

New and Unusual Technology in the Gulf of Mexico

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Overview

- What is “New Technology”
- How does BOEMRE Regulate New Technology
- Regulatory Authority
- How New Technology is Approved
- Why Develop New Technology
- What’s Considered New
- A Look Into the Future
- Conclusion

What Is New Technology?

The term “new technology” encompasses a wide range or degrees of “novelty”: A few examples include:

- A new material that is applied to a component that has been widely used;
- An existing component that is used in a new application;
- A totally new technology that has never before been put into service;
- The definition of “new” also has a geographical component. A technology that exists in other parts of the world, but has not been reviewed or approved by U.S. regulators may be considered a new technology.
- Two things that interest BOEMRE in all “new technologies” are:
 - They affect hydrocarbon recovery
 - If they fail, can create a hazard to human health or the environment.

New Technology vs. Standards Development

- Technical advancements evolve to fill a need and generally precede the development of engineering standards.
- It is not the intention of the BOEMRE to attempt to create design standards but rather to point to existing standards that address design methodologies and failure modes for equipment design.
- **It is also not the intention of the BOEMRE to hinder technical development, but the BOEMRE GOMR will take a conservative approach to approving the use new technology or equipment until applicable standards catch up with technical development**

How Does BOEMRE Regulate New Technology?

- BOEMRE regulations are published in the Code of Federal Regulations, Title 30, Part 250, Subpart A to Q.
- BOEMRE policy
 - Internal documents written to clarify a regulation. Policies may be sent to industry for reference, but generally are published as an NTL to inform industry.
- Notice to Lessees and Operators (NTL).
 - A NTL may be written to provide clarification about an existing regulation.
 - A NTL may be written to provide directions for requesting an Alternate Compliance Procedure (30 CFR 250.141) or Departure (30 CFR 250.142) from the regulations.
 - Provides a method to inform industry how new technologies, issues, and concerns are expected comply with the current regulations.
- Incorporation of Industry Standards
 - Represent best practices developed by experts in a specific technology
 - Generally set minimum values
 - BOEMRE may make the standard “law” by incorporating it into the regulations
 - Allows regulators to be proactive
- Research
 - Allows regulators to be proactive in investigating new technologies and aids in regulation development.

Regulatory Authority

Authority for review of a new technology is covered in the CFR's under:

- **30 CFR 250.243 "What general information must accompany the DPP or DOCD?"**
 - (e) New or Unusual Technology. A description and discussion of any new or unusual technology you will use to carry out your proposed development and production activities...you may exclude any proprietary information.

- **30 CFR 250.292 "What must the DWOP contain?"**
 - (n) A discussion of any new technology that affects hydrocarbon recovery systems

Regulatory Authority (continued)

- 30 CFR 250.141 “May I ever use alternate procedures or equipment?”
 - (a) Any alternate procedures or equipment that you propose to use ***must provide a level of safety and environmental protection that equals or surpasses current BOEMRE requirements***
 - (b) To receive approval, you must either submit information or give an oral presentation to the appropriate Supervisor. ***Your presentation must describe the site-specific application(s), performance characteristics, and safety features of the proposed procedure or equipment***
- There are other places a new technology application must be submitted
 - For example, if the technology concerns a new pipeline repair method, information must be included with the pipeline application.

Notice to Lessees (NTLs)

- A NTL may be written to provide clarification about an existing regulation.
- Currently there are approximately 15 NTLs currently under review for publication.
- This process includes NTL development by a subject matter expert, peer review within the technical section (ie. Pipeline, Structures), review by GOM staff and management, and review by Headquarters staff and management.

Industry Standards – BOEMRE Participation

- BOEMRE employees actively participate in over 30 API committees, ASME committees, pertinent Deepstar programs, RPSEA projects, and numerous JIPs.

A few examples include:

- API RP 170 – High Integrity Pressure Protection Systems
- API RP 96 – Deepwater Well Design
- API RP 53 – Blowout Prevention Equipment Systems for Drilling Wells
- API RP 16A – Specification for Drill-through Equipment
- API RP 65 – Isolating Potential Flow Zones During Well Construction
- API RP 16D – Specification for Control Systems for Drilling Well Control Equipment and Control Systems for Diverter Equipment
- RPSEA Composite Riser Program
- ABS Polyester Stiffness JIP

Regulatory Responsibility

- The agency will not provide technical review until the leaseholder of record applies for regulatory approval under a definitive project.
- **BOEMRE will not engage in a type approval, or any specific pre-approval, on behalf of a manufacturer or supplier of a technology.**
- It is possible for a leaseholder to submit a non-project specific new technology application.
 - Only conceptual approval will be granted
 - This enables a leaseholder to gain a certain level of confidence that the technology will be accepted
 - Before it can be installed at a specific location, additional data, testing, and risk analysis must be presented in a project specific application

Regulatory Review

- Because new technology applications vary greatly, the level of review is tailored to the specific application.
- In general, the **lease holder** (and vendors who are supporting the technology development) **must present convincing evidence that the proposed technology is "as safe or safer than" conventional technology.**
- A typical application may include some or all of the following:
 - A thorough description of the technology and specific conditions of use
 - Risk assessment (detail should be proportional to the level of risk involved)
 - Operating procedures
 - History of development and testing
 - Detailed schematics
 - Justification for use
 - Additional information necessary for the review process

Examples of New Technologies

- High pressure / High temperature equipment
- Equipment with a non-standard API pressure or temperature rating
- Subsea pumping and subsea processing
- High Integrity Pressure Protection Systems

- Example of new technology (not yet incorporated into the regulations) that is generally accepted and no specific submittal is required:
 - Horizontal Christmas Tree

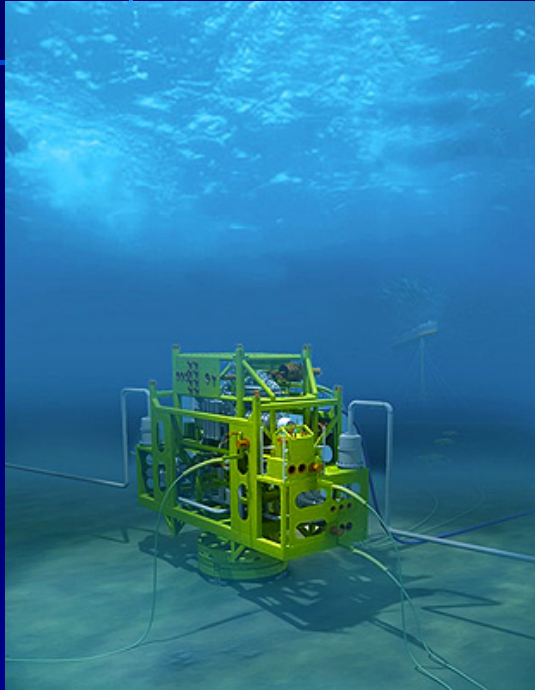
This Sounds Difficult, Why Bother?

- Deepwater development is driving the need for new technology.
- Higher pressures and temperatures, lower reservoir porosity and permeability, little in-place infrastructure.
- ***Industry needs new technology to keep exploring, drilling, and producing!***

A More Detailed look at a Few Technologies

- Subsea Pumping and Processing
- New Production Facilities
 - FPSO, FPU
- High Pressure / High Temperature Equipment
- High Integrity Pressure Protection Systems (HIPPS)

Subsea Processing Equipment



Subsea Booster Pump Assembly

King Field – Gulf of Mexico
75,000 BPD Capacity
5,430 ft water depth
17 mile tieback to Tension Leg Platform



Subsea Separation Station

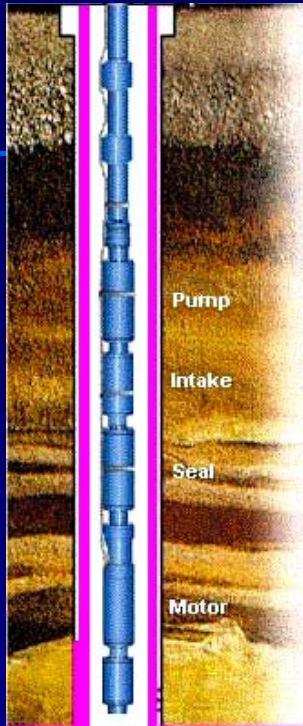
Tordis Field – North Sea
200 m water depth

Subsea Compression (pilot)

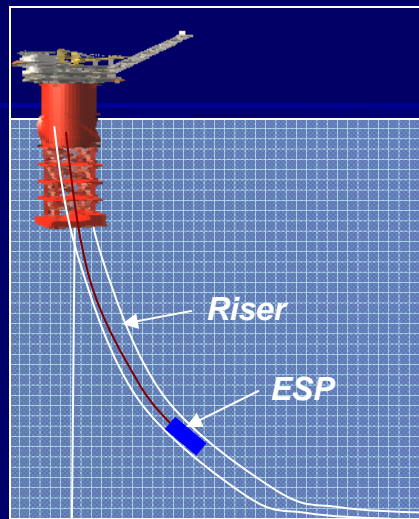
Ormen Lange – North Sea
860 m water depth



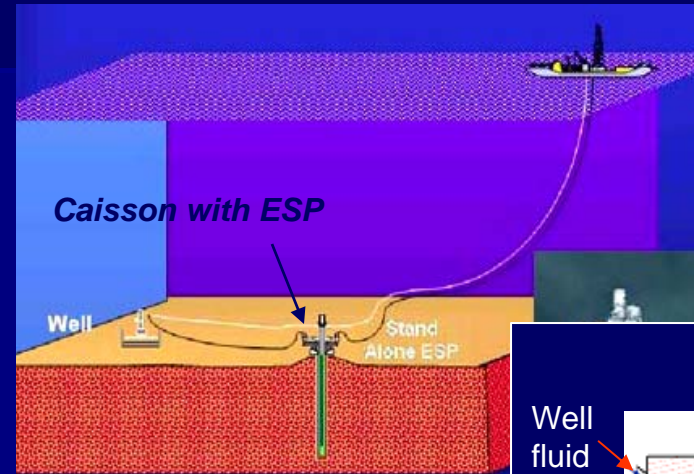
Electric Submersible Pumps (ESP)



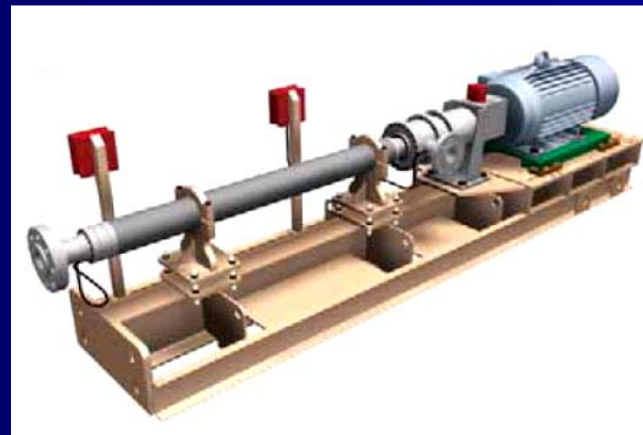
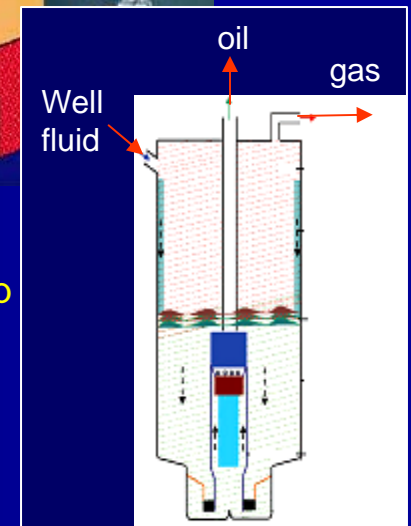
Traditional ESP in wellbore



ESP in riser



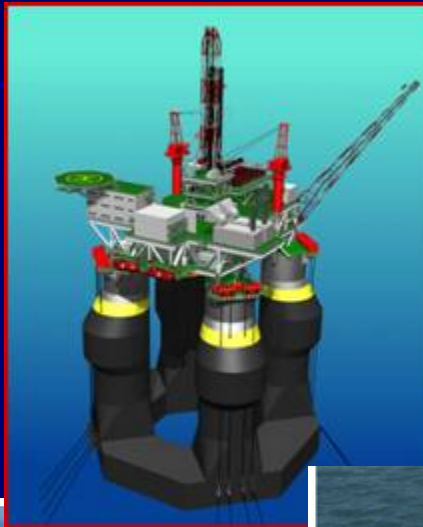
ESP in sea floor caisson - system acts as gas-oil separator and booster pump



ESP designed for use on sea floor as booster pump

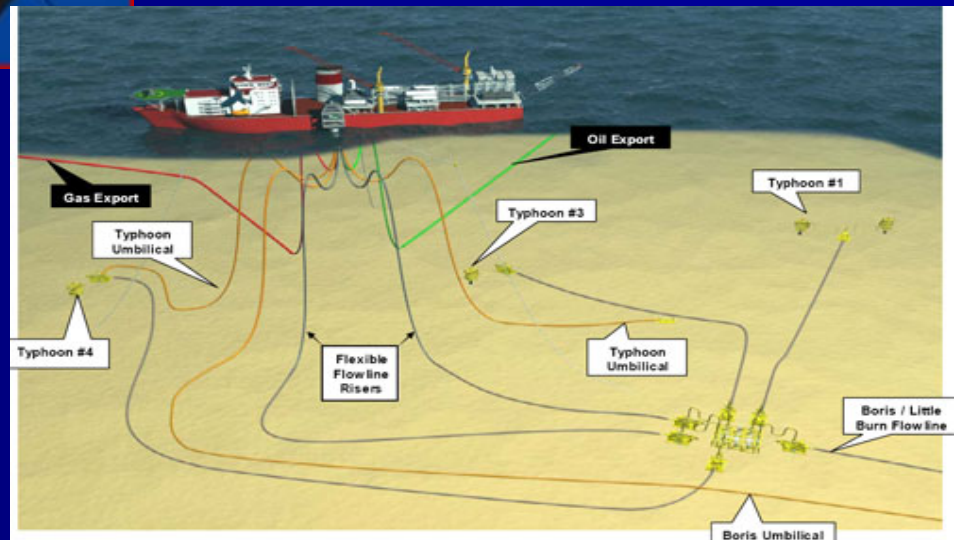
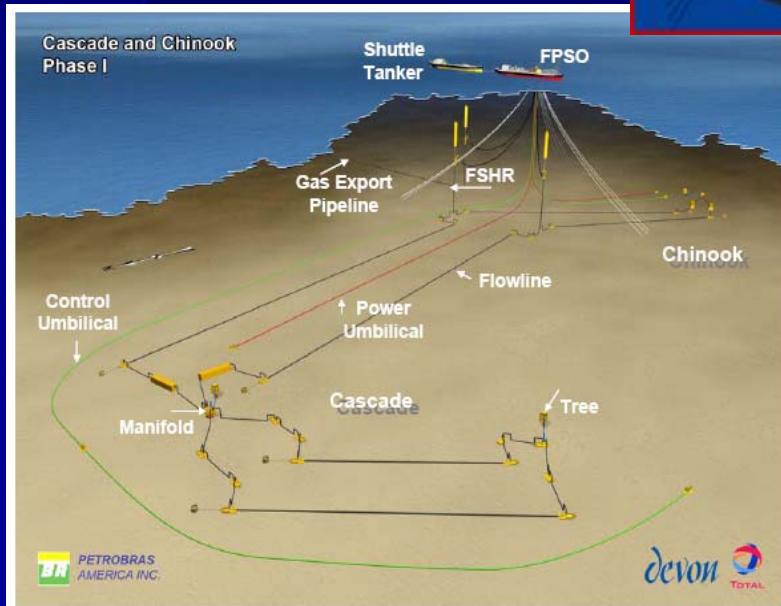
New Production Facilities

Octabuoy



FPSO

FPU

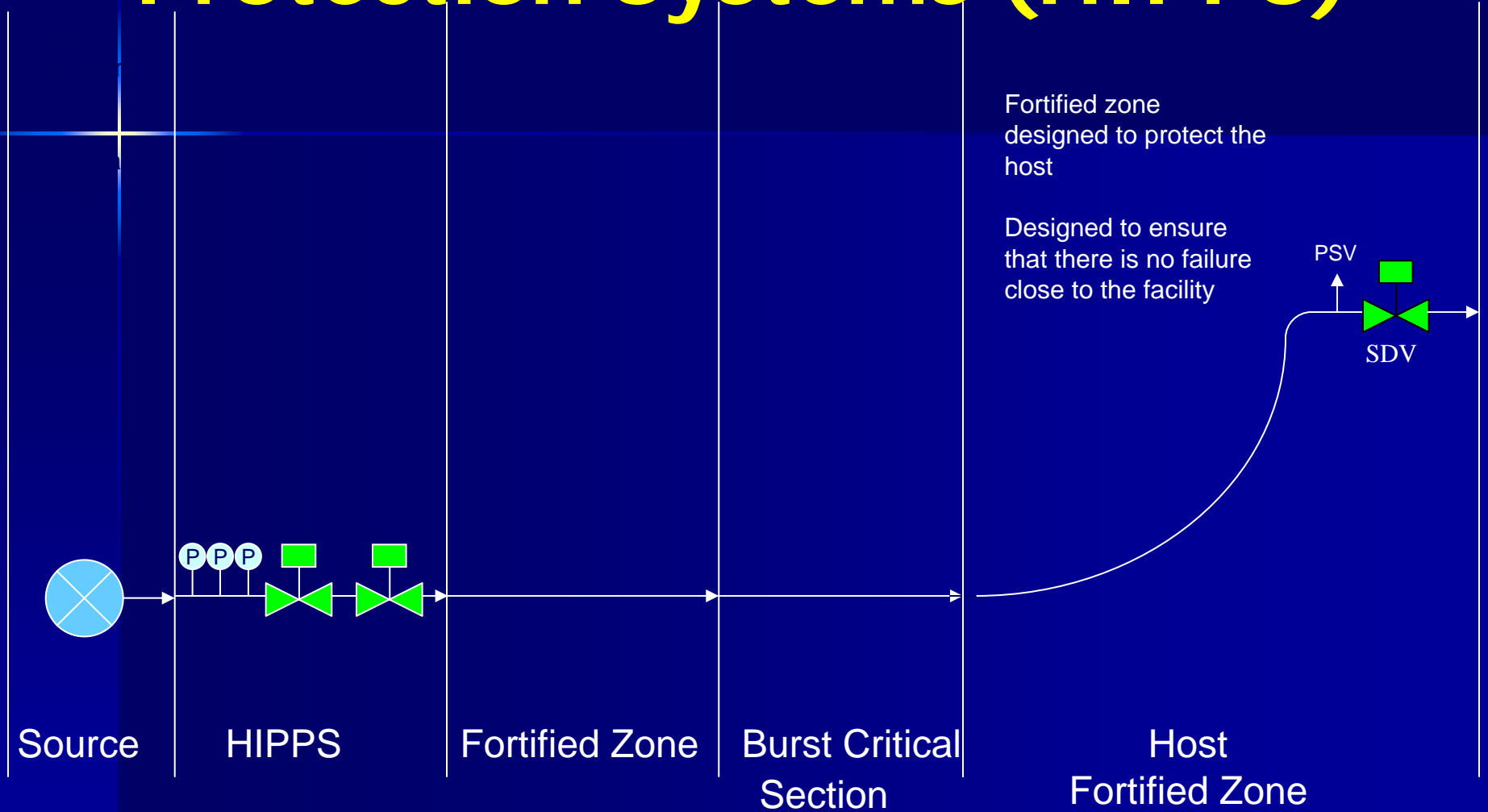


Layout of the Phoenix field, showing the FPU (*Helix Producer 1*) in position. The field is scheduled for a 3Q 2008 start-up.
 Courtesy Helix Energy Solutions Group

High Pressure / High Temperature Systems

- High Shut In Tubing Pressure (SITP)
 - Subsea wells with SITP over 15,000 psig
 - Dry tree wells with SITP over 20,000 psig
- Ultra High Pressure (XHP) equipment rated for H₂S
 - Material qualification \ selection is critical – there is a lack of expertise in this area
 - Consideration of axial loads, bending loads, pressures, temperatures and environmental loads must be addressed
- HPHT design qualification and validation testing
 - There are currently a lack of facilities to provide this testing

High Integrity Pressure Protection Systems (HIPPS)



A Look into the Future

- There are many technologies which still need to be developed in order facilitate deepwater and ultra-deepwater progress.
- BOEMRE involvement with technical developments:
 - Joint Industry Projects (JIPs)
 - Sponsors technical research projects through the TA&R program
<http://www.boemre.gov/tarphome/index.htm>
 - Works with technology-developing groups within industry such as Deepstar and RPSEA

We've Come a Long Way Baby



- The rapid expansion into deepwater has seen an increase in the number of new technology applications in the past few years.
- And...BOEMRE doesn't expect a decrease in the number of future applications
- So, get the regulators involved early!



Questions?

“The number one benefit of information technology is that it empowers people to do what they want to do. It lets people be creative. It lets people be productive. It lets people learn things they didn't think they could learn before, and so in a sense it is all about potential.”

~ Steve Ballmer

Thank you!

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