CHAPTER VI

AN EXAMPLE OF USE OF THE DEVELOPED COMPUTER PROGRAM

In this chapter, the use of developed computer program for oil reserve calculation will be illustrated. The description of calculation steps within the developed program has been already presented in the previous chapter. The exampled data used for the illustration is real data obtained from a well in AMOCO's concession area in the Gulf of Thailand. Well information is shown in Table 6.1.

Considering the availability of data, it is decided that only porosity and water saturation be treated as random variables. The other variables are assumed to be deterministic variables shown in Table 6.2.

Table 6.1. Information of petroleum exploration well.

Item	information
name of well	6-2-L
latitude	11 18 07.440
longitude	101 13 34.470
water depth (m.)	58
total measured depth (m.)	1997.0
location	Gulf of Thailand
type	oil
spudded date	9 July 1974

Table 6.2. The assigned values of involved input variables.

variable	value
area	1
recovery factor	0.2
gross thickness	1
net sand to gross sand ratio	1
oil sand to net sand ratio	1
initial oil formation volumn factor	1.2

Area and gross thickness which are used in the calculation will be assigned to be 1 acre and 1 foot, respectively. So, the calculated oil reserves will have their unit as $barrel.acre^{-1}.foot^{-1}$. In addition, the reservoir is treated as one block and the number of Monte Carlo run is 600.

Probability distribution for porosity and water saturation are shown in Figure 6.1 and 6.2, respectively. These probability distributions are obtained by using data from the drilled well. It is assumed that these probability distributions are adjusted so that they can be used for the whole reservoir. Both probability distributions for porosity and water saturation are assumed to be triangular distribution. Properties of these two probability distributions are as follows:

- porosity

      maximum value = 0.34

      minimum value = 0.24

      mode value   = 0.28

- water saturation

      maximum value = 0.55

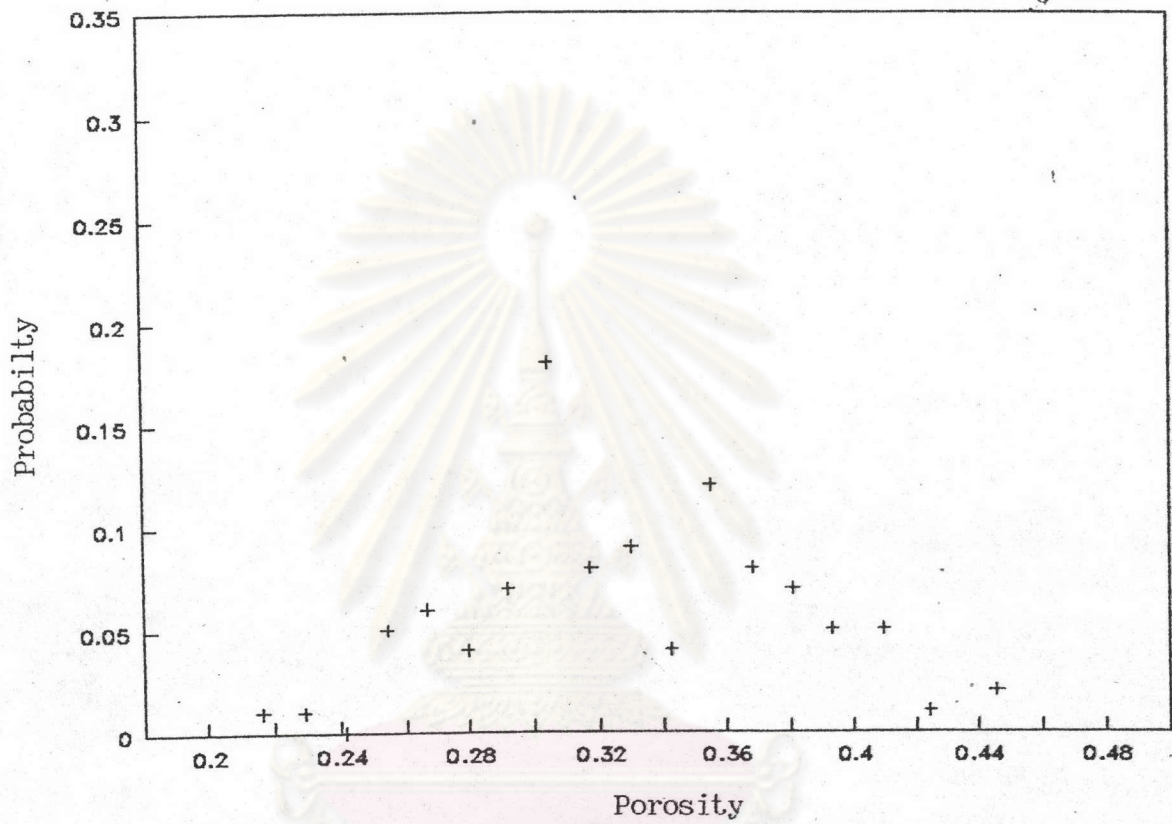   minimum value = 0.27

      mode value   = 0.45

Figure 6.1.   Probability distribution of porosity of well 6-2-L.
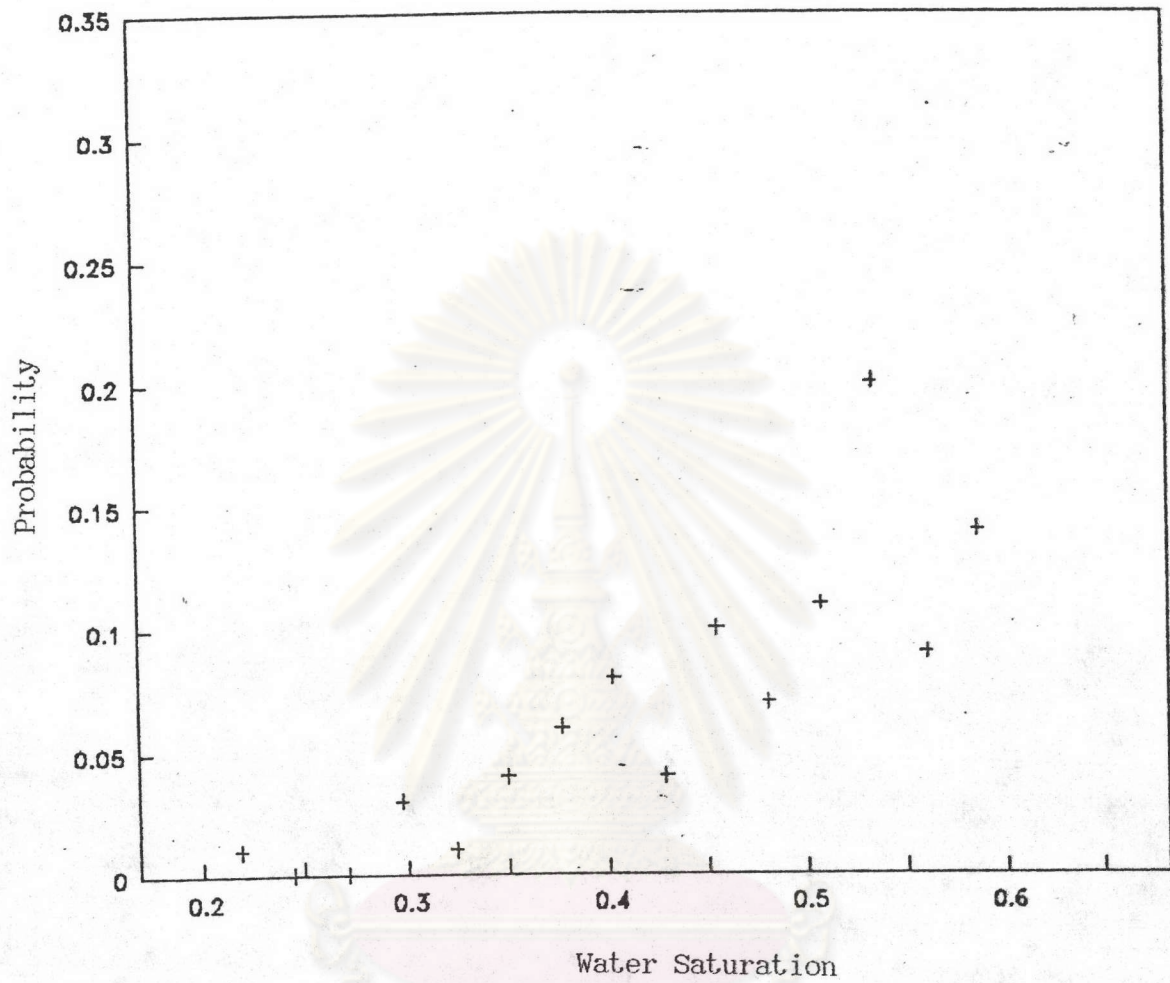
Figure 6.2. Probability distribution of water saturation of well 6-2-L.

These informations will be read into the developed program using data input file as shown in appendix B13 (formating of data entry can be seen in computer program and data input file).

In each calculation loop, values of input variables will be determined using random numbers and a value of oil reserve will be calculated using Equation (3.2). At the end, the subroutine for constructing probability density function and cumulative distribution function of calculated oil reserve will be used and the mean and standard deviation of oil reserve will be calculated. The calculated values will be storaged in output file.

From the output file, values of oil reserve are expressed in form of probability density function and cumulative distribution function as shown in Figures 6.3 and 6.4, respectively. For this illustrating example, the mean and standard deviation of oil reserve are 213.729 barrels/(acre.foot) and 26.1382 barrels/(acre.foot), respectively.
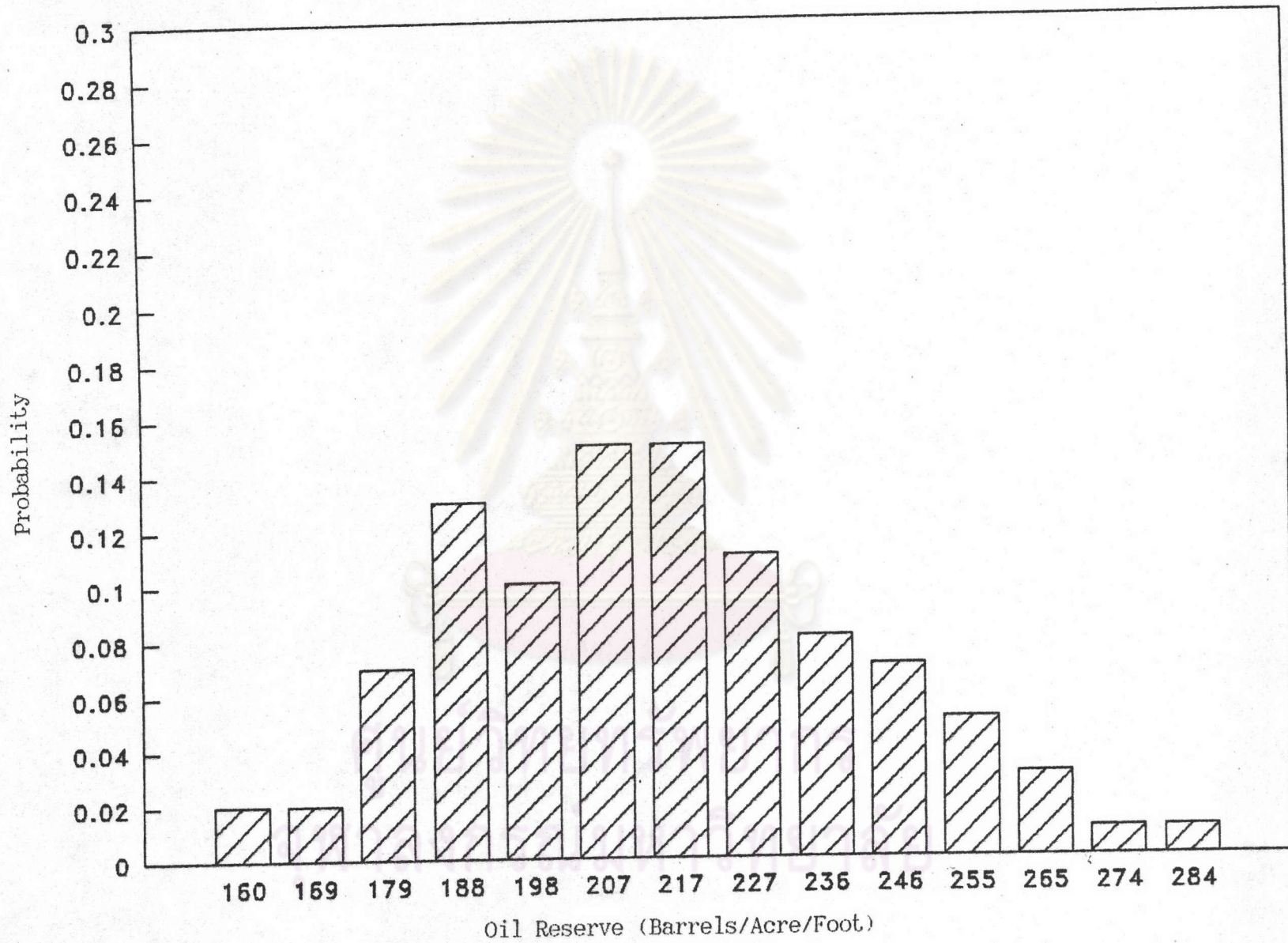
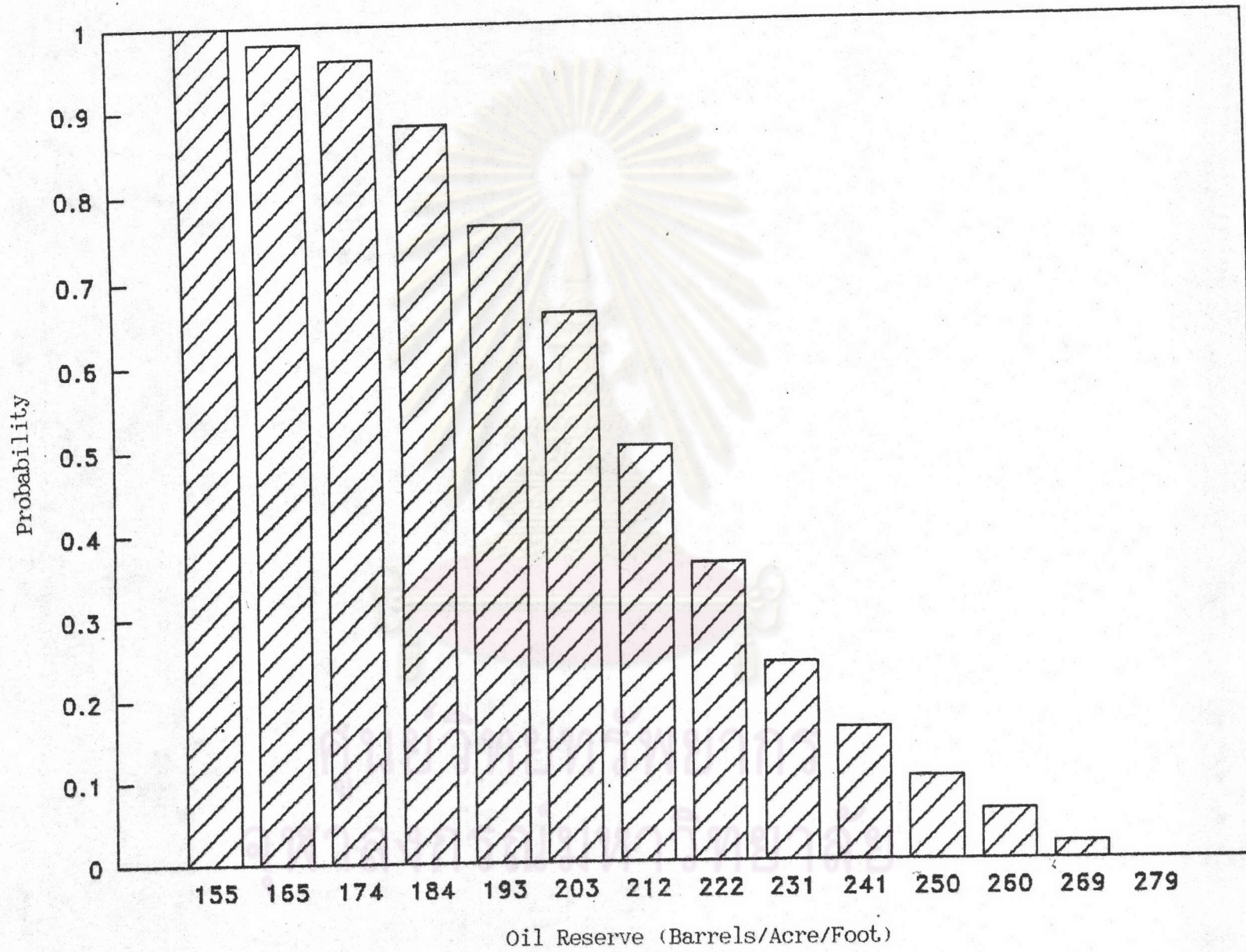Figure 6.3. Probability density function of oil reserve of well 6-2-L.

Figure 6.4. cumulative probability of oil reserve of well 6-2-L.