

Nuclear Buzz

Is Mulga Rock A Risk Worth Taking?

By Andrea Jenetta, Publisher

So the Mulga Rock DFS.

First, let me say that the executive summary is a very cool document. It's readable. It's colorful and color-coordinated. It has graphics. It is very easy to get bottom line technical and financial information.

Mulga Rock is solid and simple. But it isn't dazzling in the same way that Salamanca appears to dazzle.

The life-of-mine, all-in-sustaining cost is \$34 per pound. It needs a term price of \$44.58 just to break even. The analysis assumes \$60 per pound, a number that as of Feb. 2, 2018, seems beyond unrealistic, particularly when you take a snapshot of the supply/demand picture.

But if you know Mike Young, Julian Tapp and the rest of the Vimy team, you also know that they are credible, capable and take the Mulga Rock project very seriously.

If they have to make it happen through sheer force of will, then that's what they will do—if for know other reason than to show a middle figure to the haters and naysayers the day the first pound of Mulga Rock U3O8 is drummed.

[Aside: Fuel Cycle Week will proudly publish any and all documented

Mulga Rock Could Enter Production In 2020 with Contracts at \$60/lb

By Andrea Jenetta, Publisher

Mulga Rock in Western Australia could be producing uranium in as little as 36 months if owner Vimy Resources inks off take contracts at long term prices \$30 above current levels to secure financing and justify a final investment decision planned before the end of 2018.

The project's definitive feasibility study released this week by Vimy is predicated on a \$60 per pound U3O8 term price. The all-in capital breakeven price for the project is \$44.58 per pound using a discount rate of 8% (see key metrics chart, p. 8).

The document's executive summary devotes a chapter to making the case for why Mulga Rock could be the right project at the right time, despite the protracted negative outlook for the uranium sector as the result of too much supply, too little demand and prices too low to sustain primary production.

The premise of the argument centers on decisions by Cameco, Kazatomprom and Orano (AREVA) in late 2017 to cut production, actions that could remove as much as 30 million pounds from the market in 2018 (although it now is unclear how much production KAP will actually cut).

Vima said the moves "confirmed a widely-held view that current low uranium prices cannot sustain primary uranium production."

The firm expects what it called a "supply side strike" to drive prices higher over the short to medium term, with production from impacted operations expected to remain idle until prices warrant a resumption in mining.

At the same time, Vimy projects that nuclear generation will grow some 38% over the next 10 years, particularly in countries that aren't members of the Organization for Economic Cooperation and Development.

Speaking by phone from Perth on Feb. 2, CEO and managing director Mike Young told Fuel Cycle Week that Vimy has not signed any contracts. see [Mulga Rock DFS on page 7](#)

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Husab Produced 2.2Mlbs in 2017. What About 2018?

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In the document, the six-member, cross-party, subcommittee called on the government to detail how it will work with its European Union counterparts to anticipate and manage supply shortages, and to assess what impact leaving the internal energy market would have on the price paid by consumers for their energy.

The panel heard evidence that the U.K.'s ability to build future on nuclear generation sites, including Hinkley Point C, would be in doubt if access to specialist EU workers is curtailed.

Failure to replace Euratom Treaty provisions by the time Brexit occurs could result in the U.K. being unable to import nuclear materials.

The report concluded that Britain might become more vulnerable to energy shortages in the event of extreme weather or unplanned

generation outages.

Committee chair Lord Teverson commented: "Individuals and businesses across the U.K. depend on a reliable and affordable supply of energy. In recent years, the U.K. has achieved such a supply in partnership with the EU, working with other member states to make cross-border trade in energy easier and cheaper.

Teverson added: "Over the course of the inquiry the committee heard benefits of the U.K.'s current energy relationship with the EU"

But it remained unclear how this could be achieved, he said, without the U.K. remaining in the EU single market and the other bodies that develop and implement the EU's energy policy. ●

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But the firm is being advised by Société Générale on the level of pricing and volume necessary to get a green light on final investment and construction decisions.

"Using our financial model, the bank will provide us with the minimum contract terms on price, offtake percentage, contract terms and counterparties that we need to achieve for debt funding," Young said.

"We are therefore seeking cornerstone partners with low counterparty risk, and this of course includes the U.S.A.," he added.

Under the DFS, Mulga Rock will produce 3.5 million pounds per year, taking total production over a projected 15-year mine life to 47.1 million pounds, with an all-in-sustaining cost of \$34 per pound.

Cash operating costs for the initial five years of the project are forecast at \$25.11, while life of mine cash costs come in at \$27.95. Those numbers result in annual free cash flow (EBITDA) of A\$134 million (\$108 million) after royalties.

At \$60 per pound, pre-tax NPV (8%) is estimated at A\$530 million (\$426 million), with an IRR of 25% and a project payback period of 3.1 years after the start of production.

Mulga Rock's capital cost stands at almost half a billion Australian dollars (\$397 million), including \$41.7 million (\$34 million) in contingencies

Vimy noted that price has the greatest impact on project economics, as every \$5 per pound increase in contract prices results in NPV increasing by A\$172 million (\$138 million) (see table, below).

Table 14.1: Financial return at different uranium prices

Item	Unit	Uranium Price (US\$/lb U ₃ O ₈)				
		US\$44.58/lb	US\$55/lb	US\$60/lb	US\$65/lb	US\$70/lb
NPV ₈ (inc. royalties, pre-tax)	A\$M	0	358	530	702	874
IRR	%	8.0	20.4	25.3	29.8	34.1
Payback	Years	5.6	3.7	3.1	2.6	2.2

Jump in Reserves Improves Economics

The substantial jump in mineral resources to 90.1 million pounds grading 570ppm U3O8 announced last year will likewise boost Mulga Rock's financials (see Table 5.1, p. 9).

This represents an increase of 20% in contained U3O8 metal for the global resource compared to the 2015 prefeasibility study, including a 10% increase in uranium grade and 9% increase in tonnage.

More importantly, the Mulga Rock East area made up of the Ambassador and Princess deposits has increased by 34% in contained metal comprising a 17% increase in grade and a 13% increase in tonnage when compared to the PFS.

The project's total ore reserves of 42.3 million pounds grading 845ppm U3O8 are based on the optimized pit designs for Ambassador, Princess and Shogun, which contain 85% of proved and probable ore reserves (see Table 5.2, p. 9).

Over 90% of the first 10 years of production is supported by reserves at the three deposits. There was a 98% conversion of measured resources into proved ore reserves, and 91% conversion of indicated material into probable ore reserves.

Vimy said the operation will use a "simple, open pit operation" at a maximum depth of only 74 meters, while the process plant will adopt "a simple method of extraction" involving atmospheric acid leaching and resin-in-pulp processes.

The firm plans to mine three major high-grade pit shells at Ambassador, Princess and Shogun that will be the focus of initial mining activities during the 3.1 year payback period.

DFS vs PFS

The most significant difference between the 2015 PFS and this week's DFS, besides the upward revision in resources, is NPV which improved by nearly 40% to A\$530 million (\$426 million), using the same \$60 price and exchange rate (A\$1.00:US\$0.70).

Vimy said the improvement is the result of a higher mineral resource uranium grade; lower uranium price pit shells; inclusion of a sulfuric acid plant in the processing facility; higher uranium production during the initial ramp-up period due to higher grade ore being sourced; and a 500,000 pound increase in annual nameplate production.

Total cash operating costs fell by \$3.40 per pound, 12%, despite higher costs for some inputs. Process plant maintenance

Mulga Rock DFS Key Metrics	
Resource (ppm U3O8)	
Life of mine (yrs)	15
Plant ore throughput (Mtpa)	2.4
Grade, yrs 1-5	1,010
Run of mine grade (LOM)	770
Average strip ratio (BCM/t ore)	12.1
Production (Mlbs U3O8)	
Metallurgical recovery (%)	87.3
Annual production	3.5
LOM	47.1
Capital (A\$M)	
Pre-production	36.3
Mining	107.8
Process plant and infrastructure	211.4
Indirects, owner's costs, contingencies	137.5
Total	493
Operations (\$/lb U3O8)	
Exchange rate (AUD:USD)	0.7
Cash opex (yrs 1-5)	25.11
Cash opex (LOM)	27.95
All-in-sustaining cost (yrs 1-5)	30.16
AISC opex (LOM)	34
Royalties	
Western Australia (%)	5
Resource Capital Fund VI (%)	1.15
Project Financials	
Price assumption (\$/lb U3O8)	60
NPV (A\$M)	530
IRR (%)	25.3
Payback (yrs)	3.1

Source: Mulga Rock Definitive Feasibility Study

increased \$1.19 per pound due to corrosive process conditions. But reagent expenses fell by \$4.70 per pound after sulfuric acid use was incorporated.

According to the DFS, it will take 122 weeks to design, construction and commission Mulga Rock.

The project is scheduled to be implemented in two stages, the first involving all site activities except the beneficiation plant, and the second installation and commissioning of the beneficiation plant.

Buying, installing and turning on the SAG mill is the project's critical path and the equipment must be ordered 18 months ahead of commissioning. Regarding the beneficiation plant, the schedule for delivery and installation is expected to take 70 weeks, with construction starting at the end of year 1,

in preparation for the cessation of high-grading at the mine in year 2, month 8. Another 18 weeks will be scheduled for commissioning. The process plant will take 24 months to fully ramp-up, with the plant operating at 83% of design throughput within twelve months. ●

Table 5.1: Mulga Rock Project Mineral Resource, July 2017

Deposit / Resource	Classification	Cut-off Grade (ppm U ₃ O ₈)	Tonnes (Mt) ¹	U ₃ O ₈ (ppm) ²	U ₃ O ₈ (Mlbs)
Mulga Rock East					
Ambassador	Measured	150	5.2	1,100	12.6
Ambassador	Indicated	150	14.8	800	26.0
Ambassador	Inferred	150	14.2	420	13.1
Princess	Indicated	150	2.0	820	3.6
Princess	Inferred	150	1.3	420	1.2
Sub-Total			37.4	680	56.4
Mulga Rock West					
Shogun	Indicated	150	2.2	680	3.2
Shogun	Inferred	150	0.9	290	0.6
Emperor	Inferred	150	30.8	440	29.8
Sub-Total			33.8	450	33.6
Total Resource			71.2	570	90.1

1. t = metric dry tonnes; Appropriate rounding has been applied, and rounding errors may occur.
2. Using cut combined U₃O₈ composites (combined chemical and radiometric grades).

The information in the table above is extracted from ASX announcement entitled 'Significant Resource Update – Mulga Rock Cracks 90Mlbs' released on 12 July 2017 and available to download from www.asx.com.au ASX:VMY. The Company is not aware of any new information or data that materially affects the information included in the original market announcement and, in the case of estimates of Mineral Resources or Ore Reserves, that all material assumptions and technical parameters underpinning the estimates in the relevant market announcement continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Person's findings are presented have not been materially modified from the original market announcement.

Table 5.2: Mulga Rock Project Ore Reserves, August 2017

Deposit / Resource	Classification	Cut-off Grade (ppm U ₃ O ₈)	Tonnes (Mt) ^{1,2}	U ₃ O ₈ (ppm) ³	U ₃ O ₈ (Mlbs) ⁴
Mulga Rock East					
Ambassador	Proved	150	5.3	1,055	12.3
Ambassador	Probable	150	14.1	775	24.0
Princess	Probable	150	1.7	870	3.3
Sub-Total			21.1	850	39.6
Mulga Rock West					
Shogun	Probable	150	1.6	760	2.7
Sub-Total			1.6	760	2.7
Total Reserves			22.7	845	42.3

1. Tonnages and grades are reported including mining dilution.
2. t = metric dry tonnes; appropriate rounding has been applied and rounding errors may occur.
3. Using cut combined U₃O₈ composites (combined chemical and radiometric grades).
4. Metallurgical plant recovery factors are not applied to Total Metal content.

The information in the table above is extracted from ASX announcement entitled 'Major Ore Reserve Update – Moving to the go line' released on 4 September 2017 and available to download from www.asx.com.au ASX:VMY. The Company is not aware of any new information or data that materially affects the information included in the original market announcement and, in the case of estimates of Mineral Resources or Ore Reserves, that all material assumptions and technical parameters underpinning the estimates in the relevant market announcement continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Person's findings are presented have not been materially modified from the original market announcement.