A COMPARISON OF POROSITY MODELING INVOLVING WELL AND CORE DATA WITH AI FROM INVERSION IN TEMANA FIELD; A CASE STUDY

Siti Aishah Bt Osman, Kamal Arif B M Amin, Azrelawaty Bt Azami and Zarith Anna Bt Khalid

PEG – PED, PETRONAS Carigali Sdn Bhd, Level 24, Tower 2, Petronas Twin Towers, 50088 Kuala Lumpur

Temana field is located approximately 30km offshore Bintulu which is in the Balingian PSC, sub-blocks 4Q-29 and 4Q-30 with the water depth of 96 ft. The field is divided into 3 hydrocarbon accumulation namely the Temana West, Temana Central and Temana East; each area has different deformation style and fault patterns (Figure 1.0). The Temana field was discovered by drilling the Temana-1 well in 1962 and brought into production in 1979.

Temana Saddle has been discovered by drilling the appraisal well (Temana-72) in 2004. The outcome from the appraisal campaign indicated that the I-65 reservoir is the most promising reservoir compare to the other reservoirs in the Temana Saddle area. An FDP (Field Development Plan) study was initiated in 2005 and the 1st oil from this study was in Q1 2006 (Figure 2.0). 3 new development wells namely Temana-73ST1, Temana-74ST2 and Temana-51 ST2 were drilled in Phase 1. The highest production was from the Temana-73ST1 tested at ~3600 bopd and the accumulative production of 4.1 mmstb as of April 2009 (Figure 3.0). The dynamic simulation shows a pressure drop of ~250 psi and an increasing GOR trend approaching RMP limit (1500 scf/stb) was observed. The Phase 2 FDP study was started in 2007 after the completion of Phase 1 drilling and focusing on the pressure maintenance study. The study involves updating the static model by incorporating the new well data to update the STOIIP.

The standard workflow of static modeling (involving the well and core data) is followed as in previous Phase 1 study (Figure 4.0). At the property modeling stage, the same algorithm was used but using 2 different methods; 1) to model the porosity based on the well data and propagated by variogram and 2) to model the porosity by incorporating the AI derived porosity data constrained with log derived porosity data. The main aim of this study is to compare the porosity distribution from both methods whether it does match with the porosity in the new post drilling well. The cross plot between well log porosity and AI gives a good correlation of 87% (Figure 5.0).

From the study, the porosity model which was generated based on well data and propagated by the variogram give a good porosity match with all wells (Method 1), where as the model that was generated based on the inversion (Method 2) give a good porosity match only at the well locations that have checkshot.

Figure 1.0 : Field location and geological structural map of Temana Field.
and sonic data, and fair to good correlation in the other wells (Figure 6.0). Volume calculation shows an increase of 28% and 17% in STOIIP using method 1 and 2 respectively (Table 1.0).

In conclusion, AI derived porosity model must be used provided most of the wells have checkshot and sonic data to address the uncertainty.

REFERENCE
Mirza Arshad Beg, 1997. Reservoir Geological Model of The I-60 to I-67/I-68 Reservoirs, Temana Central. SSB. Unpubl

**Figure 2.0 : Field Development History**

**Figure 3.0 : I65 Reservoir Performance**
Figure 4.0: 3D Static Model Workflow

Figure 5.0: Correlation between well data and AI.
Figure 6: Porosity model based on different methods.

<table>
<thead>
<tr>
<th>Volumetric Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method 1</td>
</tr>
<tr>
<td>Increased by 28%</td>
</tr>
</tbody>
</table>

Table 1: Volumetric run based on different methods.