Chevron
Gulf of Mexico

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Deep Water Exploration & Projects
Chevron North America Exploration and Production
Adapted from presentation made by VP Paul Siegele

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U.S. Gulf of Mexico Deepwater
Tahiti and Blind Faith Projects

Tahiti

New Orleans

Blind Faith

Petronius

Gemini

Perseus

Tubular Bells

Genesis

Sturgis

Tobago

Great White

Tiger

Trident

Silvertip

Tahiti

St Malo

Jack

Gulf of Mexico
Why Deep Water?

- Future oil demand is likely to remain strong
- Deep water is where remaining big reserves are located
- Deep water drilling will account for 25% of offshore oil production by 2015, compared to just 9% now
- Innovative technologies will allow economic developments
- GOM is the current horizon of exciting activity
Wave of Discoveries in the US GOM

• US deepwater in 2006 was 896K b/d
• 2010, it is expected to be 1.5 mil b/d
• Reversing the US oil production decline – for a while
• Every major is a player

I am going to tell you a story about some of the risks and challenges, some of our successes and outcomes to give you an appreciation of the diversity of skills, talents, technologies, and people in these GOM projects.
Chevron continues to have a strong position in Deep Water discovered fields

Top 50 Gulf of Mexico Deep Water Fields
Field size distribution from Wood Mackenzie database

- Tahiti
- Great White
- Jack
- Knotty Head
- Mad Dog
- St. Malo
- Tubular Bells
- Big Foot
- Petronius
- Puma
- K2
- Genesis
- Gotcha
- Blind Faith
- Tonga
- Trident

MMBOE

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Dry Holes are part of the adventure
Uses of MetOcean Data

Fatigue

Climatology

Operability

Pollutant Fates

Extremes

Tows

Operability Pollutant Fates Tows Accidental Releases

Design Facilities

Real Time

Operations
Hurricane Rita
Typhoon Platform

- Platform off moorings and location
- Platform located SW of Eugene Island 273, upside down
Recent Hurricane Ike

28 platforms were destroyed as they were driven into Galveston Island.
Industry’s experience

• Additional disciplines brought into project design
  ▶ Climatologists – Dr Curtis Cooper
  ▶ Additional design features for salt, water, winds, tides/wave at the surface and below, ship traffic, wild life protection, etc
  ▶ IT
    ✷ Automation
    ✷ GPS
    ✷ Remote sensors and
    ✷ Remote operations
  ▶ IP
    ✷ Satellite communications
    ✷ Remote sensors, remote computerized operations for shut-down and start-up, monitoring, security, etc
Industry Production from Deep Water is Moving Deeper at an Increasing Pace

Exploration

Production

Break-through technologies

Water Depth (ft)
Chevron’s Deepwater Gulf of Mexico Portfolio

Tahiti Development
Blind Faith Development
Perdido Fold Belt Development
Jack Discovery
Tahiti

Tahiti Field is expected to be onstream in 2009. It is located in the deepwater U.S. Gulf of Mexico ~ 190 miles (306 km.) south of New Orleans.

Tahiti is designed to produce

- 125,000 barrels of crude oil
- 70 million cubic feet of natural gas.

The field is believed to hold 400 million to 500 million-barrels of oil-equivalent that are potentially recoverable. The entire project is to cost ~$3.5 billion from Chevron, which owns a 58-percent working interest, Statoil (25 percent) and Shell (17 percent).

Project is on time and on budget.
Tahiti Spar Ready for Service--Expected to produce 125,000 barrels of oil and 70 million cubic feet of natural gas per day

Fabricated in Pori, Finland, Tahiti’s spar arrived in Ingleside, Texas after a 24-day transoceanic journey. The spar came home on a ship appropriately called the Mighty Servant 1. In a matter of months, Tahiti will become one of Chevron’s – and the industry’s – most mighty servants.
Tahiti’s topside lift

The lift process, which took a total of 12 days, included four separate components: the module support frame, the production module, utility module and flare boom. Tahiti summoned the Heerema Thialf, a semi-submersible crane vessel, to manage the lift. The vessel has two tandem, 7,000-ton cranes with a combined lifting capacity of 14,000 tons. This is one of only two vessels in the world with this lift capacity.
Major Capital Projects – Gulf of Mexico
Blind Faith Project

- New Orleans
- Tahiti
- Perdido Fold Belt

BLIND FAITH
FIELD DEVELOPMENT PLAN

- CVX operated (62.5%)
- Subsea wells producing to a Semi-submersible facility
- Water Depth: 7,000’
- 40 MBOPD/35 MMCFD peak production
- First Oil: 2008
- 100 MMBOE potentially recoverable

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Blind Faith

Chevron operated (62.5%) + Kerr McGee

In 7000 ft of water

SE of New Orleans in Miss Canyon blocks 695/696

Miocene sands at depths of 21000-24000 ft

$90 million

Initially to produce 30K b/d oil with 60k b/d peak

30 mil cuft of gas/d
Chevron Wilcox Discoveries
Emerging Lower Tertiary Trend

Potentially 3-15 BBOE Estimated Ultimate Reserves in the Lower Tertiary Wilcox Trend *

* Source: World Oil (May 2005)
Emerging Lower Tertiary Trend
Jack #2 Well Test Results

- Drilled to a total depth of 28,175 feet
- Completed and tested in 7,000 feet of water, and more than 20,000 feet under the sea floor
- During the test, sustained a flow rate of more than 6,000 barrels of crude oil per day
- Testing represented approximately 40 percent of the total net pay measured in the well
Deep Water GOM Wells are among the Most Technically Challenging in the World

Examples where we push the envelope...

- Deepest successful well test in the U.S. Gulf of Mexico with Jack 2 (28,175’), a well situated in 7,000 feet (2,135 meters) of water and extending more than 20,000 feet (6,100 meters) beneath the seafloor

- New drilling depth record (34,189’) for the U.S. Gulf of Mexico at Knotty Head

- World record for successfully drilling a well in the deepest water depth (10,011’) in the Perdido Fold Belt
Deep Water Technology Breakthrough
New Deep Water Drillship

- Most advanced drilling capabilities
- Dynamically positioned, with double-hull
- Two drilling systems in a single derrick
- Stronger and more efficient top drive so wells can be drilled deeper
- Other unique features will target drilling wells up to 40,000 feet of total depth
- Variable deckload of over 20,000 metric tons; capable of drilling in water depths of up to 12,000 feet
## Blind Faith Qualities

### WHOLE CRUDE INSPECTIONS

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<thead>
<tr>
<th>Property</th>
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<td>Viscosity @ 50 °C (122 °F), cSt</td>
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<tr>
<td>Asphaltenes, C7, %</td>
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<td>MCR, wt%</td>
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### TBP YIELDS, VOL %

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<th>Fraction</th>
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<td>Heavy Naphtha (300-400 °F)</td>
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<tr>
<td>Vacuum Residuum (1050 °F+)</td>
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</table>
There are Reservoir Challenges as well

Tahiti Challenges

Tahiti, like nearly every other major deepwater field under development, has some unique characteristics.

• Its oil lies under a "salt canopy," a mineral roof that begins about 100 miles off the easternmost tip of Louisiana and extends to the Texas coast.

The salt hides crucial details about reservoirs from even state-of-the-art imaging techniques.

• This increases the risk.

We do not yet know how difficult it will be to maintain the flow of oil once production begins.

• We do not know if this is one giant reservoir or if it is compartmentalized (which would require water to flush out the oil— and more wells). So the deck has space for ‘water’ but the odds are not high enough to build this contingency into the deck.
Deep Water Gulf of Mexico
Technical Challenges in Drilling

Storms and hurricanes
Loop and eddy currents cause vortex induced vibrations and motions to drill strings
Unpredictable high pressure gas charged stringers and faults near surface
Mobile/flow-able/dissolvable 10,000’ thick salt canopy with unpredictable layers of highly variable trapped sediments
Unpredictable base of salt – rapid pressure differentials
“Thief zones” of significantly lower pressure which cause lost circulation – fluid loss
Ultra-deep reservoir with high temperatures, high pressures and low natural flow-ability
Mad Dog

CVX equity

BP is operator

Similar rock formation and geological age as Tahiti (salt dome canopy)

Has 12 wells to produce 100K b/d but is currently producing at half capacity.

  slower, more challenging, more expensive
## Tahiti Characteristics

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Summary

Deepwater is a complex, risky, and costly environment. Many technical challenges remain to be solved.

Chevron is focused on finding solutions to our domestic energy needs and providing the needed creativity, technology break-through in collaboration with peers and partners, across industries and political governance in a responsible and innovative manner.
Questions?