HEAVY OIL RECOVERY IN TRINIDAD AND TOBAGO

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Trinidad and Tobago Heavy Oil Recovery
Location of Heavy Oil and Tar-sands On land

Resources (OIIP) (MMBO)
Heavy Oil: 1500
Tar-sands: 2500
Location of Heavy Oil and Tar-sands Off-shore

Resources (OILP) (MMBO)
Heavy Oil: 2500
Tar-sands: ?
Trinidad and Tobago Heavy Oil Recovery, bopd

Total Oil Production  \( \approx 90,000 \)
Heavy Oil Production  \( \approx 35,000 \)
Total Primary (on land)  \( \approx 9,500 \)
Total Primary (off-shore)  \( \approx 20,000 \)
Total EOR  \( \approx 5,500 \)
Steam and WASP  \( \approx 5,400 \)
\( \text{CO}_2 \) injection:  \( \approx 60 – 100 \)
Heavy Oil Production by Steam Injection and WASP

First project started in 1963
Total projects = 20

Major Projects:
- Forest Reserves project
- North Palo Seco
- Central Los Bajos
- North Fyzabad
- Bennett Village
- Apex Quarry
- Parrylands
- Guapo
- Cruse E
- Converted to WASP from 1997
Performance Evaluation for Heavy Oil Recovery by Steam Injection

“Huff n Puff” operations (10 % of OOIP)

Maximum of 6 cycles
Steam slug size of 10,000 barrels per cycle
Soak period of 2 weeks
Production cycle of up to 6 months
Best Operation Practice for a Steam Injection Project in Trinidad

Forest Reserves Project 111

1965 - “Huff n Puff”
1967 - Pilot Flood
1968, 1971 and 1977 - Expansion periods
1979 - Peak production of 2600 bopd
June 1995 - 12.8 million bbls. (68 % OOIP) oil recovered and 57 million bbls. steam injected
1997 – 400 bopd, converted to WASP
Present – 100 bopd
Heavy Oil Production by Carbon Dioxide Injection

First project started in 1973
Total projects = 3

Forest Reserve: EOR 33
Forest Reserve: EOR 26
Forest Reserve: EOR 34
double quote ("huff n puff")
double quote

Recovery: 6 – 8 % OOIP
Performance Evaluation for Heavy Oil Recovery by Carbon Dioxide Injection

“Huff n Puff” operations
Maximum of 5 cycles
Slug size of 1 MMscf / ft of net sand
Soak period of 3 – 5 days
Production cycle of over 6 months
Monitoring Practices for Steam or Gas Injection Projects

- Understanding the sub-surface geology – the single most important factor that determines success
- Gravity Segregation, channeling, early breakthrough

**Simple indicators:**
- Steam or gas volume injected and produced
- Oil and water production
- Average reservoir pressure
- Fluid maps: iso-thermal, iso-baric, iso-salinity, iso-pack, iso-gross, nett rates, iso-cummulative production, iso-water-cut
Trinidad and Tobago Heavy Oil Recovery

Tar-sands