Strategies to Optimize Reserves and Resources Development before Drilling: Case Study in the Llanos Basin, Colombia*

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Abstract

The development plan of a petroleum field must assure all relevant points are addressed systematically and accomplished before contract rigs, civil works for abdication in surface location and drilling operation. The main purpose of this presentation is to comment on all critical aspects required to verify and plan the strategies to optimize reserve and resource development along with a detailed geological and reservoir characterization before drilling. The decision drivers and variables could be incorporated as systematic project planning to have a complete vision and plan for both short and long term. In this presentation, I propose a workflow and identify a critical path to reach the optimum reserves development.

References Cited


ECOPETROL (AEX-ICP), 1998, Evaluación Regional de la Cuenca de los Llanos Orientales- Informe Interno ECOPETROL, Bogotá.


Strategy to optimize Reserves and Resources Development before Drilling: Case Study in the Llanos Basin. Colombia.

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Agenda

• Regional Location
• General Data of Study Area
• Reservoir and Trap Description
• Main Focus to detail
• Reservoir Management
• Workflow for Reserves statement
Regional Location
**General Data of Area**

<table>
<thead>
<tr>
<th>Reservoir</th>
<th>Net Gross, ft</th>
<th>Net Pay, ft</th>
<th>Porosity, %</th>
<th>So, %</th>
<th>STOOIP, MM BBLs</th>
<th>RF final, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mirador</td>
<td>50-70</td>
<td>15-25</td>
<td>20-23</td>
<td>65-80</td>
<td>10-15</td>
<td>30</td>
</tr>
<tr>
<td>Gacheta</td>
<td>20-60</td>
<td>10-15</td>
<td>12-25</td>
<td>65-85</td>
<td>5-15</td>
<td>30-45%</td>
</tr>
<tr>
<td>Une</td>
<td>60-90</td>
<td>15-20</td>
<td>20-23</td>
<td>60-80</td>
<td>13-15</td>
<td>25%</td>
</tr>
</tbody>
</table>

*Source: Ecopetrol, 1998*
General Data of Area

Structural section of Llanos Basin (modified after Gomez, et al., 2009)
Reservoir
Do we have a **Reservoir** to store the hydrocarbons? What are its characteristics?

Is the **Closure** a trap to the hydrocarbons in the reservoir? How big is it?

Is there a seal that will **Contain** the hydrocarbons to the present day? How efficient is it?
Yuxtaposition Analysis

Allen Diagram
Reservoir Analysis

New interval was tested and took PBU data
Prospect Evaluation Process

After Otis & Schneidermann, 1997
Integrated Portfolio and time table

Integrated Portfolio

Integrated Ranked Portfolio

Time table
Conclusions

• Foreland basin has a particular aspects such as multi-reservoir and multistage doing necessary a good reservoir management, drilling, completion and fluid management.

• Testing new intervals in producer wells and Engineering data analysis (for example, PBU) are strategies of low cost that allowed to increase 20% the reserves and resources.

• Geomodeling is useful technique for 3D integration and evaluation of prospect and fields until simulation models that allow the development strategies and the evaluation of enhanced recovery feasibility, depending of the scale and detail used.

• Integrated and ranked portfolio allowed to add “value promise” at long terms combining risk of exploratory wells with development wells.