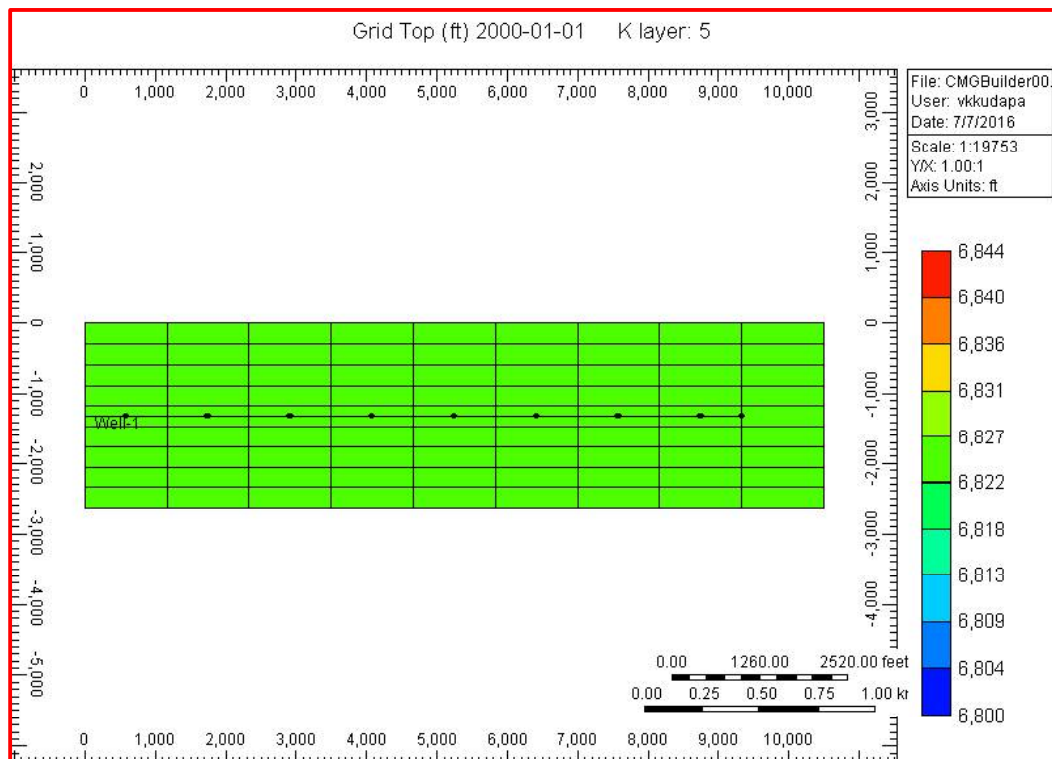


## CHAPTER-6

### RESERVOIR SIMULATION: BASE MODEL CONSTRUCTION AND SIMULATION RESULTS

#### 6.1 Base Model Construction:

In this study, a base model has been created for shale gas reservoir simulation and sensitivity analysis. Reservoir Simulation studies are performed using CMG-IMEX Simulator. Figure 6.1 and Figure 6.2 show 2D and 3D view of the reservoir Model.



*Figure 6.1: Reservoir Model with a horizontal well bore and Hydraulic fractures in middle of the reservoir.*

The model dimensions in aerially view are 10500 ft \* 2640 ft. In Z direction, the model has 9 layers, and each of them is 5.55 ft in height (Figure 6.2). The top of the first layer is at 6800 ft. A horizontal well is drilled in the 5<sup>th</sup> Layer (Figure 6.1).

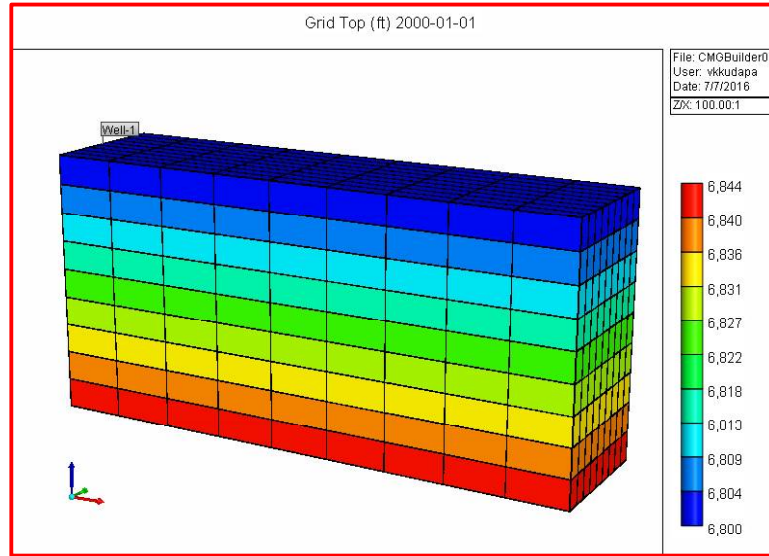


Figure 6.2: 3D View of the Reservoir Model

Natural fractures exist in the reservoir. The horizontal wellbore length is 10,000 ft. Hydraulic Fractures have been created in the reservoir. Summary of the reservoir parameters is given in Table 6.1.

Table 6.1: Summary of Reservoir Parameters

Parameter	Value	Unit
Model Dimensions	10500*2640*50	ft
Initial Pressure	3800	psi
Depth	6800	ft
Temperature	300	°F
Total Compressibility	3e-06	psi-1
Langmuir Pressure	535	psi
Langmuir Volume	197	scf/ton
Matrix Permeability	0.0002	mD
Matrix Porosity	0.07	fraction
Natural Fracture Permeability	0.03	mD
Hydraulic Fracturing Spacing	1000	ft
Hydraulic Fracture Half Length	293	ft

Horizontal wellbore length	10000	ft
Well bore pressure	200	psi.

## 6.2 Simulation Results:

Figure 6.3 and Figure 6.4 presents the results of production forecast for the model simulation on daily and monthly basis.

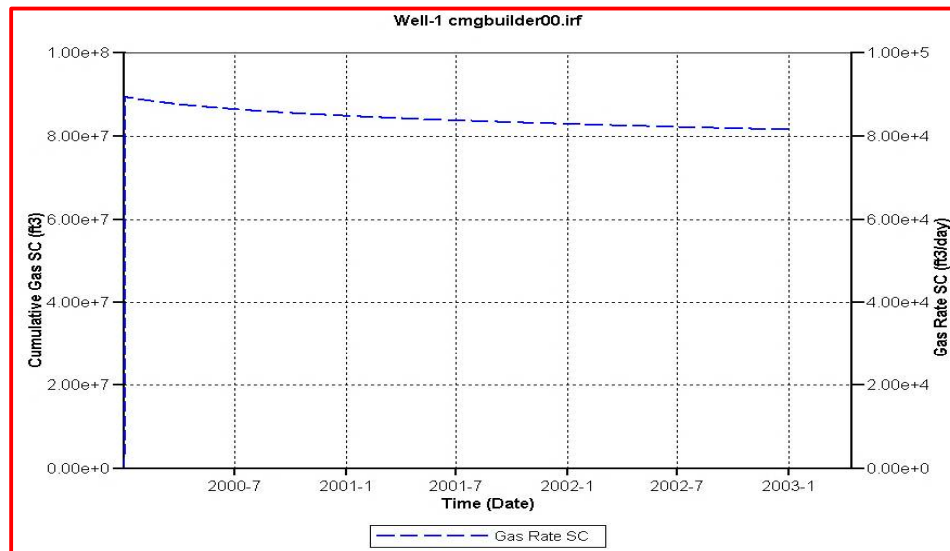


Figure 6.3: Simulation result for the reservoir model for Gas Rate on daily basis.

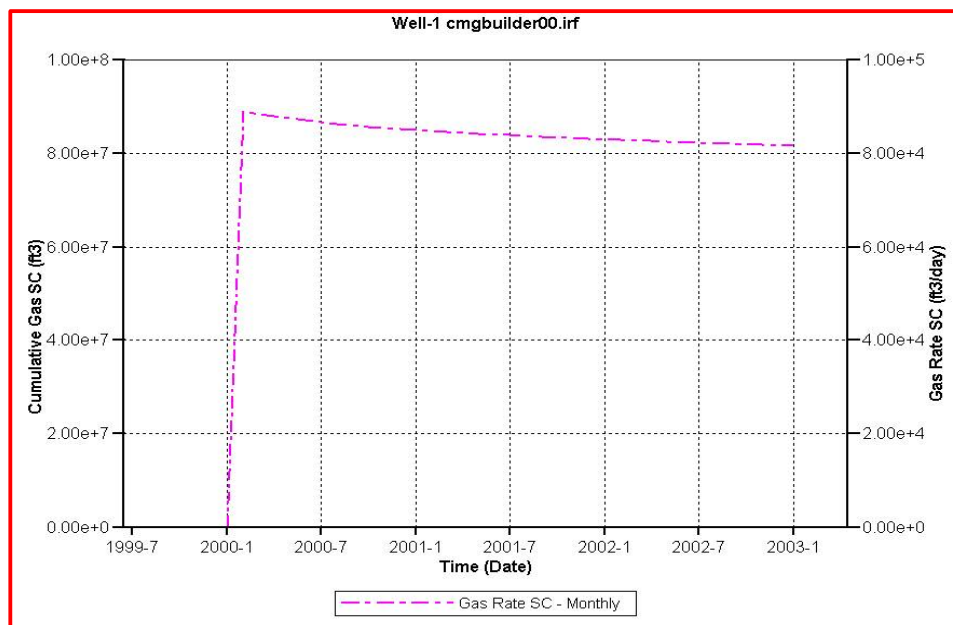


Figure 6.4: Simulation result for the reservoir model for Gas Rate on Monthly basis.

### 6.3: 2D View Pressure Variation in Shale Reservoir during Gas Production:

Figure 6.5 and 6.6 shows the distribution of pressure variations during 1-3 years specifically in Layer 5, where horizontal well is located. From these two Figures, it is clear that, for both 1 year simulation and 3 years simulations, the range of pressure drop do not touch the boundary of the reservoir.

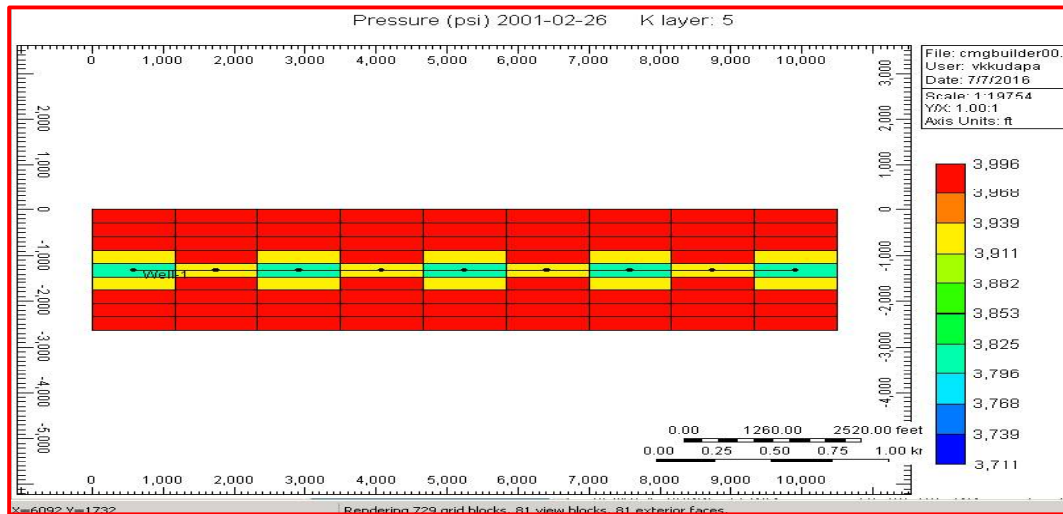


Figure 6.5 Pressure Distribution of Layer 5 after 1 Year Production.

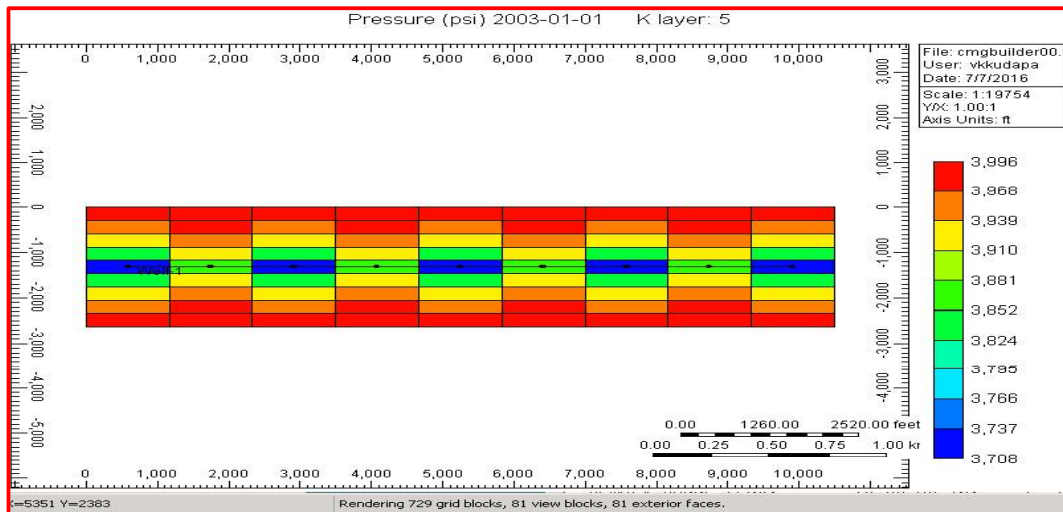


Figure 6.6 Pressure Distribution of Layer 5 after 3 Years Production.