The Temana field is located 30 km offshore Bintulu in Sarawak basin at water depth of 96 ft. The field was discovered in December 1962 and so far 22 exploratory and appraisal wells have been drilled. The field is in its production since November 1979 and till January 2009 it has produced 128.32 MMstb of oil from H, I, J & K reservoirs of Early to Middle Miocene age of which major production (almost 90%) comes from H & I reservoirs.

The Temana structure comprises of an elongate, east-west trending, west plunging, heavily cross-faulted upthrusted anticline. The structure is situated at the fringe of the Balingian basin, a major tectonic depression offshore Bintulu and is bounded to the north and south by major reverse fault zones. The anticline is dissected by NNE-SSW trending faults. The Temana structure is traditionally subdivided into three areas: Temana West, Temana Central and Temana east (as shown in the Figure 1).

The entire I sequence consists of a number of fining as well as coarsening megasequences reflecting different pulses of coastline progradation and/or lateral shift interrupted by phases of minor marine transgressions. The inferred depositional model in I sequence consists of progradation of the shoreline with deposition of coastal and nearshore sands followed by a minor sea level rise causing shoreline to retreat or stabilization. Thereafter the shore line progrades again because of excess sediment supply and the coastal plain aggrades. At the end of progradational episode formation of peat and coal swamps take place on the coastal plain. Thereafter a renewed rapid shoreline progradation caused by excess sediment supply. I-65 reservoir is one of the main producers among other reservoirs in Temana, especially in the saddle. The paleo-depositional environment for I-65 is interpreted as low energy regime distributary channel within lower coastal plain with the paleo current direction towards NE – NNE from SW (as shown in the Figure 2).

A study has been carried out integrating the conceptual geological model with the seismic attributes and the production data from the nearby wells to identify unexplored channel arm within the developed area on I-65 and I-60 reservoirs. The workflow involves well to seismic correlation, extraction of seismic amplitude within the reservoir window, validation of the seismic amplitude with the drilled wells, integration of the seismic attribute findings with the geological model leading to the delineation of untapped prospects. I-60 and I-65 have been re-interpreted (Figure 3) and flattened on I-60 level to show the channel like geometry (Figure 4). Attribute like RMS amplitude have been extracted within the reservoir window. The amplitude extraction have been carried out for I-60 reservoir window at 14 ms, 16 ms and 20 ms of which 16 ms represents the most likely scenario (Figure 5). Similarly, the RMS amplitude have also been extracted for I-65 reservoir at 12 ms, 16 ms and 24 ms of which 16 ms represent the most likely case (Figure 6).

The attribute maps show about 80% correlation with the well findings (as shown in the Figure 7). The identified prospects are dominantly of stratigraphic play. The log correlation (as shown in the Figure 8) depicts the discontinuous nature of the sands which is also evident from the attribute study. The stratigraphic trap controlled geological model successfully explained the sand body and fluid distribution at nearby wells which was difficult to explain with structural play concept. The delineated sand body gives an indication of channel configuration both at I-60 and I-65 level which correspond to the conceptual geological model. Figure 9 represent super imposition of I-60 and I-65 channel configurations indicating similar orientation.

This paper describes the work flow and the findings of the study which resulted in identification of new resources within the Temana Field in I-65 and in I-60 reservoirs. The integrated study has resulted in improved geological model and understanding of prospects within Temana field. Once successfully appraised, this would open up avenues for delineation of similar prospects and reserves accretion within the Temana field.
GEOLGY PAPER 9

REFERENCE
Mirza Arshad Beg, 1997. Reservoir Geological Model of The I-60 to I-67/I-68 Reservoirs, Temana Central. SSB. Unpbl
### Geology Paper 9

<table>
<thead>
<tr>
<th>Well Name</th>
<th>Location</th>
<th>Depth</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>TE-10</td>
<td>South</td>
<td>1000 m</td>
<td>1.5 my</td>
</tr>
<tr>
<td>TE-20</td>
<td>North</td>
<td>2000 m</td>
<td>2.0 my</td>
</tr>
<tr>
<td>TE-30</td>
<td>East</td>
<td>3000 m</td>
<td>2.5 my</td>
</tr>
<tr>
<td>TE-40</td>
<td>West</td>
<td>4000 m</td>
<td>3.0 my</td>
</tr>
</tbody>
</table>

**Figure 7** Sand Body Correlation Along Wells TE-33, TE-51, TE37, TE-50

**Figure 8** Overlapping of 1-65 & 1-60 channel configuration

**Figure 9** Map showing the tight reservoirs.