



# **API's 2015 Exploration and Production Winter Standards Meeting**

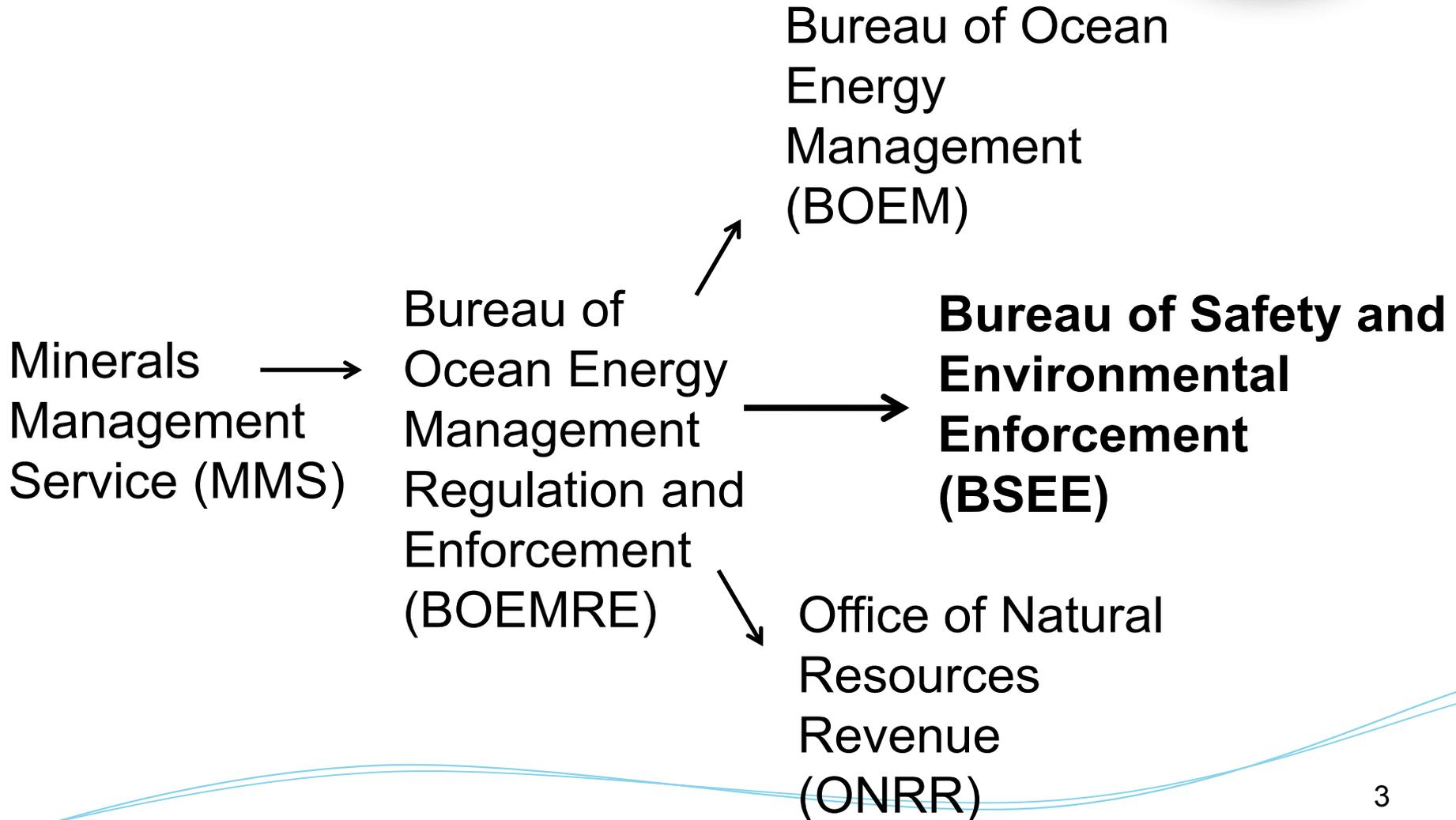
## **Emerging Technologies Branch Systems Reliability Section Evaluations**

# BSEE: Mission



*To promote safety, protect the environment, and conserve resources offshore through vigorous regulatory oversight and enforcement.*

# BSEE: History



# BSEE: Who We Are



- Staffing: 700 Employees
  - 200 engineers
  - 105 inspectors
- Locations
  - Headquartered in DC & Herndon, VA
  - Three regional offices
    - Gulf of Mexico – New Orleans, LA
    - Pacific – Camarillo, CA
    - Alaska – Anchorage, AK

# New Regulatory Approaches



- A hybrid of performance and prescriptive requirements
- Life cycle approach toward critical equipment
- Third party certification
- Use of consensus standards as baseline

# SRS – Purpose and Function



- Formed in February 2013
- Functions
  - Establish meaningful, on-going communication with original equipment manufacturer (OEM)
  - Conduct quality assurance (QA)/quality control (QC) evaluations on manufactured equipment
  - Evaluate “Fitness for Service” capabilities of equipment
  - Identify gaps in industry practices or standards
- SRS technical assessments evaluate issues that have potential industry wide impacts

# SRS Evaluations To Date



- Four evaluations since February 2013
  - Connector and Bolt Failures
    - Completed August 2014
  - Seal Assembly and Cement Failures
    - Completed January 2015
  - Two evaluations in progress
    - Wing-valve Assembly
    - HC Connector



# Connector and Bolt Failures History



- December 2012
- During drilling operations, H4 Connector Bolts failed on LMRP
  - 432 barrels of synthetic-based mud released
- Initial evaluation identified a global concern affecting
  - ~ 10,982 replacement bolts
  - ~ 361 LMRP connectors

# Connector and Bolt Failures Evaluation



- Initial Industry Findings
  - Root Cause – Hydrogen Induced Stress Corrosion Cracking
- Additional Concerns Identified by BSEE
  - Material Properties (Hardness, YS, UTS)
  - Coatings
  - QA/QC, Quality Management System (QMS)

# Connector and Bolt Failures Evaluation



- Material Property Concerns

- Inconsistencies across industry standards for material properties requirements related to fasteners (bolts/connectors)
  - Hardness, YS, UTS

- Standards with different material property requirements for subsea operation include:

- API 6A; API 16A; API 16F; API 17A; NACE MR0175; NORSOK-M001
- Fastener Coatings - ASTM B633; ASTM B849; ASTM B850; ASTM F1941; ASTM F1137

# Connector and Bolt Failures Evaluation



## ● Coatings

- Per the OEM specification, subcontractor relied on the older 1998 edition of ASTM B633 standard, rather than the latest 2007 edition
- Bolts did not receive required post bake electroplating treatment per the latest 2007 edition

## ● Interpretation of ASTM B633

- Concerns between OEM and industry on the appropriate application for Service Class 2

## ● What is the appropriate material design selection and application for marine service?

# Connector and Bolt Failures Evaluation



## ● QMS

- OEM's QMS qualified/audited only first-tier suppliers
  - OEM QMS did not require qualification and audit of second, third tier subcontractors
  - Neither operator nor contractor detected an issue with the sub-tier supplier during their assessment of the OEM
  - Need improved oversight of second and third tier subcontractors (Quality Standards)

# Path Forward



- BSEE to work with industry on developing standards to address the following:
  - Consistent material property requirements for fasteners among standards
    - Material Properties (Hardness, YS, UTS)
    - Coatings
    - OEM QMS

# Path Forward



- Two options available to BSEE to address issues on Connector/Bolt
  - Standards
  - Regulation

# Follow-Up



- BSEE International Standards Workshop – May 2015
  - Friday, May 8, 2015 (OTC Week)
  - University of Houston Hilton
  - Four concurrent sessions on
    - Quality Management and Equipment Reliability
    - Cementing
    - Emergency Disconnects (Dynamic Positioning and BOP)
    - High Pressure High Temperature
- International Regulators Forum – October 2015



# Comments or Questions?

# Questions or Comments???



<http://www.bsee.gov/BSEE-Newsroom/BSEE-News-Briefs/2014/BSEE-Releases-Technical-Review-of-Connector-and-Bolt-Failures/>

Website: [www.bsee.gov](http://www.bsee.gov)

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