

IE 347 ENGINEERING ECONOMY

CASE STUDY

Due on January 21, 2023, Saturday, 11:59 p.m.

Case Description

A drilling company has developed a lease on the southeast corner of Turkey over the last five years. They have drilled 16 production wells evenly spaced over the four square miles of the lease tract. Every well's production declines over time, so to maintain a 'steady' total flow new wells are drilled. Specifically, total production from the existing wells will decline at 17% per year if no new wells are drilled.

The timing of new wells has been planned to maintain a steady flow of about 20,000 barrels of oil per day. This flow rate is the shipping space on the great pipeline that has been allotted to the parent drilling company. A second consideration has been maximizing total recovery by distributing new wells over the leased tract. Thus each of 16 wells has helped maintain current production and also increased total recovery from the field.

Now the company is facing a different problem. The entire leased tract has been covered by 16 wells. New wells will be drilled in between existing wells and will therefore have less impact on total recovery from the field. Each new well will increase production now by 2000 barrels of oil per day and increase the decline rate by 1%. Since each well costs about \$2 million to drill and \$1.75 million to tie into the production facilities. Additional capital is required every 7 years to do a well work-over for \$1.25 million. Abandonment costs in the final year of production amount to 10% of the initial drilling and facility costs. The abandonment costs are required by state agencies to return the land to its initial condition.

Currently, the tariff for transportation through the pipeline is \$5.25 per barrel, and another \$3.75 per barrel is required to ship it to market. The incremental annual operating and maintenance cost for the field is \$200,000 for each new well.

At this point, the company must decide whether to initiate planning and construction for Well 17. This particular well could come in line next year with an estimated production rate of 2000 barrels of oil per day once tied into

existing separation facilities. By next year, the company's total production rate will fall to 18,000 barrels of oil per day. The production of the 16 wells is declining at 17% per year. With the new well added in, the higher production rate results in a field decline rate that is 1% higher at 18% per year.

To simplify, the new decline rate can be assumed to begin as soon as the new well is drilled since the field will produce at a higher rate almost from the start. While more wells will be drilled in the future, an economic analysis of Well 17 is done without considering them. Oil production at the facility will be closed down (the field will be shut-in) when the total field reaches 500 barrels of oil per day. At that production rate, it is no longer economic to operate the field.

Because some of the oil produced by Well 17 would have been produced in later years by nearby wells, the increased 'production rate' with Well 17 versus without Well 17 will be negative in later years.

The value of oil has varied dramatically over the last years at an average of \$30 per barrel.

Questions

1. Assuming a zero inflation rate for the oil prices, if the management demands a rate of return of 15%, can Well 17 be justified now or next year, or two years from now?

If now, when can well 18, 19 and so on should be justified? Each of these later wells will have a similar effect on the total decline rate for the field, i.e., increases the decline rate by 1%.

2. Now answer the above question, assuming the annual costs as a function of the inflation rate of the oil prices for the values you find suitable for Turkey. To find the inflation rate of the oil prices do a small research and forecasting.

General Remarks

- ✓ You will work in groups of exactly 2 students.
- ✓ State your assumptions clearly.
- ✓ Present all your work in an appropriately organized report.
- ✓ Use Excel as much as possible for your calculations. Make your calculations in separate sheets of an Excel file.
- ✓ Submit your Excel file along with your report. Your file should be understandable and parametric such that your results can be controllable for different parameter values.