

OPTIMIZING COMMINGLE PRODUCTION STRATEGY USING  
INTEGRATED PRODUCTION MODEL

Mr. Komkrit Jiraratwaro

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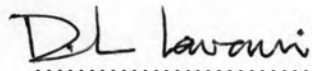
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
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Thesis Co-advisor           Thotsaphon Chaianansutcharit, Ph.D.


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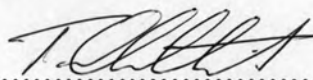
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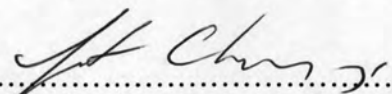
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THESIS COMMITTEE

..... Chairman  
(Associate Professor Sarithdej Pathanasethpong)

..... Thesis Advisor  
(Assistant Professor Suwat Athichanagorn, Ph.D.)

..... Thesis Co-advisor  
(Thotsaphon Chaianansutcharit, Ph.D.)

..... Member  
(Jirawat Chewaroungroj, Ph.D.)

คมกฤษ จิระราชวโร : กลยุทธ์การผลิตร่วมที่เหมาะสมโดยใช้การจำลองการผลิตแบบ  
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แหล่งไฮโดรคาร์บอนใต้พื้นผิวซึ่งเป็นสิ่งที่มีความสำคัญและปริมาณที่จำกัดนั้น จะถูกนำออกมาสู่พื้นผิว  
 เบื้องบนในปริมาณที่มากที่สุดเท่าที่จะเป็นไปได้เสมอ ในหลายครั้งหลายคร้ ่ กลยุทธ์การเปิดชั้นการผลิตที่ได้  
 กระทำไปนั้นจะขึ้นอยู่กับประสบการณ์ของผู้ทำการผลิต และไม่มีโอกาสที่จะได้ทำการตรวจสอบถึงกลยุทธ์การ  
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 วิเคราะห์ผลของกลยุทธ์การเปิดชั้นการผลิตต่างๆ ซึ่งนำไปสู่การได้ปริมาณไฮโดรคาร์บอนมากที่สุด งานวิจัยจึง  
 เริ่มด้วยการสร้างแบบจำลองเพื่อใช้ในการหาค่าเสมือนจริงของรูปแบบการผลิตของแต่ละหลุม เมื่อได้ข้อมูลที่  
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 นำมาพิจารณาด้วยความสำคัญสูงสุดสำหรับภายในสถานะแวดล้อมที่ใช้ในงานวิจัยนี้

ผลของงานวิจัยสามารถบ่งชี้ได้ว่า ไม่มีกลยุทธ์ใดกลยุทธ์หนึ่งที่แน่ชัดที่สามารถทำการผลิตน้ำมันได้ใน  
 ปริมาณที่มากที่สุด เมื่อมองในแง่ของการผลิตน้ำและแก๊สแล้ว พบว่ากลยุทธ์การเปิดชั้นการผลิตที่ใช้อยู่ใน  
 ปัจจุบันที่มีการปิดหลุมบางส่วน ให้ผลการผลิตน้ำที่น้อยที่สุด และกลยุทธ์การเปิดชั้นการผลิตจากล่างขึ้นบนทีละ  
 ชั้น ให้การผลิตแก๊สในปริมาณมากที่สุด เมื่อมองในแง่ของการได้มาของปริมาณเทียบเท่าน้ำมันดิบพบว่า กลยุทธ์  
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The hydrocarbon resources we have at subsurface are limited and hence top priority has always been to get maximum out of it. Many times perforation strategy has been done based on experience, and we have never had a chance to check if other perforation strategies will be able to deliver a better result. Simulation has made it possible to evaluate different perforation strategies in order to achieve the highest ultimate hydrocarbon recovery. In this study, reservoir models were built based on history matching on the production profiles using integrated production model. Then, six perforation strategies are applied to the same well in order to see the difference. The strategy delivering the highest oil recovery for most wells will be considered top performer for the environment in which the research is based on.

The results obtained indicate that no single strategy appears to consistently deliver the highest ultimate oil recovery. For the recovery of water and gas, the actual perforation that include plug and patches yields the lowest water recovery and the bottoms up perforation yields the highest gas recovery. Regarding BOE recovery, bottom up perforation is the most favorable.

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Student's signature ..... *Komkrit J.*

Advisor's signature ..... *Suwat Athichanagorn*

Co-advisor's signature ..... *T. Chait*

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## NOMENCLATURES

$A$	area of tubing, ft <sup>2</sup>
$B_g$	gas formation volume factor
$B_o$	oil formation volume factor
$B_t$	total formation volume factor
$B_w$	water formation volume factor
$c_w$	water compressibility
$c_f$	rock pore volume compressibility
$G$	initial gas in place
$G_{pc}$	cumulative gas-cap gas produced
$\gamma_g$	gas gravity
$h$	zone height, feet
$J$	productivity index
$k_o$	oil relative permeability, md
$m$	ratio of gas cap volume to oil volume
$n$	reciprocal slope of best fit plot of $q$ vs. $(\bar{p}^2 - p_{wf}^2)$
$N_p$	cumulative oil production
$N$	initial oil in place
$\bar{p}$	average reservoir pressure
$p$	reservoir pressure
$p_{wh}$	wellhead flowing pressure, psia
$p_{wf}$	well flowing pressure
$p_i$	initial pressure
$p_R$	reservoir pressure
$q$	flow rate
$q_{sc}$	the minimum rate, MMscf
$q_m$	producing rate when $p_{wf} = 0$
$r_e$	external boundary radius
$r_w$	well radius
$R_p$	cumulative production gas-oil ratio
$R_s$	solution gas-oil ratio

$S_w$	water saturation
$T$	temperature, °R
$\mu_o$	oil viscosity, cp
$v_{min}$	minimum velocity, ft/sec
$W_e$	cumulative aquifer influx
$W_p$	total water produced
$Z$	gas compressibility factor
$\rho_o$	oil density
$\beta$	velocity coefficient, ft <sup>-1</sup>