

Troll Pilot



Master the uncertainties of novel technology in field developments

Subjects;

Status

Performance

Novel technology

Criteria for choosing novel tech.

The opportunity

Exposure

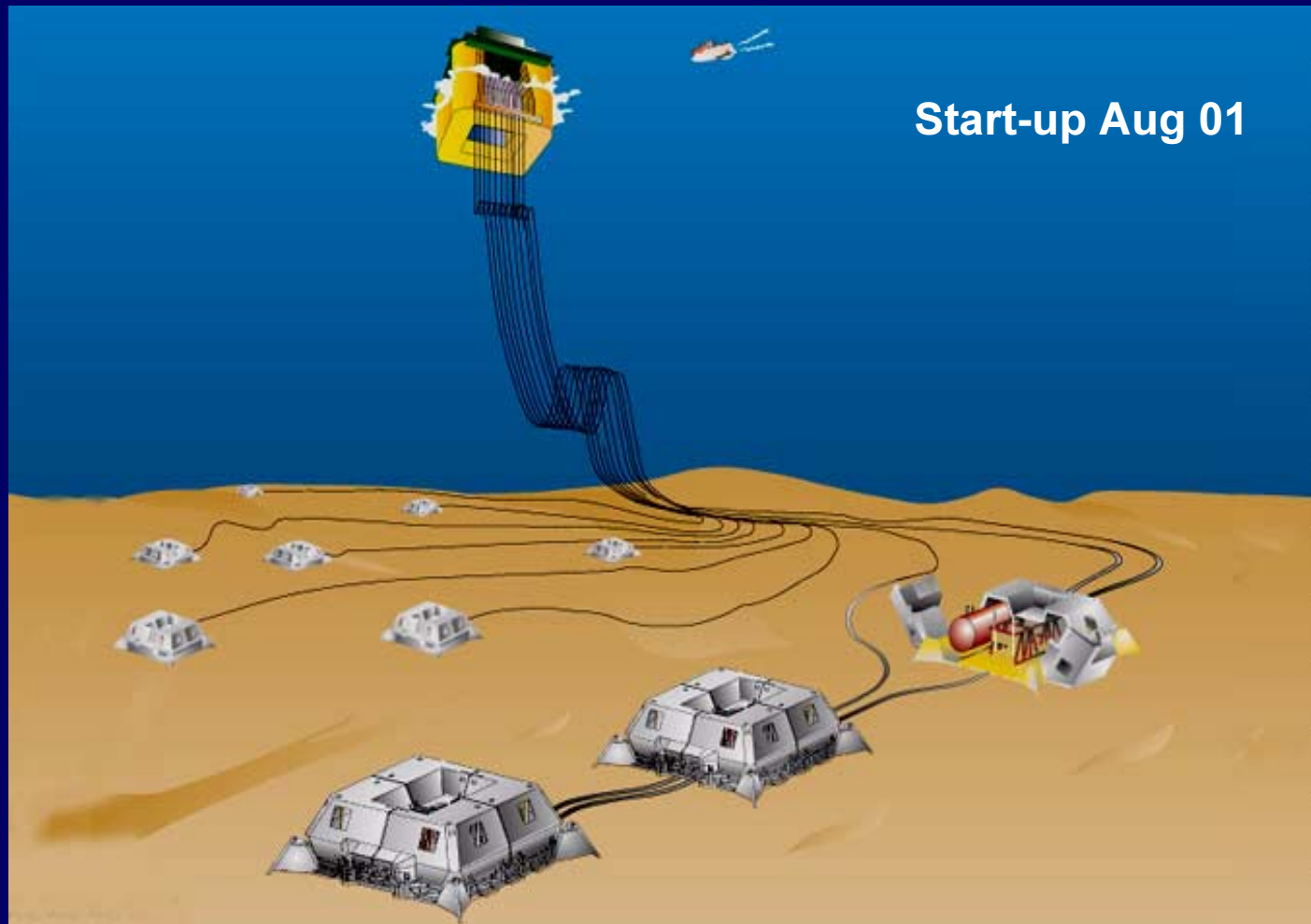
Design Strategy

Potential benefits

DnV / Demo 2000 / NPD
Stavanger 30 Nov
William Bakke, Norsk Hydro



Troll-Pilot Field Arrangement



Troll-Pilot

Status;

- ✓ Troll-Pilot in regular operation for more than 3 months
- ✓ Production from 3 wells (Approx. 50% water cut)
- ✓ Production well Nr. 4 ready for TP in Feb.. 02



Troll-Pilot

Performance;

- ✓ **Approximately 500 ppm Oil in injected water**
- ✓ **1.5% water in output oil - without emulsion breaker**
- ✓ **Injection capacity demonstrated to 50.000 b/D**



Troll-Pilot

Novel Technology;

- ✓ 3 phase subsea separator
- ✓ Integrated subsea service umbilical (HV, optical, electrical, hydraulic and chemical)
- ✓ Subsea nucleonic level detector system
- ✓ Subsea inductive level detection system

- ✓ Success on first installation
- * Success on second installation



Troll-Pilot

Novel Technology;

- ✓ 2 MW subsea electrically driven booster
- * 2 MW, 11 kV power supply with wet make/break connector
- * High bandwidth optical communication system with hybrid connectors

- ✓ Success on first installation
- * Success on second installation



Troll-Pilot

Criteria for choosing novel Technology;

- ✓ Economical incentive
- ✓ Part of long term strategy
- ✓ Environmental issue
- ✓ Field development feasibility issue



Troll-Pilot

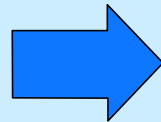
The opportunity;

- ✓ Early water production
- ✓ Troll-pilot project integrated in the
- ✓ Troll- C project
 - project services
 - standard hardware
 - marine operations

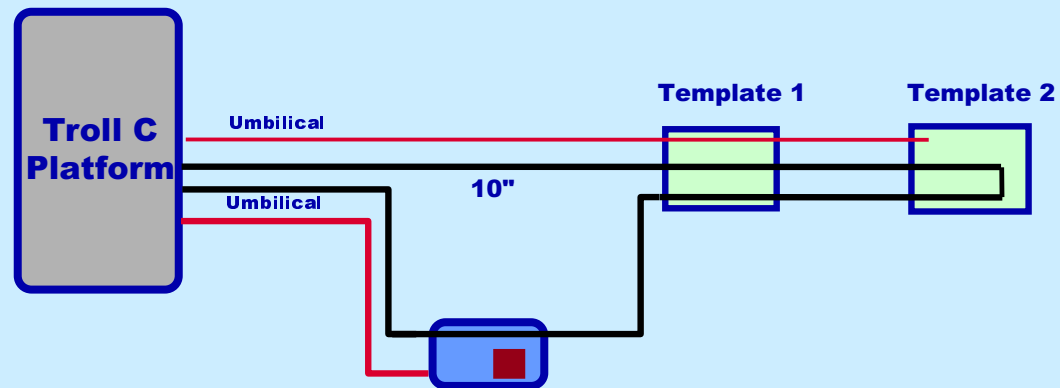


Troll Pilot

Exposure;



**Associated with investment.
Not lost production**

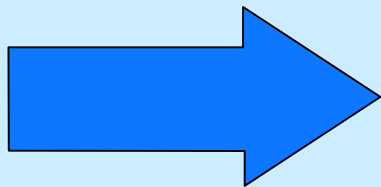


*TROLL-PILOT constitute a
separate building block*



Troll Pilot

Σ DRIVERS \rangle Σ OBJECTIONS



New technology



Troll-Pilot

Design strategy;

- ✓ Simple 1G separation adapted to subsea conditions
- ✓ Extensive use of proven hardware
- ✓ Simple and robust modularization
- ✓ Simple instrumentation, only operational parameters, no diagnostics
- ✓ Level detection, new development based on established technology



Troll-Pilot

Potential benefits;

- * Increased recovery from reservoirs
- * Enhanced flow assurance (hydrates)
- * Improved environmental effects.
- ✓ Smaller diameter flowlines
- ✓ Optimized riser system
- * Reduced size and weight of platform
- ✓ Increased subsea commingling

* Relevant for Troll - Pilot



Troll Pilot



System behaviour;

