



7° CONGRESO IAPI
**Producción
y Desarrollo
de Reservas**

5 – 8 de Noviembre 2019
Mar del Plata, Argentina



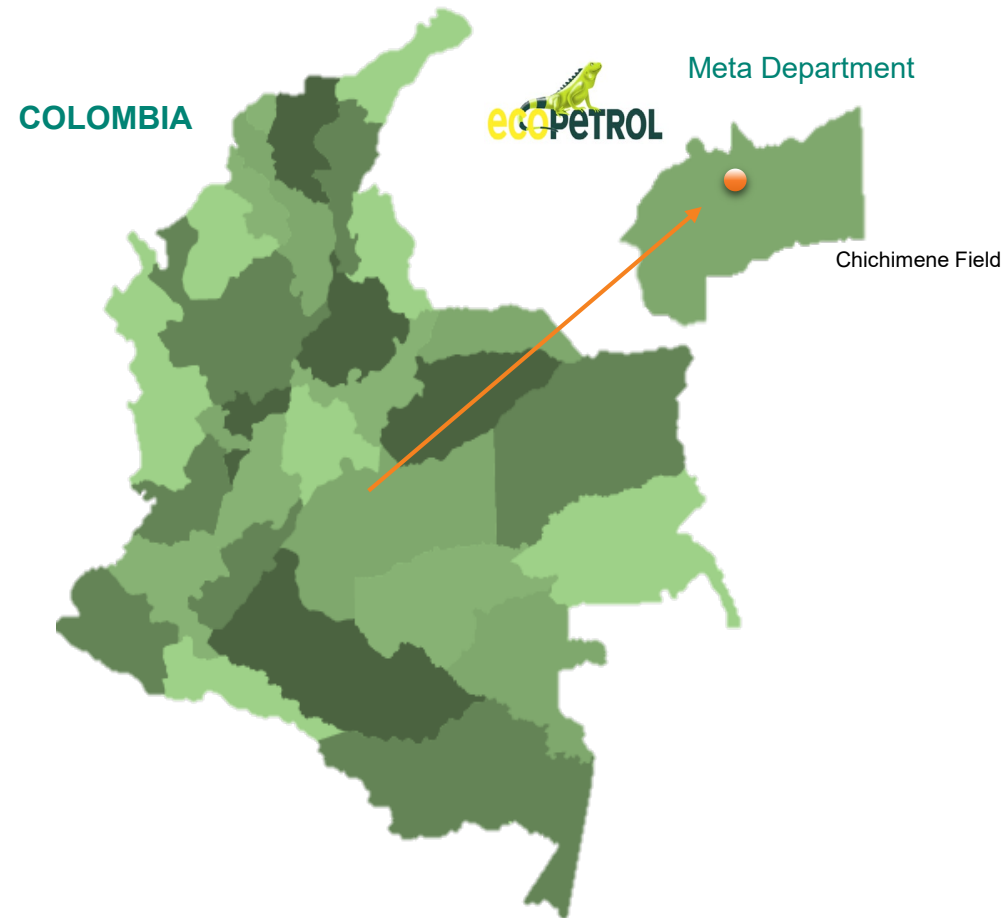
Improving Oil Recovery in Mature Field With Innovative Completion Solution: Dumpflood Application

Néstor Devia, Juan Pascuas, Raúl Jimenez, Camilo Gonzalez, Pilar Aguinaga,
Baker Hughes; Jose Parra, Rubén Collazos, John Polania, Sayda Blanco,
Edwinder Bolaños; Néstor Villalobos, Guillermo Geney, John Pineda, Carolina
Cespedes, Ecopetrol

Baker Hughes 



Chichimene Field Background



API: 7° - 9° Extra heavy oil

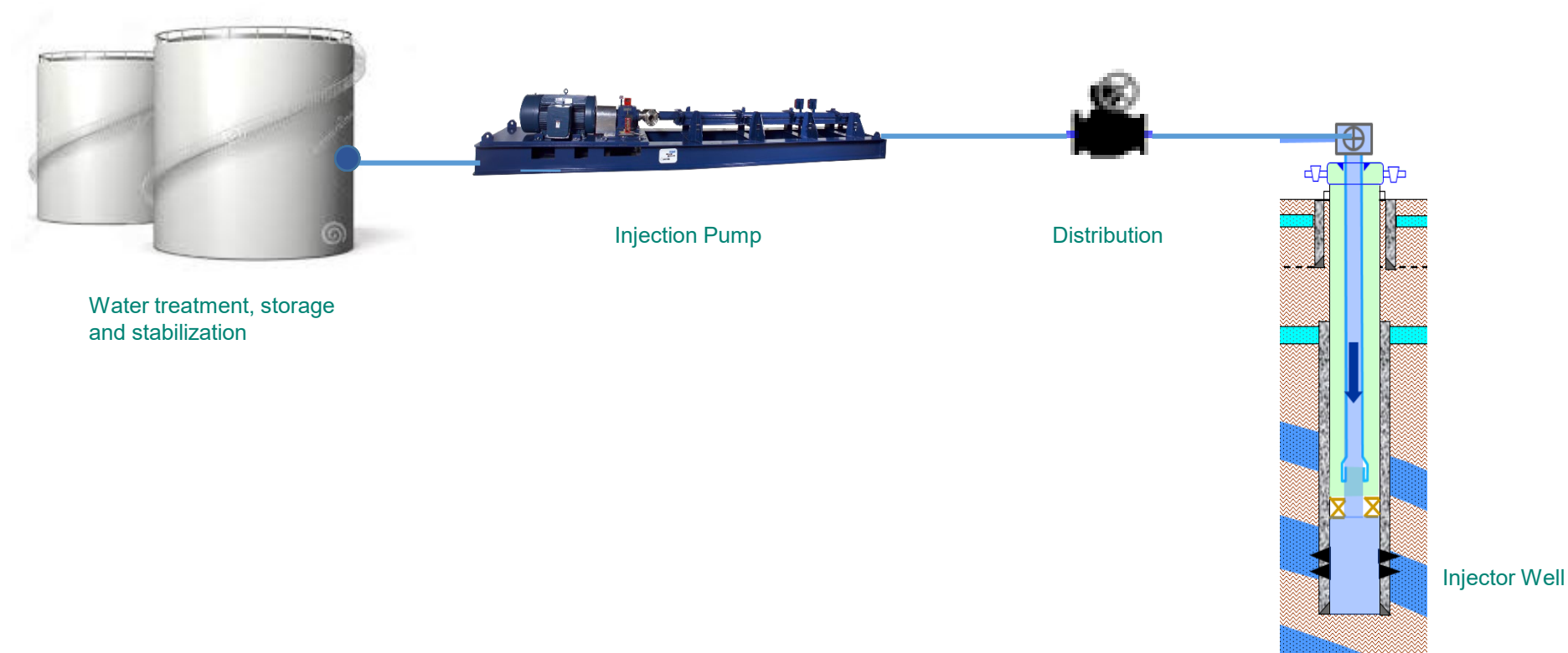
BSW: 12%

78,000 BOPD

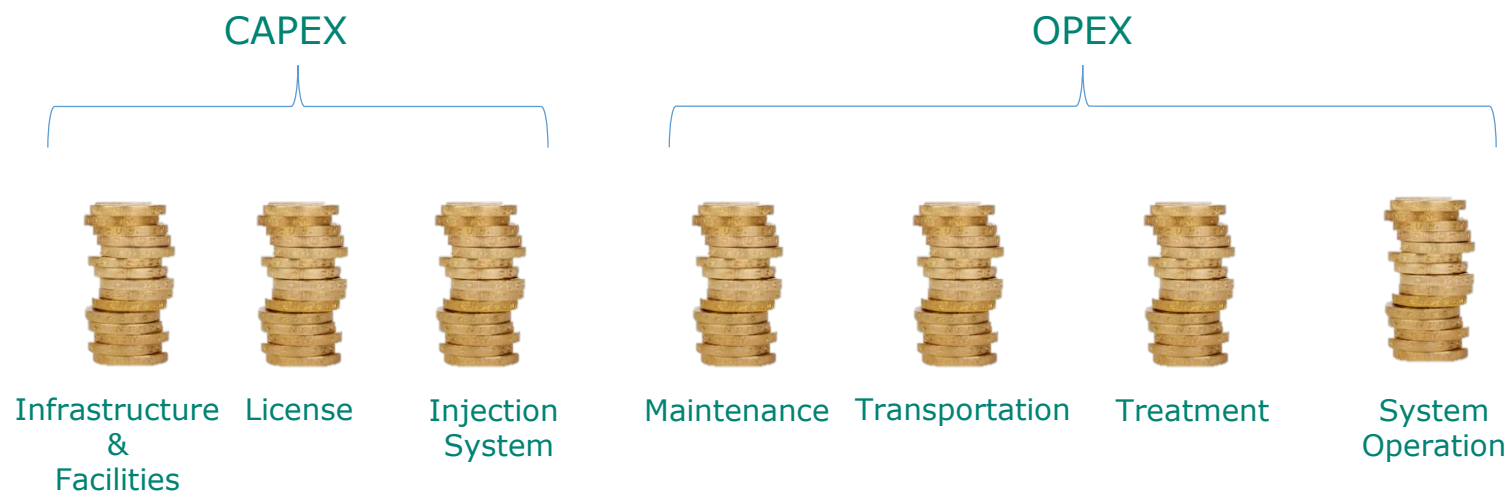
235 Producing Wells



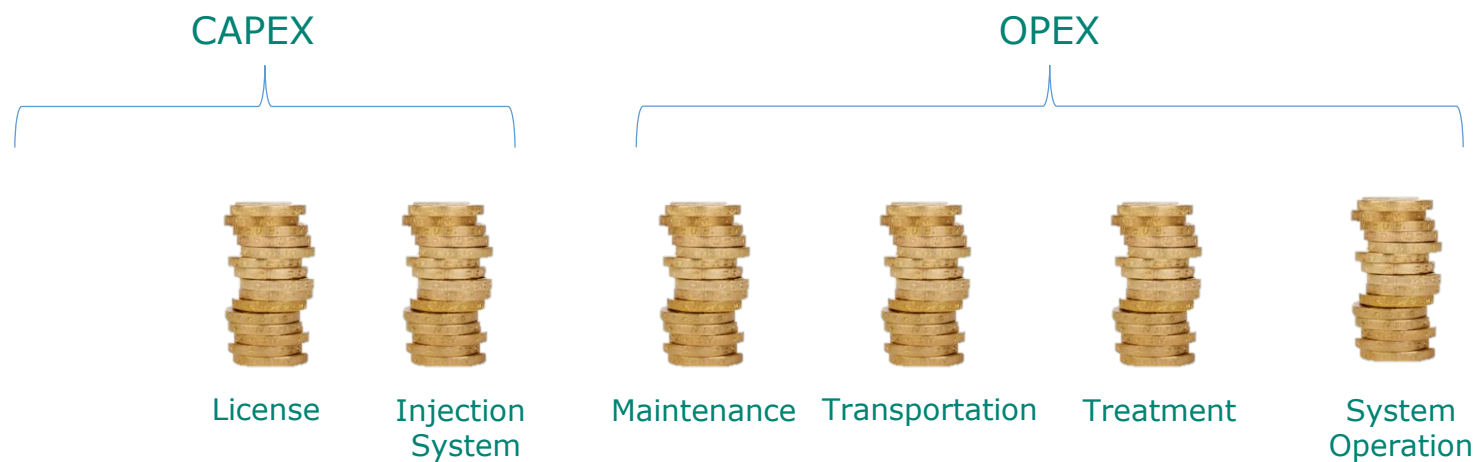
Traditional Water Injection System



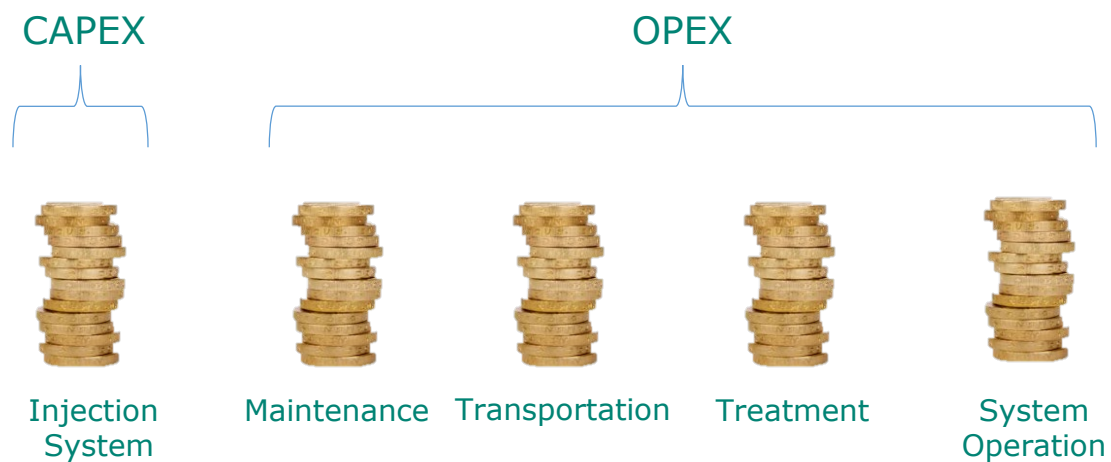
Traditional Water System Economics



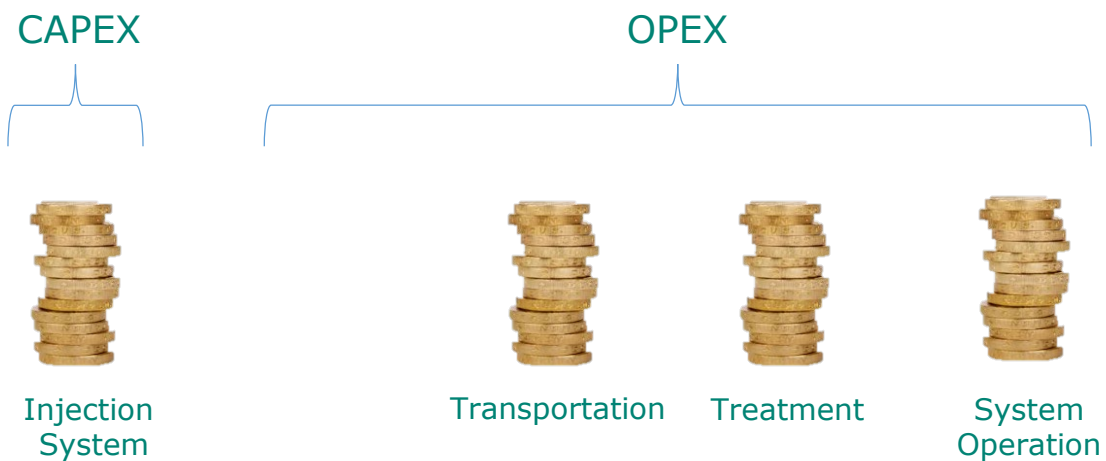
Traditional Water System Economics



Traditional Water System Economics



Traditional Water System Economics

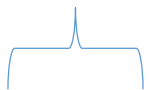


Traditional Water System Economics



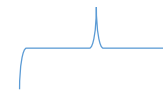
Traditional Water System Economics

CAPEX



Injection
System

OPEX



System
Operation

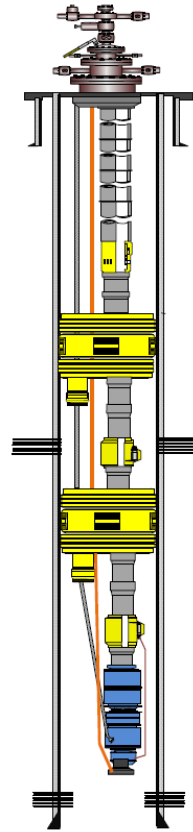


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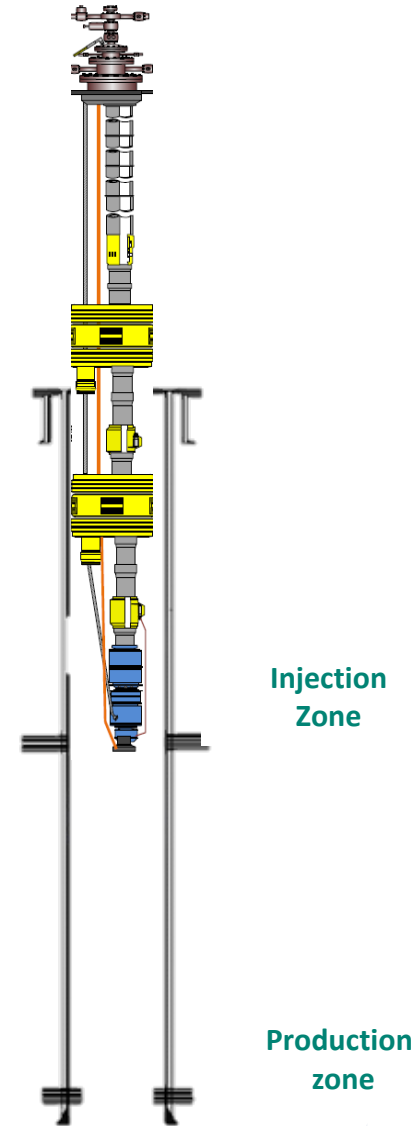
The Solution: Dumpflood System



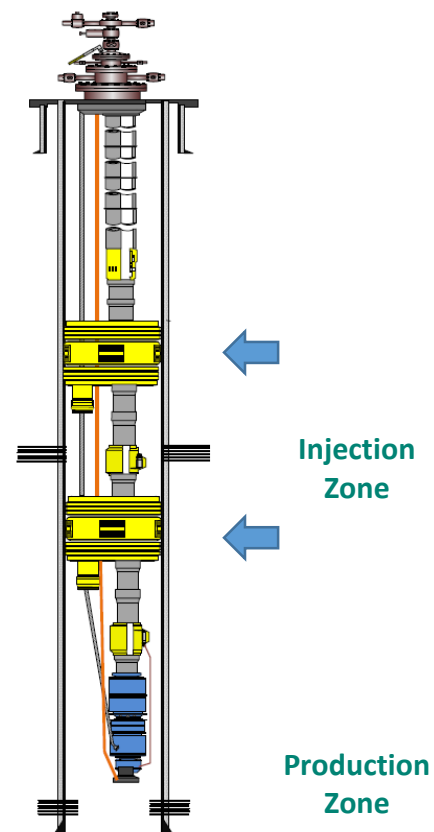


Dumpflood System

- Innovative downhole water injection system that allows producing and injecting water in the same well
- Water is produced from a production zone to be injected in the zone of interest to stimulate hydrocarbon recovery



Dumpflood System



Selective Injection String :

- Special Packers for Electrical Submersible Pump (ESP)
- Side Pocket Mandrel
- Sliding sleeve
- Electrical Submersible Pump



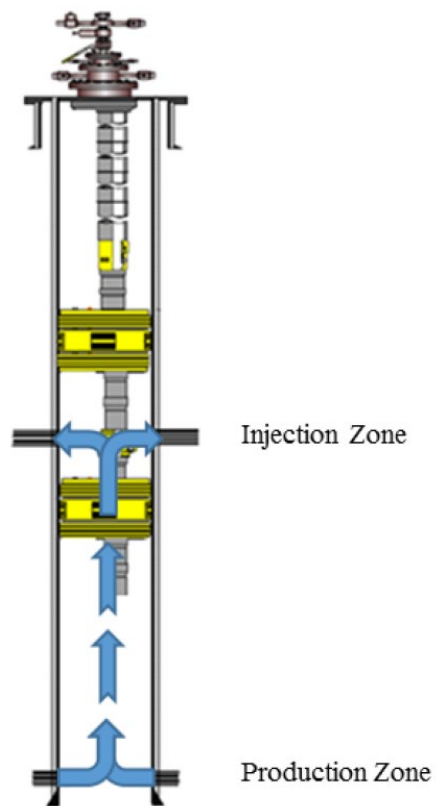
Dumpflood System: *Design Considerations*



Compatibility of the injection fluid with target reservoir

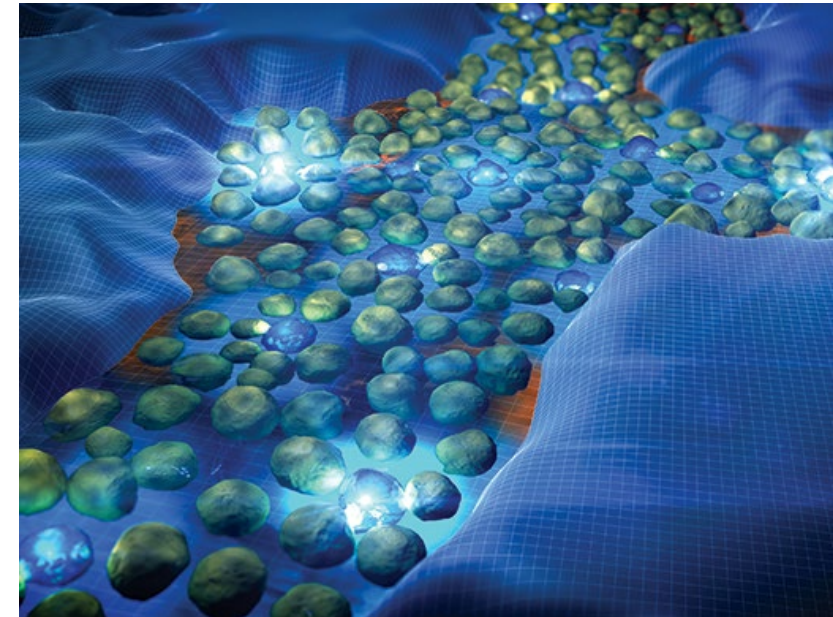
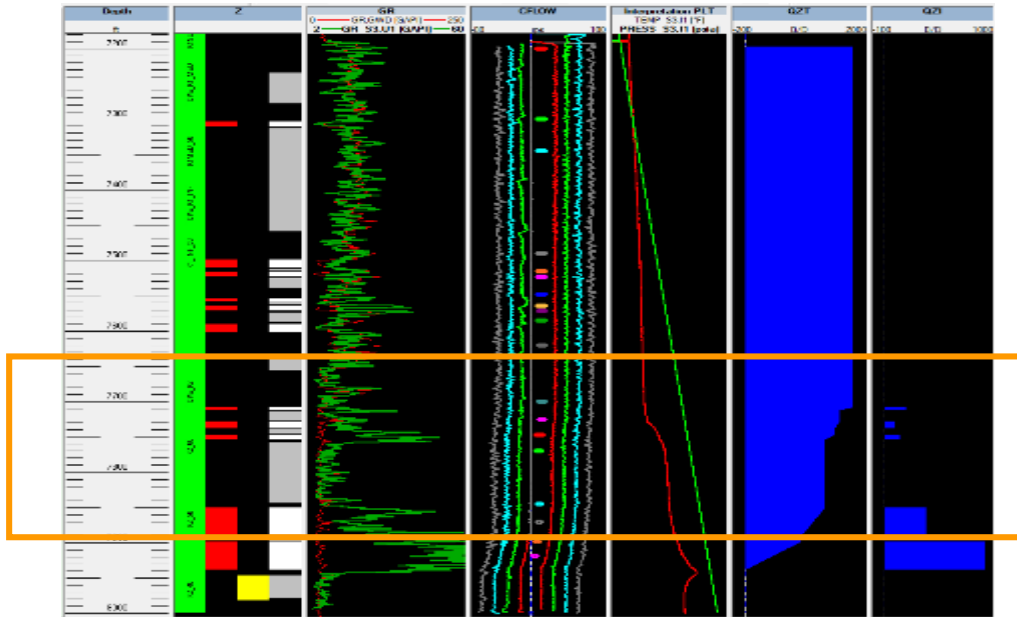


Injection zone above production zone



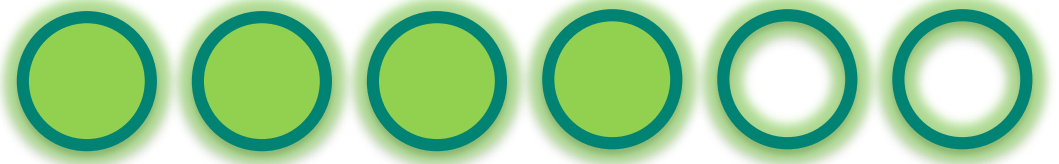
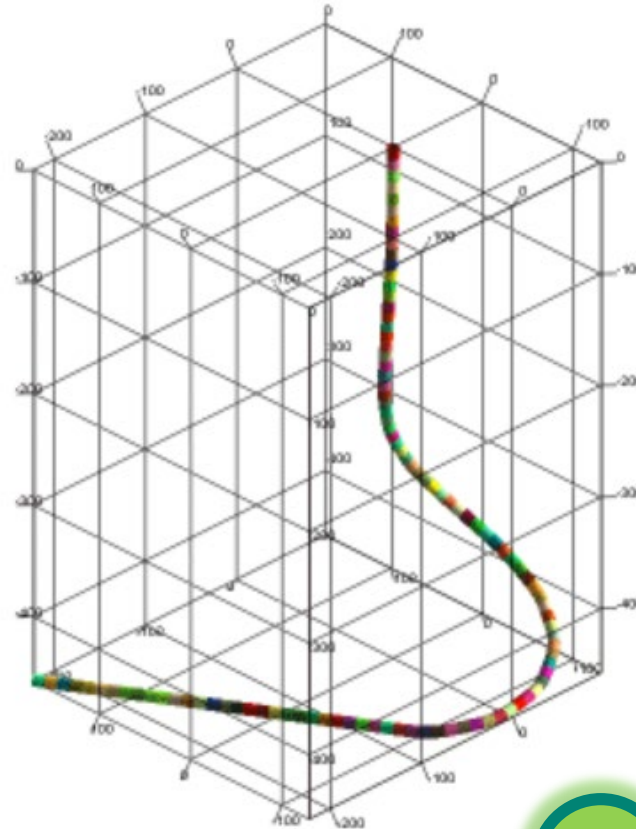


Establish a well injectivity index

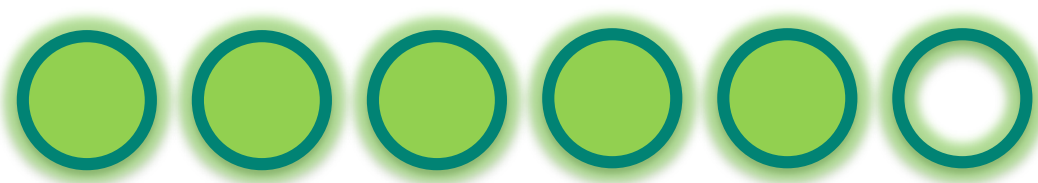
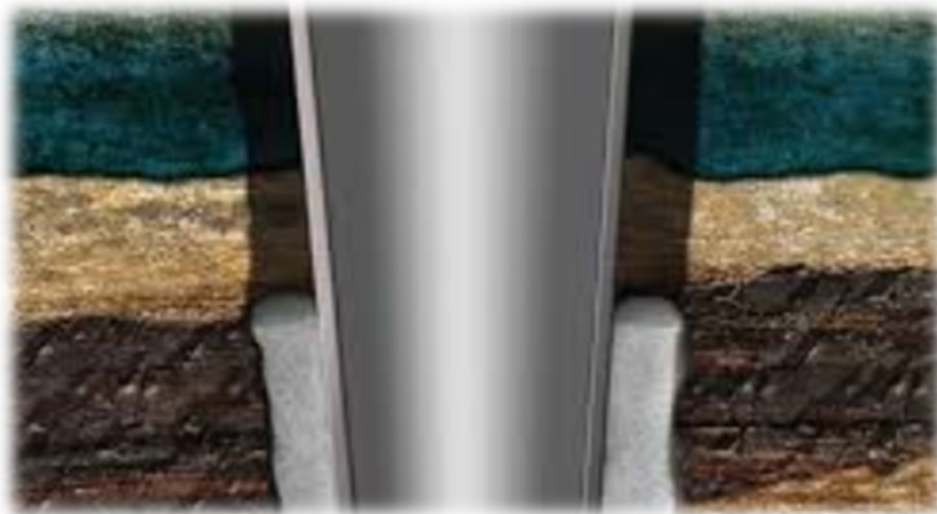




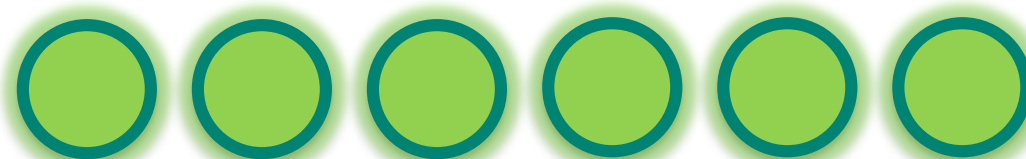
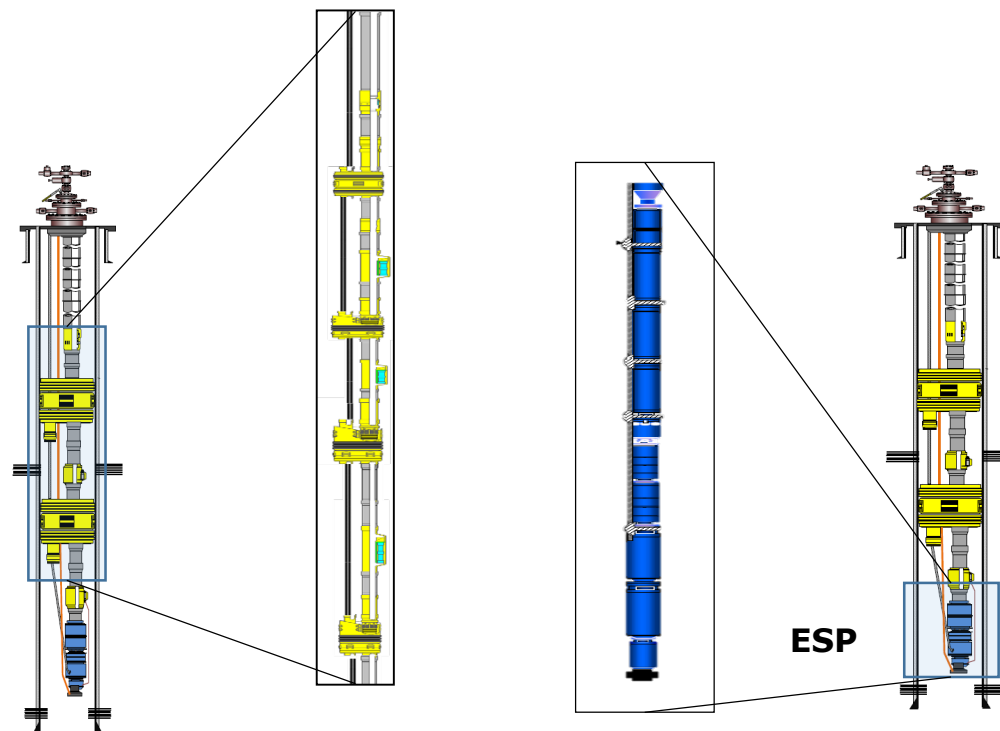
Well Construction (DLS, Inclination, Casing & Depth)



Cement Integrity



Proper ESP & Packers Selection





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Benefits



Dumpflood Benefits

Improve the secondary oil recovery

- Increase sweep efficiency in the hydrocarbon zone
- Reduce residual hydrocarbon saturation
- Maintain reservoir pressure
- Increase recovery factor – Production increase

CAPEX reduction (Facilities, Infrastructure, License)

OPEX reduction (Maintenance, water transportation & treatment)



Chichimene Field Results



↑ **20%** of production increase in the wells influenced by the Dumpflood project

↓ **60%** of CAPEX reduction

↓ **30%** of OPEX reduction



Conclusions

First successful installation in Colombia

Immediate & cost effective solution for maintaining reservoir pressure and improving oil recovery

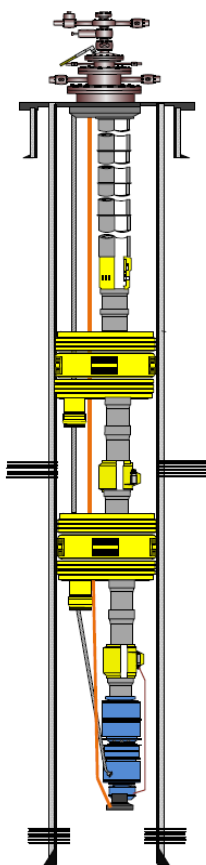
Innovation by integrating products and services is ***key*** to our industry



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QUESTIONS?