

Industry Note

Equity Research

April 1, 2020

Metals & Minerals

Uranium Weekly: Mine Suspensions Expanding

Ux Consulting's (UxC) spot price indicator has increased by US\$3.15/lb to US\$27.40 over the past week, an increase of ~13%. Spot activity surged higher, with 26 transactions completed for ~2.8mm lbs U3O8. Mine closures have moved to the forefront, and we suspect that the market is beginning to focus on the possibility that near-term supply could be much tighter.

In an interesting move, UxC lowered its month-end term price to \$31/lb (from \$32/lb) — the first change in the term price since December 2018. The move looks odd in the face of the sharply higher spot price over the past two weeks. Although we believe that UxC's March month-end term price reflects previous transactions, it would seem that these transactions were completed before the various mine closure announcements within the past week. Therefore, it would seem possible that the March month-end term price does not reflect current market conditions. In fact, UxC notes in its comments that with recent market shifts and supply developments, utilities may shift back towards base-escalated pricing.

Following Cameco's decision to place the Cigar Lake mine on care and maintenance for four weeks a week ago, several more uranium operations have been affected by the COVID-19 crisis. Namibia has announced restrictions, including minimizing mining operations, which has resulted in the Rossing and Husab mines discontinuing operations for 21 days. ERA has maintained its production guidance for its Range mine, but noted that increasing travel restrictions could eventually affect production. We estimate that the production impact to-date (assuming that mine closures are not extended) will lower 2020 mine production by ~2.4mm lbs, or ~1.7% of unaffected 2020 forecast primary production. So far, Kazakhstan has not reduced uranium production, but with major cities now in lock-down, the potential for reduced output from the world's largest primary uranium producer is increasing.

We believe that in-situ recovery (ISR) uranium production in Kazakhstan will be a key driver behind uranium price volatility as the COVID-19 crisis continues to unfold. Kazakhstan produces ~41% of global primary supply, and its in-situ leach operations could continue to provide production via residual leaching (albeit declining), even if minimally staffed and well-field activity is curtailed. That being said, we believe that further mine closures or production slowdowns (particularly in Kazakhstan) could drive utilities, producers, and financial players to reassess procurement strategies.

We have not updated our price deck at this time — but further or extended mine curtailments present upside risk to our forecasts. We are currently projecting an average spot price of US\$25.13/lb in 2020 and US\$27.00/lb in 2021. Our long-term price (starting in 2025) is US\$45/lb.

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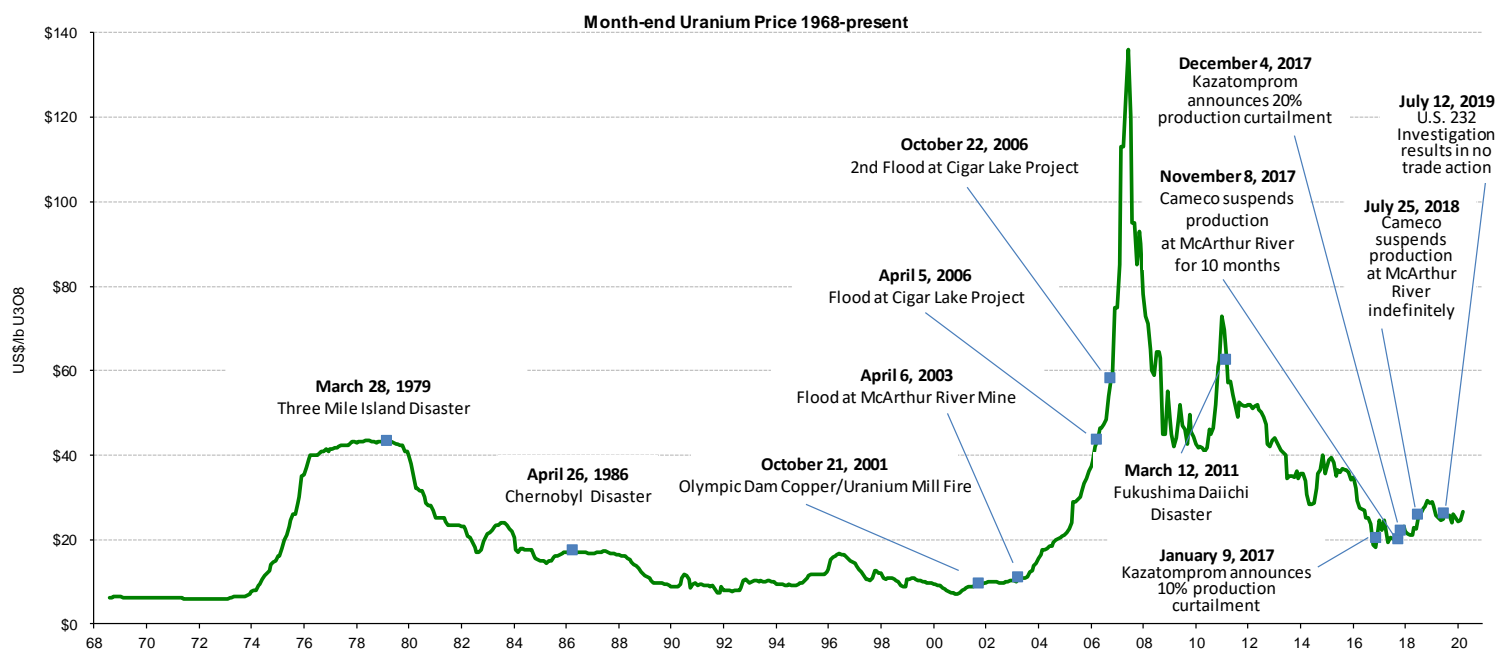
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Exhibit 1. Uranium Mine Suspension Tracker

Operation	Company	Location	Annual Production (mm lbs)	Percent of Global Annual Mine Production	Suspension	Potential Lost Production (mm lbs)
Cigar Lake	Cameco/Orano	Canada	18	12.5%	28 days	1.5
Rossing	CNNC/CGN	Namibia	4	2.8%	21 days	0.25
Husab	CNNC/CGN	Namibia	10	6.9%	21 days	0.6
Ranger (1)	ERA	Australia	3.1	2.2%	n/a	n/a
Kazakh ISR (2)	Kazatomprom	Kazakhstan	59	41.0%	n/a	n/a

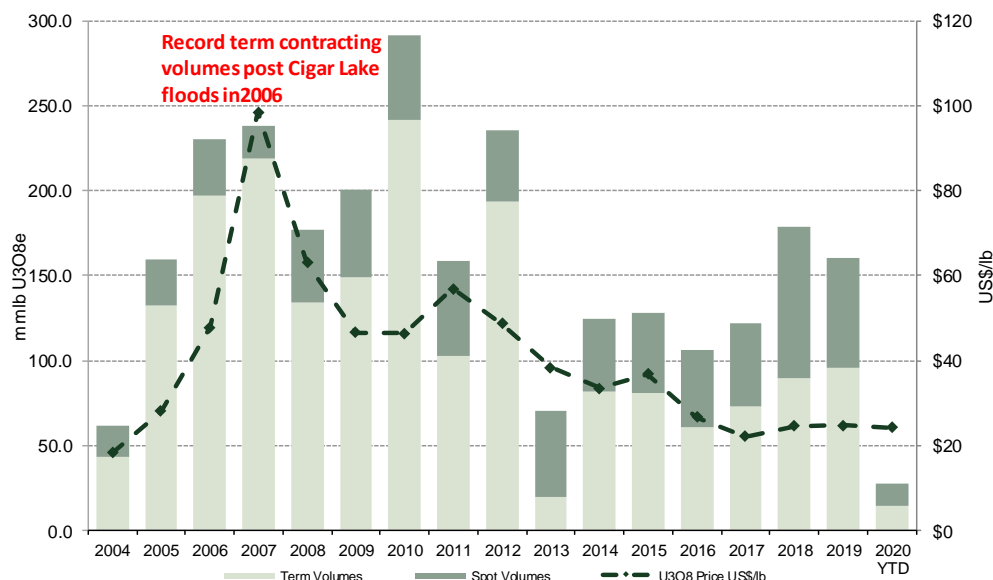
Notes:
 (1) ERA has maintained 2020 production guidance at 2.65-3.53 mm lbs U3O8, but travel restriction could impact production
 (2) Kazatomprom noted that it could suspend production at one or more of its ISR operations in the event of a worsening scenario
 Source: Company reports, UxC, TD Securities Inc. estimates

Exhibit 2. Spot and Term Uranium Prices (US\$/lb)



Source: UxC, companies, TD Securities Inc.

Exhibit 3. Term Contracting Hit Record Levels Following 2006 Cigar Lake Floods



Source: UxC, TD Securities Inc.

Industry News

Georgia Power successfully places Vogtle 4 containment vessel top (Source: UxC)

- On March 27, Southern Company subsidiary Georgia Power reported the successful lifting and placement of the containment vessel top of Unit 4 at the Vogtle nuclear power plant in Georgia.
- The containment vessel is a high-integrity steel structure that houses critical plant components, and the latest placement milestone occurs approximately one year after the same component was set atop Vogtle 3.
- Following this milestone, Georgia Power said that the overall twin AP1000 unit Vogtle expansion program is about 84% complete. The utility announced no changes in the regulator-approved in-service dates of November 2021 and 2022 for Vogtle 3 & 4, respectively.

Opinion poll on Japan’s nuclear power sector shows slightly positive trend (Source: UxC)

- The Japan Atomic Industrial Forum Inc. (JAIF) announced on March 25 that the Japan Atomic Energy Relations Organization (JAERO) released the result of its latest nationwide public opinion poll on nuclear power to understand changes in Japanese public opinion towards nuclear energy.
- The latest survey was conducted in October 2019 and included citizens aged 15 to 70 across the country, with 1,200 responses received.
- When asked what Japan should do regarding nuclear power in the future energy mix, 49.4% of respondents said that it should be discontinued gradually, followed by those who said that they did not know, at 22.7%.
- Meanwhile, 11.3% of respondents held positive views about nuclear power. JAIF reported that the survey showed an increase for the third straight year of those who support an increase in nuclear energy (2.0%) with those who support the pre-Fukushima status quo (9.3%). In addition, respondents who want nuclear power to be discontinued immediately totalled 11.2%, a figure that has declined since 2016.

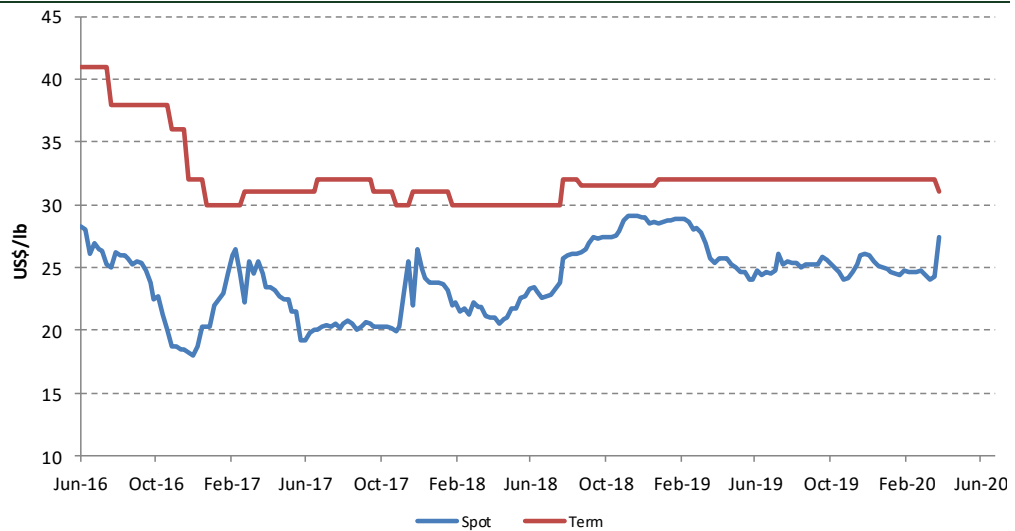


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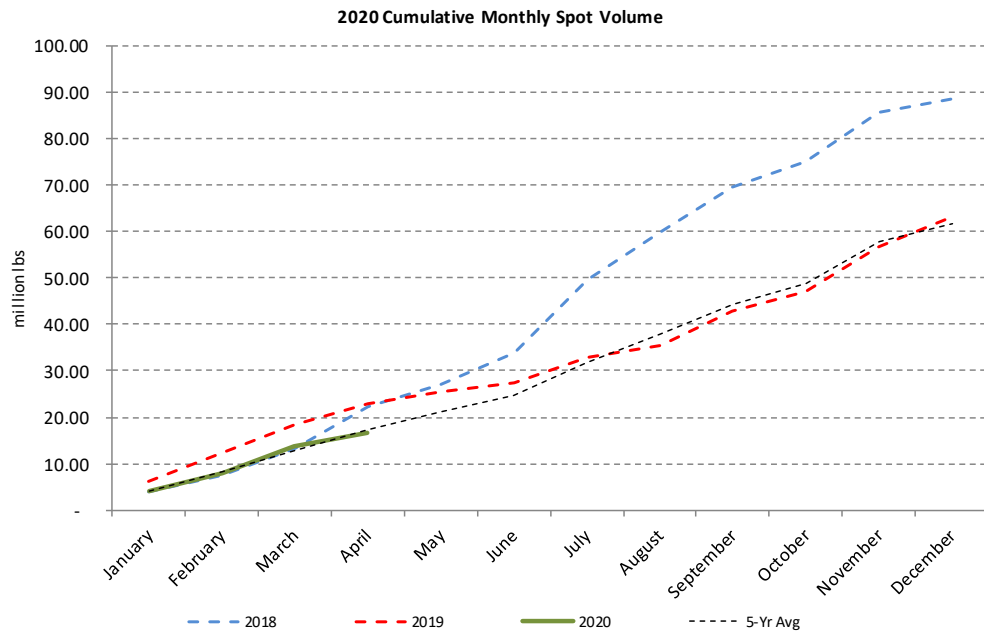
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Exhibit 4. Spot and Term Uranium Prices (US\$/lb)



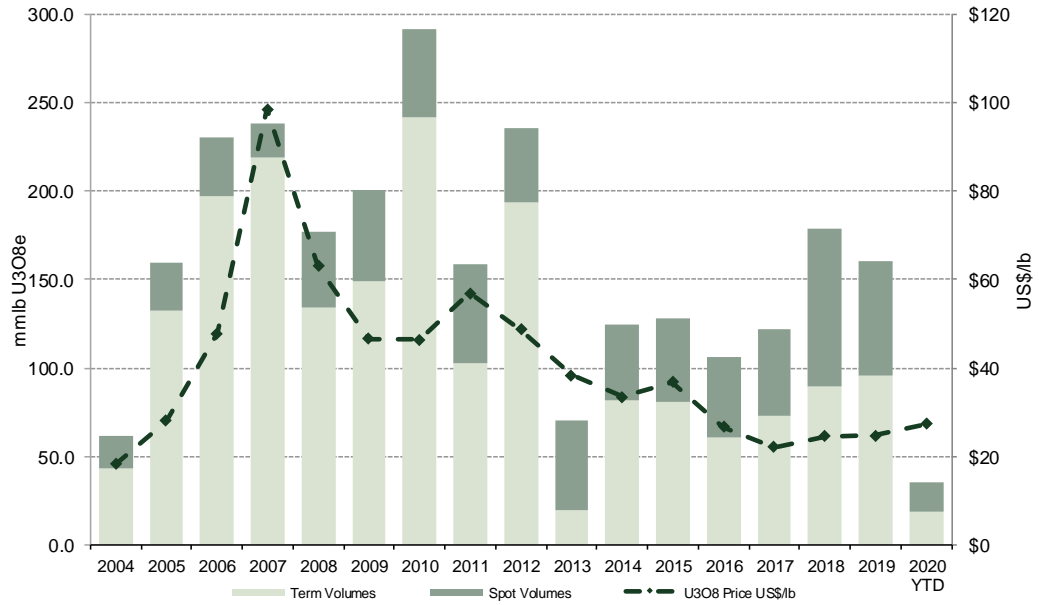
Source: UxC

Exhibit 5. Cumulative Monthly Spot Market Volume



Source: UxC

Exhibit 6. Annual Spot Plus Term Uranium Market Volumes



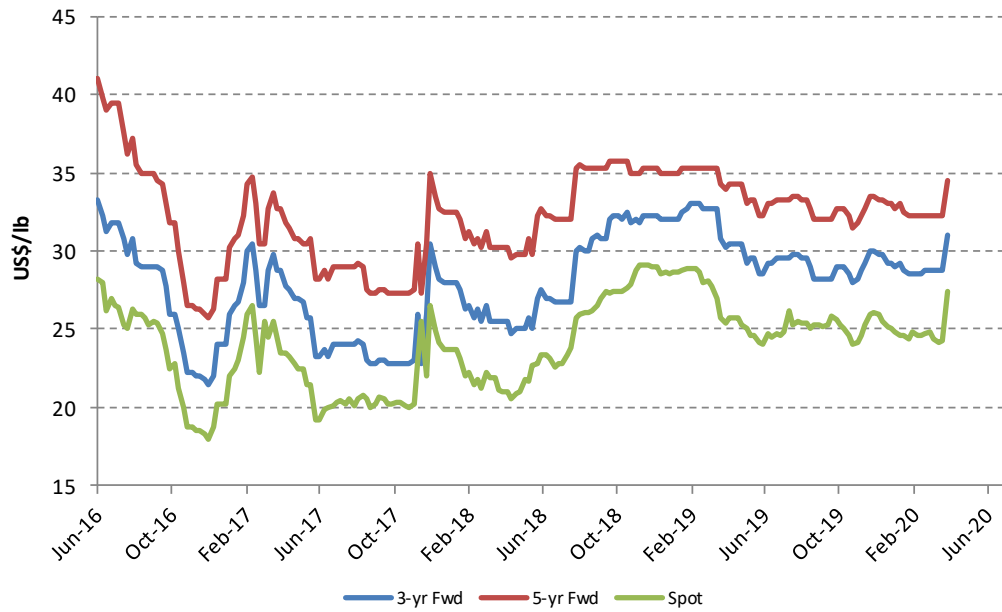
Source: UxC

Exhibit 7. Uranium Term Price Premium to Spot (US\$/lb)



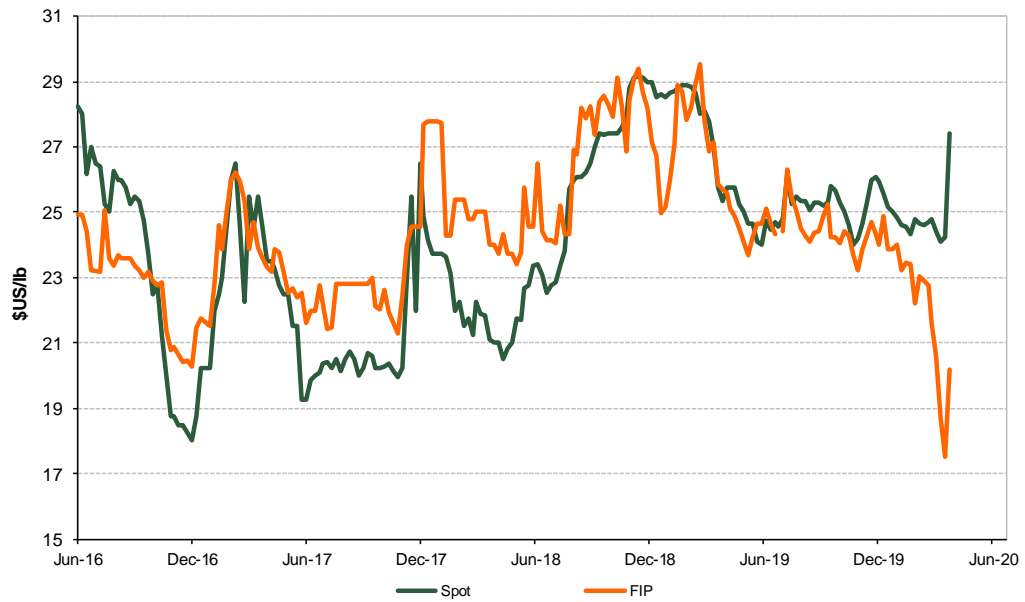
Source: UxC

Exhibit 8. Uranium Prices — Spot, 3-year Forward and 5-year Forward



Source: UxC

Exhibit 9. Fund Implied Price (FIP) and Spot Price



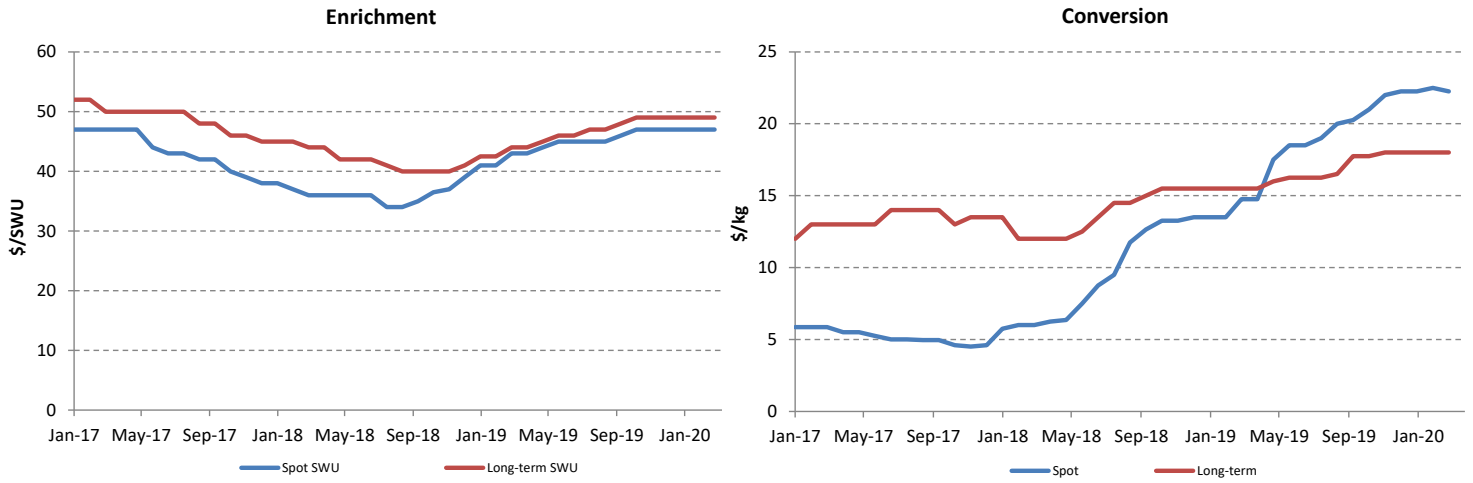
Source: UxC

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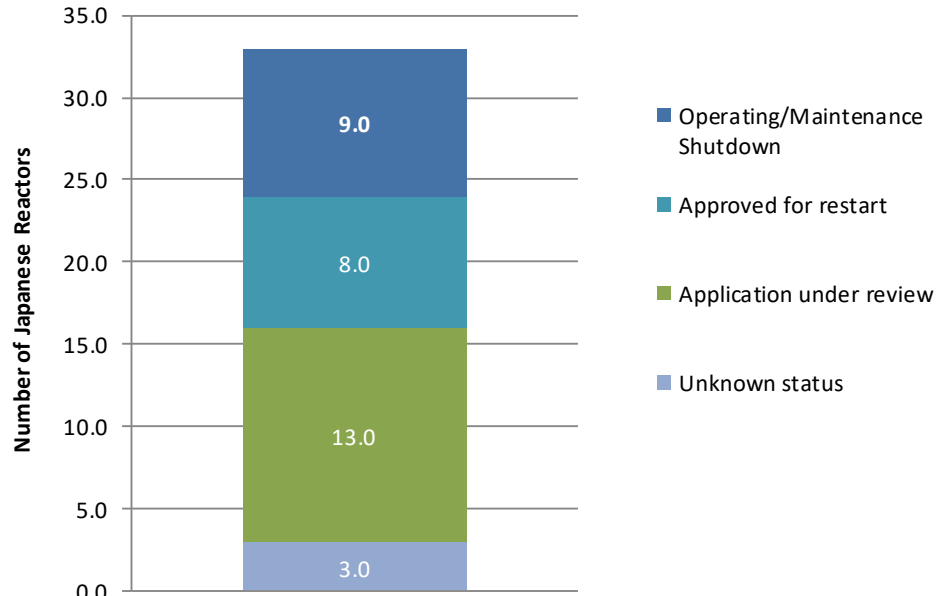
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Exhibit 10. Monthly SWU and Conversion Pricing



Source: UxC

Exhibit 11. Japanese Reactor Status



Source: UxC, Bloomberg, World Nuclear Association

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Exhibit 12. TD Securities Uranium Supply/Demand Model

	2012	2013	2014	2015	2016	2017	2018	2019	2020E	2021E	2022E	2023E	2024E
Mine Supply - Western World (mm lbs U3O8)													
Total Mine Supply - Western World	90	93	85	106	104	100	83	86	88	84	84	88	90
Net Eastern Mine Supply (lbs U3O8)	59	60	60	57	62	54	54	55	55	55	60	60	66
Total World Mine Supply (mmlb U3O8)	150	153	145	163	166	154	138	141	144	139	144	148	156
YoY % change	5.9%	2.4%	-5.3%	12.2%	2.1%	-7.6%	-10.2%	2.3%	1.9%	-3.4%	3.8%	2.6%	5.8%
Secondary Supply													
Global underfeeding and tails re-enrichment*	5	15	20	20	18	19	18	18	16	16	15	15	14
Mixed Oxide Fuel (MOX)*	10	8	8	4	5	5	5	6	6	6	6	6	7
US government sales (DOE Proposed)*	5	8	8	7	4	3	2	2	1	0	0	0	0
Additional Russian secondary supply*	24	24	5	2	2	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Secondary Supply (mmlb)	43	55	41	34	29	27	24	26	24	22	21	21	21
Secondary supply as % of global reactor demand	28%	32%	26%	21%	17%	16%	14%	15%	13%	12%	12%	12%	11%
Mobilization of Commercial Inventory			4	8	7	7	7	7	7	7	7	7	7
Total Supply	193	208	190	205	202	187	169	174	174	168	172	176	185
Total World Demand													
Total World Nuclear Generating Capacity (MWe) *				345,377	351,271	358,819	368,571	372,978	379,182	384,508	385,211	389,242	394,906
Uranium requirements per MWe				464	474	472	472	472	472	472	472	472	472
Uranium demand (mmlb)				160	167	169	174	176	179	181	182	184	186
First Core Requirement (2 year lead)				-	-	-	-	-	-	-	-	-	-
Total World Demand (mmlbs U3O8)	155	170	155	160	167	169	174	176	179	181	182	184	186
YoY % change	0.0%	9.7%	-8.8%	3.4%	3.9%	1.7%	2.7%	1.2%	1.7%	1.4%	0.2%	1.0%	1.5%
Supply / Demand Balance (mmlb)	38	38	35	44	35	18	-5	-2	-5	-14	-9	-8	-2
Spot Uranium Price (US\$/lb U3O8)	\$48.73	\$38.57	\$33.60	\$36.89	\$26.57	\$22.12	\$24.82	\$25.94	\$25.13	\$27.00	\$30.00	\$35.00	\$40.00

* Source: World Nuclear Association - Nuclear Fuel Report 2019-2040 Reference Case

Note - TD LT price assumption starts in 2025; a flat US\$45/lb price is assumed for 2025 and beyond.

Source: UxC, Bloomberg, TD Securities Inc.

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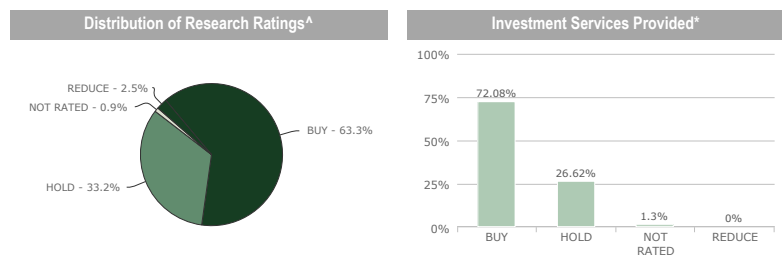
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