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HPHT Field Development Experience Transfer

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BACKGROUND & INTRODUCTION

Location

Image courtesy: Google Maps
BACKGROUND & INTRODUCTION

The Central Graben
BACKGROUND & INTRODUCTION

The Field
DRILLING

The Last Appraisal Well 22/30c-13 with the “West Epsilon”
DRILLING

Challenges

- Target Depth: 5,500m
- Pressure Range: 600 – 1,100bar
- Fluid Temperature: 193 Deg. C
- Sea Floor Depth: 93 m
- Storm Force 10 Loadings in Winter Months
  - Hydrogen Sulfide
  - Carbon Dioxide & Water
DRILLING

Geological Column
DRILLING OPERATIONS
THE PROCESS UTILITIES QUARTERS
THzE GAS LEAK
THE GAS LEAK
THE GAS LEAK

BATTLE TO PLUG THE LEAK

THE POSSIBLE CAUSE
- Engineers working on pipes to an old gas reservoir caused it to rupture

HOW THEY COULD FIX IT
- Pump mud into the well to suppress the flow of gas
- Drill a relief well from another platform

ELGIN PLATFORM
- Location: 149 miles east of Aberdeen, the oil capital of Europe
- Depth of water: 305ft
- Field discovered: 1991
- Production started: 2001

ON STANDBY
- Two firefighting vessels, Sea Bear and Skandia Saigon
- Unmanned submarine to scan seabed for signs of leaks
- Hercules aircraft carrying pollution dispersants

There are fears a flare on the rig could ignite the gas cloud.
THE GAS LEAK
THE GAS LEAK

North Sea gas leak at Total Elgin platform

Elgin wellhead platform

Gas cloud, likely methane, leaking from wellhead platform at 200,000 cubic meters a day

Sea level

Elgin wellhead platform

Layer of gas condensate

Well cross-section

Production tube (plugged at reservoir)

Concentric rings of casing

Gas entered the outside shell of the well, presumed to be through a crack in the outer casing and travelled up to the surface.

Wells

Five other wells that were in production, have now been shut down

Pocket of tight gas - likely source of leak

Not to scale

Main Elgin producing reservoir

Well plugged a year ago

Slide 17

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THE GAS LEAK
OPTIONS FOR SOLVING THE PROBLEM

Gas leak at Total’s Elgin platform

1. Do nothing. Allow gas to escape until pressure drops. May take months/years. Huge financial cost to Total. Potential environmental damage.

2. Kill the well by filling it with mud. "Relatively quick" but may involve returning workers to the platform, where they face a risk of explosions.

3. Drill a relief well to reduce pressure and inject cement to block the gas flow. Involves bringing in another drilling rig. Could take 6 months.
DIVERTER INSTALLATION
TOP KILL RIG “THE WEST PHOENIX”
RELIEF WELL RIG “THE SEDCO 714”
COST

- $8.7bn fall in Company capitalization
- $3.3bn fall in value of Company’s share of field
  - 230,000 boe production loss
  - 4.5 tonnes gas release
- $200m cost to drill relief well
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Thank You / Questions