The rapid increase in gas-oil ratios in the Rodessa Field led to the enactment of a gas-conservation order. In this order, oil and gas production were allocated partly on a volumetric basis to restrict production from wells with high gas-oil ratios. The basic ratio for oil wells was set at 2000 SCF/bbl. For leases on which the wells produced more than 2000 SCF/STB, the allowable in barrels per day per well, based on acreage and pressure, was multiplied by 2000 and divided by the gas-oil ratio of the well. This cut in production produced a double hump in the daily production curve.

In addition to a graph showing the production history versus *time,* it is usually desirable to have a graph that shows the production history plotted versus the *cumulative produced oil.* Figure 5.6 is such a plot for the Gloyd-Mitchell zone data and is also obtained from Table 5.5. This graph shows some features that do not appear in the time graph. For example, a study of the reservoir pressure curve shows the Gloyd-Mitchell zone was producing by liquid expansion until approximately 200,000 bbl were produced. This was followed by a period of production by gas expansion with a limited amount of free gas flow. When approximately 3 million bbl had been produced, the gas began to flow much more rapidly than the oil, resulting in a rapid increase in the gas-oil ratio. In the course of this trend, the gas-oil ratio curve reached a maximum, then declined as the gas was depleted and the reservoir pressure approached zero. The decline in gas-oil ratio beginning after approximately 4.5 million bbl were produced was due mainly to the expansion of the flowing reservoir gas as pressure declined. Thus the same gas-oil ratio in standard cubic feet per day gives approximately twice the reservoir flow rate at 400 psig

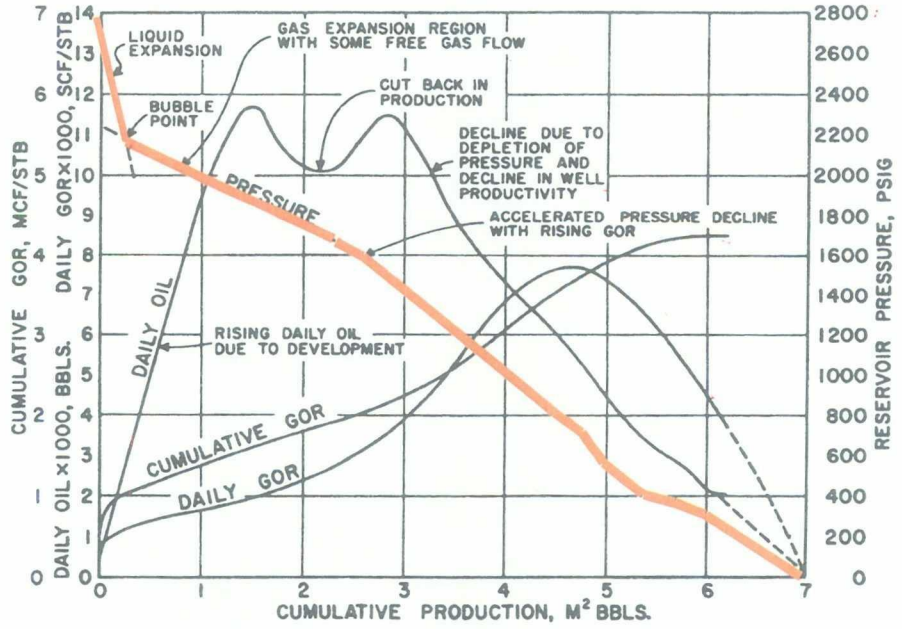
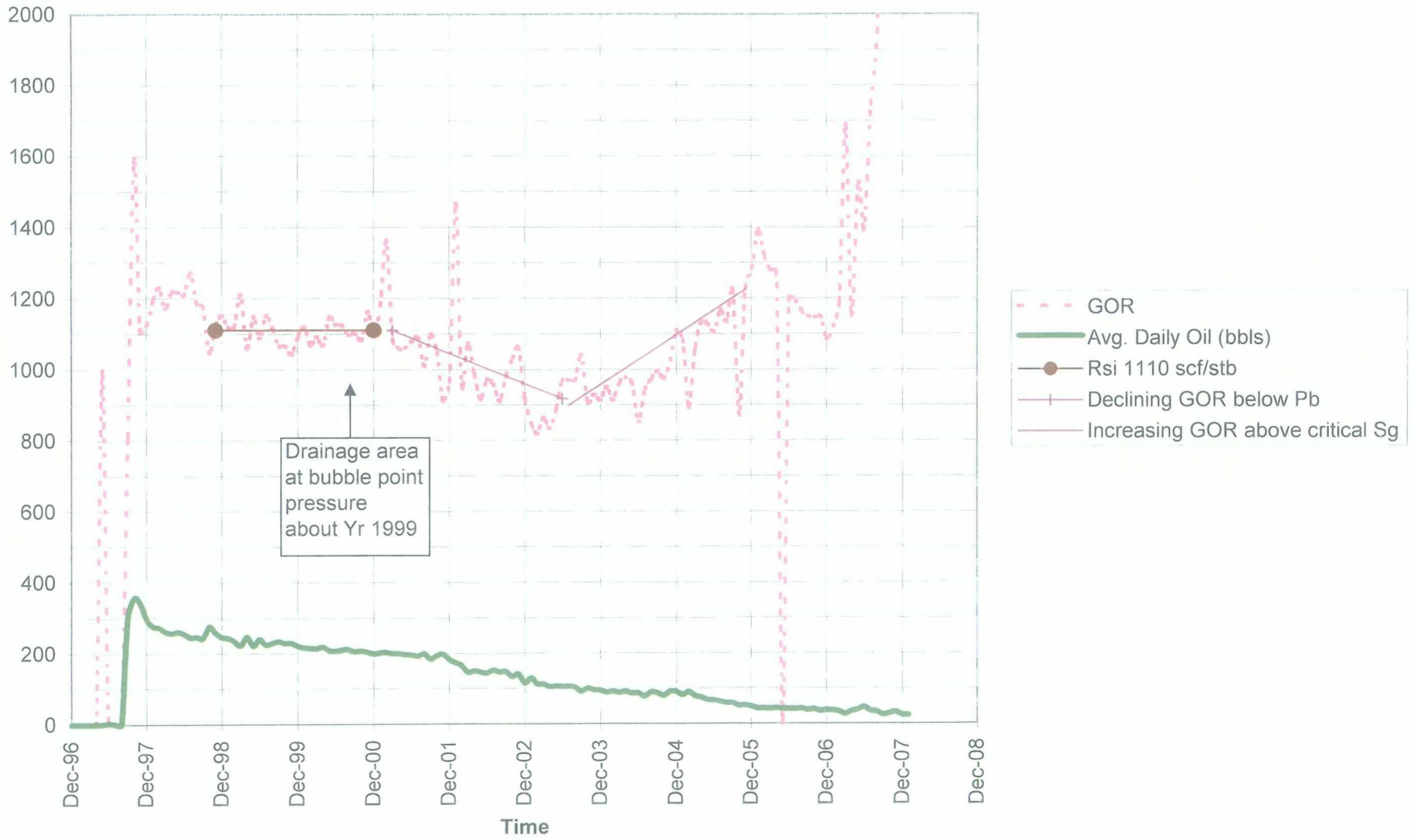
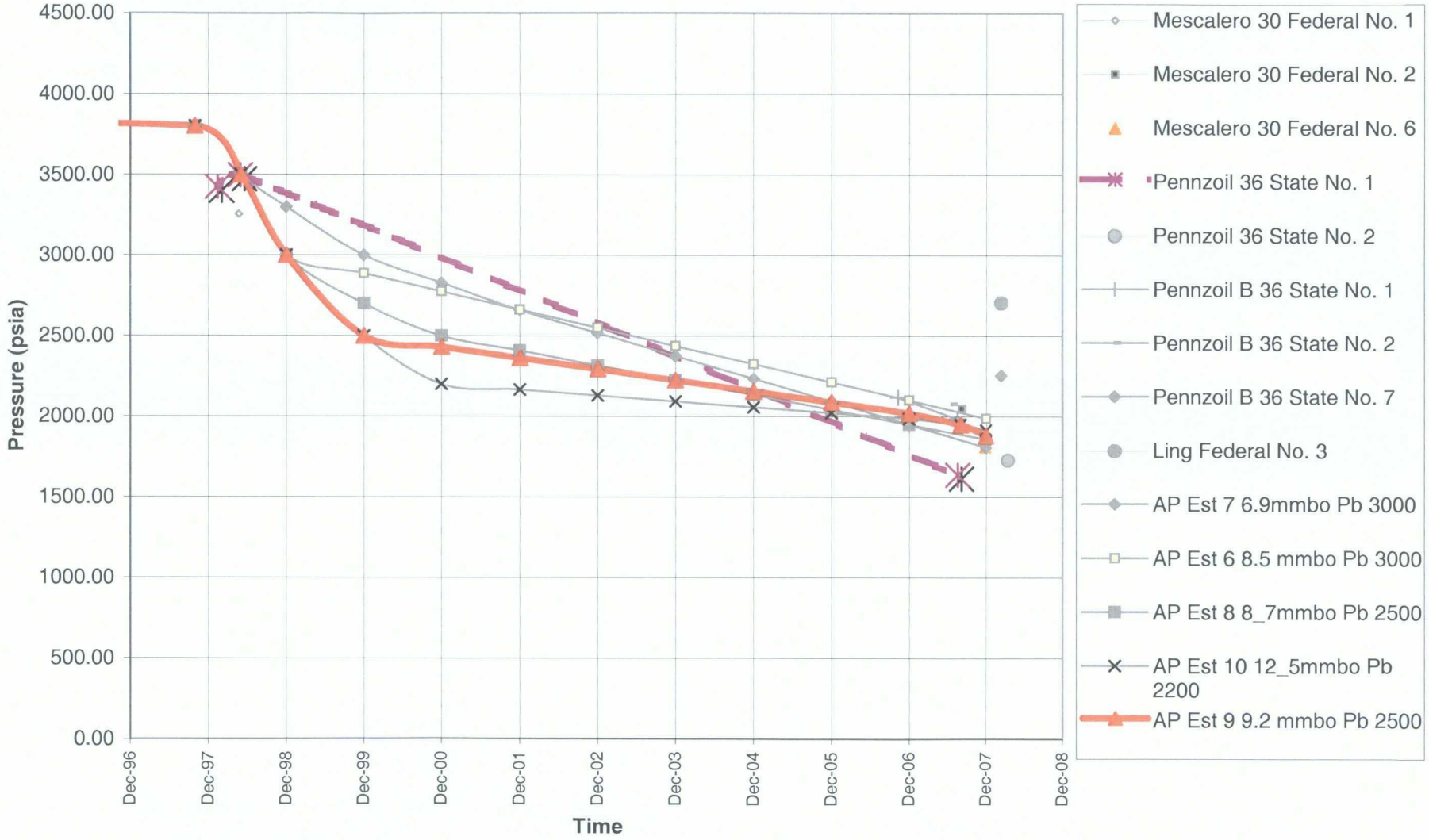


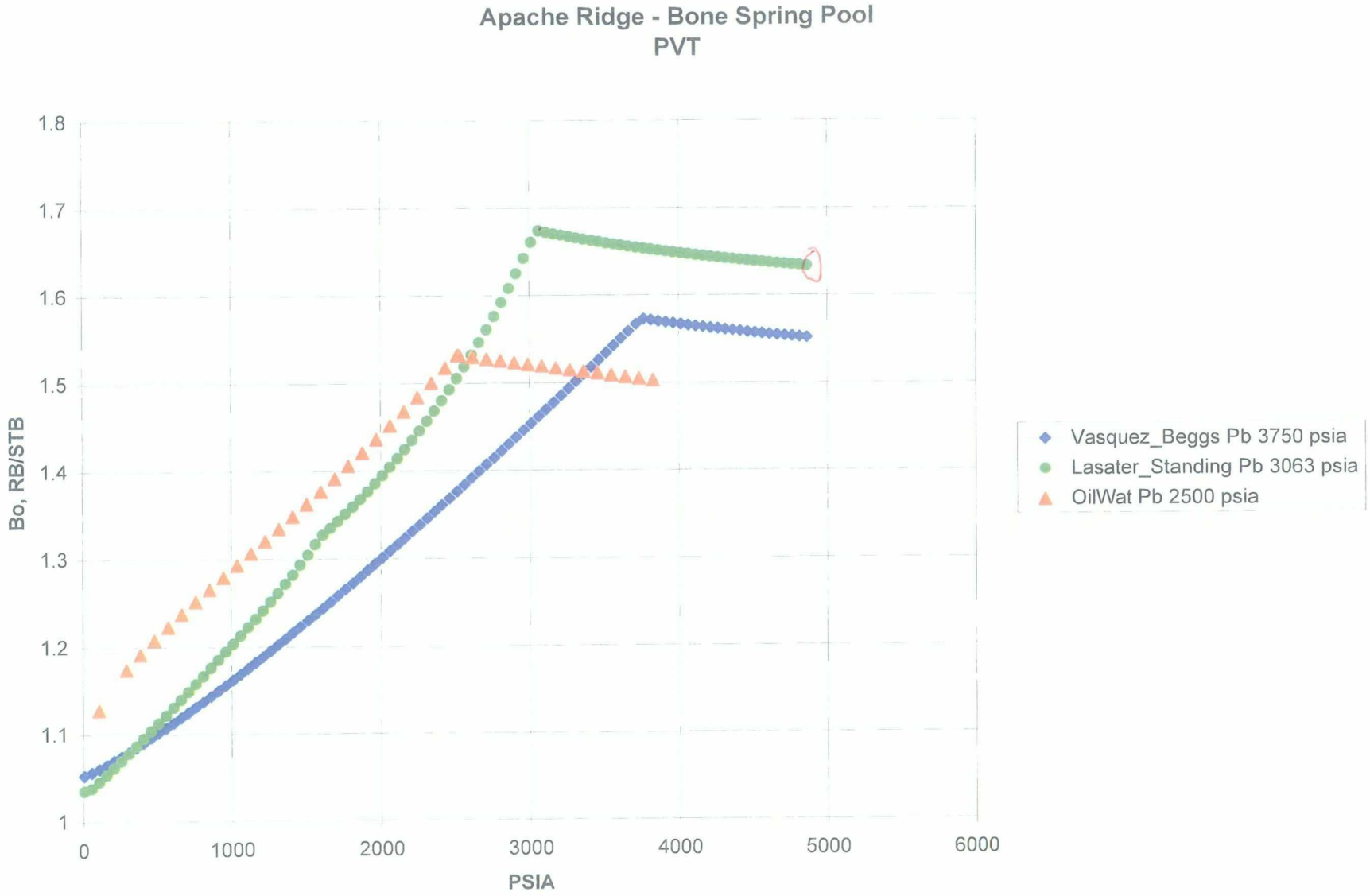
Fig. 5.6. History of the Gloyd-Mitchell Zone of the Rodessa Field plotted versus cumulative recovery.

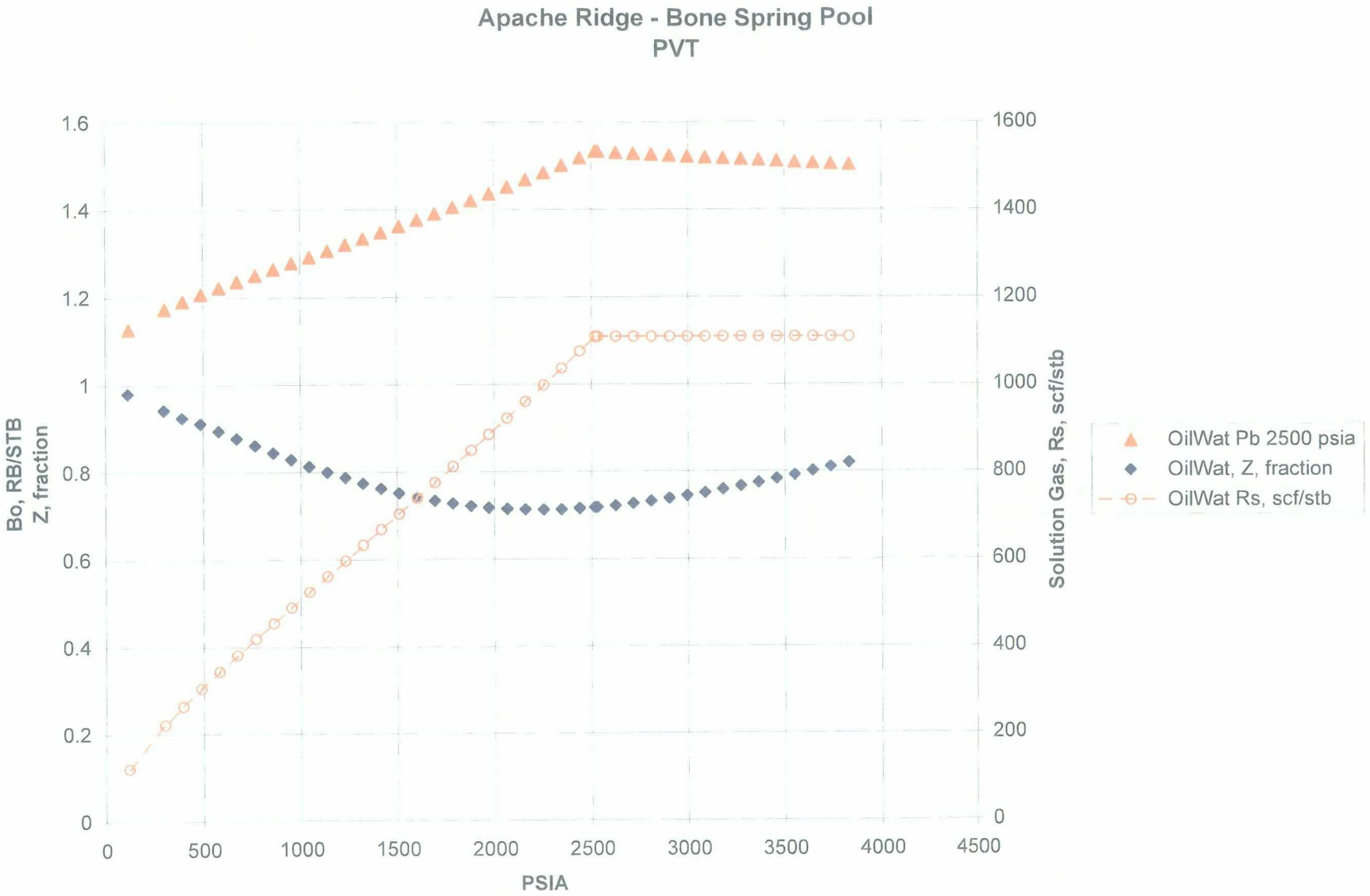
Pennzoil 36 State No. 1 Production

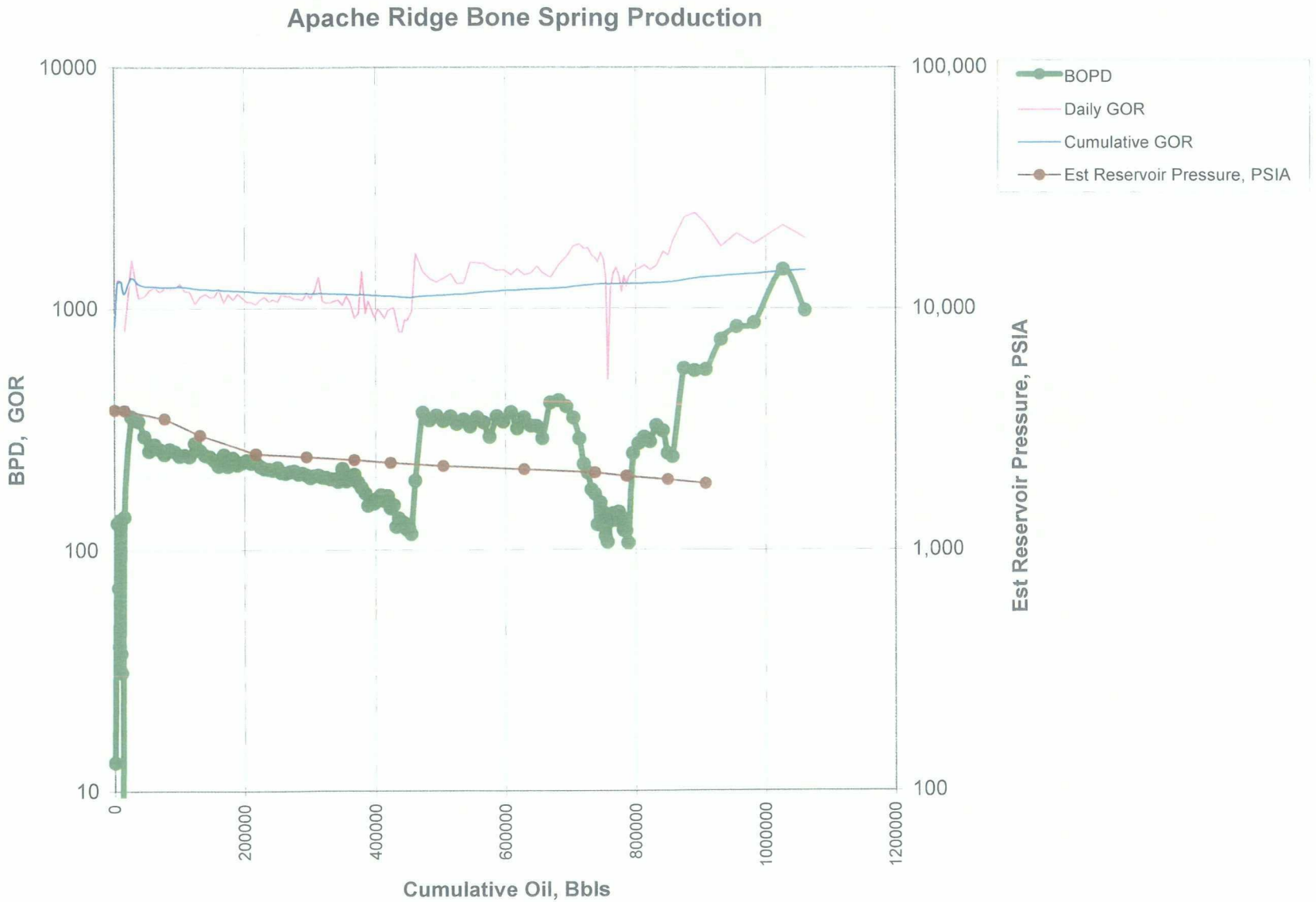


Apache Ridge Bone Springs Bottom Hole Pressure History




Apache Ridge - Bone Spring Pool
PVT
Bo, RB/STB
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0
1000
2000
3000
4000
5000
6000
PSIA
Vasquez_Beggs Pb 3750 psia
Lasater_Standing Pb 3063 psia
OilWat Pb 2500 psia


Apache Ridge - Bone Spring Pool
PVT
Bo, RB/STB
Z, fraction
Solution Gas, Rs, scf/stb
PSIA
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
0
200
400
600
800
1000
1200
1400
1600
0
500
1000
1500
2000
2500
3000
3500
4000
4500
OilWat Pb 2500 psia
OilWat, Z, fraction
OilWat Rs, scf/stb


Apache Ridge Bone Spring Production
10000
1000
100
10
100,000
10,000
1,000
100
BPD, GOR
Est Reservoir Pressure, PSIA
0
200000
400000
600000
800000
1000000
1200000
Cumulative Oil, Bbls
BOPD
Daily GOR
Cumulative GOR
Est Reservoir Pressure, PSIA