

# MECH 431

## Assignment #2 – TigerKing

TigerKing Oil has discovered a new 500 million barrel crude oil reservoir in Kasakstan. Reservoir engineers predict recovery of about 300 million barrels with current technology. The firm needs a preliminary cost estimate for a feasibility study of a facility to produce the oil and prepare it for transmission via pipeline.

Wildcat has paid the Kasakstan government \$400M(illion) in up front lease costs (for the right to produce the oil. This would be refunded if the facility does not proceed). Additionally, the Kasakstan government will receive 10% of the net revenues (value/barrel [bbl] *minus* operating costs *minus* transportation costs). After 100 million barrels have been produced, all facilities and the remaining oil will belong to the Kasakstan government.

The feasibility study should optimize the trade-off between capital investment and production capacity. Vendors have provided cost estimates for the five major classes of equipment for a generic 36,000 bbl/day facility (see table below). The supporting equipment factor indicates the expected cost factor to account for all supporting equipment and installation based on TigerKing's past experience (for example, the total cost linked with the turbines is 2.5 times the \$33.2 million, or 83.0 million).

TigerKing is using an expected oil price of \$19.50/bbl for this quality of oil, delivered to the Port of Kasakstan. Facility operating costs are expected to be \$4.50/bbl, and transportation to the port is estimated at \$1.25/bbl.

Oilfield production generally follows a declining curve, however based on the facility size and amount of the reservoir under negotiation, the expected production can be considered constant during TigerKing's ownership. For large refineries of this type, TigerKing has found a power sizing exponent of 0.67 reasonably reflect the changes in costs with changes in equipment size.

Equipment class	Major Equipment Cost	Supporting Equipment
	(Millions of \$)	Factor
Turbines	33.2	2.5
Compressors	24.8	2.8
Vessels & Tanks	25.6	2.7
Valves	7.2	3.8
Switchgear	4.8	2.4

(cont'd)

Adapted from Case 3 (Herb Schroeder) in Cases in Engineering Economy, 2<sup>nd</sup> Edition, Peterson and Eschenbach

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1. What point of view should you take for analyzing this project? How would your considerations differ from another point of view? [4]
2. How much should be budgeted for a baseline facility of 36,000 bbl/day? [4]
3. Estimate additional costs would be incurred to increase the facility size by 5,000 bbl/day. Are there any benefits to increasing the facility size? [4]
4. TigerKing is a large, integrated oil company with an interest rate of 15% (reflective of both the cost of capital and risks). What is the expected Present Value of both the 36,000 bbl/day facility and the larger facility? Which, if any, would you recommend TigerKing proceed with? [8]