



MASSIFCAPITAL

KAZATOMPROM (KAP)

INVESTMENT REVIEW
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MASSIF CAPITAL, LLC | CHARLOTTE, NC

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Investment Overview

Investment Background: Many resource investors have long been confident that an eventual uranium bull market would occur. Unfortunately, those investors have been disappointed by what has been a near decade long slump. Investors have also been confronted with a niche market that is poorly understood, exceedingly small, comprised of few operating companies, and a glut of pre-production exploration companies. There have been few, if any, opportunities to execute a uranium investment.¹ There exist several speculative opportunities with significant positive upside optionality that may compensate for the lengthy wait, but nothing worth investing in.

The singular potential investing opportunity of the past decade has been Canadian producer Cameco. If you had invested in Cameco in 2008, at the most opportune time (21-NOV-2008), you would have paid \$12.98 a share, you would now, more than a decade later be down 8.2% and during that time would have watched the spot price of Uranium fall from \$53.0 to the current spot price of \$28.9. The investment would have occurred at a PE north of 20 and with a dividend of less than 2.5% for most of the investment period. You would have been paid a pittance and sat around waiting as the company slowly melted.

We believe that with the IPO of Kazatomprom (KAP), in November of 2018, that the situation has finally changed. KAP is the first investable Uranium miner to hit the market in a decade and investors now have an opportunity to make a sensible investment for which the price of Uranium is simply an additional catalyst to appreciation, instead of the entire investment case.

Investment Thesis: KAP is the largest Uranium miner in the world (responsible for ~20% of global primary supply in 2017) and is the lowest cost producer in the industry. At the current time, the firm operates or has an equity interest in, nine of the eleven lowest cost mines in the world. Due to the firm's complex structure, which includes ten asset level partnership with equity interests of between 30% and 65%, significant balance sheet value is obscured by IFRS equity method accounting rules for JVs.

At current Uranium spot prices, and at a 10% discount rate, the mines the firm operates or has an interest in are trading at a 22% discount to intrinsic value. This valuation ignores significant industry tailwinds, the firms dominate position within the industry and a dividend of up to 75% of FCF. We believe a more realistic valuation is between \$22 and \$24 a share, suggesting the firm is currently trading at a discount to intrinsic value of between 38% and 43%.

Milestones and Catalysts

- (Positive Catalyst) Production
- (Mixed Catalyst) Increase Free Float
- (Positive Catalyst) Uranium Prices
- (Positive Milestone) Dividend
- (Uncertain Catalyst) Section 232 Petition
- (Uncertain Catalyst) Kazakhstani Presidential Elections in 2020

¹ According to Adam Rodman of Segra Capital management, the Uranium market Pre-Fukushima had a market capitalization of \$130 billion and was comprised of 450 companies. Today there are 40 companies with a total market cap of less than \$10 billion. (Source: "Expert View - Uranium Update – Still a Glowing Opportunity, Real Vision January 16th, 2019).

Business Overview

KAP was formed in 1997 as a state-owned entity to run uranium mines that were discovered in Kazakhstan during the Soviet Era. At the time, the firm produced 2 Mil. Lbs. of U_3O_8 a year. Management and JV partners have since increased production to roughly ~60 Mil. Lbs. of U_3O_8 (~30 Mil. Lbs. of attributable to KAP).² The significant increase is largely a function of the joint development of most assets with foreign partners including: Orano (French State), Cameco (Canadian Publicly Traded Firm) Uranium One/ARMS (Russian State-Owned Firms) and other producers from South Korea, Japan and Europe. The joint development strategy has enabled KAP to expand operations while sharing of portion of the risk.

Mining Operations: Uranium mining represents the majority of KAP business accounting for 62% of revenue, with the share of results from Joint Ventures and Associates boosting pre-tax earnings (EBT) by ~40% in FY2017. Mining operations include three wholly owned mining operations, and ten asset level partnerships currently producing ~60 Mil. Lbs. of U_3O_8 and capable of producing ~75 Mil. Lbs. of U_3O_8 . Additionally, KAP has a portfolio of exploration assets: two assets with identified resources, one with a maiden resource expected later this year, three exploration projects and eight identified properties of interest.³ We currently assign no value in to any of these assets but believe it is worth noting that the identified resources (Inkai 2 and Inkai 3 which are 100% owned by KAP), contain a reported ~325 Mil. Lbs. of U_3O_8 .

Table 1: Kazatomprom Subsidiaries, JVs and Associates

Classification	Mining Subsidiary	Equity Interest (%)
Subsidiary	Kazatomprom-SaUran LLP	100.00
	Ortalyk LLP	100.00
	RU-6 LLP	65.00
	Appak LLP	60.00
	JV Inkai LLP	52.50
Joint Venture	Baiken-U LLP	51.00
	Semizbai-U LLP	51.00
Joint Operation	Budenovskoye LLP	50.00
	JV Akbastau JSC	50.00
	Karatau LLP	49.98
Associates	JV Katco LLP	49.00
	JV Khorassan-U LLP	50.00
	JV SMCC LLP	30.00

Source: Massif Capital, Kazatomprom Prospectus

Measured by attributable production, KAP is the largest producer of natural uranium globally, as well as being either the lowest or second lowest cost producer, depending on who you consult. For FY2017, the company, together with its subsidiaries produced ~20% of total global primary uranium production and ~40% of global in-situ leach recovery (ISR) uranium production.⁴ KAP's mineral assets are in three of six known uranium bearing geological provinces within Kazakhstan, a map of the provinces and mines can be found in Appendix C.

Mineral assets are held through 14 subsidiaries, joint ventures and associate companies, 13 of which are producing firms responsible for mining uranium and downstream processing, and one of which is focused on exploration. The subsidiaries and KAP equity interest can be found in Table 1.

The aggregated Proved and Probable Ore Reserves⁵ of all the subsoil use agreements that grant the company extraction rights is 884.7 Mil. tons grading 0.06% Uranium, the attributable reserves are 535 Mt grading 0.058% Uranium. Aggregated production from the group was 60.5 Mil. Lbs. of U_3O_8 , with sales of 60.2 Mil. Lbs. of U_3O_8 at a reported All in Sustaining Cost (AISC) of \$14.51 per Lbs. of U_3O_8 with attributable production of 31.4 Mil. Lbs. of U_3O_8 and sales of 30.7 Mil. Lbs. of U_3O_8 at a reported AISC of \$16.08 per Lbs. of U_3O_8 . A full resource statement and mine by mine discussion can be found in Appendix C.

² 60 Mil. Lbs. include 100% of production from all JV and Associates, as such it also represents all of Kazakhstan's Uranium production.

³ See Glossary.

⁴ See Appendix A for full discussion and explanation of ISR.

⁵ See Glossary.

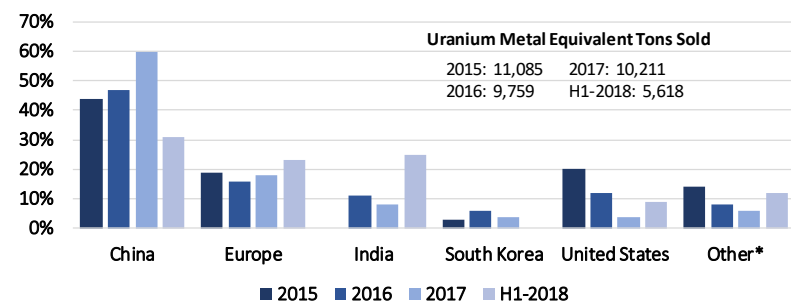
Metallurgical Plant, Nuclear Fuel Chain Businesses and Trading Arm: The Ulba Metallurgical plant was established in 1949 and became a KAP subsidiary in 1997. The plant primarily provides uranium processing to KAP mining subsidiaries, converting ore into Yellow Cake, and uranium process tolling services for mining operations that produce a calcined U_3O_8 product as a final product instead of Yellow Cake. The Ulb plant is also a top three producer of beryllium, tantalum and niobium. At the current time Ulba can produce 472 tons per annum of UO_2 powder⁷ and up to 108 tons per annum of fuel pellets, the majority of which are sold on to Chinese consumers.

KAP has several additional opportunities and investments downstream of mining operations within the Nuclear Fuel Cycle.⁸ Although the company does not possess enrichment technology, the company does hold direct and indirect interests in two enrichment facilities located in Russia. These investments include an indirect interest the world's largest enrichment facility, an interest that entitles KAP to 2.5 million separate work units (SWU)⁹ of enrichment capacity annually, which is equivalent to roughly 4.25% of annual global enrichment capacity. KAP has the option to use this enrichment capacity through 2043. Additional downstream Nuclear Fuel Cycle investments include:

- Joint-Venture with China General Nuclear Power Group (CGNPC) to build a fuel assembly plant that will start operation in 2020. \$40 million of an expected \$135 million of CapEx has been spent and upon receiving a long-term contract for offtake of fuel assemblies. KAP will sell CGNPC a 49% stake of the 100% owned Ortalyk subsidiary, at market prices. We expect that sale would generate north of \$400 million in cash.
- In 2008 KAP entered into an agreement with Cameco to build a Uranium conversion plant (conversion of U_3O_8 to UF_6).¹⁰ The project has not moved forward, and Cameco has backed out, but pursuant to the agreement, Cameco will make the conversion technology available to KAP, at no cost, in perpetuity.

Sales and Marketing: KAP sells uranium products to more than 15 customers in eight countries. In FY2017, KAP's top three and top five uranium products customers account for 43% and 51% of the group's revenue. Sales by region are presented in Figure 1. In 2017, KAP launched THK, a wholly owned uranium products trading arm. The aim of THK is to better facilitate relationships with partners, promote sales of Kazakhstani uranium products and increase liquidity in the uranium spot market. Since founding THK has increased spot market sales by \$37 million a year, acquired four new clients for KAP and entered into an unspecified number of long-term uranium delivery contracts, some of which have tenors lasting until 2029. See Appendix C for a discussion of the sales and marketing relationship between KAP, its JVs and associates.

Figure 1: Geographic Split of Uranium Customers Revenue



Source: Massif Capital, Kazatomprom Prospectus

⁷ See Appendix B: Nuclear Fuel Cycle to see where in the Nuclear fuel supply chain UO_2 is.

⁸ See Appendix B: Nuclear Fuel Cycle

⁹ See Glossary

¹⁰ See Appendix B: Nuclear Fuel Cycle

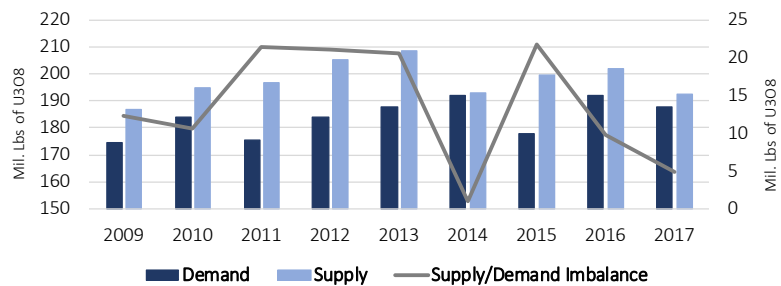
Uranium Outlook

Introduction: The uranium mining market is highly concentrated; the top three producers control 50% of the market and the top six producers control 77% of the market. The market is also highly concentrated on the consumer side, with ~70 consumers globally. Between mine production and final consumption is a global supply chain with multiple processing bottlenecks, lengthy timelines and limited flexibility due to both security and technology constraints.

Uranium is principally sold on long-term contracts, typically 36+ months in length, and there exists no commodity exchange that transacts physical uranium.^{11,12,13}

Demand: The principal use for U_3O_8 is electricity generation, which ties demand directly to burn rates of uranium fuel in reactors and the number of reactors in operation. As of January 1, 2017, there were a total of 449 commercial nuclear reactors operating in 31 countries with 55 reactors under construction. In total these reactors require ~163.3 Mil. Lbs. of U_3O_8 every year, this does not include utility purchases for inventory.¹⁴ In 2017, mined uranium totaled 154.5 Mil. Lbs.¹⁵ The gap between demand and mined supply has historically been filled by both reprocessing used uranium and from secondary supplies, such as government stock piles or government programs.¹⁶ Secondary supplies are discussed in depth below.

Figure 2: Supply and Demand



Source: Massif Capital, BMO, BofA & Red Book

Utilities address their refueling needs with long term contracts of between three and ten years. The last major contracting period was between 2005 and 2012. This would suggest that many utilities have either already reached the point at which they need to be signing new supply contracts or will shortly. a result of the negligent re-contracting by utilities, new reactors coming online, and supply constraints discussed below, UxC¹⁷ believes that if no new long-term supply contracts are signed in upcoming years, by 2021 23% of global uranium demand will not be covered by long term contracts and by 2025, 50% of global demand will not be

¹¹ According to UxC, a nuclear industry consulting firm, in 2017 48 Mil. Lbs. of U_3O_8 was sold on the spot market. The first half of 2018 saw significant growth in the spot market, which has grown extensively in the last few years due to, it is believed, increased financial buyers and utilities buying more volume in the spot market. In H1-2018 34.8 Mil. Lbs. of U_3O_8 was sold.

¹² There is a financially settled futures contract traded on the NYMEX under the contract symbol UX. The contract size is 205 Lbs. of U_3O_8 , the contract settlement price is based on the UxC Consulting reported Spot Price.

¹³ It is important to note that the spot market price available via either a financially settled futures contract or via various nuclear industry consulting firms (the two largest at TradeTech and UxC) is a purely indicative price. The spot price is not particularly relevant to the industry though as utilities do not source the majority or even a significant portion of their long-term fuel needs from the spot market. That being said, some long-term contracts are tied to "spot prices" in particular KAP's. The reason for this is that under Kazakhstani law contracts not based on "spot prices" may be subject to higher tax rates. The result is that KAP contracts generally have a hybrid price with a fixed component and an indexed component.

¹⁴ See Glossary for conversion factors and Appendix C for Nuclear Reactor Summary Data

¹⁵ See page 65 of Kazatomprom Prospectus.

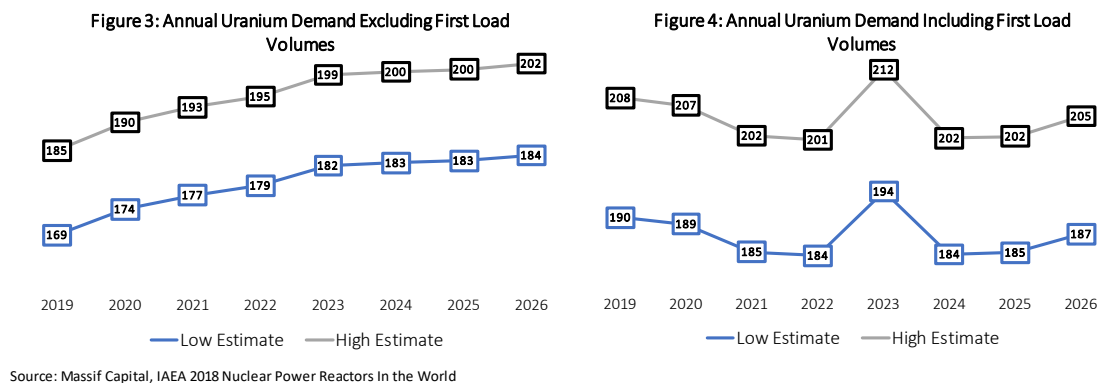
¹⁶ Gigatons for Gigawatts is an example of a government program. This program took highly enriched uranium from Soviet Era Nukes and Diluted it down to low enriched uranium appropriate for civilian nuclear reactors.

¹⁷ UxC is one of the leading Nuclear Industry consultancies.

covered. More importantly perhaps, the longer utilities go without re-contracting the greater the probability that there is a rush by utilities to recontract simultaneously.

As with any commodity, demand is critically important, and a positive price move supported by growing demand is stronger and more lasting than a supply supported price move. In the case of Uranium, the demand is growing, despite post-Fukushima backlash in the west. According to the World Nuclear Association and *IAEA 2018 Nuclear Power Reactors In the World*, there are currently 55 reactors under construction globally, and 49 with established dates to be turned on and connected to the grid between now and 2026.

These reactors will boost the global reactor fleet to 503 reactors by 2026. Assuming no existing reactors are shut down, annual uranium demand will increase from current levels of roughly 163 Mil Lbs. of U_3O_8 in 2018 to between 184 and 202 Mil. Lbs. of U_3O_8 a year in 2026. In addition, the reactors that are being turned on will require an additional 26 to 28 Mil. Lbs. of U_3O_8 over the period 2019-2026 to account for the higher volumes of uranium needed when a new reactor is first turned on, referred here after to the first load volume.

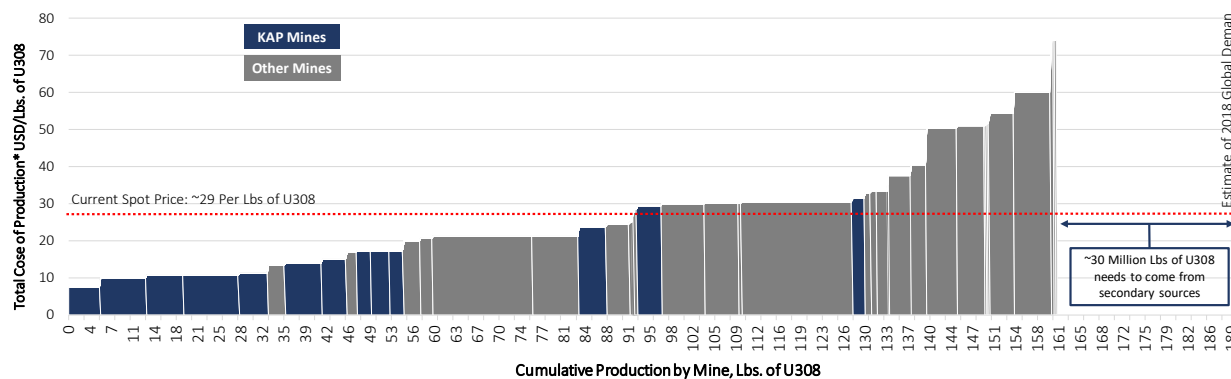


The forward-looking projection of demand for commodities is always difficult but nuclear reactor related uranium requirements over the short to medium term are fundamentally determined by installed nuclear capacity. The charts above are based on the demand for U_3O_8 from the existing global fleet and under construction reactors. The follow through on demand growth is very likely. It is possible, given the many issues firms run into constructing Nuclear reactors that the demand growth is shallower, due to delays, over the period 2019 to 2026, but it is unlikely to change the final demand numbers.

Supply: Although more difficult to assess than demand, the limited number of producers and mines makes uranium supply easier to evaluate than other commodities. Currently, the top ten producers control 88% of the market and the top three producers control 50%. KAP, is the largest of the big three with 20% of the global market. In addition, KAP has the 2nd largest reserve base in the world. We have reviewed all the uranium mines operating globally in 2016-2017 and created our own cost curve.¹⁸ In total our cost curve represents ~160 Mil. Lbs. of U_3O_8 production vs. reported global primary Uranium production of ~160 Mil. Lbs. of U_3O_8 in 2016-2017. As such, we are confident we have captured substantially all the meaningful mines in existence.

¹⁸ The cost curve includes 50 uranium mines globally, of which 75% are owned by publicly traded companies or owned jointly between private and public companies in such a way that we have access to production and cost data. The remaining production and cost have been estimated, primarily from reading government documents.

Figure 4: Uranium Production Cost Curve



Source: Massif Capital, Company Filings, BMO, UxC, BofA
 *Total Cost: Cash Cost of production plus depreciation, SG&A and royalties

The dashed red line in the graph is the current spot price for Uranium, the solid black line on the right side of the graph represents 2017 global demand. Note that the market does not clear naturally, the mined supply of uranium is significantly less than annual demand for Uranium. The red line is at around 198 Mil Lbs. of U₃O₈, creating a demand gap of roughly 30 Mil Lbs. of U₃O₈.

That gap is filled by a combination of recycled spent fuel, inventories and other secondary supplies such as government stockpiles. Also note that the current spot price (absent inventories) implies a market that clears with only half of current global demand. Additionally, several mines in the graph, have either been shut down or put into care and maintenance in 2018. Roughly 25 Mil. Lbs. of production represented on this graph is no longer in production. That’s principally the output of two mines, the primary one being Cameco’s McArthur River mine in Saskatchewan, Canada. We believe that global production in 2018 will be between 130 to 140 Mil. Lbs., a production range that is likely for several more years.¹⁹

Secondary Supplies and Inventories: Because of the cyclical, utility caution, and government activity, much of the annual demand for fresh uranium has been met by secondary supplies and inventory. We believe, based on our supply curve above, that at least 40 Mil. Lbs. a year of supply has been met by secondary sources and inventories for several years. Inventories and secondary supplies include:

- Uranium inventories at utilities
- Reproduces nuclear fuel
- Down blending of highly enriched uranium
- Tail-re-enrichments
- Mixed oxide fuels
- Historical over supply

Of these secondary sources, we believe down blending of highly enriched uranium, and existing inventories warrant the most attention. Other sources can add marginal supply, but not enough to tilt the supply-demand balance too far in any one direction. A significant source of secondary supply since the end of the cold war has been the down blending of highly enriched uranium from Russian nuclear warheads to low enriched uranium through the government sponsored Megatons to Megawatts deal.²⁰

¹⁹ Decisions by Cameco regarding McArthur river have the ability to swing this expected production quite a bit higher but the longer the mine remains closed the longer the ramp up time will be.

²⁰ The Megatons to megawatts deal was in place for 20 years and came to an end in 2013. Over that period the program produced roughly 23 Mil. Lbs. of U₃O₈ a year, all of which was sold to US Utilities. Since the program came to an end, the US and Russia have not struck another deal and the Russian government has stated that they will not engage in any

The largest source of secondary supply is inventories at utilities. Currently, we estimate that inventory levels globally are equal to ~ 4.4 years of global demand. Although this sounds problematic to our investment thesis, the reality is far from it. To start with, most utilities like to keep between two and five years of uranium stock on hand, suggesting that current inventory levels are not nearly as high as they may sound. The reason that utilities like to keep inventory levels this high is a result of a combination of factors, but the lead times necessary to get natural uranium into a state it can be used in a nuclear reactor is a primary cause.²¹

The lengthy and complex supply chain from mine to reactor means that not all inventory is readily usable. Odds are if you have U₃O₈ in inventory you are probably at a minimum 18 to 24 months away useable fuel for a reactor. Additionally, tight refining and enriching infrastructure presents logistical challenges at each stage (there are only 5 enrichers globally, only 6 refiners, etc.). Furthermore, the actual geographic distribution of the inventory is important. China currently has strategic stock piles for domestic consumption of 278 Mil. Lbs. U₃O₈ or 39% of global inventory. That inventory is not available for the rest of the world.

The result is that EU and North American utilities appear to have less than three years of uranium stock on hand. China is thus the big inventory question. But there too the Chinese inventory levels appear relatively logical when one takes in account the fact the country does not have significant domestic uranium production and they have ambitious plans for building out their reactor fleet. New reactors require a first load of uranium, which is significant and usually three times the annual need. We estimate Chinese inventory between 5.3 years (not including the additional uranium needed in a first load) to 3.1 years (again not including the additional uranium needed in a first load).

Valuation

KAP is a somewhat difficult company to value. After a long bear market there exist no appropriate comparables, or frankly healthy companies in the industry. Many might suggest comparing the company to Cameco but the operating jurisdiction, deposit geology, scale and operations are vastly different.

Additionally, the corporate structure obfuscates value. Consolidation rules for the associates and JVs hide balance sheet asset value to a significant degree. The only legitimate valuation approach is to conduct a mine by mine, sum of parts valuation based on the life of mine plan for each mine. This approach uncovers significant asset value that is otherwise not apparent.

The current tangible book value of the firm is \$6.9 a share. Following a valuation of each mine, and the attributable KAP share in each mine, the tangible book value per share is \$14.3 share. This assumes current

further down blending of highly enriched uranium from either decommission war heads of strategic stock piles. We believe it reasonable to assume they will not change their mind on this issue any time soon, especially given the deterioration in the US-Russia relationship. At the same time, it is worth noting that the Russians are believed to have substantial stock piles of highly enriched Uranium, and should they choose to down blend it they could very well swamp the market.

²¹ The process of converting mined U₃O₈ into a fuel assembly includes 5 stages, there is no single facility globally that operates commercially that does all five, the shipping of uranium from one location to another to undergo the various stages of refining, conversion, enrichment etc. can take up to a year in and of itself, as a result consumers and suppliers usually maintain inventory at each stage. See Appendix 2: Nuclear Fuel Chain for in depth discussion of process.

Uranium spot prices and a 10% discount rate. Additionally, JVs and associates are on the balance sheet for a \$1.04 a share but have a real value of \$5.2 a share under the same circumstances.

We tested our sum of parts valuation with a series of Uranium price curves including a spot rate curve, KAPs prospectus price curve, \$30, \$40 and \$50 dollar per Lbs. U₃O₈, BMO's cost curve and our own cost curve, which is a blend of KAPs curve in the long run and our own analysis in the short term. We believe KAPs curve is a strong price curve, appropriately conservative in the long run (topping out at \$43.4 in 2035) but overly conservative in the short run.²² At the same time, cost curves by most investment banks, although possible, are wholly inappropriate for the purposes of investment analysis and evaluation of margin of safety. BMO foresees a price of \$55 per Lbs. U₃O₈ in 2023. While certainly possible, that does not work for our base case.²³

This analysis results in a value of \$14 per share on the low-end, which is derived from an NPV analysis at current spot rate for the life of existing mines, to \$27 on the high-end using BMO's cost curve. Our cost curve, which we believe represents the most likely outcome, suggests a pure technical valuation of \$20 per share, a margin of safety of 32.7% at the current price. The company will be paying a 2018 annual dividend in 2019 that management has already stated will be a minimum of \$200 million or \$0.77 a share. After considering this dividend we believe it is appropriate to think of yourself as buying shares in KAP today at the market price less the dividend, implying that at \$20 a share you have a margin of safety closer to 36%.

Given industry dynamics we believe that mine sum of parts analysis fails to capture the strength of the company, its ability to grow market share in the future, and the value of that industry dominance. Given the mines that have shut down, and the flexibility of the IRL production method, which allows KAP to dial up or down production far more easily than a more traditional mine, it is possible that KAP will increase its market share from 20% to north of 30% over the next five years.

The strength of the company's balance sheet is also overlooked in the NPV analysis. Unlike most firms in the uranium mining business, which are pre-production, and in need of financing and years away from production, or Cameco, which has \$1.4 billion in debt (a debt to equity ratio of 30), and just shut down indefinitely its largest producing mine, KAP had manageable debt of just \$235 million and cash of \$261 million.

Finally, KAP entered into a supply agreement with Yellow Cake PLC, a London based financial buyer, in May 2018. The agreement provides for the supply of up to 8.1 Mil. pounds (or approximately 3,674 tons) of U₃O₈ for US\$170 million, and the right of Yellow Cake PLC to purchase up to an additional US\$100 million of U₃O₈ annually between 2019 and 2026. An initial delivery of 3,100 tons of U₃O₈ was delivered in July. Much, if not all of this came from existing inventories, which at the end of June 2018, stood at 10,095 tons worth \$585 million at the current spot price or \$2.25 a share. The Yellow Cake agreement gives KAP an opportunity to monetize this significant inventory buildup.

Given these additional variables we believe that a conservative valuation of KAP is \$22 to \$24, with the potential that momentum could take it beyond a reasonable valuation on Uranium price appreciation and investable supply. KAP is the only well-established publicly traded Uranium miner that combines growth, producing assets, free cash flow, and a rock-solid balance sheet in one company. Most firms in the industry

²² Current spot prices are already above KAP 2020 price estimates.

²³ Note that BMO's cost curve only extends to 2023, as such we have faded their peak price to KAPs curve in the out years over the course of 5 years.

are either pre-production project firms or exploration firms which creates a situation in which there is very limited supply of investable assets, increasing the odds of positive momentum.

Dividend Policy: Management has implemented a dividend policy geared towards returning 75% of free cash flow to shareholders assuming certain liquidity and solvency requirements are met and have already stated that the annual dividend paid for 2018 and 2019 will be no less than \$200 million in the prospectus. Given the strength of the balance sheet there appears to be little risk that the group maintains a Net Debt to Adjusted EBITDA ratio of less than one, the key requirement for paying out 75% of FCF as a dividend. Year-end 2018 Net Debt to Adjusted EBITDA will likely be 0.5x, falling to 0.1x in 2020. As a result, the dividend could rise to as much as \$2.50 to \$3.00 a share over the course of the next five years.

Risks to Thesis

Customer Concentration: The Nuclear fuel industry is highly concentrated and KAP only has ~15 customers, with 84% of sales coming from just 5 customers in 2017. In addition, KAP has significant exposure to China, who is KAP's largest regional customer. This exposure creates significant downside risk in the case of economic downturn in China. It is unclear the degree to which growing demand for electricity in China is driven by economic growth or evolution in the composition and direction of the economy as well as changing lifestyles of the citizenry.

FX Risk: KAP has benefited significantly from a fall in the value of the Kazakhstani Currency (the Tenge) vs. the US Dollar. Between 2015 and 2017 the Tenge fell 30% vs the dollar which coincided with the global fall in the price of crude and the subsequent floating of the currency. A reversal of the fall could significantly impact the cost structure of the business.²⁴

US Related Risks

- **US Sanctions:** Due to the deteriorating relationship between the United States and Russia, Joint Ventures that KAP has with Uranium One could create problems for the business. We estimate the NPV attributable to Uranium One Joint Ventures is \$1.8 billion, or 36% of the total company NPV.
- **Section 232 Investigation:** The US Department of Commerce has launched a Section 232 Investigation into whether the current level of imports of Uranium, for use by utilities, threatens the viability of US based uranium mining, and thus threatens National Security. Should the Department of Commerce decide that imports do, KAP will almost certainly trade down, but it is important to recognize that the clear majority of KAP sales are to Asian and European consumers. Additionally, it is not clear what impact a bifurcation of the market (like the oil markets in the US prior to 2015) would do to the price of Uranium.²⁵ We believe that the current administration is likely receptive to the argument made by domestic suppliers and thus assume the probability of tariffs being implemented is reasonably high but it should be no utilities supported the implementation and it was widely criticized within policy circles.

²⁴ [Kazakhstan floats tenge, currency tumbles](#)

²⁵ Congressional Research Services Section 232 Investigations Overview (this report specifically addresses recent Steel and Aluminum 232 Petitions but also provides a good overview of Section 232): <https://fas.org/sgp/crs/misc/R45249.pdf>

Environmental, Health and Safety Overview: SRK, the third-party auditor of the mining operations for KAP, reviewed the degree to which KAP operations and management abide by Internal Finance Corporation (IFC) performance standards and World Bank Environmental, Health and Safety Guidelines. SRK concluded that although the operations have been designed, and are being operated to minimize Environmental, Social and Health (ESH) impact, there is room for improvement. We are not surprised by this finding and would be more skeptical of the report if they found there was no room for improvement. SRK notes that KAP is already subject to frequent inspections, that they are responsive to critique, and that management has a frank understanding of the potential negative environmental, health and safety impact of their operations. SRK's review includes five suggested areas of focus to improve and developed with the company action plans to address the report's findings.²⁶ We will believe that a careful review of management's follow-through on these issues will be important for investors to undertake over the course of the next two to three years because it will provide an indication of how responsive the management is to critique and provide an indication of the degree to which management takes their new role as a publicly traded company with additional responsibilities and stakeholders seriously.

Uranium Prices: We believe that the Uranium market has turned a corner, but many have said this before and been wrong. We have avoided investments in Uranium in the past because they hinged so much on the price of Uranium and nothing else, as outlined in the valuation section. We believe that KAP is different, and that although Uranium price appreciation is a positive upside catalyst, the large resource base and industry leading AISC of production means KAP can be successfully invested in absent a significant recovery in the price of Uranium. Nevertheless, should the price of Uranium return to the low levels seen in 2016 (\$18 per Lbs. U₃O₈) KAP will trade down.

Logistics: Another risk that we are surprised has gone overlooked in our research is logistics. KAP can only export uranium via an overland route, by rail, through either China or Russia. Sanctions against the right company, or persons, could mean that export via Russia is no longer feasible. It is not clear what overland exports via China would do to costs (or who would bear the cost), as it is a route only used for exports to China. We view this as probably the most significant risk and would characterize it as a significant known unknown risk.

Political Risk: We characterize the Kazakhstan as a stable but tense country, investable but not without caution and consistent monitoring. The domestic political risk will decrease dramatically once it is clear whether the current president is running in the 2020 Presidential Elections. We believe the odds of the president running are greater than 50%. Foreign political risk, because of the KAP's relationship with Russia, is of greater concern. There is a high degree of uncertainty in the political risk to this investment, we advise managing that risk through position sizing, not through adjustments to valuation given the high level of uncertainty, which precludes a logically defensible integration into a valuation. See Appendix D for a more in-depth discussion.

²⁶ Findings can be found in the "Competent Persons' Report on Mineral Assets of Joint Stock Company National Atomic Company Kazatomprom, Republic of Kazakhstan" which is included with the prospectus. Pages 160-161 of 244.

Appendix A: ISL Mining Explained

All but one KAP mine is operated by the In-Situ Leaching (ISL) method (sometimes referred to as ISR, In-Situ Recovery) which differs significantly from traditional mining methods. In traditional mining, ore is removed from the ground, via an open pit or underground mine, and then on the surface treated to separate waste material from economically valuable ore. In-Situ Leaching, on the other hand, does not involve significant disturbance of the area surrounding the targeted ore. The ore is left in ground and a solution that dissolves the desired ore is pumped into the ground.

The solution of dissolved ore, referred to as a pregnant solution, is then recovered through extraction wells. The ISL approach works best when the ore is surrounded by impregnable clay layers and when the ore deposits are relatively shallow. In addition to being a low cost method of production, primary capex is drilling pumping and extraction wells and environmental monitoring, there is little in the way of surface disturbance and no tailings or waste rock is created. The deposits controlled by KAP benefit from several geological features that make them exceptionally well suited for ISL mining.

ISL mining was first tried in Kazakhstan in 1970. The current slate of mines is relatively shallow (between 100m and 700m deep) and occur in sandstone aquifers, which generally have good porosity allowing for good flow of pre-pregnant and pregnant solution. Uranium in the Kazak sandstone aquifers generally coats sand grains, as Uranium is not water soluble. Because there is a low presence of acid consuming minerals in the host aquifers in Kazakhstan, as opposed to US ISL Uranium Deposits which are generally high in gypsum and limestone, KAP can use Acid leaching, which means the recovery and operating costs are about half those of other ISL operations that are alkaline leach.

KAP uses sulfuric acid to dissolve in ground uranium. At the current time the company's operations generally use between 35kg and 155kg of sulphuric acid per kilogram of uranium recovered. The aquifers from which KAP recovers uranium are comprised of non-potable water, due to the high presence of radionuclides and dissolved solids and the water extracted during the recovery process is generally pumped back into the aquifers.

Appendix B: Nuclear Fuel Cycle

Once a Uranium bearing solution is pumped out of the ground the nuclear fuel cycle starts. The nuclear fuel cycle can be thought of as the process by which naturally occurring uranium is transformed into a fuel appropriate for nuclear reactors. The process is complex with multiple stages, each of which is a potential bottle neck in the supply chain, and lengthy timelines. The process starts with mining, discussed above, the result of mining typically a uranium oxide concentrates in powder form, referred to as Yellow Cake, that is between 70% and 90% U₃O₈.

Many mines take the process one step further and calcined the Yellow Cake, which turns it into a black powder. Once the product, either Yellow Cake or Calcined Uranium Oxide is ready for shipment it is placed in oil drums and shipped to a refining and conversion facility.

The refining and conversion process can take on several forms, but the result is uranium hexafluoride (UF₆) if the uranium is destined for a light water reactor or uranium dioxide (UO₂) if it is destined from a heavy water reactor. At the current time there are only six conversion facilities globally, although one facility in the US is currently shut down. In addition, China is believed to be expanding their facilities and capabilities significantly.

Global Uranium Conversion Facilities

Company	Location	Nameplate capacity (tons U/yr as UF ₆)	Approx capacity utilisation	Capacity utilisation (tU/yr)
Cameco	Port Hope, Canada	12,500	50%	6250
TVEL (Rosatom)	SGCE Seversk, Russia	18,000	100% assumed	18,000
Areva	Pierrelatte, France	15,000	70%	10,500
ConverDyn	Metropolis, USA [^]	7000	0%	0
CNNC	Lanzhou, China*	5000	80%	4000
IPEN	Brazil	100	70%	70
World Total		57,600		38,820

*Information on China's conversion capacity is uncertain. An additional 9000 tU/yr plant is reported to be under construction at Lanzhou, as well as a 3000 tU/yr plant at Hengyang in Hunan.

[^] As of November 2017 the Metropolis Plant, which is a joint operation between Honeywell and General Atomics, has been shut down and is not in operation. We have attempted to speak with the plant manager to get a sense of the timelines associated with restart but have had no luck yet.

Source: Massif Capital, World Nuclear Association Nuclear Fuel Report 2017

for Uranium to sustain a chain reaction in a light water reactor the ²³⁵U must be enriched to between 3% and 5%. The enrichment process produces a stream of enriched ²³⁵U and waste stream of depleted uranium, known as the tails).

The tails of an enrichment process are important to monitor because higher level of enrichment require greater and greater effort, measured in separative work units (SWU), and the SWU is measured based on an assay of the tails, which typically have anywhere from 0.2% to 0.15% ²³⁵U remaining when the process is complete. Uranium supply can thus be tweaked by dialing up or down the tails assay depending on the current economics of the uranium market.

Following conversion, Uranium needs to be packaged up and sent to another location for enrichment, assuming it is destined for use in a light water reactor, which make up most of the global reactor fleet. It is worth noting that although most reactors are light water reactors, there are a large variety of different reactor designs which have various fuel requirements. The enrichment process is necessary because natural Uranium is generally composed of two Uranium Isotopes (99.28% ²³⁸U and 0.72% ²³⁵U), of the two only ²³⁵U is fissile and can sustain a fission chain reaction. In a specific type of reactor, called a fast neutron reactor.²⁷ In order

²⁷ Fast Neutron reactors has advantages and disadvantages vs. light water reactors but the primary disadvantage is they are costlier to build and operate.

The actual enrichment process takes one of two forms: gaseous diffusion or centrifuge, although currently all enrichment facilities use centrifuges. In the centrifuge process gaseous UF₆ is feed in to a chain of gas

Global Enrichment Capacity (thousand of SWU/yr)

Country	Company and plant	2013A	2015A	2020E
France	Areva, Georges Besse I & II	5,500	7,000	7,500
Germany-	Urenco: Gronau, Germany; Almelo,	14,200	14,400	14,900
Netherlands-UK	Netherlands; Capenhurst, UK.			
Japan	JNFL, Rokkaasho	75	75	75
USA	USEC, Piketon	0*	0	0
USA	Urenco, New Mexico	3,500	4,700	4,700
USA	Areva, Idaho Falls	0	0	0
USA	Global Laser Enrichment, Paducah	0	0	0
Russia	Tenex: Angarsk, Novouralsk, Zelenogorsk, Seversk	26,000	26,578	28,663
China	CNNC, Hanzhun & Lanzhou	2,200	5,760	10,700
Other	Various: Argentina, Brazil, India, Pakistan, Iran	75	100	170
Total SWU/yr approx		51,550	58,600	66,700
Requirements (WNA reference scenario)		49,154	47,285	57,456

Source: World Nuclear Association Nuclear Fuel Report 2013 and 2015, Areva 2014 Reference Document

centrifuges (often referred to as a cascade of centrifuges) that spin the gas at very high speeds (>50,000/min). The spinning process combined with a temperature, gradually results in the separation of ²³⁵U and ²³⁸U based on the mass of the different isotopes. If the centrifuges are separating isotopes at the atomic level by mass, they are highly sensitive machines. Our understanding is that once the centrifuges are spun up, the calibration is so sensitive that they must continue running for the remainder of their useful life, which is between 20 and 30 years, and must be loaded

with UF₆ when spinning as the UF₆ helps keep the centrifuges in balance. If the centrifuges are stopped, they are generally irreparably set of calibration and need to be replaced. This means that enrichment capacity is either on or off, with restart being an expensive and time-consuming process. We are in the process of attempting to understand the cost associated with the enrichment process, for obvious security reasons we are not having a lot of luck.

At the current time there are six operating enrichment facilities globally, and eight existing facilities excluding North Korea and Iran. At the current time Iran is believed to have 9,000 SWU worth of enrichment capacity, about twice the current operating capacity of the United States.

Once enriched, UF₆ is converted into UO₂ and fabricated into fuel pellets. This usually occur at different facilities then then enrichment process. Fuel pellets are loaded in fuel rods, which are arranged into assemblies that can be loaded into a reactor. There are several different fuel rod and assemblies' designs.

At the current time there are 20 locations that offer fuel fabrication services globally for Light Water Reactors. KAP is currently engaged in a joint venture with CGNPC to create a fuel assembly plant to supply china with assembled fuel rods from Kazakhstanian Uranium.

World Fuel Fabrication for Light Water Reactors (Tons/Yr)

	Fabricator	Location	Conversion	Pelletizing	Rod Assembly
Brazil	INB	Resende	160	160	240
China	CNNC	Yibin	400	400	800
		Baotou	600	600	600
France	AREVA NP-FBFC	Romans	1800	1400	1400
Germany	AREVA NP-ANF	Lingen	800	650	650
India	DAE Nuclear Fuel Complex	Hyderabad	48	48	48
	NFI (PWR)	Kumatori	0	360	284
	NFI (BWR)	Tokai-Mura	0	250	250
Japan	Mitsubishi Nuclear Fuel	Tokai-Mura	450	440	440
	Global Nuclear Fuel – Japan	Kurihama	0	750	750
Kazakhstan	Ulba	Ust Kamenogorsk	2000	2000	0
	KNFC	Daejeon	700	700	700
Russia	TVEL-MSZ	Elektrostal	1500	1500	1560
	TVEL-NCCP	Novosibirsk	450	1200	1200
Spain	ENUSA	Juzbado	0	500	500
Sweden	Westinghouse AB	Västeras	600	600	600
UK	Westinghouse	Springfields	950	600	860
	AREVA Inc	Richland	1200	1200	1200
USA	Global Nuclear Fuel – Americas	Wilmington	1200	1000	1000
	Westinghouse	Columbia	1500	1500	1500
Total			14,358	15,818	14,582

Source: World Nuclear Association Nuclear Fuel Report, 2017

Appendix C: Mine by Mine Review and Information

Ortalyk: Ortalyk has been a 100% owned producing mine since 2005. The mine has produced an average of 3.8 Mil. Lbs. of U_3O_8 every year for the last 3 years, peaking at roughly Mil. Lbs. of U_3O_8 in 2017. 2018 production is expected to have been between 4 and 5 Mil. Lbs. of U_3O_8 . The mine produces at an all-in sustained cost (AISC) since 2015 of roughly \$22 a pound, but this is number has been skewed higher in the last few years as a result of higher operating costs and capital expenditures. Going forward the AISC appears to be more like 2017 (\$14 a pound) than 2015 (\$28 a pound).

According to the technical documents that accompanied the prospectus Ortalyk has reserves of 75 Mil. Lbs. of U_3O_8 , and a remaining mine life of roughly 15 years remaining. Additionally, although the deal is not yet complete, KAP is expected to sell 49% of Ortalyk to CGN at a “market price” in 2020, should this sale occur it we believe it could generate north of \$300 million in cash. The sale would be timed to correspond with the commencement of fuel sales to CGNPC from the joint venture the two firms have entered into to expand the Ulba metallurgical plant to include fuel production in the form of UO_2 pellets.

SaUran: SaUran is a 100% owned asset that has been in production in 1977. Operations include uranium recovery at 5 different deposits. The subsidiary produces roughly 4 Mil. Lbs. of U_3O_8 a year at an AISC of \$27 dollars a pound, which makes it the highest cost producing asset in KAP’s portfolio.

RU-6: RU-6 is a 100% owned subsidiary that has been producing uranium from a southern deposit since 1996. The operation include recovery from two deposits with a total mine life of 16 years. In 2017 the subsidiary sold roughly 2 Mil. Lbs. of U_3O_8 at an AISC of \$23 a pound. The deposits and existing infrastructure, with limited additional investment, can ramp production to between 2.5 and 3 million pounds a year for a 10 period. Should a ramp up occur, the current deposits have an expected life of 16 years.

Appak: Appak is 65% owned by KAP, 25% by Sumitomo Corporation and 10% by Kansai. The project has an expected life of 18.5 years, reserves of 50 Mil. Lbs. of U_3O_8 , and averages sales of roughly 2.3 Mil. Lbs. of U_3O_8 a year, of which 1.5 Mil. Lbs. of U_3O_8 is attributable to KAP. Production has an AISC of ~\$17/lbs U_3O_8 .

Inkai: Inkai is 60% owned by KAP and 40% owned by Cameco. The mine is the largest ISR mine in the world and started production in 2000. This JV produces uranium out of the Inkai 1 deposit, there are also an Inaki 2 and 3, both of which KAP owns. At the current time the mine produces ~5.7 Mil. Lbs. of U_3O_8 but is the midst of a multi-year ramp up to roughly 10 Mil. Lbs. of U_3O_8 a year. As part of this ramp up a calcining plant is being constructed so that the final product from the mine will be U_3O_8 instead of yellow cake, the current end-product. This should result in higher margins as it means the product leaving the mine further along the nuclear fuel cycle supply chain. Additionally, the extra production, despite requiring some additional capital expenditures will result in an AISC of \$13 per Lbs. of U_3O_8 vs. the current \$14 to \$16 dollars per Lbs. of U_3O_8 .

Semizbai-U: Semizbai-U is 51% owned by Kazatomprom and 49% owned by CGN (Chinese General Nuclear Power Group). Semizbai produces uranium from the only existing mine in northern Kazakhstan, as opposed to all the other mines which are clustered in the south. The mine also produces uranium in the eluate instead of yellow cake, please see the discussion of the Nuclear Fuel Cycle for an explanation of the various processing stages of Uranium. AISC at Semizbai is ~\$16/lbs. of U_3O_8

Karatau: Karatau is 50% owned by KAP and 50% owned by Uranium One, which is intern 100% owned by Rosatom, the Russian State uranium miner. The mine commenced production in 2005 and produces ~6 Mil.

Lbs. of U_3O_8 a year at the astonishing low AISC of \$10 per lbs. of U_3O_8 . The mine plan calls for production to ramp to 8.3 Mil. Lbs. of U_3O_8 by 2023. The mine has a remaining life of 15 years. The production and cost make the mine of the largest and lowest cost mines in the KAP portfolio and thus also one of the largest lowest cost mines in the world. Starting in 2018, Karatau and Akbastau, another mine 50% owned by Uranium One, have been considered a single Joint Venture.

Akbastau is another southern Karakstani uranium mine, with production having started in 2007. The mine produces ~5.0 Mil. Lbs. of U_3O_8 at an AISC of \$10 and has a remaining life of 21 years.

Zarechnoye: Zarechnoye is 50% owned by KAP and 50% owned by uranium one. The mine was put into production in 2002 and produces yellow cake. The mine reserves are 12 Mil. Lbs. of U_3O_8 with an AISC of \$20 per Lbs. of U_3O_8 , the higher AISC is a result of the lower recovery at the mine, most of KAP mines recover 90% of uranium in place, Zarechnoye has historically recovered a lower 80%.

Katco: Katco is 49% owned by KAP and 51% owned by Orano. It is the oldest operating mine in the KAP portfolio and the largest mine by yearly production at up to 10.3 Mil. Lbs. of U_3O_8 a year. Katco has an AISC of \$12 per Lbs. of U_3O_8 , reserves and measured and indicated resources of 156 Mil. Lbs. of U_3O_8 with a mine life of 15 years.

Khorassan-U: Khorassan is 50% owned by KAP, 30% owned by Uranium One and 36% owned by Energy Asia Holdings. KAP increased its share in the venture from 34% to 50% at the end of 2018. Reserves and Measured and Indicated resource stand at 111 Mil. Lbs. of U_3O_8 with an AISC of \$16 per Lbs. of U_3O_8 . The mine has an expected life of 18 years.

SMMC: SMMC is 30% owned by KAP and 70% owned by Uranium One. The mine produces ~7.6 Mil Lbs. of U_3O_8 a year at an AISC of \$12 per Lbs. of U_3O_8 . The mine has an expected remaining life of 18 years.

Baiken-U: Baiken-U is 52.5% owned by KAP as of 2019 and 47.5% owned by Energy Asia limited. The mine produces ~4.9 Mil Lbs. of U_3O_8 a year at an AISC of \$14 per Lbs. of U_3O_8 . The mine has an expected remaining life of 14 years.

Mining Subsidiary/Deposit	Equity Interest (%)	Uranium Mining Province	Attributable (Measured & Indicated)			Attributable Total Mineral Resources		
			(Mt)	(%U)	(ktU)	(Mt)	(%U)	(ktU)
Kazatomprom-SaUran LLP	100.00							
Uvanas		Shu-Sarysu	-	-	-	-	-	-
Eastern Mynkuduk		Shu-Sarysu	22.6	0.030	6.8	22.6	0.030	6.8
Kanzhugan		Shu-Sarysu	31.1	0.038	12.0	31.1	0.038	12.0
South Moinkum (Southern part)		Shu-Sarysu	1.8	0.047	0.8	1.8	0.047	0.8
Central Moinkum		Shu-Sarysu	20.5	0.058	11.9	20.5	0.058	11.9
Total			75.9	0.041	31.4	75.9	0.041	31.4
Ortalyk LLP	100.00							
Zhalpak		Shu-Sarysu	44.9	0.032	14.5	44.9	0.032	14.5
Central Mynkuduk		Shu-Sarysu	64.1	0.045	28.8	64.1	0.045	28.8
Total			109.1	0.040	43.3	109.1	0.040	43.3
RU-6 LLP	100.00							
Northern Karamurun		Syrdarya	8.6	0.064	5.5	8.6	0.064	5.5
Southern Karamurun		Syrdarya	12.4	0.084	10.4	12.4	0.084	10.4
Total			20.9	0.076	15.9	20.9	0.076	15.9
Appak LLP	65.00							
Western Mynkuduk		Shu-Sarysu	35.6	0.035	12.5	35.6	0.035	12.5
JV Inkai LLP	60.00							
Blocks 1, Inkai (a)		Shu-Sarysu	27.7	0.073	20.2	27.7	0.073	20.2
Blocks 1, Inkai (b)		Shu-Sarysu	72.5	0.052	38.0	72.5	0.052	38.0
Blocks 1, Inkai (c)		Shu-Sarysu	58.8	0.047	27.8	58.8	0.047	27.8
Total			159.0	0.054	86.0	159.0	0.054	86.0
Semizbai-U LLP	51.00							
Semizbai		Northern Kazakhstan	10.1	0.056	5.7	10.1	0.056	5.7
Irkol		Syrdarya	20.5	0.041	8.5	20.5	0.041	8.5
Total			30.6	0.046	14.2	30.6	0.046	14.2
JV Akbastau JSC	50.00							
Block 1 Budenovskoye		Shu-Sarysu	7.5	0.100	7.6	7.5	0.100	7.6
Block 3 Budenovskoye		Shu-Sarysu	13.9	0.078	10.8	13.9	0.078	10.8
Block 4 Budenovskoye		Shu-Sarysu	3.4	0.105	3.5	3.4	0.105	3.5
Total			24.8	0.089	21.9	24.8	0.089	21.9
Karatau LLP	50.00							
Block 2, Budenovskoye		Shu-Sarysu	29.6	0.081	24.1	29.6	0.081	24.1
JV Zarechnoye JSC	49.98							
Zarechnoye		Syrdarya	4.0	0.060	2.4	6.1	0.056	3.4
JV Katco LLP	49.00							
Southern Moinkum (Northern part)		Shu-Sarysu	7.6	0.061	4.6	7.6	0.061	4.6
Tortkuduk		Shu-Sarysu	20.6	0.120	24.7	20.6	0.120	24.7
Total			28.2	0.104	29.4	28.2	0.104	29.4
JV Khorassan-U LLP	50.00							
Block Kharassan 1, North Kharassan		Syrdarya	20.0	0.107	21.3	20.0	0.107	21.3
JV SMCC LLP	30.00							
Akdala		Shu-Sarysu	3.1	0.057	1.7	3.1	0.057	1.7
Block 4, Inkai		Shu-Sarysu	30.2	0.038	11.4	30.2	0.038	11.4
Total			33.2	0.040	13.2	33.2	0.040	13.2
Baiken-U LLP	52.50							
Block Kharassan 2, North Kharassan		Syrdarya	10.5	0.112	11.7	10.5	0.112	11.7
Kazatomprom (Exploration)	100.00							
Block 2 Inkai		Shu-Sarysu	133.8	0.031	42.0	133.8	0.031	42.0
Block 3 Inkai		Shu-Sarysu	172.3	0.048	83.1	172.3	0.048	83.1
Total			306.1	0.041	125.1	306.1	0.041	125.1
Grand Total			887.7	0.051	452.5	889.7	0.051	453.5

Appendix D: Political Risk

As we will note in a forthcoming white paper on our approach to political risk analysis and management, political risk is highly idiosyncratic, not only to a company and a country but sometimes to an individual asset. This makes the management of the risk by a portfolio manager challenging and extremely difficult to integrate into a valuation. The risks a business is exposed to because of social and political events tend to come in two flavors, low probability-high impact/high probability-uncertain impact. In either case, the integration of the risk into either a discount rate or a scenario in which items such as revenue are manipulated to reflect possible impact is often counterproductive. This is as true of KAP as any other company in our portfolio, perhaps even more so due to the odd way political risk manifests itself for public-private entities such as publicly traded state-owned entities.

In the case of KAP, our primary concern is political stability. Political stability is, of course, a concern for any business but for a publicly traded state-owned entity it is of importance, because the state ownership shields the business from most other political risks, especially in an authoritarian regime (which authoritarians liked to call a “managed democracy” these days). As such the following analysis is primarily concerned with political stability.

Political stability is the key political risk concern for investors in KAP because instability would prevent the continuation of business as usual and could cast a shadow over the historical reliability of KAP as a supplier of uranium to the utilities of the world. Additionally, instability would increase the odds of either a re-nationalization of KAP (and even we view as low probability regardless of any instability) or outside intervention of a state to secure uranium deposits under the guise of national/international security concerns.

Introduction to Kazakhstan: The Republic of Kazakhstan is the ninth largest country in the world, situated principally in Asia, although technically the most western parts of the country are in Europe. The country is the dominant economic power in Central Asia, generating 60% of the regions GDP, primarily generated through extensive oil/gas and mineral reserves. Kazakhstan has the eleventh largest oil reserves in the world and the world’s second largest uranium reserves.

The modern state of Kazakhstan was found on December 16th, 1991 and was the last Soviet Republic to declare independence. Nursultan Nazarbayev, the communist-era leader of the Soviet Republic, became the country’s first president. Nazarbayev has governed as president since the country’s founding winning elections in six elections in a row, all of which have been less than democratic. Despite the questionable nature of the elections, he appears to be genuinely popular, and it is unclear if the results would have been any different had the elections been free and fair.²⁸

While the first five years of his rule were difficult, the economy shrank 9% per annum, and inflation peaked at 1,547 percent, the subsequent post-soviet period has been one of healthy growth with average GDP growth of 5.6%. The GDP per capita of the country has increased from \$1,515 (in current USD) in 1991 to \$9,031 in 2017, an increase of 496%. The difficulty of forging a state from the land mass known as Kazakhstan should not be underestimated, the country has ~125 ethnic groups, including a large Russian population, and a young population, 40% of which have been born since Nazarbayev came to power. Despite these challenges, he is commonly referred to by the people as “Papa” a title few other people in his position would have. He is

²⁸ Dark Shadows: Inside the Secret World of Kazakhstan by Joanna Lissis.

also the only ex-Soviet ruler who has been in power since before the USSR has collapsed, he also lived through every Soviet leader except Lenin.

Nazarbayev's mantra for building the nation has been: "political stability, economic prosperity, and ethnic harmony." Thus far he appears to have accomplished that goal, he is not without his detractors though, and there is no question the country is an authoritarian regime. Kazakhstan remains politically stable, with reasonable degrees of legislative and political predictability assuming one focuses on the assessment of the right factors.

FrameWork for Kazakhstani Political Risk

Do not ever expect western analysts to understand the political situation in a country the way the locals do. Regarding Kazakhstan, we have found the work of Dosym Satpaev the most helpful in understanding the current situation on the ground. The following framework for analysis is based on theories of political survival articulated by Bruce Bueno De Mesquita in his work "The Logic of Political Survival" and adapted from Dosym Satpaev's 2008 work "An Analysis of the Internal Structure of Kazakhstan's Political Elite and an Assessment of Political Risk Levels." These are the key factors to think about when assessing the political risk in Kazakhstan.

Internal Factors

The balance of power between competing political factions.

- Distribution of power between different politicians. Politics in Kazakhstan is about individuals, not policy.
- The key person in Kazakhstan politics is the current president, in power since the country's independence in 1991.

There are three key questions for investors to consider regarding domestic political issues:

- 1) What is the ability of the president to manage the balance of power between different political factions? – Nazarbayev has done so successfully for a long time; we have no reason to believe he won't continue to do so successfully.
- 2) What is the state of presidential successor planning? – See Below
- 3) What are the strengths and weaknesses of political institutions at the current time and how are they evolving? – See Below

Financial Crisis = Political Crisis

In general, we believe that the survival of leaders and institutions depends on their ability to provide enough resources to sustain political support among different groups that keep them in power (this is as true of authoritarian regimes as democracies), in this way politics can be thought of as a common utility function.²⁹ Key concerns for Kazakhstan:

- Stability of the natural resource industries as the primary drivers of economic growth.
- Progress in the diversification of the economy

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- Evolution of Anti-Corruption efforts: The success or failure of rooting out corruption is not necessarily the key issue; the key issue is who the efforts impact and their power networks.

Kazakhstan has faced increased domestic unrest in the wake of the 2014-2015 oil price fall, in keeping with our theory that financial crisis equals political crisis. In 2017 and 2018, with a rebound in GDP per capita, a higher level of stability appears to have returned to the country, although that is just our interpretation of the news out of the country.

External Factors

Geopolitical Factors

Kazakhstan is a landlocked country with Russia to the north, China to the East and unstable countries to the south (Iran, Kyrgyzstan, Uzbekistan, Pakistan, Afghanistan, Tajikistan, and Turkmenistan). Despite this difficult neighborhood, Nazarbayev has bucked the trend and maintained stability, encouraged economic growth and achieved significant foreign direct investment. This makes Kazakhstan unique in the region. Nevertheless, the political stability of the neighborhood is a key issue. Central Asia has three types of regional risk:

- Interstate relations
- The existence of conflict zones in the region
- Negative consequences of rising trade restrictions and anti-globalization sentiment

Another key geopolitical factor for Kazakhstan is relations between Russia, the United States, and China. To date the regime has maintained good relations with all three, this may not be sustainable.

Global Economy

- The pace of global growth and the demand for natural resources

In-Depth Discussion of two Key Topics: Presidential Succession and Russia and Kazakhstan

Presidential Succession: In June 2018, the speaker of Kazakhstan's parliament, Kassym-Jomart Tokayev, stated in an interview with the BBC, that the country's President Nursultan Nazarbayev would not run for re-election in 2020. Given the deft hand with which Nazarbayev has managed the country and the lack of a clear succession plan (at least publicly) this statement (which he quickly backtracked from) prompts two important and interrelated questions:

- 1) When will Nazarbayev step down?
- 2) Will Nazarbayev be able to ensure a stable transition of power?

Instability in Kazakhstan, with the country's large oil and uranium endowments and large Russian population³⁰, is a concern not only globally, but obviously for investors. Kazakhstan's oil and gas sector has

³⁰ We do not view a repeat of Ukraine as a particularly likely event, but Putin is expansionist, ambitious and on record as stating that the fall of the Soviet Union was a geopolitical catastrophe. Putin has previously used large ethnic Russian populations as cover/an excuse for involvement in other countries, most notably in the Russian invasion of Georgia in 2008 and more recently in the Ukraine. From the perspective of a KAP investor it is worth noting that the ethnic Russian

been the recipient of billions of dollars of foreign direct investment by international Oil companies in particular US firms.³¹ Furthermore, both Western firms and China have invested billions in the country's Uranium industry. Kazakhstan also hosts the International Atomic Energy Agency's uranium bank which contains ready to use reactor fuel that the state is responsible for protecting and which KAP is paid a fee for maintaining.

The country has, to some degree miraculously, maintained stability since independence, despite the unstable part of the world it is in, and despite past Russian efforts to incite secessionist sentiments among the large ethnic-Russian population. Moreover, because of Kazakhstan's political history as a one party, one ruler state, it has significant weakness in its political institutions. The country's elections are managed, but not free and fair, and the legislature is dominated by Nazarbayev's political party.

As Paul Stronski, a senior fellow with the Carnegie Endowment for International Peace, and author of a recent piece entitled "A Troubling Scenario for Kazakhstan"³² which is well worth reading for any interested investor, noted Nazarbayev has played an "essential role as the creator and guarantor of Kazakh sovereignty," but has failed to create the "political and cultural institutions to ground the country in the post-Nazarbayev era."³³

Based on our research though, Nazarbayev appears to recognize this key state weakness and is working to change it. Thus far he has pursued a dual-track strategy:

- 1) Nazarbayev is de-concentrating power from the executive branch, likely in hopes of preventing the rise of a strong man of less capable means.
- 2) Nazarbayev has forced increased domestic investment by economic elites, a situation that appears geared towards creating a situation where their livelihoods and wealth are tied to the survival of Kazakhstan. This is in many ways a recognition of our previous statement that financial crisis=political crisis in reverse and could be summed up as a strategy geared towards creating an environment in which avoiding a political crisis because it may prompt a financial crisis is a primary concern for the business elite.

Nazarbayev has deliberately tried to weaken the Kazakhstan executive branch, having made the following decisions:

- In March 2017, he endorsed several amendments, devolving some powers to the legislature.³⁴
- In July 2018, the Kazakh parliament took up a bill, granting Nazarbayev the right to head the country's Security Council for life but also changed the Council from a consultative body to a constitutional one, increasing its clout and ensuring its long-term influence.

populations of Kazakhstan are predominantly in the north of the country, while the Uranium assets of KAP are, save for one mine, in the south.

³¹ "Kazakhstan is the 86th largest trading partner of the United States, with a total of \$1.3 billion in two-way trade in 2017. U.S. firms have invested tens of billions of dollars in Kazakhstan, concentrated in the oil and gas sector." (Source: <https://www.state.gov/r/pa/ei/bgn/5487.htm>)

³² [A Troubling Scenario for Kazakhstan](#)

³³ [Kazakhstan At Twenty-Five: Stable but Tense](#)

³⁴ [Kazakh Lawmakers Give Final Approval to Constitutional Amendments](#)

In keeping with our previous statement that balancing the power of elites is key to stability in Kazakhstan, Nazarbayev, has encouraged the elites to become more heavily invested in the economic status quo. The fortunes of the elite are increasingly tied to Kazakhstan's economic performance and, in turn, the country's political stability.

- In January 2018, Nazarbayev said that “the withdrawal of capital by bank shareholders for the benefit of affiliated companies or persons should be a serious crime.”³⁵
- In July 2018, his government implemented a law to limit capital outflows from the country by elites trying to hide money abroad.

It is not clear if or when Nazarbayev will step down, the 2020 presidential elections will be important to watch in this regard.³⁶ Nevertheless, Nazarbayev appears to recognize the weaknesses of the regime he has created, and he seems to be preparing for a political transition. He has worked to devolve power and to get the country's elites invested in maintaining the status quo. Political transitions are of course very difficult; we would note that they are usually undertaken in the absence of experience. Kazakhstan happens to have as its current leader one of the few, if not the only leader globally, who has navigated a political transition in the same position of power he is currently in. Nazarbayev was, of course, president when Kazakhstan transitioned from the Soviet Republic to the current soft authoritarian regime. Just because he did it successfully once does not mean he can do it again, but we do think it raises the odds.

Russia and Kazakhstan: Relations between the United States and Russia have continued to deteriorate in 2017 and 2018. In August 2017, Donald Trump signed into law a new bill called Countering America's Adversaries Through Sanctions Act (CAATSA), which extended the post-2014 Ukraine sanctions. The key change to the point of the law was it enables the administration to sanction foreign buyers of Russian military equipment. Kazakhstan is a member of the Collective Security Treaty Organization (Russia's weaker version of NATO) and a large consumer of Russian weapons.

Kazakhstan, started its life as a weak country, historically dominated by its larger neighbor north and has thus stuck to a multi-vector foreign policy based on the idea of maintaining good relationships as many influential countries as possible. Nazarbayev made an official visit to Washington, DC, in January 2018, for this very reason.³⁷ Nevertheless, Western sanctions against Russia have made balance ever more difficult.

The Russian ruble has been steadily losing ground since the beginning of 2018, and while ruble volatility can be attributed to a host of factors, such as the price of oil, western sanction has played a role. The ruble's current weakness is also the Kazakhstani Tenge's weakness as Kazakhstan is Russia's closest trading partner in the former Soviet sphere and both are major exporters of hydrocarbons. The Tenge has depreciated from approximately 312–322 tenge per \$1 in June 2017, to ~380 tenges per \$1.

Economy Minister Timur Suleimenov recently noted that his country is “constantly talking as if sanctions [against Russia] were directly applicable to us. They influence us only via the exchange rate”³⁸. In April 2018, Suleimenov indicated that Kazakhstan was prepared for various scenarios, one of which could see the ruble weakening to 90 per US dollar. The prospect of additional Western sanctions against Russia is problematic for Kazakhstan because of its wide-ranging implications and extensive economic links. In a similar vein, any

³⁵ [New Law Limits Outflow of Money](#)

³⁶ It is worth noting that Kazakhstan has a history of calling presidential elections the year before they are scheduled to occur, it has happened in every presidential election since independence, and so the election may occur in 2019.

³⁷ [Nazarbayev Goes to Washington](#)

³⁸ [Western Sanctions Against Russia Leave Kazakhstan Exposed](#)

countermeasures taken by Russia could potentially impact Kazakhstan's economic well-being in negative ways. Accordingly, Kazakhstani authorities are careful to avoid any public criticisms of Vladimir Putin or Russia's adventurist foreign policy.

Although Kazakhstan cannot easily disentangle itself from Russia, the fallout from Russia's standoff with the West, which many in Kazakhstan are increasingly inclined to blame on Moscow, could jeopardize the historically strong bilateral relationship.³⁹ In June 2018, the chairperson of Kazakhstan's Senate, Kassymzhomart Tokayev, said that, in his opinion, Nazarbayev may not run for president again in the presidential elections scheduled for 2020. Despite the economic challenges Kazakhstan would be faced with if it distanced itself from Russia, Kazakhstan's next leader may choose a different path than Nazarbayev, that is if he does not run.

³⁹ [Western Sanctions Against Russia Leave Kazakhstan Exposed](#)

The following terms are frequently used in the Uranium Mining Industry, definitions have been taken from an OECD Report "[Uranium 2018: Resources, Production and Demand](#)" which is published every other year and is commonly referred to as the Red Book and from a 2001 IAEA study entitled "[Analysis of Uranium Supply to 2050](#)." We have made some adjustments for clarity but otherwise this is a reproduction of parts of the glossaries of both documents.

Units: Metric units are used in all tabulations and statements. Resources and production quantities are generally expressed in terms of tons (t) contained uranium (U) not Lbs. of U_3O_8 .

1 short ton U_3O_8 = 0.769 tU

1% U_3O_8 = 0.848% U

1 USD/lb U_3O_8 = USD 2.6/kg U

1 ton = 1 metric ton

Burnup: A measure of the total energy released by a nuclear fuel compared to its mass, typically measured in gigawatt days per ton.

Conversion: Generally, conversion refers to the process whereby uranium concentrates are purified and converted in uranium hexafluoride, prior to enrichment. Conversion can also refer to the transformation of natural uranium or enriched uranium hexafluoride to uranium dioxide or uranium metal as a preliminary step in fuel fabrication.

Depleted Uranium: Uranium where the U-235 isotope concentration is less than 0.711% (by weight), the concentration for naturally occurring uranium. Depleted uranium is a residual product from the enrichment process.

Enrichment: Process by which the U-235 isotope concentration in uranium is increased from the naturally occurring 0.711%.

Enrichment Tails: The relatively depleted fissile uranium (U-235) remaining from the uranium enrichment process. The natural uranium 'feed' that enters the enrichment process generally contains 0.711% by weight ^{235}U . The 'product stream' contains enriched uranium (greater than 0.711% ^{235}U) and the 'waste' or 'tails' contains depleted uranium (less than 0.711% ^{235}U). At an enrichment tails assay of 0.3%, the tails would contain 0.3% ^{235}U . A higher enrichment tails assay requires more uranium feed (thus permitting natural uranium stockpiles to be decreased), while increasing the output of enriched material for the same energy expenditure.

High Enriched Uranium. Any form of uranium having a ^{235}U concentration of 20% or higher. HEU is used principally for producing nuclear weapons and fuel for reactors to propel submarines and other vessels. Weapons grade HEU contains at least 90% ^{235}U .

Known Resources. Total of reasonably assured resources and estimated additional resources.

Low Enriched Uranium. Any form of uranium having a ^{235}U concentration greater than 0.711% but below 20%. Typical concentrations used in light water reactors range from 3 to 5%.

Mixed Oxide Fuel (MOX). A fuel fabricated from plutonium and depleted or natural uranium oxide which can be used in standard light water reactors. MOX fuel assemblies are typically loaded in light water reactors with uranium fuel assemblies in the ratio of one to two.

Natural Uranium. Uranium whose natural isotopic composition (approximately 0.711% ²³⁵U by weight) has not been altered.

Plutonium. A heavy, fissionable, radioactive metallic element with atomic number 94. Plutonium is not naturally occurring but is produced as a by-product of the fission reaction in a uranium fueled nuclear reactor and is recovered from irradiated fuel. It is used in preparing commercial nuclear fuel and in manufacturing nuclear weapons.

Reprocessed Uranium. Uranium extracted from spent fuel which may return to the fuel cycle to be fabricated as new fuel.

Reprocessing. The chemical separation of uranium and plutonium from spent fuel. It allows the recycling of valuable fuel material and minimizes the volume of high-level waste material.

Resource Classification: A 'Mineral Resource' is a concentration or occurrence of material of intrinsic economic interest in or on the earth's crust in such form, quality and quantity that there are reasonable prospects for eventual economic extraction. Mineral Resources are further sub-divided, in order of increasing geological confidence, into inferred, Indicated and measured Categories.

Inferred Mineral Resource is the part of a mineral resource for which tonnage, grade and mineral content can be estimated with a low level of confidence. It is inferred from geological evidence and assumed but not verified geological or grade continuity. It is based on information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes which may be of limited or uncertain quality and reliability.

Indicated resources are simply economic mineral occurrences that have been sampled (from locations such as outcrops, trenches, pits and drill holes) to a point where an estimate has been made, at a reasonable level of confidence, of their contained metal, grade, tonnage, shape, densities, physical characteristics.

Measured resources are indicated resources that have undergone enough further sampling that a 'competent person' (defined by the norms of the relevant mining code; usually a geologist) has declared them to be an acceptable estimate, at a high degree of confidence, of the grade, tonnage, shape, densities, physical characteristics and mineral content of the mineral occurrence.

Separative Work Unit (SWU). The standard measure of enrichment services, measuring the effort expended in increasing the ²³⁵U content of uranium above the naturally occurring 0.711%. It typically measures the amount of enrichment capacity required to produce a given amount of enriched uranium from a feed material.

Unconventional Resources. Very low grade resources which are not now economic or from which uranium is only recoverable as a minor by-product (e.g. phosphates, monazite, coal, lignite and black shale).

Uranium. A heavy, naturally occurring radioactive element, with atomic number 92.

Uranium Hexafluoride (UF₆). A white solid obtained by chemical treatment of uranium oxide, which forms a vapour at temperatures above 56°C. UF₆ is the form of uranium required for the enrichment process.

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