API 17O – Recommended Practice for Subsea High Pressure Protection Systems (HIPPS)

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Agenda

- Introduction and background
- HIPPS overview
- Codes and standards
- Regulatory issues
- API 17O - HIPPS
- Conclusions

Introduction

- Subsea HIPPS predominantly in North Sea
- GoM seeing increasing reservoir pressures and temperature in deep water
- No regulatory framework in GoM
- Presentation covers:
  - Key differences
  - API 17O RP
  - Work with regulatory authority (MMS/BSEE)

Background

- HIPPS is a key enabling technology
- Impact of increased water depth on systems
- Impact of high flow rate wells
- Lack of clear position by MMS/BSEE

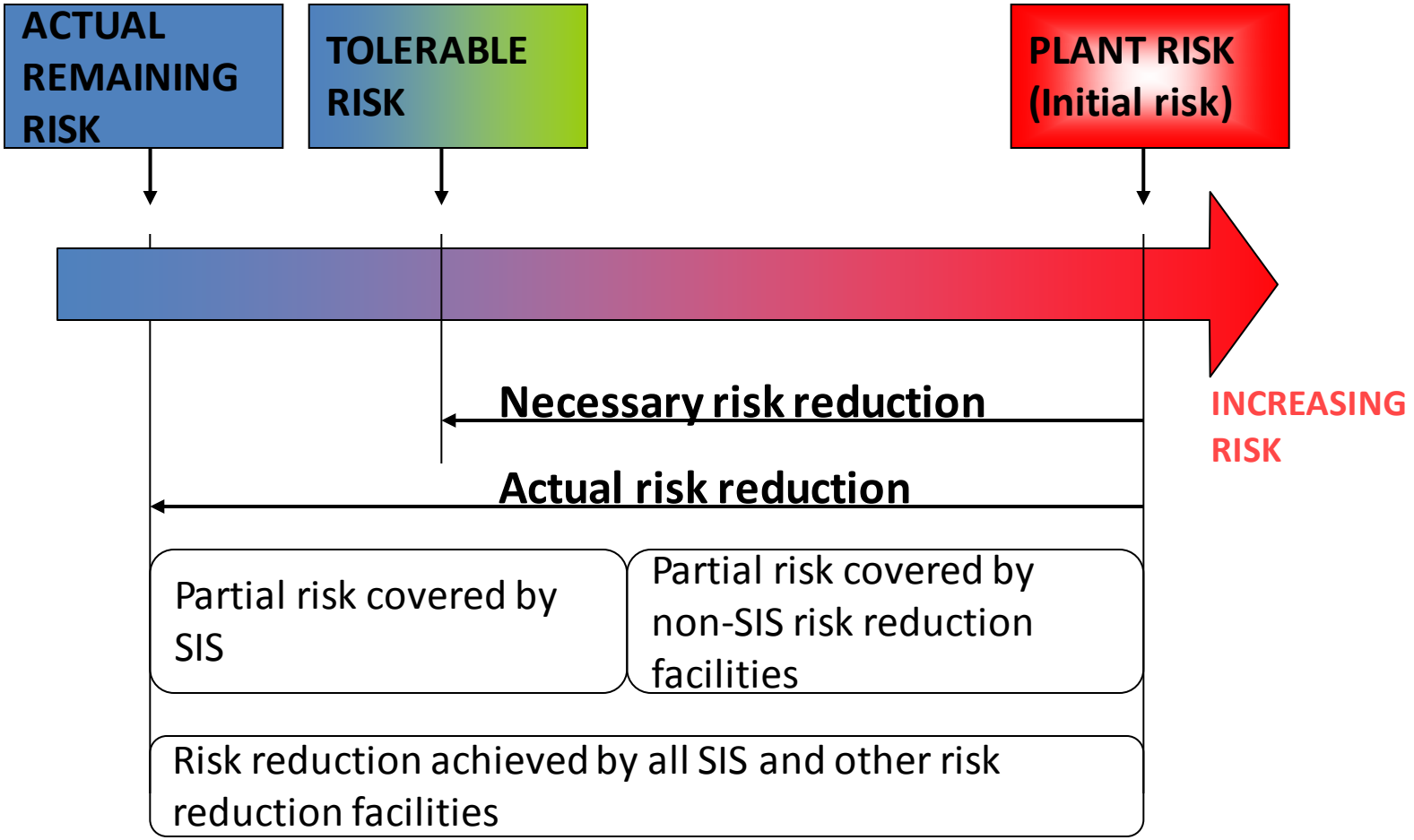
Background contd

Project	Operator	Location	Fluid	Installation
Kingfisher	Shell	North Sea	Gas	1997
Gullfaks	Statoil	North Sea	Oil/Gas	2000
Penguins	Shell	North Sea	Oil	2002
Juno	BG	North Sea	Gas	2002
Kristin**	Statoil	North Sea	Gas	2005
Rhum**	BP	North Sea	Gas	2005

- Globally ~20 projects with HIPPS installed
- GoM is different to the North Sea
  - North Sea projects do not perform routine subsea valve leak tests (routine annual maintenance shutdown only)
  - Regulatory approval based on safety cases

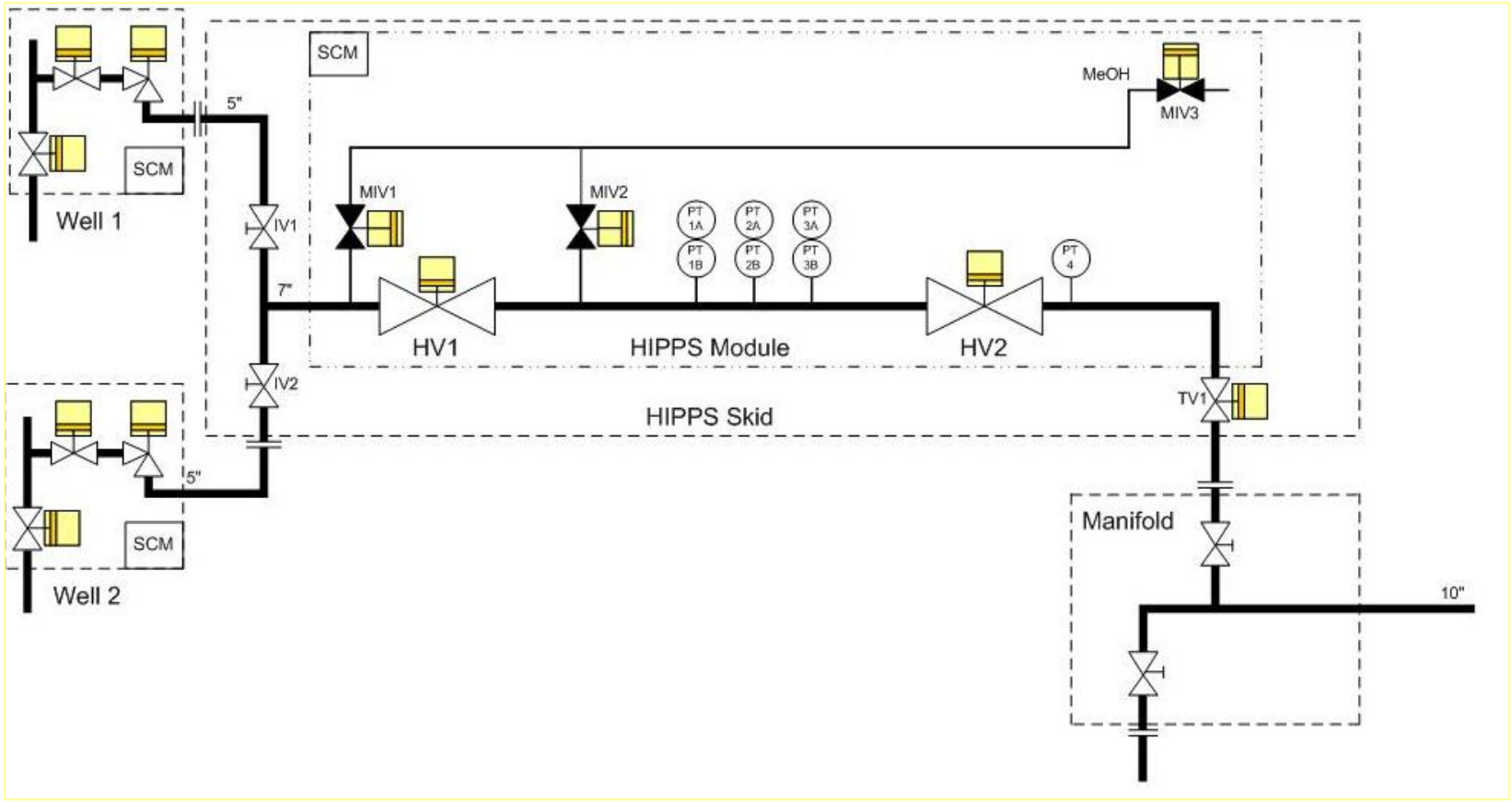
Benefits of HIPPS

- Reduce topside pressures:
- Reduce flowline and riser wall thickness;
- Reduced offshore welding time;
- Reduced temperature induced axial force
- Improved riser design; and
- Potential to use existing, lower pressure flowlines and risers.



ANSI/ISA-84.00.01-2004 Part 3 (IEC 61511-3 Mod)

HIPPS components



Codes and standards

- GoM based on proscriptive approach
- IEC 61508 & 61511 (risk based approach) –ISA 84
- API 14C (traditional approach)
- API 17O – HIPPS – Published 2009

Regulatory issues – in the past

- Unknown requirements leading to HIPPS not being selected in a number of projects
- DeepStar regulatory committee
- New Technology Application

Current position with BSEE

- NTA March 2006, approved July 2006
- BSEE plans to use the DWOP process to approve a HIPPS project
- First HIPPS application being developed for GoM - Julia

BSEE Position

- SIL 3 rated
- Fail safe
- Failure away from facility
- Quarterly function test, partial stroking not accepted
- Zero leakage for HIPPS valves
- Closure on loss of communication or power
- Redundant pressure sensors

API 17O Typical HIPPS

SIL 3 system with two valves

Designed to be tested to zero leakage (some leakage may be tolerated due to the inclusion of a surface PSV)

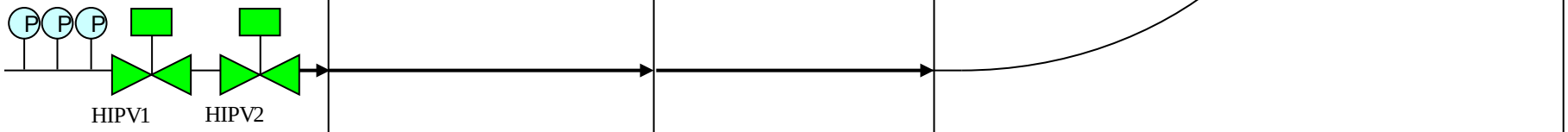
HIPPS could be mounted on the tree, Jumper or manifold

No burst zone designed to allow sufficient time for the HIPPS valves to close

Fortify zone designed to protect the host

Designed to ensure that the Protective Segment fails before the riser

A PSV is included to prevent valve leakage over pressurizing the system during platform abandonment



HIPPS

Subsea Fortified Zone

Protective Segment Section

Host Fortified Zone

API RP 17O - HIPPS

Operators

- Anadarko
- BP (Chair)
- Chevron
- Devon
- Hess
- Murphy
- Nexen
- Shell
- StatoilHydro
- Williams

US Government

- BSEE

HIPPS Suppliers

- Aker Solutions
- Cameron
- Dril Quip
- FMC
- GE

Engineering Cos

- Creative Systems International
- Intec
- J P Kenny
- KBR
- Paragon
- Stress Subsea
- Technip

Conclusions

- Systems available for 15,000 psi
- First project now appearing in GoM
- HIPPS is an enabling technology for deep water HP
- Regulatory position is now well understood, still need NTL
- API 17O Published 2009
- API 17O revision being balloted as a Standard

Questions?