# CHAPTER 6

## Conclusions and Recommendations

### 6.1 Conclusions

A simulation program for calculating petroleum quantity in storage tanks is developed using principle of standard API and ISO standard proposed recently. These categories of products, tank, API gravity at observed temperature, API gravity at 60 $^{o}$F, hydrometer temperature and temperature of products in tanks are taken into consideration. The program is developed using Delphi language therefore it can be utilized on personal computers with Microsoft Windows.

Actual petroleum quantity data 4,860 recorded (see law data in floppy disk) of 15 internal floating roof tanks and 12 fixed roof tanks from 5 terminals is collected for comparing with the simulated results of the developed program and currently used program; products has temperature high or less than base temperature will differ values. Products fuel oil has more difference value because very high temperature.

Difference between developed program and currently used program because developed program use effect of temperature on the steel shell of tank for analyst petroleum quantity which some location and product necessary to adjust value. According to calibration tanks use base temperature at 86$^{o}$ F for calculate quantity table so the appropriate temperature for keep petroleum product in tanks is base temperature. But temperatures of product in tanks sometime high or low than base temperature so this case will effect to expansion or contraction on steel shell occurring petroleum quantity more than or less than actual quantity. The effect of temperature on steel shell of tanks will relate with sizes of tank if temperature of product in tank high or less than base temperature but size of tank contain quantity less than 2 millions liters will effect not much to petroleum quantity. On the other hand, the developed program can calculate actual data more accurate than the previously used program does. It can

be conclude that the developed program could calculate more reliable results because of consideration on many parameters presented in updated API equations but neglected in the previously program. And the developed program can calculate value API @ 60°F which its will help reduce human error but currently used program can not do its.

## 6.2 Recommendations

1) This simulation program can be applied correction factor for sedimentation and water of product crude oil in tanks.
2) This simulation program can be applied for marine vessel's tanks in case effect of temperature on the steel shell of marine tanks.
3) Because the developed program is designed to have easy interaction using, it is interesting to integrate with simulate program of oil loss which will help a guidance to estimate total loss in storage tanks for actual plant control system.