

CHAPTER I

INTRODUCTION

One of the most challenging problems in the energy issue is the cost of petroleum. This issue becomes a major issue in this decade because the demand in energy has dramatically increased and the price of petroleum grew up very fast when compared to the past. Thus, many methods were developed in order to decrease the cost of petroleum that will lead to cheap price of energy.

The major expenses in petroleum business is in the upstream production because this step requires high investment cost in exploration, drilling, casing and perforating. Accurate data will help petroleum engineers make right decision with less trials and errors and thus decrease the cost of petroleum production.

Several methods have been developed to minimize the cost of production by focusing on the efficiency of drilling. An efficient drilling condition is usually related to a proper bit size and a rate of penetration and rotation speed that match the structure of formation to save the cost of the drilling. Many equations were developed to track the efficiency of the drilling process, such as mechanical specific energy, drilling specific energy and hydro mechanical specific energy.

Specific energy is not only used to determine the efficiency of drilling, but also to characterize of rock formation by combining with other information, such as porosity, resistivity and gamma ray to locate the potential production zone. An advantage of concept is to reduce the cost of perforation.

The accurate specific energy is very important for precise calculation, which requires down-hole parameters (down-hole torque and down-hole weight on bit). Generally, an acquisition of the down-hole parameters is difficult and expensive. One of famous methods measures different surface data between on and off bottom and approximates the suitable down-hole parameters. However it takes a long measurement time (Fazaelizadeh, 2013). Another method uses a down-hole sensor to measure down-hole parameters, but it takes a lot of expenses.

The previous study (Klayhan, 2014) used a computer programming to calculate the surface data of the drilling off bottom, however, friction coefficient was assumed constant without taking the rock formation into the calculation.

A purpose of this research was to improve the previous program by using more accurate friction model, which can calculate friction coefficient, down-hole torque and weight on bit and interpret the potential production zone by down-hole drilling specific energy, well logging and lithology. The benefit of this research will help in increasing the accuracy of perforation, thus reduce the cost of perforation and formation compact tester.