Case 21

Glowing in the Dark

POC, Inc., treats hazardous wastes at over a hundred facilities in the United States. Their company name comes from an early advertising theme, Protecting Our Children. POC may construct a new facility for a substance recently reclassified by the EPA as hazardous. The unit cost of treatment is low relative to the value of the process that produces the hazardous chemical; thus, the market appears promising.

POC builds small, specialized facilities, with only a few processes used or waste streams treated. This minimizes potential interactions between incoming wastes, transportation dangers, and political difficulties in the approval of new facilities.

The reclassified chemical is a by-product of an older inspection process that relies on visual inspection of a dipped part under "black lights." It is commonly used in foundries and assembly plants for engine parts. Sites where this process is still used are scattered throughout the country, but the biggest concentrations are around Detroit, Michigan and Gary, Indiana. POC plans to build the facility between these two cities.

The EPA has defined new exposure standards, but it has not yet set a timetable for compliance with the permanent standard. It has established a minimum interim standard. Preliminary indications are that the volume of waste will double when the new standard is imposed. Even the interim standard, at pricing levels used in an earlier feasibility study, will produce a net annual revenue of about $900,000 to POC. This should also double when the new standard is implemented.

The timing of the permanent standard depends on an EPA study of economic consequences that will take almost two years to complete. Dr. Eric Klossen, the company's director for governmental relations, guesstimates that the permanent standard will become effective in 3, 5, or 10 years with respective probabilities of 20%, 50%, and 30%.

The director of engineering, George C. Perriwinkle, has had his staff estimate three alternatives. The structure can be sized to meet the volume of the interim or of the permanent standard. If the smaller size is built, it can include some utilities and facilities to support the later expansion. In each case initial construction includes one "treatment process" line and the building to contain it. The differences between the options focus on whether the building has room for the larger "treatment process" line. In each case the equipment of the larger treatment line will only be purchased and installed when it is needed.

Alternative M (Minimal)

The **minimal** facility sized for the interim standard will cost $6 million. Expanding it for the permanent standard will cost another $5 million later. This facility will cost $200,000 annually to operate initially, then it will double when expanded.

Alternative S (Staged)

Construction can be **staged** by sizing utilities, loading docks, etc., to support later expansion. This adds very little to the annual operating costs, but it does increase initial construction costs by $1.15 million. In return, the expansion will only cost $3 million later.

Alternative A (All)

Construction of **all** of the project can be undertaken immediately. Initial construction costs are $9 million, and annual operating expenses increase. However, POC can use the extra building space for warehousing. The value of this use about equals the increased operating cost.

Each construction stage will take about a year, with the bulk of the costs occurring at the start of the year. Other costs and revenues can be evaluated as end-of-year cash flows. Phase-in periods for the revenues to reach their projected levels are short enough that they can be ignored for this analysis. If POC uses a 30-year horizon, and a 10% discount rate, evaluate these alternatives. This evaluation should consider both the expected value and the variance of the return with each option. Which alternative should be selected and why?

Options

1. Simplify the case by ignoring the variance of the return with each alternative.

2. POC can wait until the research study is done to begin construction of the treatment plant. Dr. Klossen believes that predictions can be far more accurate then, but still not perfect. If a low economic cost is predicted, then there is a 50% chance each for 1- or 3-year additional delays. If a medium economic cost is predicted, then there is one chance in six of an additional 1-year delay, a 50% chance of an additional 3-year delay, and one chance in three of an additional 8-year delay. If a high economic cost is predicted, then there is a 50% chance each for additional 3- and 8-year delays. According to Dr. Klossen's Bayes' theorem calculations, these are consistent with a 30% probability of a low economic cost prediction, 30% for medium, and 40% for high.

   Should they wait? What is the expected value of the sample information received by waiting until the end of the research study? What is the cost of the delay?

3. If POC starts construction in the near future, there is a 5% chance that a new competitor might start a plant as well. This would cut POC's market in half. If POC delays for two years, this probability goes up to 15%. If POC builds a plant first, it does not expect a competitor to enter this market. What should POC do?