Project Management Leads to Zero NPT:
How Total E&P Angola and Halliburton Successfully Managed the CLOV Lower Completion Campaign
Agenda

• Project Background
• Scope of Work
• Project Management Plan/Challenges
• First Phase: Design and Engineering
• Second Phase: Mobilization and Execution
• Third Phase: Continuous Improvement
• Project Success
Project Background

Block 17 deepwater offshore Angola

Fourth major multi-field project in Block 17 (Girassol, Dalia, Pazflor, CLOV)

Comprised of four subfields (Cravo, Lirio, Orquidea, Violeta)

Water depth up to 1400 m to 1260 m average

Single dedicated FPSO: 1.8MM bbl capacity
- 36 wellheads
- 19 subsea trees
- Seven subsea manifolds
Scope of Work

• 34 subsea wells: 19 producers/15 injectors
• 3564 m average MD/RT
• 10 3/4-in. production casing, 9 1/2-in. open hole, 588 m average openhole length

• All wells require sand control
  ▪ Six openhole gravel pack completions planned with alternate path screens
  ▪ 28 standalone screen completions planned: premium mesh and direct wrap

• Five different completion types
  ▪ Commingled oil producer
  ▪ Commingled water injector
  ▪ Openhole gravel pack oil producer
  ▪ Selective oil producer: two zone
  ▪ Selective water injector: two zone
CLOV Project Management Plan

• First project between Total and Halliburton using defined project management plan

• Two main phases:
  ▪ First phase in France for project initiation and planning: from KOM to issuing POs
  ▪ Second phase in Angola for project implementation and execution: from CWOP to SQM

• Halliburton project manager and desk engineer on site at Total Paris office for 6 months during the first phase before the project moved to Angola
First Phase: Design and Engineering—Objectives

• Define project execution timeline
• Review and finalize contracts
• Review and finalize system design
• Review and finalize HSE and quality plan
• Review of potential failures and risks for operation
• Develop completion procedures and design schematics
• Issue POs, place orders, and track delivery time
First Phase: Design and Engineering—Main Process

- **KOM**: Review project scope and planning and present the project management execution plan
- **DDR**: Review and approve design with technical expert from both parties
- **FRA**: Identify operational potential risks and mitigation measures
- **Develop Programs**: Prepare procedure, schematics, tool simulations, and request for engineering on new equipment
- **POs**: Define delivery timeline, issue purchase order, order equipment, and manage delivery
First Phase: Design and Engineering—Benefits

• PM and DE dedicated to the project, full focus on project success
• Build relationship and confidence between parties
• Full transparency on equipment design and limitations
• Time available to review and correct possible mistakes/issues identified during DDR and FRA
• Delivery timeline defined and first PO issued to avoid any delivery issues
• Operation site focused on execution
Second Phase: Mobilization and Execution—Objectives

- CWOP with all involved service companies to hash out any compatibility issues
- Standardize and finalize completion programs for each of the five completion types
- Finalize schematics, shop assembly sheets, HSE and quality plans, running procedures, contingency plans, etc.
- Ship materials to Angola, clear customs, inventory, and store
  - Up to 18-week process due to location, government regulations, and logistical challenges
- Maintain accurate inventories and keep material orders on track to suit project demand
Second Phase: Mobilization Challenges

• One objective: ensure sufficient inventory available for the project wells schedule
  ▪ With some flexibility for changes
  ▪ Avoid excessive inventory
  ▪ Optimize freight cost (eliminate air freight)
  ▪ Allow additional time for workshop subassembly preparation

• Challenges: four different manufacturing locations (Malaysia, Singapore, Lafayette, UK)

• Management of customer-supplied pipe produced in north of France to the screens production sites

• Optimize the reception and tracking of equipment inventory in country
Second Phase: Mobilization and Execution—Main Process

- CWOP:
  Go through the entire completion and well hookup process with all services companies

- Pre-job meetings:
  Go through the entire completion process with the engineering, shop, and offshore team to ensure everyone is aware of the processes and risks associated

- Management of Change:
  Risk assess, review, document, and approve all changes made to the well program and completion as the RIH date approaches

- Equipment installation
Second Phase: Mobilization and Execution—Benefits

- Multiple reviews of the equipment and installation procedures helps ensure everyone involved on the project is up to speed and able to assess issues that arise during installation.

- Changes to the drilling program, equipment setup, completion process, etc. is well documented and approved with proper risk assessment and mitigation measures agreed upon.

- Flawless execution thanks to everyone from the shop hand to the project manager being fully aware of their areas of responsibility.
Third Phase: Continuous Improvement

• Well-documented post-job reports and post-job meetings provide an avenue to discuss lessons learned for areas of improvement/increased efficiencies on subsequent jobs.

• Collaboration between Halliburton and Total on each completion program to reduce running times, increase job success, increase safety, and reduce chance for incurring NPT

• Quarterly SQM between Total and Halliburton to review operational performance including inventory management and engineering support
Project Timeline

Oct 2009: ITT launched

Jan 2010: Technical and commercial submission

- Technical clarifications
- Commercial evaluation

May 2011: Letter of award

Sep 2011: 1st Purchase order

Dec 2011: Project transferred to Angola

Jan 2012: CLOV technical manual completed

May 2012: CWOP

- Equipment delivery
- Completion program

Feb 2013: First lower completion

End 2016: 34th lower completion
Project Success

• Planning

• Review

• Preparation

• Inventory Management

• Management of Change

• Execution

• Improvement

• ZERO NPT