Simulation & Risk Analytics: Term Project Part 1

Monte Carlo Simulation for Oil and Gas Exploration
Due Date: Tuesday, October 15
The assignment is due by 5:00pm. Feel free to hand it to me or email it to my NCSU address.

General Instructions

For this assignment, you are expected to provide a written business report.
The objective of assignments 2 and 3 is to build a Monte Carlo simulation to analyze the following:

- Net Present value of the expected returns from an oil exploration/production project
- Risk assessment of the project for horizons of 1, 3, 5, 10 and 15 years ahead
- Identify which of all factors (Price per Barrel of Oil, Reservoir, Drilling costs, Decline Rate, etc.) have the highest impact on the simulation result. Are the results the same across different horizons? Are the same factors driving the Expected NPV, VaR and CVaR?
- This project has a life of 15 years. Unless the drilling turns out to be a "dry-hole" you have to continue the operation for a total of 15 years. Suppose that a financial institution is willing to give you the option to abandon the investment at the end of Year 7, without incurring any costs or penalties. What would be the highest price you would be willing to pay for such an option?

Objective of assignment 2

You should provide a business report that includes the following sections (the order is just a suggestion; feel free to use any order that fits best to the flow of your analysis):

- An overall description of this project. You should provide a brief overview of the problem and the key variables/risk factors that are associated with it.
- Provide an initial, single point estimate, for the NPV of this project. In other words, show what would be the expected net present value if we assume that all variables of interest take their average value. This estimate is not taking into account the variability or the inter-dependencies (correlations) of the variables. What do you think about it?
- Provide a brief explanation of the benefits of Monte Carlo analysis. Create a flow chart that identifies how the different inputs of the model are combined to get the final result.
- Give a brief discussion on the distributions that you have decided to use for (a) drilling costs and (b) future price of oil. You don't have to get into the details, since this is a

business report after all. Feel free to include visuals/graphs and if you want to add any details, add them in an appendix.