CASE 5: YANGARRA RESOUCE LIMITED

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Outline

- *Problem Statement*
- *Assumptions*
- *Model Development*
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- *Sensitivity Analysis*
- *Conclusion*

Problem Statement

- **Yangarra** was an oil and gas company with properties throughout Alberta. In this case, it was involved in **construction of the 9-20 well**.
- **Jim Evashkevich**, president and CEO of Yangarra was going to make a choice of whether Yangarra should **continue to invest in the project or not**, which yields different consequences.
- Yangarra gets revenue in both scenarios, but on different terms.
- The objective was to **select the plan with a higher return**.

Assumptions

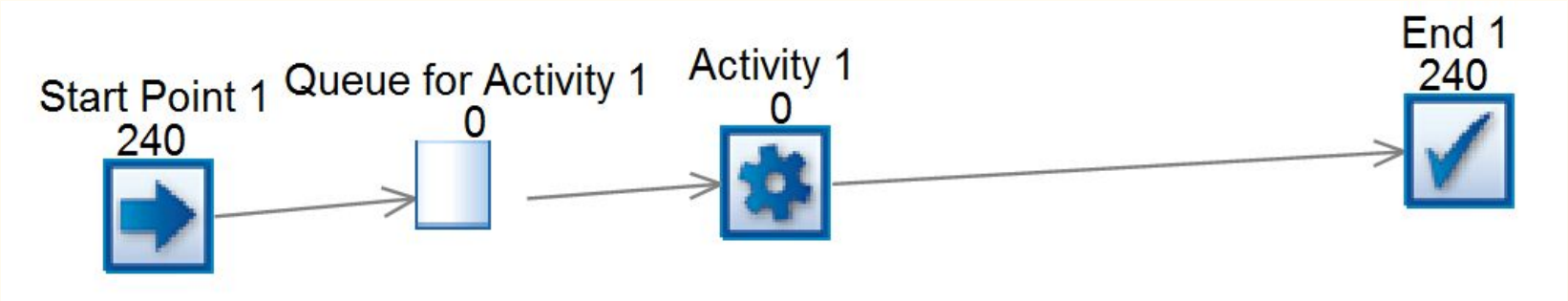
- The **initial oil production** has a **uniform distribution** between from 50 - 400 barrels.
- The **decline rate of oil production** has a **linear relationship** within each time interval.
- The **monthly oil price** also distributes **uniformly**, ranging from 70 - 80 barrels.
- Yangarra pays **2 times** the cost of completion and tie-in if not investing. Other cases would be analysed in the sensitivity analysis.
- If Yangarra chooses not to invest, the company would **not receive any cash** inflow until the project breakevens.
- **Oil production** is **the same** throughout each month.

Model Development - Basic Principles

- Since there were only two choices here and there were some conditional constraints, **SIMUL8** was chosen by us to model this case.
- As mentioned in the assumptions, we use **uniform distributions** to generate a random number between **50 to 400 barrels/day** as initial oil production for each itertaion and a random number between from **70 to 80 dollar/barrel** for each month
- There are 240 arrivals representing the 240 months (20 years) project life span

Model Development - Graphical Prensentation

- This is how our model looks like in SIMUL8.
- 240 is the count for months.
- Detailed Visual Logics is in Activity 1



Model Development - Visual Logic

- This is the visual logic we used to calculate the total gross revenue and net income in NPV.

Visual Logic for Crown Royalties

Base Solution

- The Net Income and Total Revenue of the whole project:

Net Income	16283230.9	17757132	19231033.07
Total Revenue	21205397.3	23227498.8	25249600.34

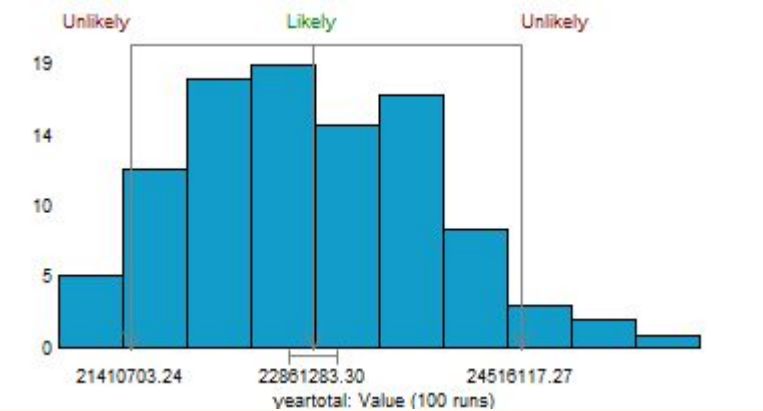
Option 1 - Invest

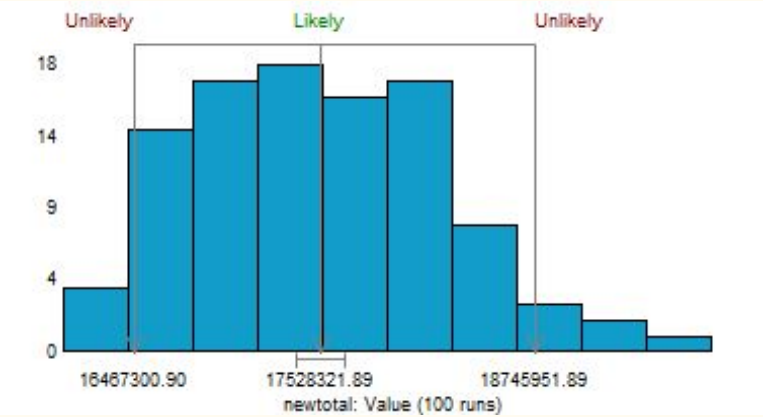
To invest:

- Total Return = 31.875% of Net Income + 15% * 68.125%*Total Revenue - investment cost

Column1	5%	50%	95%
Total return	7357206.38	8033645.85	8710085.326
ROI	3.577289	3.90619366	4.235098326

The scenario with a cost of around 2 million.





Option 2 - Not to invest

Not to Invest:

- Since the project breaks even during the first year, we can calculate Yangarra's earning by deducing the amount to breakeven from the total revenue of the project
- Total Return = (Total Revenue -$2,056,643)*15%- $655,555*2

Column1	5%	50%	95%
Total return	1561203.14	1864518.37	2167833.601

Base Solution

- Clearly Yangarra needs to continue investing for more profit if they have enough cash flow.

- **Invest**

Column1	5%	50%	95%
Total return	7357206.38	8033645.85	8710085.326
ROI	3.41141597	3.72506987	4.03872376

- **Not invest**

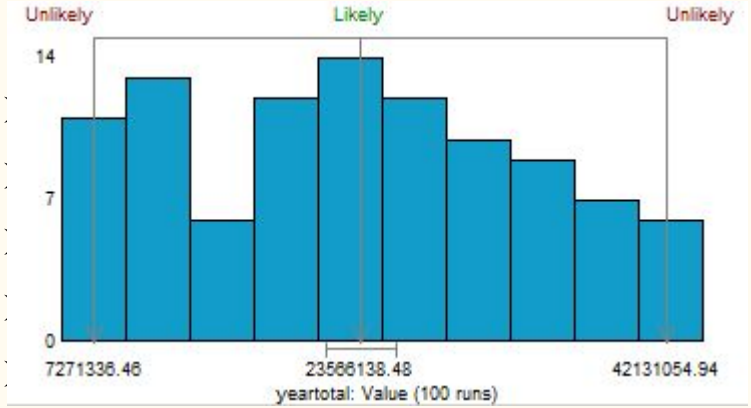
Column1	5%	50%	95%
Total return	1546203.14	1849518.37	2152833.601

Sensitivity Analysis

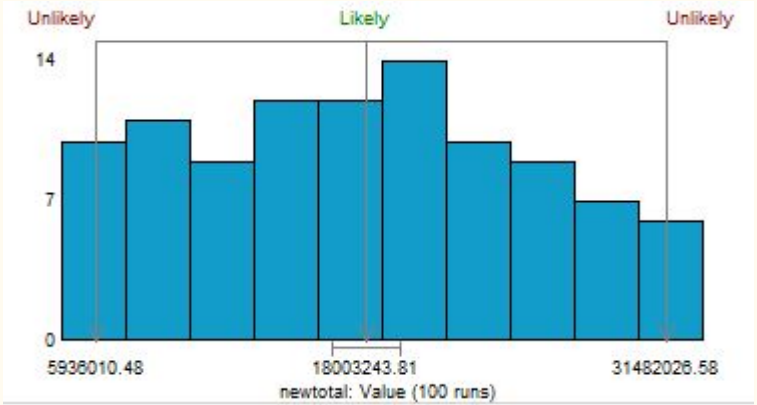
- In this section, our sensitivity analysis will basicslly focus on 2 aspects:
  - **Change the floating discount rate** to see what influence will apply on the model.
  - **Study the risk of Harvest's completion method.** According to the case description, there would be approximately one in 10 completions having cost overruns up to 1 million.

Sensitivity Analysis- Floating Discount Rate

Discount Rate between 5% and 15%



➢ revenue



Net Income

Sensitivity Analysis - Change the Investment Amount

- The scenario with a cost of around 3 million.
- To invest

Column1	5%	50%	95%
Total return	4800821	4866646.99	4932472.564
ROI	1.570619	1.5921542	1.613689451

- Not to invest

Column1	5%	50%	95%
Total return	1629898	1659586.05	1689274.449

Conclusion

- Under the current GORR rate, Yangarra should always consider to **keep investing**, as this option is much more profitable in 95% cases.
- The expected return is **$8,033,645.85** when the expected completion cost is $2,056,643.
- No matter how much penalty Yangarra pays (the least being 2 times the completion cost, as we have assumed), the option of not investing is never as profitable as the option of keep investing.