Our mission is to become a reliable and respected uranium producer.
Highlight

The DFS mine schedule supports 15 years of production at 3.5Mlb of uranium per annum.

The optimised pit designs for the DFS remain economic under a broad range of uranium prices both at current-term contract prices and expected future pricing.

The DFS has a high-grade start-up strategy to maximise cash flow during initial production ramp-up, whilst maintaining mine life.

Excavation of two bulk test pits at Ambassador verified the free-dig nature of the overburden.
Mining Plus was engaged by Vimy to undertake the mining components of the DFS. As part of this work, Advisian (a member of the WorleyParsons Group) was also engaged by Vimy to undertake the advanced pit dewatering design and cost estimation components of the DFS, which form part of the total mining capital cost estimate. Vimy completed the resource optimisation and mine scheduling components of the DFS, with Mining Plus reviewing the work completed by Vimy.

**PIT OPTIMISATION**

Vimy completed resource optimisations for the Ambassador, Princess, Shogun and Emperor deposits using the July 2017 resource block model, and input parameters developed as part of the DFS. Resource optimisation was completed using Hexagon Mining’s MineSight Economic Planner software programme using the Pseudoflow algorithm.

Measured, Indicated and Inferred (MII) mineral resources were included in all optimisations as potential mineral inventory.

The optimisations for all deposits were performed over a range of Revenue Factors (RF), i.e. uranium offtake contract price, between US$25/lb and US$95/lb U₃O₈, at US$10/lb increments, to analyse the sensitivity of the deposits to the changing metal price. Undiscounted cash flows were generated for each optimised pit shell at each respective revenue factor. The individual pit shell cash flows were then stress-tested to changing metal prices to produce a range of cash flow curves for all the optimised pit shells, an example of which is shown in Figure 6.1. For example, the US$55/lb optimised pit shell has been selected for Ambassador, which is anticipated to generate A$2,000M of free cash flow (after production costs and ignoring cost of capital) assuming a uranium price of US$60/lb. By increasing the size of the pit shell from US$55/lb (DFS) to US$75/lb (PFS) there is no additional cash flow generated because the additional mineral inventory within the larger pit shell (US$75/lb) only covers the cost of production. A higher uranium metal price (greater than US$60/lb) would be required to select a larger pit shell in the above scenario.

Apart from free cash flow, other key metrics were assessed for each optimised pit shell including:

- Ore tonnes;
- Waste tonnes;
- Total material movement;
- U₃O₈ grade;
- Contained metal (U₃O₈);
- Strip ratio (waste tonnes:contained metal); and
- Calculated breakeven price.
There were some variations in pit shell selection for each deposit, depending on proposed timing within the mine plan and project development timeframe, mining methodology and operational factors, and sensitivity analysis results. The pit shells selected for the DFS are provided in Table 6.1. As a result of the increase in contained metal in the July 2017 Mineral Resource estimate, the DFS pit shells yield the same uranium metal production at a significantly lower uranium price when compared to the PFS pit designs.

The breakeven price was back-calculated to determine at what metal price the costs for each optimised pit shell equalled the calculated revenue. This is an important value to recognise during a low uranium price market environment, and assists in understanding the economic robustness of each deposit. The contained metal and total material movement quantities were also plotted to assist in the resource optimisation analysis.

**Figure 6.1: Optimised Pit Shell Cash Flow Analysis (Ambassador Resource)**

![Graph showing total pit shell cash flow analysis](image)

Table 6.1: Comparison of Selected Optimised Pit Shell Revenue Factors

<table>
<thead>
<tr>
<th>Deposit</th>
<th>PFS Pit Shell Revenue Factor (US$/lb U₃O₈)</th>
<th>DFS Pit Shell Revenue Factor (US$/lb U₃O₈)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambassador</td>
<td>75</td>
<td>55</td>
</tr>
<tr>
<td>Princess</td>
<td>65</td>
<td>45</td>
</tr>
<tr>
<td>Shogun</td>
<td>90</td>
<td>65</td>
</tr>
<tr>
<td>Emperor</td>
<td>82</td>
<td>35</td>
</tr>
<tr>
<td>MRP Average</td>
<td>78</td>
<td>50</td>
</tr>
</tbody>
</table>
The pit shells used to derive the optimised pit designs for the DFS remain economic under a broad range of uranium prices both at current-term contract prices and expected future pricing. For example, the weighted average price of term contracts for uranium purchased by owners and operators of US civilian nuclear power reactors in 2016 was US$46.11/lb U₃O₈ equivalent. Based on this average price, Vimy considers that the pit design price ranges are appropriate.

The DFS is based on optimised pit shells derived at an average of US$50/lb U₃O₈. This compares to the PFS which was based on optimised pit shells derived at US$78/lb U₃O₈. Despite a US$28/lb reduction in the uranium price used, the total contained uranium metal within the optimised pit shells has only reduced by 5Mlbs U₃O₈, from 59Mlbs for the PFS to 54Mlbs for the DFS. More importantly, the total material movement has reduced by approximately 375Mt (wet) over LOM when comparing the pit shells between the PFS and DFS.

Figure 6.2 shows the pit shells for Ambassador and Princess for a range of uranium prices between US$35 to US$75/lb U₃O₈. The optimised pit designs are economically robust and there is virtually no change to the width or depth of the Ambassador pit between US$45 to US$75/lb U₃O₈. Only 7% of the Ore Reserve is lying outside the optimised pit designs at a uranium contract price of US$45/lb U₃O₈. The southern end of Ambassador is more sensitive to price due to increasing overburden thickness. This characteristic is also reflected in the flat curves in Figure 6.1 and is a direct result of the flat-lying nature of the orebody. This is significant since the mine design will not change to any great extent irrespective of uranium contract prices above US$45/lb.

The optimised pit shells for Shogun and Emperor are shown in Figure 6.3 and Figure 6.4 respectively. Emperor is much more sensitive to the uranium contract price due to the thinner ore zones and higher strip ratio.
Figure 6.3: Shogun Pit Shell Optimisation

Figure 6.4: Emperor Pit Shell Optimisation
HIGH-GRADE START-UP

Vimy examined a high-grade start-up strategy to maximise metal output, and therefore value, during the initial ramp-up phase. A separate optimisation study was conducted for the Ambassador and Princess deposits using adjusted optimisation parameters to represent direct feed (instead of through the beneficiation circuit first) into the semi-autogenous grinding (SAG) mill. The adjusted parameters along with variation in the revenue factor provided nested pit shell results to determine areas suitable to support the high-grade production ramp-up phase within the ultimate economic pit limits identified in the previous section.

Figure 6.5 shows the Ambassador deposit at different targeted ROM feed grades. During start-up, ore will be fed directly to the SAG mill at 2,355ppm U₃O₈, bypassing the beneficiation plant, and maintaining a production rate between 3.0-3.5Mlbs U₃O₈ per annum. The Ambassador pit will provide high-grade ore to the process plant for the first twenty months. Figure 6.6 shows the location of the three high-grade pits. Ore will be excavated to the final LOM floor level and excess ore below the selected initial high-grade feed cut-off grade will be stockpiled for future processing. Figure 6.11 shows the closing stockpile inventory at the end of each year. Stockpiled ore will then be reclaimed from Year 2 Month 9 and notably will have negligible mining cost.
Figure 6.5: Nested Pit Shells at Targeted Uranium ROM Feed Grades

Figure 6.6: Ambassador High-Grade Pit Designs
MINE DESIGN

Following on from the resource optimisation, Mining Plus developed the pit designs and defined the mineral inventories for the deposits using the optimised pit shells.

Geotechnical pit wall slope design parameters were fully supported by an extensive geotechnical diamond drilling program undertaken at Ambassador, Princess and Shogun. The parameters were subsequently verified by two geotechnical test pits excavated as part of the DFS in March 2016. AMC supervised all geotechnical work undertaken as part of the DFS. The pit design parameters, based on geotechnical assessment across all pits, were:

- 15m benches with 5m berms;
- The top berms are below the surface Quaternary sand layer;
- The batter angles vary to suit the material and heights of walls;
- Operating bench heights, 10m for waste and 5m for ore;
- Minimum mining widths, 80m for cutbacks and 40m at pit base;
- Final pit floor to follow contour of footwall ore contact;
- Ramp widths, 40m dual lane and 25m for single lane; and
- Ramp gradients maintained at less than 10%.

The overburden is free-digging as verified by the two bulk test pits completed at Ambassador. The overburden sequence will be mined by two face shovels operating on 10-15m high faces.

The pit design inventories are summarised in Table 6.2 and include Measured, Indicated and Inferred regularised mineral resources as process plant feed.

Figures 6.7 and 6.8 show the final pit designs for Mulga Rock East and Mulga Rock West. Overburden landforms have been designed to accommodate required ex-pit volumes.

Table 6.2: Pit Inventory by Deposit

<table>
<thead>
<tr>
<th>Deposit</th>
<th>Ore (Mt dry)</th>
<th>Ore Grade (ppm U3O8)</th>
<th>Metal (Mlbs U3O8)</th>
<th>Waste (Mt dry)</th>
<th>Total (Mt dry)</th>
<th>Strip Ratio (BCM: tonne)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambassador</td>
<td>25.5</td>
<td>765</td>
<td>42.9</td>
<td>456</td>
<td>482</td>
<td>10.6</td>
</tr>
<tr>
<td>Princess</td>
<td>2.0</td>
<td>815</td>
<td>3.5</td>
<td>39</td>
<td>41</td>
<td>11.6</td>
</tr>
<tr>
<td>Shogun</td>
<td>1.6</td>
<td>755</td>
<td>2.7</td>
<td>55</td>
<td>57</td>
<td>20.2</td>
</tr>
<tr>
<td>Emperor</td>
<td>2.6</td>
<td>835</td>
<td>4.8</td>
<td>107</td>
<td>110</td>
<td>24.2</td>
</tr>
<tr>
<td>Total</td>
<td>31.7</td>
<td>775</td>
<td>53.9</td>
<td>658</td>
<td>690</td>
<td>12.1</td>
</tr>
</tbody>
</table>

BCM = bank cubic metre
Figure 6.7: Mulga Rock East Mining Centre Layout

Figure 6.8: Mulga Rock West Mining Centre Layout
MINE SCHEDULE

The project consists of two separate mining areas over a total length of 30km with the individual pits ranging in length from 1km to 8km. The ore zones, including interburden, are up to 38m thick at Mulga Rock East with an average thickness of 4.5m, and up to 8m in thickness at Mulga Rock West with an average of 2.3m.

Uranium mineralisation is hosted by flat-lying, carbonaceous clastic sediments which are in turn overlain by weathered, oxidised sediments that range in thickness from 19m to 62m of waste overburden. Owing to the nature of the host rock and overburden, most of the mining is free-dig, with only a small requirement for drill and blast of silcrete layers.

Due to the large lateral extent and horizontal geometry of the deposits, Vimy is proposing to use large-scale open pit ‘strip’ mining techniques like those used in mineral sands and other bulk mining operations. Strip mining commences with the excavation of an initial box cut to expose the ore, with the overburden placed in a surface landform. After mining the ore exposed by the first box cut, the resulting pit void is available to take the overburden from the next mining strip as mining moves along strike. In general, mining advances one strip at a time with previously mined areas progressively backfilled and rehabilitated. This mining method will result in ‘real-time rehabilitation’ leading to a smaller environmental footprint and significant savings in waste movement and end of mine life rehabilitation liability.

The regular geometry of the mining operation, with a fixed distance from the active mine face and backfill, lends itself to either a track and shovel (T&S) operation, or continuous mechanised waste haulage system such as an in-pit crushing and conveying (IPCC) system. Vimy has investigated a number of mechanised mining systems, including drag line, dozer trap, bucket wheel excavator, and IPCC. These mechanised mining options have progressively been eliminated due to excessive capital cost or technical risk. For the purposes of the DFS, it has been determined that an owner-operator T&S operation is the most cost-effective mining approach for the MRP.

There are also a number of smaller high-grade and secondary satellite pits within the MRP. A conventional T&S mining method will be utilised for these pits where mining proceeds bench-by-bench in a vertical direction from surface with dumping of waste material ex-pit on overburden surface landforms. This method will also be used within the larger deposits where pit geometries are less favourable for strip mining as described above.

The mine schedule proposes that the Ambassador North pit is mined first (Year -1 to Year 0), prior to uranium production commencing, with ore stockpiled within the ultimate Ambassador pit footprint and adjacent to the process plant. This will create a sterilised pit void to allow process tailings to be discharged into an in-pit tailings storage facility at the commencement of uranium production. Formal commencement of operations is defined by first ore being processed through the SAG mill in Year 1, Month 1.

At the completion of the Ambassador North pit, mining will commence at Ambassador West targeting high-grade ore zones for direct feed to the SAG mill at the process plant. Two conventional T&S pits will be mined at Ambassador West from Year 0 through to Year 2, with a third high-grade pit being mined at Ambassador East from Year 1 through to Year 3. Ore that is not directly fed into the SAG mill from the high-grade pits will be stockpiled according to pre-determined cut-off grades in front of the process plant. Only the high-grade and mid-grade stockpiles will be used to manage the ore feed into the SAG mill during the initial high-grade production ramp-up period. High-grade ore will be maintained from the pits and stockpiles until Year 2, Month 8.

The beneficiation plant commences operation in Year 2, Month 9. Ore is reclaimed from all of the available ROM stockpiles through to Year 4, Month 7 when stockpiles are exhausted. Mining continues at Ambassador East from the void of the high-grade starter pit then along strike using the strip mining method through to Year 7. Depending on uranium grade, ore will be supplemented from the Princess deposit between Years 3 to 6.

Strip mining commences in Ambassador West during Year 6 with operations continuing until Year 14. The ore from Ambassador West is blended throughout this time with ore sourced from Ambassador South, Shogun and Emperor. Ambassador South commences in Year 7 and continues to Year 10, while Shogun and Emperor commence in Years 9 and 11 respectively, and continue to the end of mine life in Year 15. Ore from Shogun and Emperor will be hauled to the beneficiation plant using B-double side tippers along a dedicated haul road within the restricted area of the mine.

Figure 6.9 shows the yearly total material movements for the MRP. Figure 6.10 provides the yearly ore schedule delivered to the process plant and the average uranium grade. The high-grade start-up during the first two years of production is clearly evident. Figure 6.11 shows the yearly stockpile inventory over LOM.
Figure 6.9: Total Material Movements for Mining Operation

Figure 6.10: Ore Tonnes and Uranium Grade Mined

Figure 6.11: LOM Ore Stockpile Inventory