Independent Third Party Verification of BOP for the GOM

AADE Deepwater and Emerging Technologies Group

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Agenda

- Brief chronology of events post Macondo, and some of the reasons why there is still confusion in the industry
- Summary of current US Code of Federal Regulations (CFR) requirements for Well Control Equipment (WCE)
  - Definition of Independent Third Party (I3P), requirements, and scope
  - Verification of Equipment Readiness
  - Verification of Equipment Compatibility
- Regulatory compliance is not enough
  - Well Control Equipment Operational Framework
  - Systems Engineering Approach
- Athens Group is an Independent Third Party
  - Measurable value added through holistic implementation of Systems Engineering

Chronology of Events

- Department of Interior issues the report *"Increased Safety Measures for Energy Development on the Outer Continental Shelf"* post Macondo

- BSEE issues interim rule NTL No. 2010-N05 based on this report
  - Independent Third Party (I3P) must be an API-licensed manufacturing, inspection, or certification firm or a technical classification society

- NTL No. 2010-N05 is vacated nearly two years later as BSEE proposes revisions to the CFR and invites comments from industry
  - BSEE removed the option in §250.416(g)(1) for I3P to be an API-licensed firm because API does not license such firms.
  - BSEE also confirmed in their response to comments from industry that *"verification from any firm or person that meets the requirements may be accepted. We will not require the exclusive use of technical classification societies at this time."*

- Final Drilling Safety Rule (BOP requirements) is published Aug-2012
- Final Workplace Safety Rule (SEMS requirements) published Apr-2013

Why Does Confusion Persist?

- The Code of Federal Regulations is massive, and there are parts that do require classification societies or firms to perform “certifications”
  - There are regulations that address the need to have a class notation certificate for the structural integrity of the drilling vessel itself; the BOP is not a part of the structural integrity of the rig
  - There are regulations that require the cement plan to be “certified” by an actual “certifying agency” - which the classifications societies generally are
- Comments during the rule making process tried to require classification societies for inspecting BOPs, but BSEE disagreed and removed these restrictions

Definition of I3P

- According to 30 CFR 250.416 (g), an Independent Third Party is **either:** *"a technical classification society, or a licensed professional engineering firm, or a registered professional engineer capable of providing the verifications required under this part"*

- I3P must provide evidence that it:
  - *"Holds appropriate licenses to perform the verification in the appropriate jurisdiction"*
  - *"Has the expertise and experience necessary to perform the required verifications"*

- There is no mention of engineering discipline → any licensed engineer with experience and expertise in Well Control Equipment can perform the required verifications.

What is Required?

- Operators are required to submit descriptions of Diverter and BOP Equipment as part of their Application for Permit to Drill (APD): US Code of Federal Regulations, Title 30, Section 250, Subpart D, Article 416 (30 CFR 250.416)

  - Specific design, testing, and documentation requirements for Diverters and BOPs are referenced in other articles (430-434 and 440-451 respectively); suffice to say these are all driven from API documents
    - E.g., RP 64, RP 53, Spec 16A, Spec 16C, Spec 16D, etc.

      Note STD 53 is not referenced… yet

  - I3P verification that (30 CFR 250.416 (e) & (f)):
    - Blind Shear Rams can shear any tubular to be used under maximum anticipated surface pressure (MASP)
    - BOP Stack has not been compromised or damaged from previous service
    - BOP Stack is designed for the specific equipment on the rig and well design
    - BOP Stack will operate in the conditions in which it will be used

Equipment Readiness

- Verification of Shearing Capability
  - Witness physical shear test of a specific type of tubular to be used (e.g., specific Shear Sub for a completion landing string)
  - Analysis of shear test results and engineering calculations (adjusting for MASP) to determine pressure and volume required to shear and seal
  - Verify that the BOP Control System can supply the necessary pressure and volume to effectively shear and seal the wellbore on the range of tubulars to be used

- BOP has not been damaged from previous service
  - Visual inspection of the BOP equipment and associated control system
  - Inspection of PMITP records (including COCs, drawing, manuals, registers, etc.) to ensure they are up to date
  - Verify the BOP equipment *has been maintained* per the PMITP

Equipment Compatibility

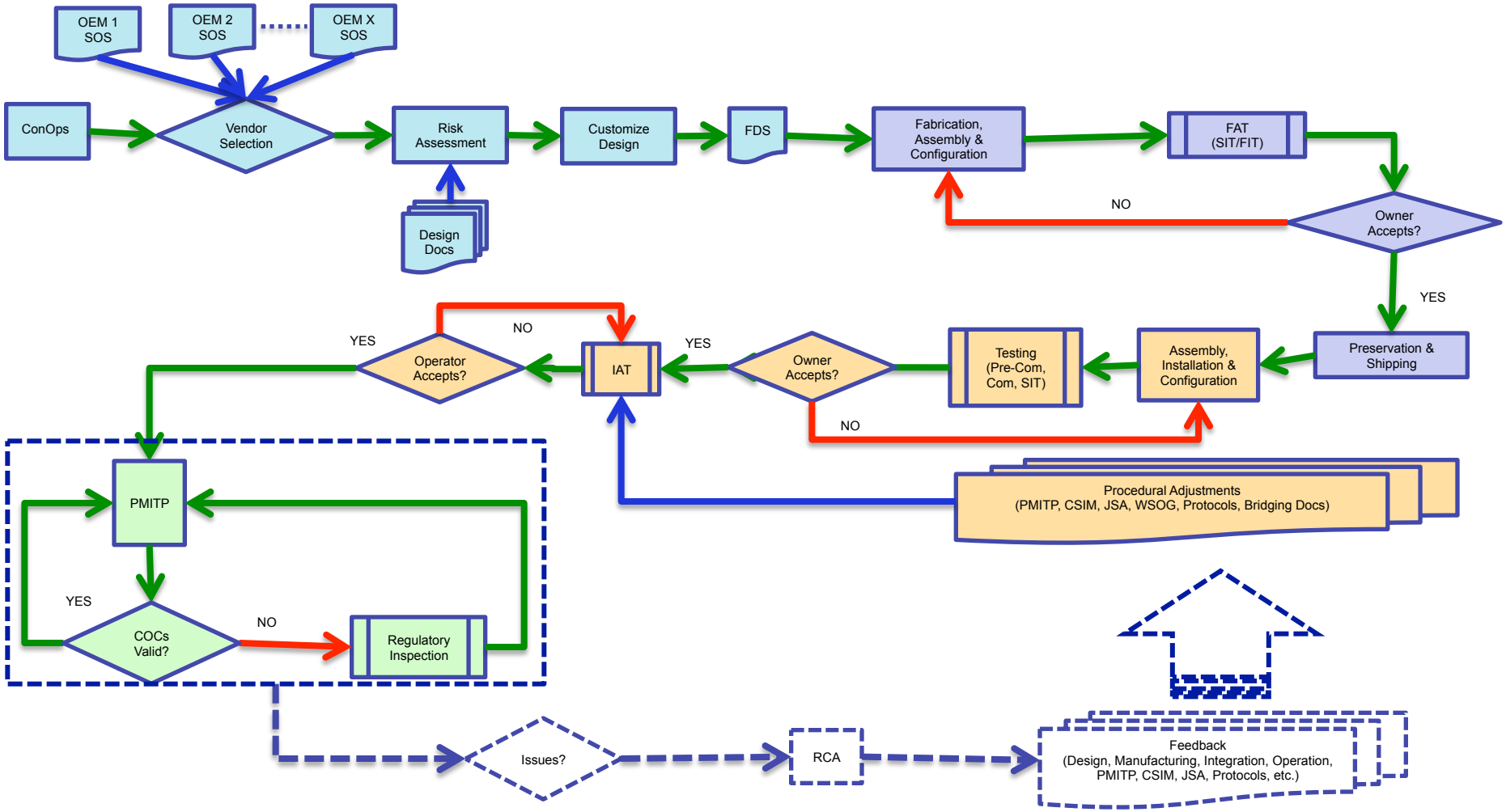
- BOP is designed for the specific equipment on the rig
  - Visual inspection and testing of equipment used to move, deploy, operate, retrieve, and return to storage area (i.e., “parking area”) for maintenance
  - Verify mechanical, hydraulic, pneumatic, electrical, and software interfaces are reliable to ensure safe and effective operations

- BOP will operate in the conditions in which it will be used
  - Review of expected water depth, environmental and wellbore pressure and temperature parameters, compatibility with mud additives and H_2S, etc.
  - Verify the expected conditions are within the operational parameters of the BOP Equipment
  - Adjust PMITP to address any concerns (e.g., replace all wellbore seals during between well maintenance periods when exposed to corrosive mud additives)

Preparing for Success

- Safety is a function of Quality
  - You can have Quality without Safety, but not Safety without Quality
  - Component design and reliability is one element of operational quality; how the equipment is integrated, controlled, and maintained is just as critical
- Systems Quality is provided through Systems Engineering
  - Individual optimization of each sub-system does not always result in optimal integrated system performance
  - Look beyond the BOP to develop broader safety and operational performance goals of the entire Well Control Equipment system → WCE Operational Framework
- To consistently achieve safety and performance goals, your WCE Framework requires preemptive initiative throughout the lifecycle, not reactive compliance
  - Regulatory verification only ensures BOP capability to the minimum required safety level at a single point in time
  - Safety and performance goals must be higher than the regulatory baseline; regulatory compliance becomes a byproduct

The BOP Lifecycle



Systems Engineering Approach

- Consider the specific purpose and value added of all inspection and verification activities at all phases of the equipment lifecycle

- Three primary systems engineering activities to be employed over the acquisition and operational lifecycle:
  1. Define comprehensive and specific requirements
  2. Execute systems-based hazard and failure mode analysis prior to development
  3. Test the system to quantify the inherited quality level and adjust the framework
     - Quantify the inherited quality level established during design and manufacturing (FAT)
     - Adjust your operational framework as the systems are integrated (Commissioning, IAT)

- As the industry continues to push operational boundaries and adopts new technologies, equipment verification programs based on regulations alone no longer suffice
  - When selecting an independent third party, consider what your goals are and choose the one that is built upon helping you achieve them

Why Athens Group?

- Service portfolio encompasses the entire BOP lifecycle, so we are uniquely positioned to help develop and implement the customer's WCE operational framework
  - Meaningful solutions, improvement opportunities, and tools you can use → confidence the system *will* deliver the higher level of performance expected
- Measurable value added:
  - Holistic scope of systems, equipment interfaces and asset integration
  - Systems Engineering approach that encompasses functional and operational verification of the equipment focused on improving its effectiveness (safety, reliability, availability, and efficiency)
- Most experienced I3P with regards to regulatory requirements, industry standards, and Quality Management Systems
  - SmartList℠, an industry first
  - Proven Practices℠, KnowledgeBase, AGQMS
  - We have refined Operators' Corporate QMS, and developed tools for global implementation

QUESTIONS?