CHAPTER 9

CONCLUSIONS AND RECOMMENDATIONS

The observation made from the interpretation of the results obtained from the simulation runs indicates that there is room for the effective use of electrical submersible pump (ESP) from understanding different sets of parameters that have an effect on its performance. If talking in terms of maximizing cumulative recovery only (regardless of the cost) then ESP can be used for both high and low water cut profile wells provided that the well has low solution GOR. Not only that the ESP can be installed to wells which have declining GOR, but also the ones that start to exhaust naturally.

One of the important factors to bear is that the ESP should be used above the bubble point because below the bubble point there is a rapid increase in the GOR and there is more of gas intake which dramatically reduces the efficiency of the pump. The pump can be used for the wells below the bubble point when the peak GOR is already crossed and the GOR of the well is around or below 350 SCF/STB. As there are a lot of reservoirs which possess these qualities which in turn favors the use of ESP.

Using a different correlation may suggest a different conclusion altogether. Considering the correlation of Beggs and Brills used for the study, it is evident that for a specific design of the ESP it is important to make use of the ESP within the designed range. Also that when the solution GOR starts to increase, the ESP can still outperform the gas lift under some specific conditions, like increasing the landing depth of the ESP, designing a lower flow rate (which will increase the bottom-hole flowing pressure and in turn keep the gas intake to a minimum) and installing it to the wells with high water cut profiles. ESP is therefore best for high liquid rate, high water cut and low solution GORs. It is also important to have good well data and a pump size that operates in the recommended range.

Different gas-oil split ratios are not viable and if the gas sands are open, it will be subjected to a lot of cross-flow from the oil sand to the gas sand. Therefore, all gas sands need to be shut if an ESP is to be installed.

Design of experiments has enabled us to observe the interaction between two factors and visualizing their impact on the response (in terms of oil recovery). It is an effort and time saving technique which requires a limited number of runs in order to reflect the overall trend of the system. However, there is a loss of accuracy in the above mentioned technique. For future work, sensitivities which have not been considered in the study, such as varying well head pressure and different design rates for the ESP may be considered.

The use of the variable speed drive, the one that is used in Gulf of Thailand, makes it more versatile. If the pump capacity is higher than the well inflow, the pump will pump off and the under-load current will shut the system down. When oversized the pump operates in a down-thrust region which tends to shorten its life. On the contrary, an undersized pump will not reach the desired production rate. Approach taken towards each well is different as many factors affect the actual efficiency of the pump. Careful use of the ESP can help in quicker recovery and lowering the abandonment pressure.

Finally, the ESP holds a bright prospect in the Gulf of Thailand and this study has enabled us to see a clearer picture on the usage of the pump.