

공학기술의 종합응용: 석유공학

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Contents

- ◆ Origin of petroleum
- ◆ Petroleum development stages
- ◆ Offshore drilling
- ◆ Drilling problems and solutions
- ◆ Jobs
- ◆ Homework!

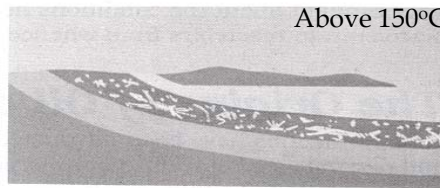


석유의 기원



Figure 2-4 Organic theory of origin of gas and oil. Some scientists believe petroleum formation began millions of years ago, when tiny marine creatures abounded in the seas (courtesy API).

Figure 2-5 The marine plants and animals, held in clay, sand, and silt, were changed to gas and oil, probably by gradual decay, heat, pressure, and possibly bacterial and radioactive actions (courtesy API).

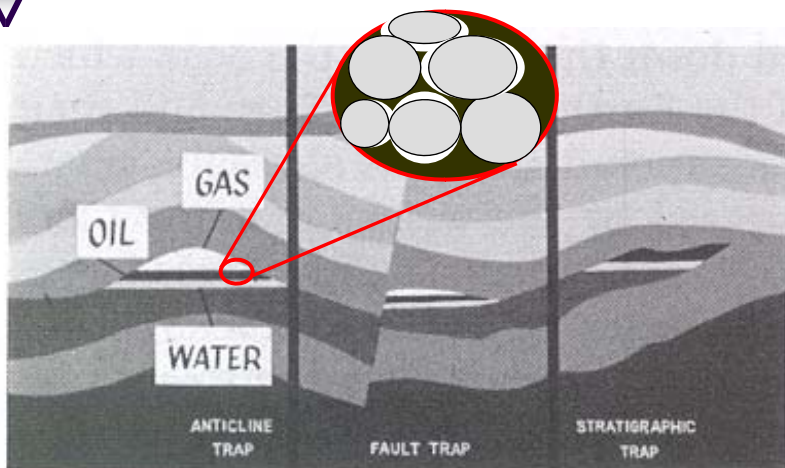


65~150°C: oil
Above 150°C: gas

석유가스공학 연구실



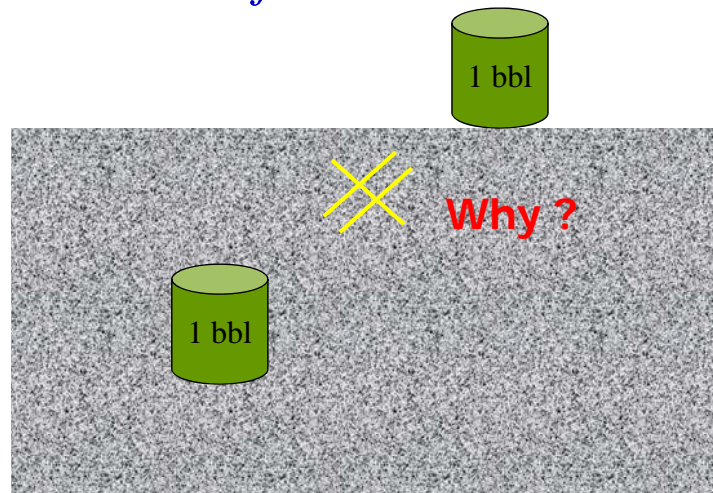
저류층 (Reservoir)



석유가스공학 연구실



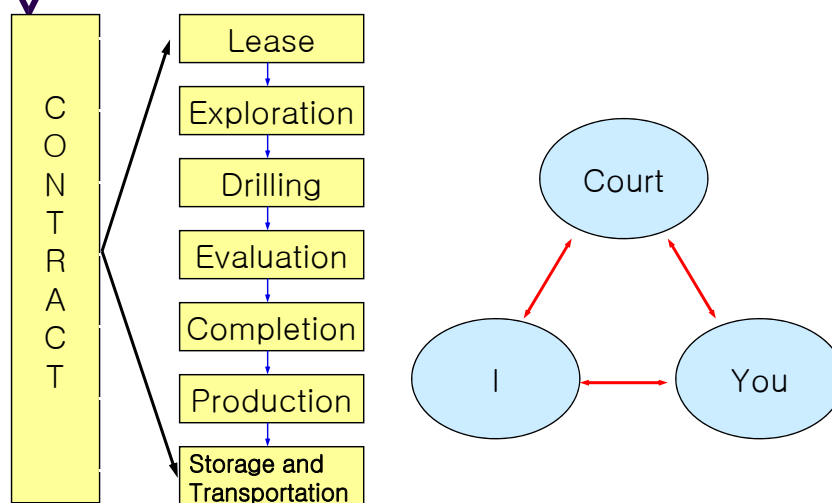
A Barrel of Oil



Petroleum Gas Eng. Lab



Petroleum Development Stages

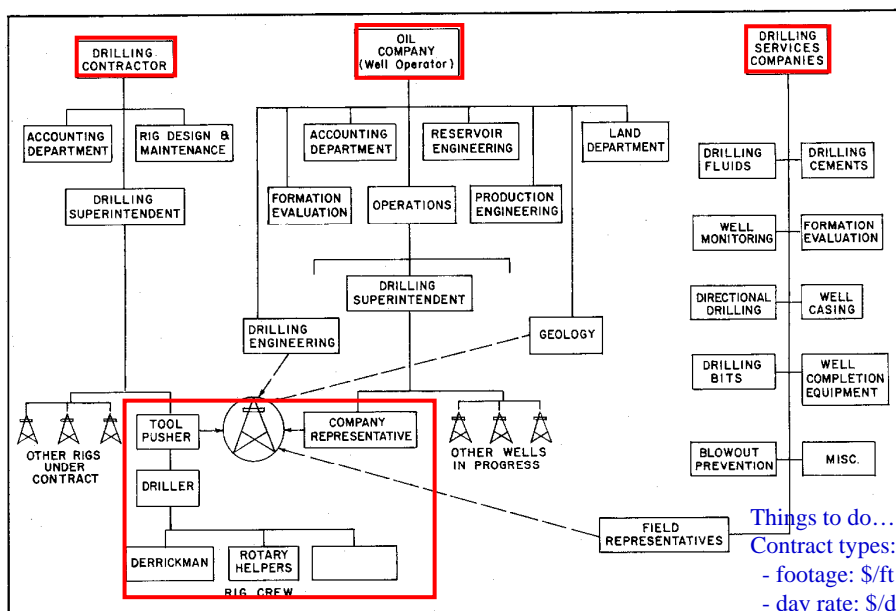
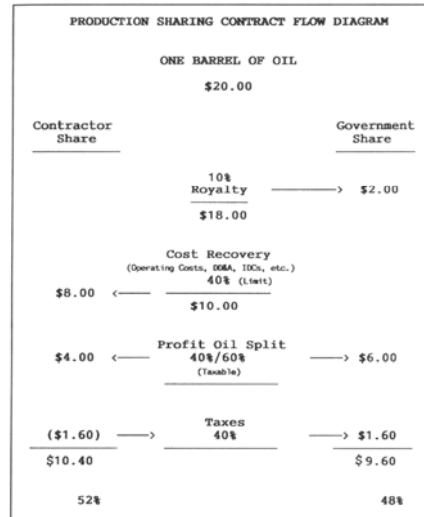
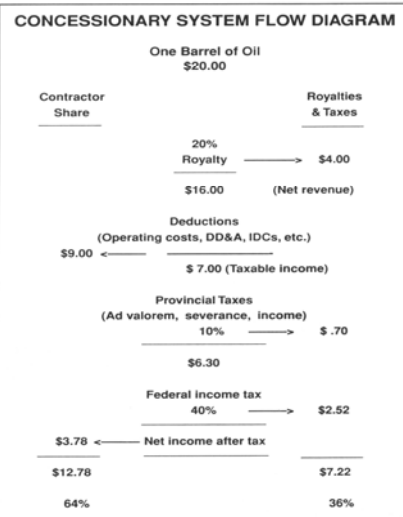


Petroleum Gas Eng. Lab



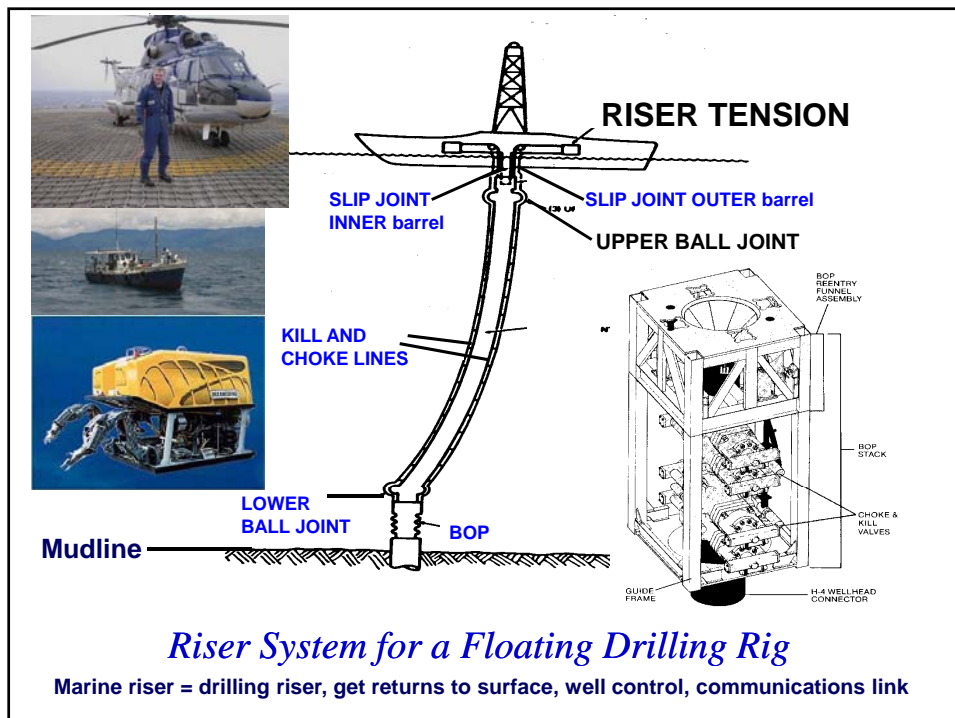
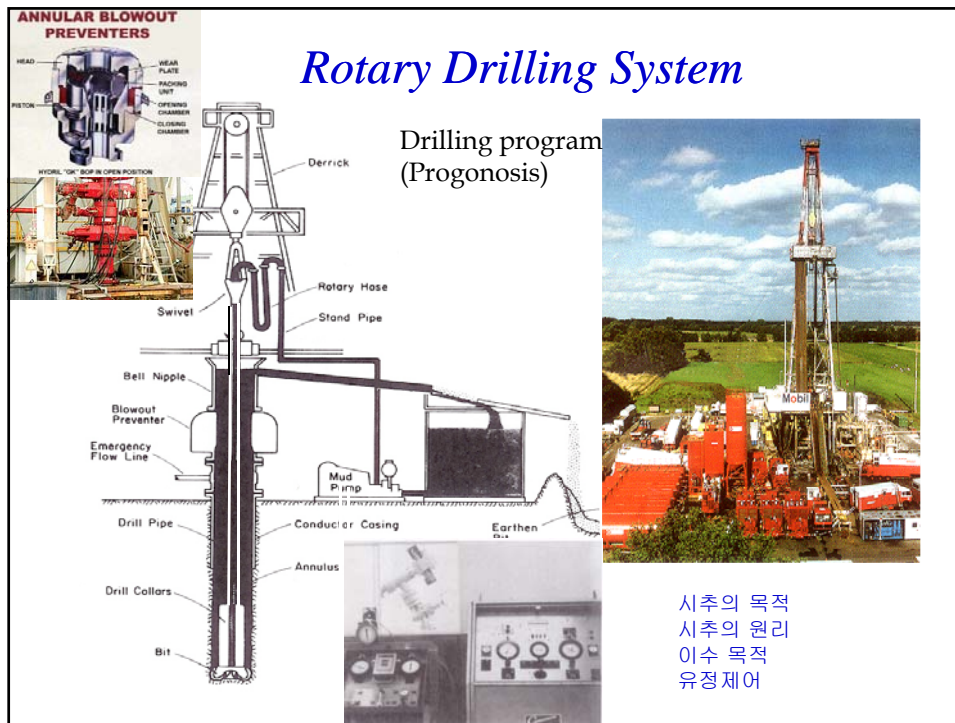
Typical Types of Contracts

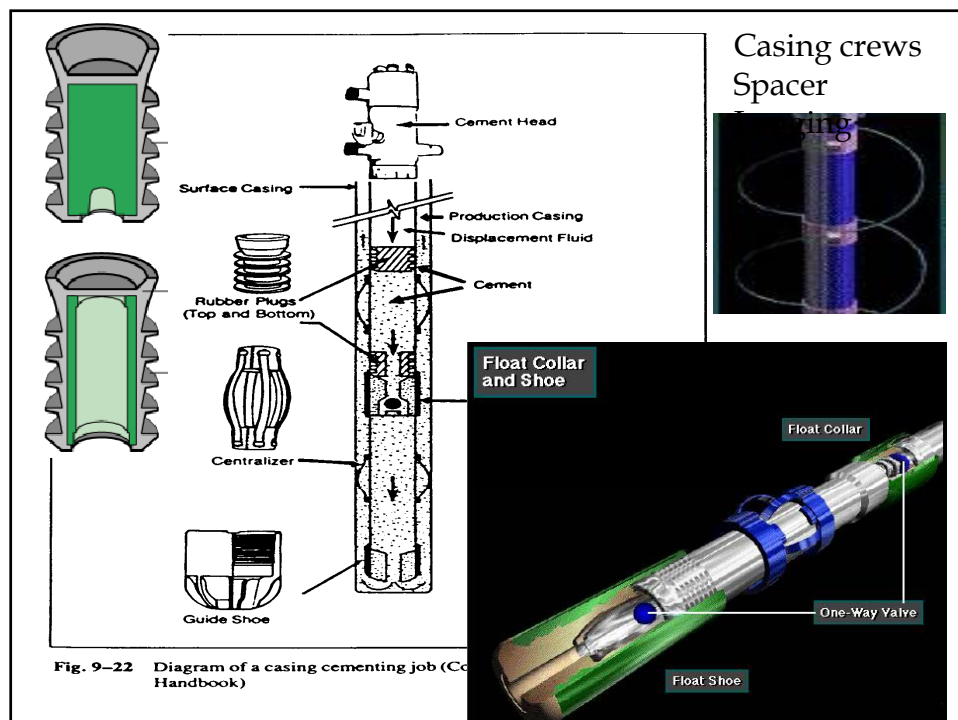
- ♦ Mineral ownership
 - Government vs. individual
 - Mineral lease
 - Bonus payment, Delay rental, Royalty, Revision of rights, Surface use
 - Landman
- ♦ Permitting



Things to do....
Contract types:
- footage: \$/ft
- day rate: \$/day
- turnkey: \$/well

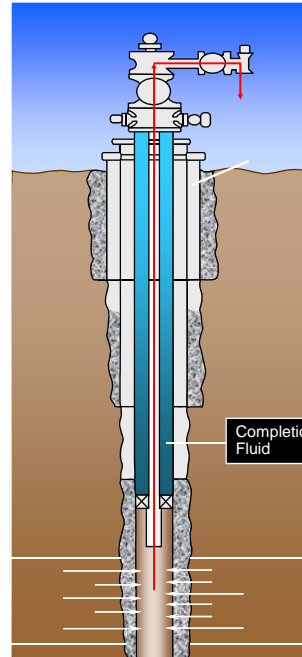
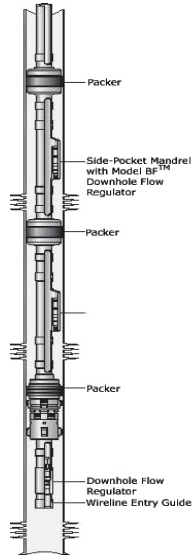
Typical Drilling Rig Organization



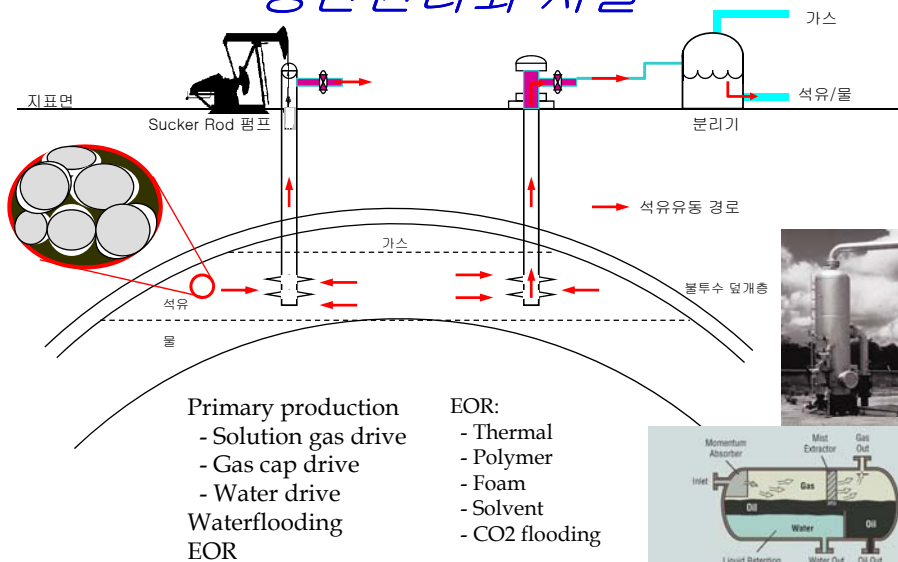




Well Completion



생산원리와 시설



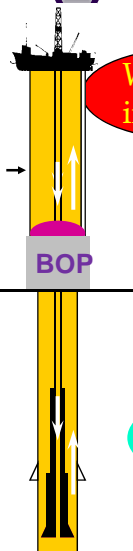


Are you thirsty?



Problems in Deepwater Drilling

Analysis of riserless drilling and well-control hydraulics (SPE D&C, March 1999)
Analyses and procedures for kick detection in Subsea Mudlift Drilling (SPE D&C, Dec. 2007)
초심해시추와 유정제어 (KNOC 석유지, June 2006)



Water depth increase

Higher External force

Narrow gap of PP & FP

Huge riser capacity

Rig positioning difficulties

Many casing points

Large mud volume

High level DPS

Well-control limitations

Excessive riser weight

High capacity drillship

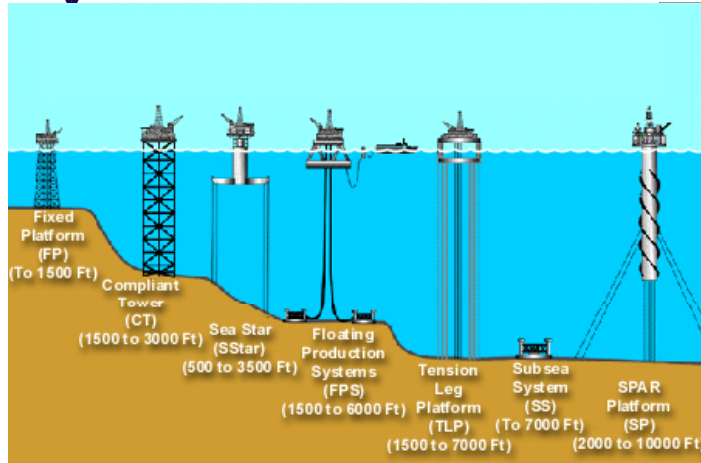
COST\$

Shallow hazards

Longer tripping time



Subsea Drilling and Completion



SHELL OFFSHORE INC.

Auger TLP



Eiffel Tower
1,063 ft
(7,300 Tons steel)



Washington Monument
555'



817 ft
(250m)
63 Building



1,454'
Sears Tower



1,615'
Bullwinkle
1,353' WD
400 x 480 ft
63,300 Tons



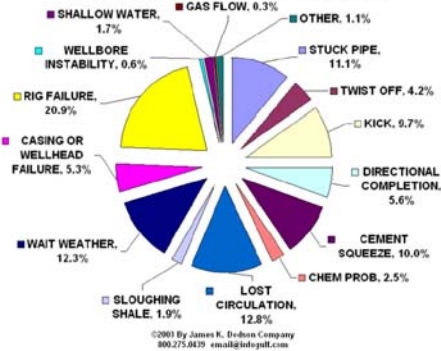
3,275'
Auger
2,860' WD
245 x 245 ft
36,500 Tons

© 2003 Shell International Petroleum Company Ltd.



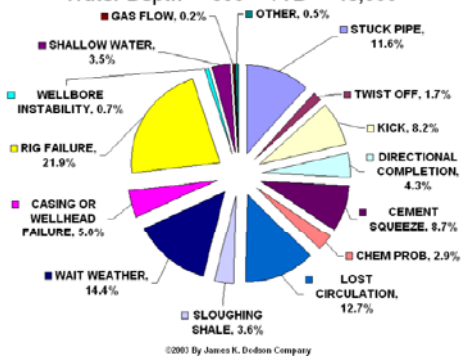
Drilling Related Incidents/Problems

Deep Gas Wellbores Drilled 1993 - 2002
Water Depth $\leq 600'$ - TVD $> 15,000'$



102 wells
Dry hole cost = \$444/ft

Shallow Gas Wellbores Drilled 1993 - 2002
Water Depth $\leq 600'$ - TVD $\leq 15,000'$



549 wells
Dry hole cost = \$291/ft



Drilling Problems and Solutions

- ◆ Lost circulation
- ◆ Stuck pipe
 - Keyseat: crooked hole
 - Differential sticking
 - Mechanical sticking
- ◆ Junk in the hole:
- ◆ Shallow water or gas flow
- ◆ Unstable sea floor
- ◆ Hole instability
- ◆ Kicks and blowout

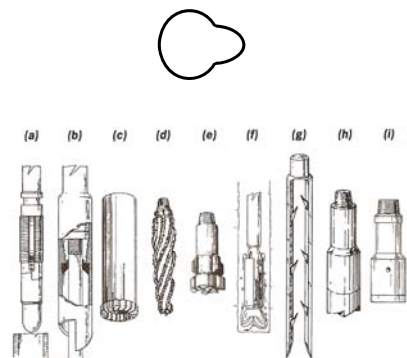
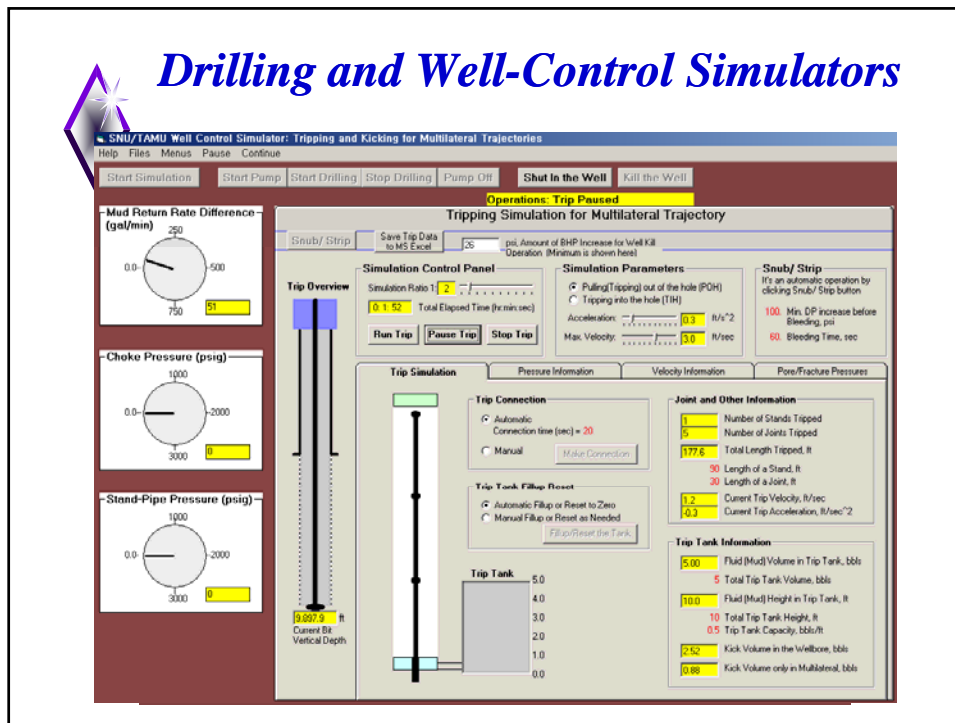


Fig. 17-3 Fishing tools (a) spear (b) overshoot (c) washpipe (d) tapered mill reamer (e) junk mill (f) boot basket (g) wireline spear (h) fishing magnet (i) impression block

Drilling and Well-Control Simulators



Concluding Remarks





취업?



2007년 하반기 STX그룹 대졸 신입사원 모집

- 모집 인원 : 650명
- 회사별 모집 직무 및 전공 분야

www.koc.co.kr

한국석유공사

대한민국을 움직이는 젊은 에너지!
당신을 글로벌 챌린저로 모십니다

세계를 무대로 에너지 독립국의 꿈을 펼칠 뜨거운 열망을 품고
당신의 남치는 에너지로 대한민국 에너지와 미래를 창조하십시오.

구분	모집분야	종사지역	요청학력
신입직	<ul style="list-style-type: none"> 석유화학공정 기술 및 석유화학 제품 석유화학 공정 기술 및 석유화학 제품 석유화학 공정 기술 및 석유화학 제품 	전국	석유화학공정 기술 및 석유화학 제품
	<ul style="list-style-type: none"> 석유화학 공정 기술 및 석유화학 제품 석유화학 공정 기술 및 석유화학 제품 석유화학 공정 기술 및 석유화학 제품 	전국	석유화학공정 기술 및 석유화학 제품
현장직	<ul style="list-style-type: none"> 석유화학 공정 기술 및 석유화학 제품 석유화학 공정 기술 및 석유화학 제품 석유화학 공정 기술 및 석유화학 제품 	전국	석유화학공정 기술 및 석유화학 제품
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현장 기술직	<ul style="list-style-type: none"> 석유화학 공정 기술 및 석유화학 제품 석유화학 공정 기술 및 석유화학 제품 석유화학 공정 기술 및 석유화학 제품 	전국	석유화학공정 기술 및 석유화학 제품
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 • 합격 발표 : 2007. 10. 28(토) ~ 10. 29(일)

※ 기타
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Global Challenger

Petroleum & Gas Eng. Lab



Homework

- ◆ Default homework
- ◆ 10 min. presentation for class projects

Petroleum & Gas Eng. Lab