\$31.50 €28.37
	Long-Term	\$32.00 €28.82
Conversion	NA Spot	\$21.00 €18.92
	NA Term	\$17.75 €15.99
	EU Spot	\$20.75 €18.69
	EU Term	\$17.50 €15.76
UF₆ Spot	NA Price	\$84.00 €75.66
	NA Value*	\$83.71 €75.39
	EU Value*	\$83.46 €75.17
SWU	Spot	\$47.00 €42.33
	Long-Term	\$49.00 €44.14
EUP	NA Spot**	\$1,148 €1,034
	NA Term**	\$1,341 €1,208

Uranium Term Market

Although several utilities remain active either awaiting or evaluating term uranium offers, no new term demand or contract awards were reported over the past week. While there was an increase in opportunities for sellers to make term offers over the past month, most of the activity still focused on fixed-price options with mid-term delivery. And, while both the 3- and 5-year forward indicators fell this month, there is still a reluctance by producers to adjust base-escalated offers, and in fact a higher range of the starting price in base-escalated offers have been reported. However, based on limited data and given the existing lower end of the current range, the Ux Long-Term (LT) U₃O₈ Price is unchanged for the month at \$32.00 per pound.

Still active in the market is a non-U.S. utility that is out for five reloads of components/EUP with delivery in 2022-2028. Offers are due November 7. A U.S. utility is evaluating offers based on its request for one million pounds U₃O₈ with delivery in the 2023-2026 time period. Another U.S. utility is evaluating offers for components/EUP with delivery in 2020-2022. A non-U.S. utility is evaluating offers for up to two million pounds U₃O₈ with delivery from 2022 to 2024. Another non-U.S. utility is evaluating final offers for up to 55% of requirements as EUP or components with delivery over the 2022-2026 time period. A third non-U.S. utility is reviewing budgetary offers prior to its formal request for just over 2.7 million pounds U₃O₈e as UF₆/EUP, including options, with delivery in 2022-2025. Several other utilities are also evaluating potential market entrance, although more have noted interest in mid-term delivery.

Conversion

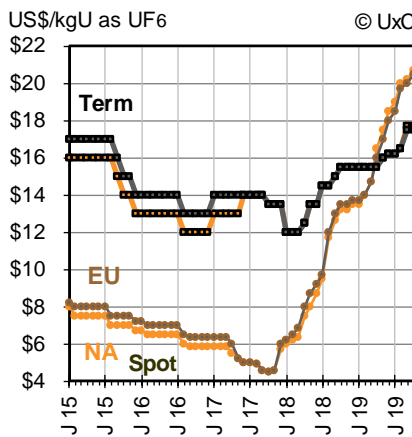
The spot conversion market has been quiet for much of the month, but it experienced some limited activity last week. At the same time, several utilities are quietly seeking spot/near-term delivery of either EUP, UF₆, or conversion services.

Although no new formal demand has been reported, one spot conversion transaction was booked over the past week. Following activity in the uranium market,

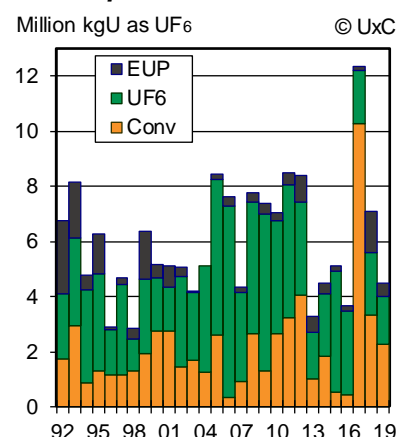
the more illiquid spot conversion market has been slightly more active this year as market participants have been posting both bids and offers over the past several months. Price movements have also followed each round of demand and completed transactions. This month is not different and the spot Ux North American (NA) and European (EU) Conversion Prices both increase by \$0.75 this month to \$21.00 and \$20.75 per kgU, respectively.

For term conversion, offers are due November 7 to a non-U.S. utility that is seeking five reloads as components/EUP with delivery in 2022-2028. A U.S. utility is evaluating offers for components/EUP with delivery in 2020-2022. Another U.S. utility is evaluating term offers for delivery in 2021-2023, plus options through 2025 involving just over one million kgU including optional years. A non-U.S. utility is evaluating offers for EUP or components totaling up to 55% of its requirements with delivery in 2022-2026. Another non-U.S.

Ux Conversion Prices



Annual Spot Conversion Volumes



utility is reviewing budgetary offers involving over one million kgU as UF₆ (including options). Based on the most recent activity, the Ux Long-Term (LT) NA and EU Conversion Prices are unchanged for the month at \$17.75 and \$17.50 per kgU, respectively.

UF₆

Although the spot U₃O₈ price fell sharply during the second half of the month, UF₆ offers have been slower to react to this most recent downturn and have tended to better track the upward movements in the spot conversion market. As a result, the Ux NA UF₆ Price slips this month by \$2.75 to \$84.00 per kgU. The calculated Ux NA and EU UF₆ Values come in at \$83.71 and \$83.46 per kgU, respectively.

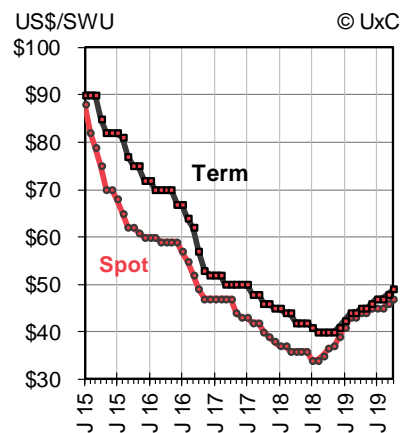
Enrichment & EUP

After picking up somewhat during September, spot enrichment activity has once again been quieter over the past month. Although one utility is seeking SWU or EUP and others are considering near-term supply. U.S. utilities are also starting to show market interest given concerns that the Iran nuclear-related waivers in the U.S. are not renewed by the end of the month. In the meantime, available spot supply has been limited, and while still enough to meet what little spot demand has entered the market this year, pricing has continued to be under slow upward pressure. As such, the spot Ux SWU Price increases to \$47.00 per SWU, up \$1 for the month.

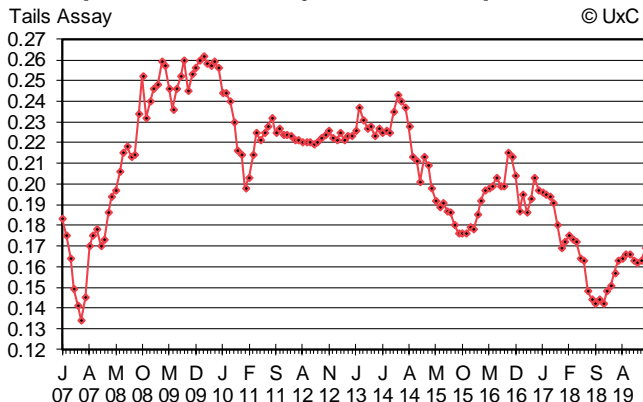
In the term enrichment market, a non-U.S. utility is seeking offers (due November 7) based on its request for five reloads as components/EUP with delivery in 2022-2028. A U.S. utility is evaluating offers for components/EUP with delivery in 2020-2022. A non-U.S. utility is evaluating offers for up to 55% of its requirements as EUP or components with delivery in 2022-2026. Another non-U.S. utility is reviewing budgetary offers for up to 730,000 SWU with delivery in 2022-2025. As the market awaits the next round of offers to be made, term pricing remains under slow upward pressure. As a result, the Ux Long-Term (LT) SWU Price increased by \$1 this month to \$49.00 per SWU.

Although both the SWU price and conversion price increased during September, with the noted decline in the U₃O₈ price for the month, the optimal tails assay based on spot indicators increases to 0.169%.

Ux SWU Prices



Optimal Tails Assays Based on Spot Prices



Calculated Enriched Uranium Product (EUP) Values at Various Tails Assays Current Optimal Tails: 0.169%					
Tails	0.15%	0.20%	0.25%	0.30%	0.35%
FtoP	7.754	8.415	9.219	10.219	11.496
StoP	8.801	7.690	6.871	6.231	5.710
EUP\$	\$1,063	\$1,066	\$1,095	\$1,148	\$1,231

Calculations based on Ux spot indicators using a 4.50% product assay.
 FtoP: Feed to Product ratio. StoP: SWU to Product ratio.
 EUP \$: US\$ per kgU of enriched UF₆.
 EUP \$ = (UF₆ Price * FtoP) + (SWU Price * StoP)

Ux Price Indicator Definitions

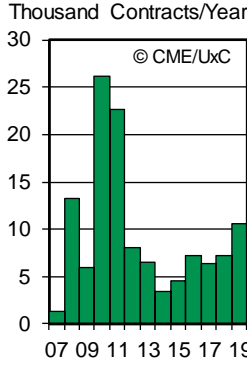
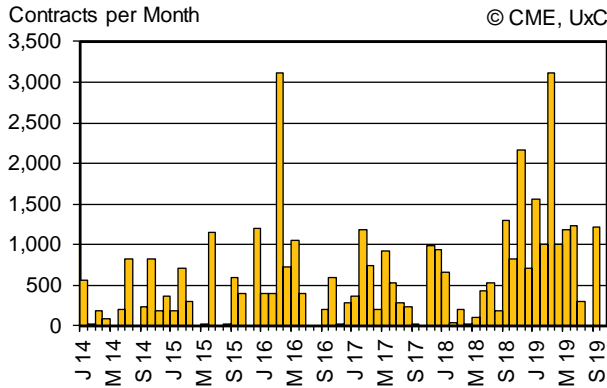
The Ux Spot Prices indicate, subject to the terms listed, the most competitive offers available for the respective product or service of which UxC, LLC (UxC) is aware, taking into consideration information on bid prices for these products and services and the timing of bids and offers as well (with a Monday cut-off time of 2:30pm Eastern Time). The Ux U₃O₈ Price[®] (Spot) includes conditions for delivery timeframe (≤ 3 months), quantity (≥ 100,000 pounds), and origin considerations, and is published weekly. †The Ux U₃O₈ Monthly Average Price (Spot MAP) represents the average of all weekly Ux U₃O₈ Prices for the month. The Ux 3-Year and 5-Year U₃O₈ Forward Prices reflect UxC's estimate of prices for U₃O₈ delivery 36 and 60 months forward taking into account market activity and other indicators, using the same quantity and origin specifications as the Spot indicator. The Ux LT U₃O₈ Price (Long-Term) includes conditions for escalation (from current quarter), delivery timeframe (≥36 months), and quantity flexibility (up to ±10%) considerations. The Ux Conversion Prices consider offers for delivery up to twelve months forward (Spot) and base-escalated long-term offers (Term) for multi-annual deliveries with delivery in North America (NA) or Europe (EU). The Ux NA UF₆ Price includes conditions for delivery timeframe (6 months), quantity (50-150,000 kgU), and delivery considerations. *The Ux NA and EU UF₆ Values represent the sum of the component U₃O₈ (multiplied by 2.61285) and conversion spot prices as discussed above and, therefore, do not necessarily represent the most competitive UF₆ spot offers available. The Ux SWU Price (Spot) considers spot offers for deliveries up to twelve months forward. The Ux LT SWU Price (Long-Term) reflects base-escalated long-term offers for multi-annual deliveries. **The Ux Spot and Term EUP Values represent calculated prices per kgU of enriched uranium product based on a product assay of 4.50% and a tails assay of 0.30%, using spot and term Ux NA and appropriate spot and term price indicators and are provided for comparison purposes only. All prices, except for the weekly spot Ux U₃O₈ and Forward Prices, are published the last Monday of each month. The Ux Prices represent neither an offer to sell nor a bid to buy the products or services listed. †The Euro price equivalents are based on exchange rate estimates at the time of publication and are for comparison purposes only. (Units: U₃O₈ = US\$ per pound, Conversion/UF₆: US\$ per kgU, SWU: US\$ per SWU, EUP: US\$ per kgU)

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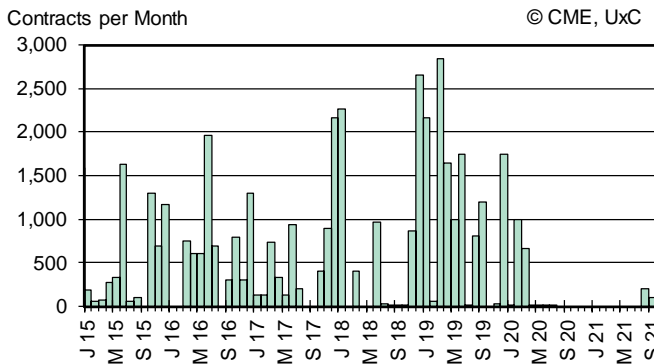
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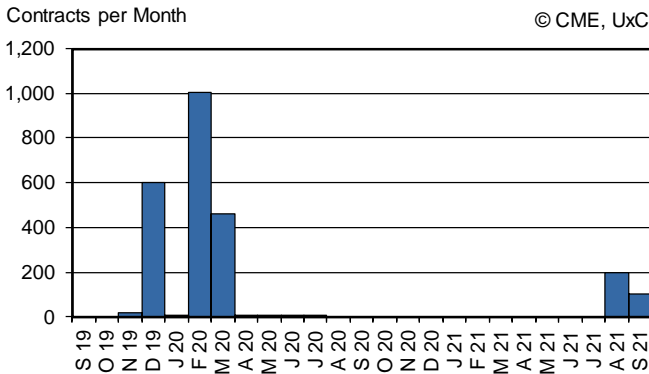
CME/NYMEX UX Futures Activity Total Contracts by Transaction Month, by Transaction Year



Total Contracts by Settlement Month



Open Interest by Settlement Month

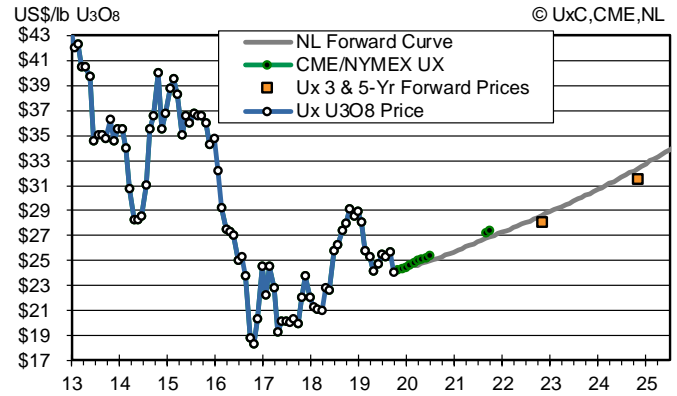


CME Uranium U₃O₈ (UX) Futures

Activity as of October 25, 2019

Settlement	Price	Volume	Open
Jun 2018	\$22.55	963	N/A
Jul 2018	\$25.70	25	N/A
Aug 2018	\$26.20	6	N/A
Sep 2018	\$27.30	12	N/A
Oct 2018	\$27.90	12	N/A
Nov 2018	\$29.10	874	N/A
Dec 2018	\$28.50	2,657	N/A
Jan 2019	\$28.90	2,168	N/A
Feb 2019	\$28.00	55	N/A
Mar 2019	\$25.75	2,845	N/A
Apr 2019	\$25.25	1,646	N/A
May 2019	\$24.10	1,000	N/A
Jun 2019	\$24.70	1,752	N/A
Jul 2019	\$25.50	14	N/A
Aug 2019	\$25.30	804	N/A
Sep 2019	\$25.65	1,200	N/A
Nov 2019	\$24.20	32	16
Dec 2019	\$24.30	1,745	602
Jan 2020	\$24.40	3	3
Feb 2020	\$24.60	1,003	1,003
Mar 2020	\$24.75	660	460
Apr 2020	\$24.95	5	5
May 2020	\$25.10	5	5
Jun 2020	\$25.20	6	6
Jul 2020	\$25.35	6	6
Aug 2021	\$27.20	200	200
Sep 2021	\$27.40	100	100
From May 2007		Totals: 123,195	2,406

Ux U₃O₈ Price vs. CME/NYMEX Forward UX Price Curve



UxC Broker Average Price (BAP) Definition

The **UxC BAP[®]** (Broker Average Price), subject to the terms listed, is a calculated average mid-point of bid and offer prices as supplied to UxC by participating brokers. The participating brokers are Evolution Markets and Numerco Limited (the "Brokers"). Data posted by the Brokers are kept confidential and will not be published or made available independently. The Broker data are subject to verification by UxC, LLC (UxC), which compiles and reports the UxC BAP. In order to have a sufficient number of data points and to represent submissions by all of the Brokers, the UxC BAP includes the best bids and offers reported up to a three-month forward period. This period is consistent with the three-month delivery period for offers considered in the determination of the **Ux U₃O₈ Price[®]**. On a daily basis with a cut-off time of 2:30 pm Eastern Time, the Brokers submit their best bids and offers over a forward three-month period through a secure system. From these postings, UxC separately calculates the UxC Broker Average (BA) Bid and the UxC Broker Average (BA) Offer prices. The UxC BAP is a simple mid-point average of the **UxC BA Bid** and **UxC BA Offer** prices. Other Broker data collected include lot volume on a per offer basis. The UxC BAP is published on a daily basis and is made available to subscribers through email updates and UxC's Subscriber Services website.

