**Case 2: Sapphire Mine**

Maxine Peru, CEO of Peru Gems, has been given an investment proposal for a new sapphire mine on land she owns in Montana. Test boring indicates sufficient reserves to produce 340 tons of raw sapphires per year over a 7-year period.

The land probably also contains gem quality garnets. The amount and quality of the garnets are hard to predict because they tend to occur in “pockets.” The mining engineer guessed that 150 pounds per year might be found. The current price for high-quality garnets gems is $3,300 per pound.

Peru Gems is a family-owned business with total assets of $45 million, including cash reserves of $4 million. The outlay required for the new mine would be a major commitment. Ms. Peru believed that the company could borrow up to $9 million at an interest rate of 8 percent.

The mine’s operating costs are projected at $900,000 per year, including $400,00 of fixed costs and $500,000 of variable costs. Ms. Peru thinks these forecasts are accurate. Opening the mine, and providing the necessary machinery and facilities, is supposed to cost $10 million, but overruns of 10 to 15 percent are common in the mining business. In addition, new environmental regulations, if enacted could increase the cost of the mine by $1.5 million.

There is a cheaper design for the mine, which would reduce its cost by $1.7 million and eliminate much of the uncertainty about cost overruns. Unfortunately, this design would require much higher fixed operating costs. Fixed costs would increase to $850,000 per year at planned production levels.

The current price of sapphires is $10,000 per ton, but there is no consensus about future prices. Some experts are projecting a rapid price increase to $14,000 per ton. On the other hand, there are pessimists saying that prices could be as low as $7,500 per ton. Ms. Peru does not have a strong view either way. Her best guess is that prices will increase with inflation at 3.5 percent per year. (Mine operating costs will also increase with inflation.) Ms. Peru’s experience suggested that mining projects with similar risk required a nominal return of at least 14 percent.

Assumptions: Tax rate = 30%:, mine can be depreciated straight-line over 7 years for tax purposes.

1) What is the NPV of the base-case scenario with the 10 million mine? With the cheaper mine? Which mine should be selected?

2) Show the effect of the uncertainty surrounding potential cost overruns. Are cost overruns important in your NPV accept-reject decision?