ROLE OF SEPARATORS IN MARGINAL OIL FIELD DEVELOPMENT

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Introduction
HORIZONTAL SEPARATOR: may vary in size from 10 or 12 in. in diameter and 4 to 5 ft seam to seam (S to S) up to 15 to 16 ft in diameter and 60 to 70 ft S to S. Manufactured with monotube and dual-tube shell.
VERTICAL SEPARATOR: Vary in size from 10 or 12 in. in diameter and 4 to 5 ft S to S up to 10 or 12 ft in diameter and 15 to 25 ft S to S.

SPHERICAL SEPARATOR:

Usually available in 24 or 30 in. up to 66 to 72 in. in diameter
CLASSIFICATION BY FUNCTION:

TWO PHASE SEPARATOR: Gas is separated from the liquid with the gas and liquid being discharged separately.

THREE PHASE SEPARATOR: In three-phase separators, well fluid is separated into gas, oil, and water with the three fluids being discharged separately.

SEPARATOR COMPONENTS

- The main components of a separator, shown in Figure, are the feed pipe, inlet device, gas gravity separation section, mist extractor and the liquid gravity separation section.
- The gas/liquid separator components will be briefly discussed in regards to their effects on gas/liquid separation performance.
- These effects need to be understood and quantified in order to troubleshoot separator operations, and to identify modifications that can be made to improve performance.
INLET FEED PIPE

✓ The inlet feed pipe sizing and geometry is important as it is desired to keep the multiphase flow pattern “stabilized” in the piping to minimize the production of small liquid droplets, and liquid entrainment into the gas phase. Fig shows the effect of feed pipe velocity on liquid entrainment. Figure demonstrates how quickly the liquid entrainment increases once the entrainment inception point is reached.
some general guidelines for inlet piping to minimize liquid entrainment are:

Provide 10 diameters of straight pipe upstream of the inlet nozzle without valves, expansions/contractions or elbows. If a valve is required, only use full port gate or ball valves.

INLET DEVICE

The main purpose of an inlet device is to improve separation performance. This is achieved by maximizing the amount of gas-liquid separation occurring in the feed pipe, minimizing droplet shearing, and optimizing the downstream velocity distributions of the separated phases into the separator. Schematics for inlet devices are shown in Figure 17. In large capacity, more critical separation applications, the vane-type and cyclonic inlet devices are commonly used. The simpler, and less expensive, impact (or diverter plates) are often used where the separation performance is lesscritical.

FIG 17 EXAMPLE OF LIQUID ENTRAINMENT BEHAVIOR IN A GAS-LIQUID SYSTEM
The inlet momentum ($\rho_m V_m^2$ – density*velocity$^2$ of the mixture) of the feed stream is typically used to select and size inlet devices. Table 3 provides the suggested upper limits of inlet momentum values. For conditions where it is not practical to avoid higher feed pipe velocities, it must be recognized that failure to do so will result in higher entrainment loads, smaller droplet sizes, and more difficult separation conditions.
TABLE 2 INLET DEVICE PV² UPPER LIMITS

<table>
<thead>
<tr>
<th>Inlet Device Type</th>
<th>ρV², lb/ft·sec²</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Inlet Device</td>
<td>700</td>
</tr>
<tr>
<td>Diverter Plate</td>
<td>950</td>
</tr>
<tr>
<td>Half-pipe</td>
<td>1400</td>
</tr>
<tr>
<td>Vane-type</td>
<td>5400</td>
</tr>
<tr>
<td>Cyclonic</td>
<td>10 000</td>
</tr>
</tbody>
</table>

Conclusion:

Because information given about every instrumental operations in field in both theory and field observation. As it is good to know these operations as crude coming from well to separator and loading is carried in a same place. We can see everything in same place and feel it.

References:

- CAIRN MANUALS
- PETROWIKI
- WEB SITES REGARDING EQUIPMENTS FIELD NOTES