CHAPTER VIII
CONCLUSIONS AND RECOMMENDATIONS

This chapter concludes the effect of various parameters on pressure transient obtained from wireline formation tester and discusses about limitation from the study and the recommendations for future works are outlined.

8.1 Conclusions

In this study, a reservoir simulator was used as a tool to generate well flowing and shut-in pressure response when tested with a wireline formation test under different reservoir conditions. After that, Pressure Transient Analysis (PTA) was performed on the pressure using a well test interpretation software to determine reservoir properties. The work described in this report focuses on a single layered homogeneous reservoir, a single layered reservoir with invaded zone, and a single layered reservoir with a stimulated zone.

First, a single layered homogeneous reservoir is simulated. The effects of probe size and permeability anisotropy are considered.

Second, a single layered reservoir with invaded zone due to mud filtrate is investigated to evaluate the effects of mobility ratio and effects of radius of invasion.

Finally, a single layered reservoir with stimulated zone due to well stimulation is considered to evaluate the effects of mobility ratio and effects of radius of stimulated zone.

From the simulation and interpretation results, the conclusions are described below:

1. Wireline formation test can be an alternative method to evaluate the reservoir parameters when an appropriate probe size is used. If the probe size is too small compared with pore volume of the reservoir, the pressure derivatives in the diagnostic plot may scatter.

2. In order to see fully developed radial flow regime in low permeability anisotropy ratio reservoir and to estimate the horizontal permeability, wireline formation test needs to be conducted for a longer period of time.
3. For high permeability anisotropy ratio, error of interpreted vertical permeability is high because the period of spherical flow regime is too short to validate K_v.
4. The interpreted skin factor by using wireline formation test is overestimated compared with actual skin factor. It is can be concluded that the interpreted skin factor is affected by the spherical skin or the skin due to probe.
5. If the radius of invasion or the radius of stimulated zone is large enough, the reservoir behaves like a composite reservoir model. Therefore, to make the regression better match with the data, we need the correct regression model which is single probe with composite reservoir model. However, the required model is not available at this time.
6. The horizontal permeability estimated from a test in both damaged and stimulated well gives consistent result with the actual permeability used in the simulation. This means that for both invaded and stimulated reservoir, the pressure response obtained from the single probe wireline formation test can provide accurate estimate of reservoir permeability. Therefore, the single probe wireline formation test can be readily used in invaded reservoir.

8.2 Recommendations

The following points are recommendations for future study:

1. In this study, only the difference in permeability between damaged zone and undamaged zone is considered. In order to provide more extensive application of wireline formation test in an invaded reservoir, the effect of mud-filtrate type such as water-based mud and oil-based mud should be considered.

2. In this study, only a single layered reservoir is considered. Wireline formation test in a multilayer reservoir with invaded zones may have different behaviors. Detailed investigation is needed.
3. To observe the application and limitation of wireline formation test tool, future study should focus on variety of fluid formations such as gas or gas condensate.