



## An Experimental Study of Single Well-Steam Assisted Gravity Drainage in Heavy Oil Fields



PhD in Petroleum Engineering (DEPet)

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### 1 – Abstract

This PhD project aims to investigate and implement more assertive projects for advanced recovery of heavy oil in mature fields using cyclic steam injection - Single Well Steam Assisted Gravity Drainage (SW-SAGD). Taking into account the current context of the oil market, it is hard to justify the investment in new deposits, thus, the implementation of SW-SAGD in already depleted heavy oil reservoirs would be enhanced.

### 2 – Objective

The objective is improve the performance in fields with SW-SAGD technology, and with this, understand the main demands and difficulties, thus proposing feasible solutions. It is also intended to develop abacus and graphics correlating with existing models; reduction of the uncertainty surrounding the area and boost the rate of recovery of wells completed with SW-SAGD technology.

### 3 – Methodology

The approach will map the main possibilities, process the data acquired in computational simulators and, with that, propose models and alternatives of implementation. Studies of basin geology (case study), geological interpretation and geological data analysis will also be carried out with a view to creating a geological model for the study area.

### 4 – Viscosity Behavior

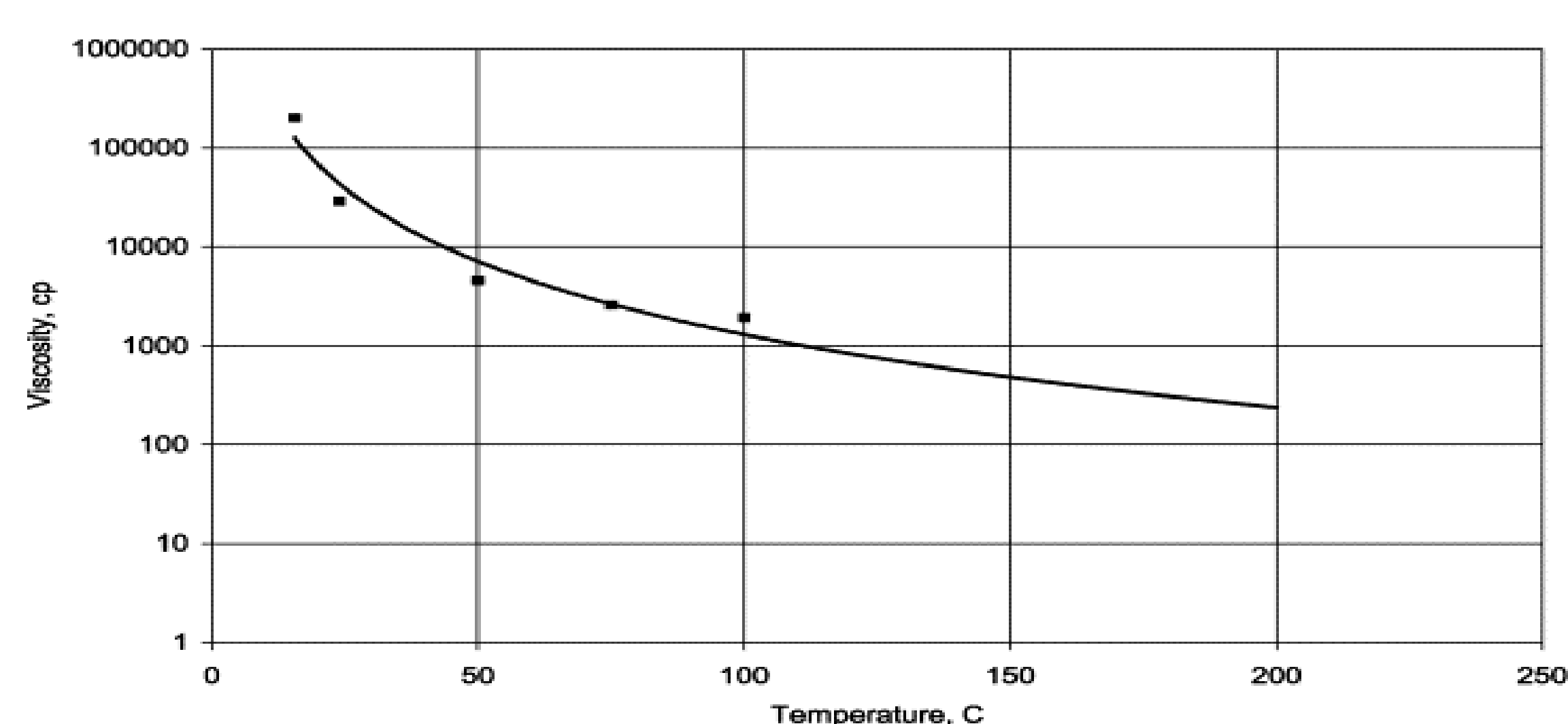


Fig. 1. Temperature-viscosity relationship for the crude oil. (Grant, 2013)

### 5- SW-SAGD Process

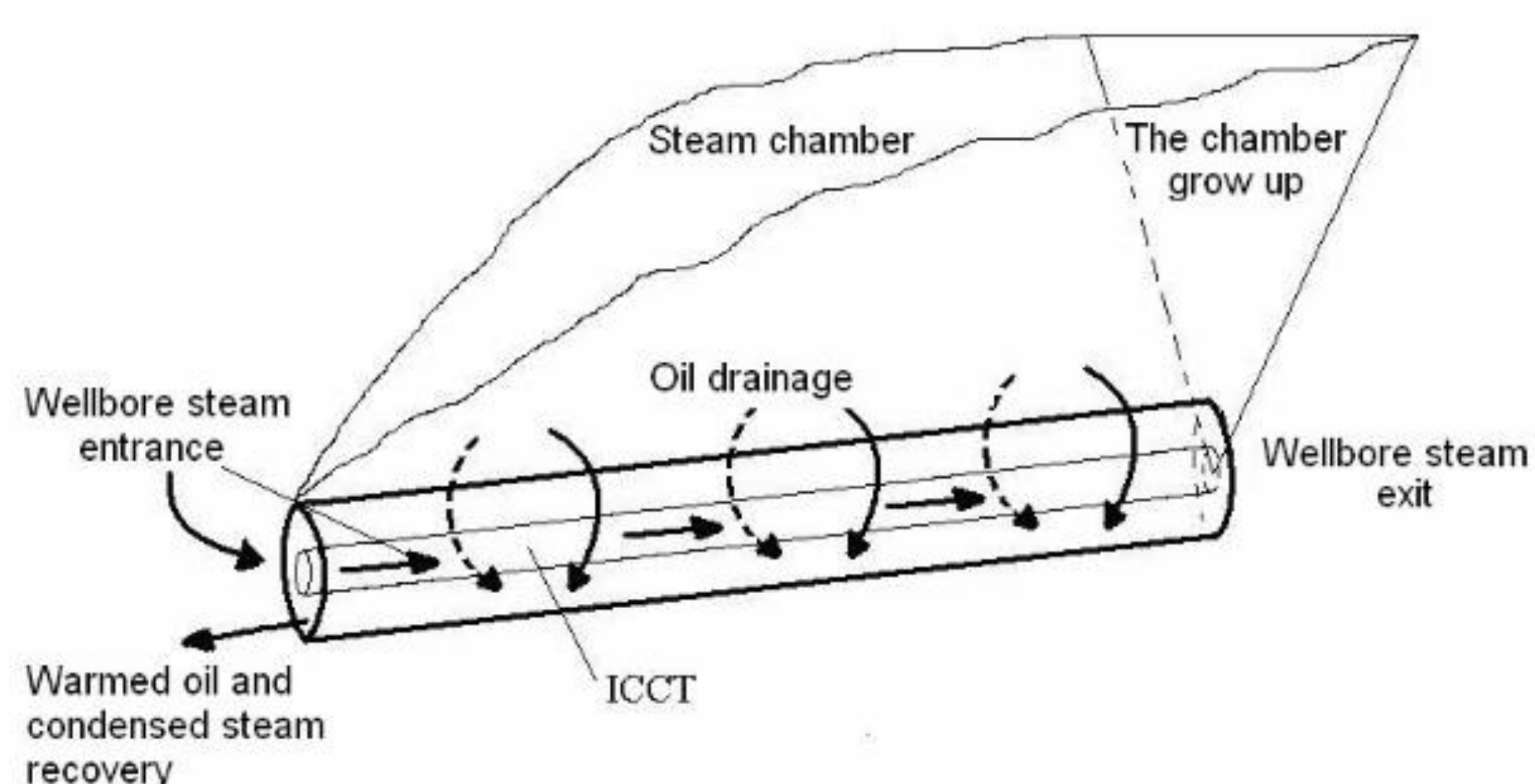


Fig. 2 – Scheme of the Steam Flow in the SW-SAGD process. Modified from Moreira et al. (2007)

### 6 – Heated Zones Analysis

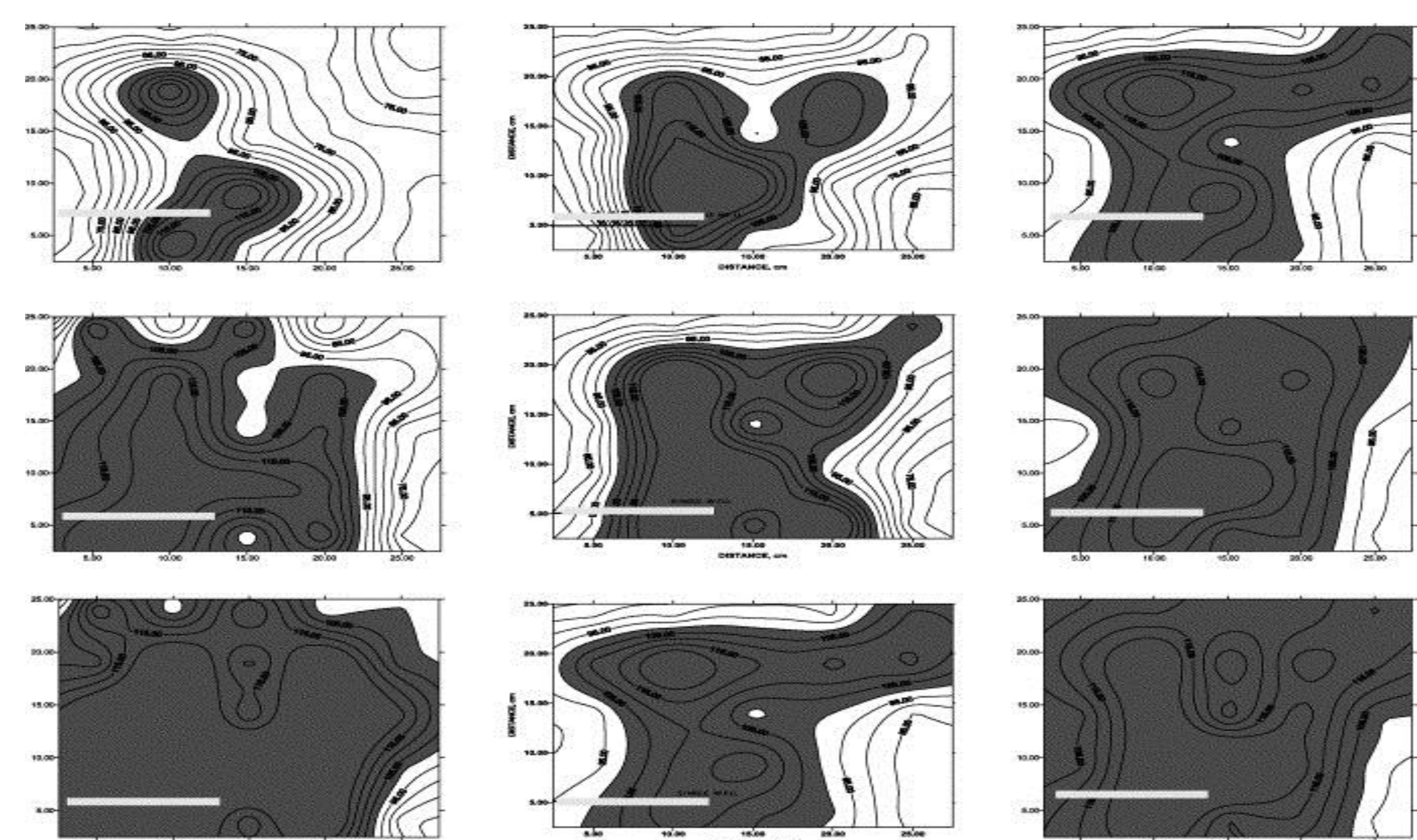


Fig. 3. Comparison of heated zones for different SW-SAGD production: left: steam circulation, middle: cyclic injection, right: continuous injection. (ASHOK et al 2000)

### 7 – OOIP Vs. Injected Steam

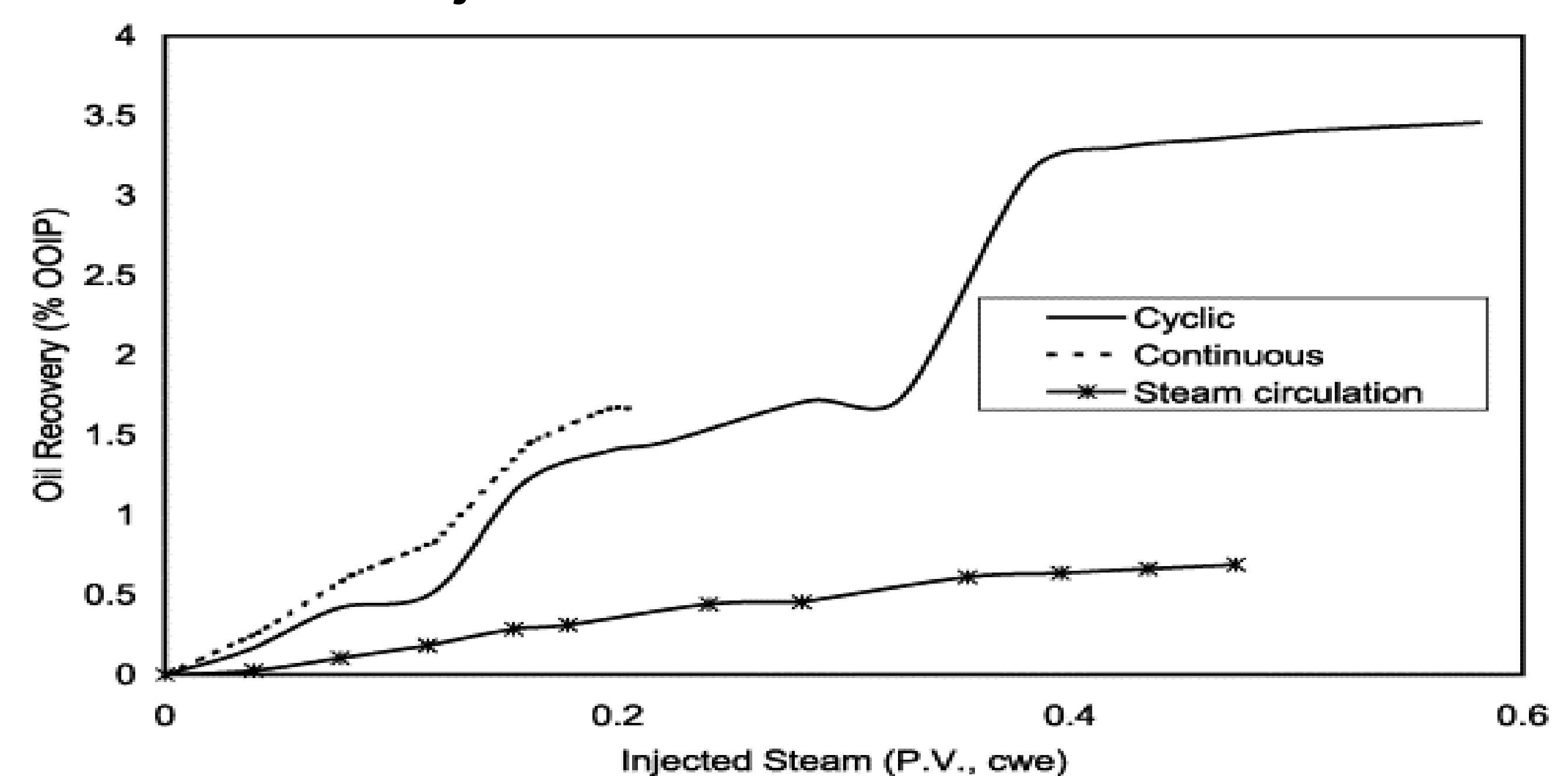


Fig. 4. Comparison of recovery curves for different SW-SAGD operating strategies. (Grant, 2013)

### 8 - Expected Results

- Reactivate and / or maximize the production of offshore heavy oil fields;
- Decrease operating costs;
- Simplify completion;
- Obtain better estimates of production through mathematical model;

### 9 - References

ASHOK K. SINGHAL; SWAPAN DAS; JON GOLDMAN AND ALEXANDRU T. TURTA "A Mechanistic Study of Single Well Steam Assisted Gravity Drainage" Tulsa, Oklahoma, SPE 59333, 3-5, April 2000.

Grant Hocking (GeoSierra LLC) | Dale A. Walters (Taurus Reservoir Solutions Ltd) - Vertical Single-Well SAGD with Multiple Producers - SPE Heavy Oil Conference-Canada, 11-2013 June, Calgary, Alberta, Canada

MOREIRA R. D. R. e TREVISAN, O.V., "Estratégia de Injeção de Vapor em Poço Horizontal Único", IV PDPETRO, Campinas, 21-24 de Outubro de 2007.