

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

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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

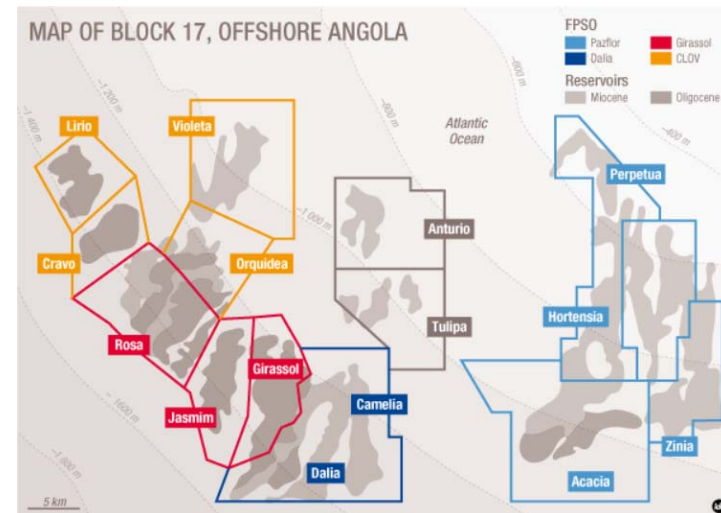
Fourth major multi-field project in Block 17
(Girassol, Dalia, Pazflor, CLOV)

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

Water depth up to 1400 m to 1260 m average

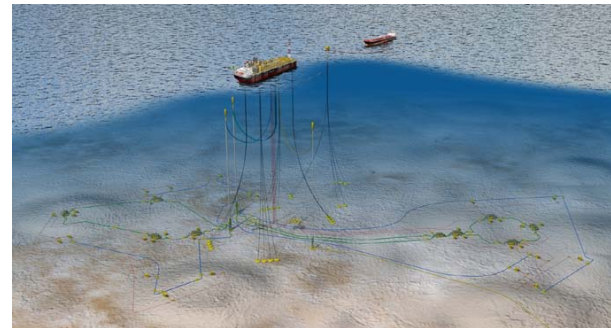
Single dedicated FPSO: 1.8MM bbl capacity

- 36 wellheads
- 19 subsea trees
- Seven subsea manifolds



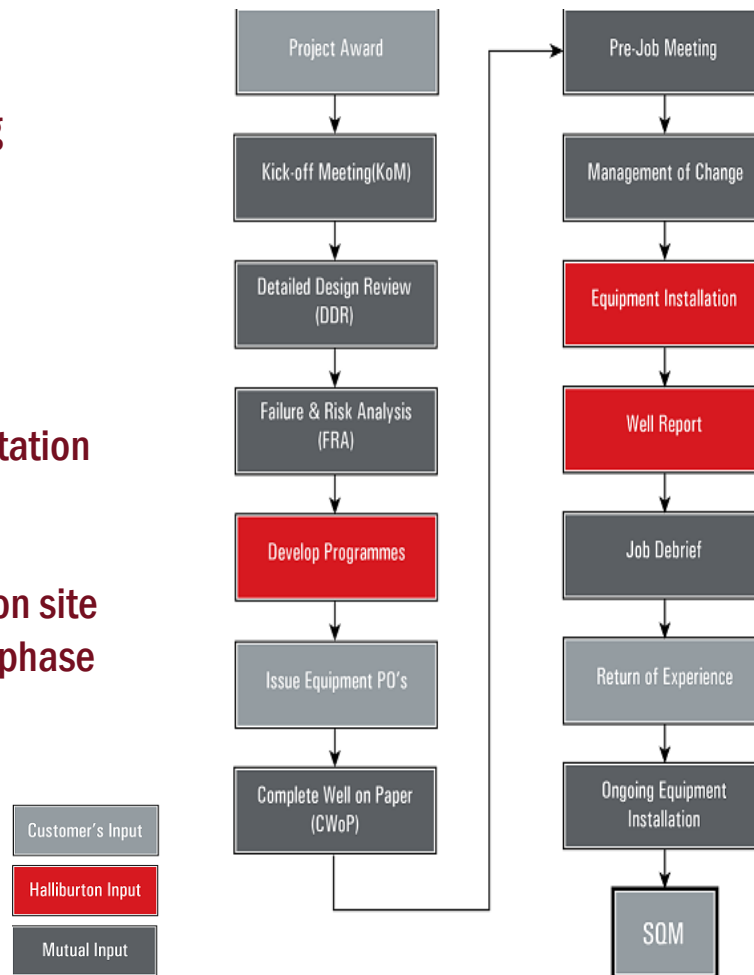
Scope of Work

- 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



HALLIBURTON ATLANTIC LIMITED
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CLDW LOWER COMPLETION - MASTER DOCUMENT REGISTER

Document Title	Revision	Author	Checker	Appr. Date	Doc. No.	Doc. Status	Doc. Type	Doc. Format	Doc. Location	Doc. Date	Doc. Status
Master Document Register (Initial)	1	MR	MR	21 Oct 2011	MR-001	MR-001	MR-001	MR-001	MR-001	21 Oct 2011	MR-001
Final Design and Engineering - Final Design and Engineering (Initial)	1	MR	MR	21 Oct 2011	MR-001	MR-001	MR-001	MR-001	MR-001	21 Oct 2011	MR-001
Finalize Contracts	1	MR	MR	21 Oct 2011	MR-001	MR-001	MR-001	MR-001	MR-001	21 Oct 2011	MR-001
Finalize System Design	1	MR	MR	21 Oct 2011	MR-001	MR-001	MR-001	MR-001	MR-001	21 Oct 2011	MR-001
Finalize HSE and Quality Plan	1	MR	MR	21 Oct 2011	MR-001	MR-001	MR-001	MR-001	MR-001	21 Oct 2011	MR-001
Review of Potential Failures and Risks	1	MR	MR	21 Oct 2011	MR-001	MR-001	MR-001	MR-001	MR-001	21 Oct 2011	MR-001
Develop Completion Procedures and Design Schematics	1	MR	MR	21 Oct 2011	MR-001	MR-001	MR-001	MR-001	MR-001	21 Oct 2011	MR-001
Issue POs, Place Orders, and Track Delivery Time	1	MR	MR	21 Oct 2011	MR-001	MR-001	MR-001	MR-001	MR-001	21 Oct 2011	MR-001
Finalize Contracts	1	MR	MR	21 Oct 2011	MR-001	MR-001	MR-001	MR-001	MR-001	21 Oct 2011	MR-001

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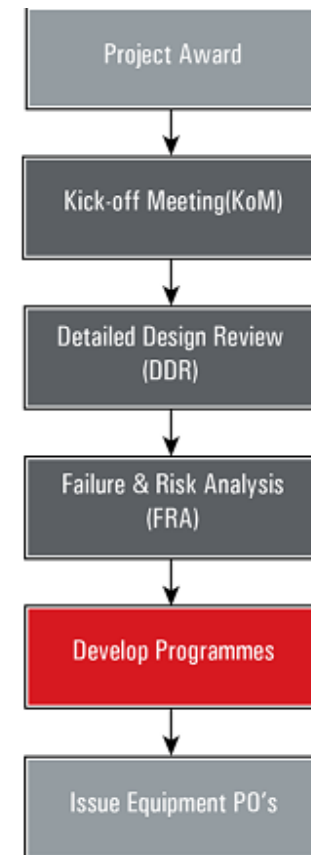
10 3/4" CBHP WITH SHORTS - CLOW PROJECT

SCHEMATIC	Item	QTY	O.D.	L.G.	Material	Rating	Supplier	Description
1	1	1	10 3/4"	1.000	1301-1401	6140	MR	10 3/4" WFL pipe for 60' G.S. P.G. 6,000
2	2	2	8.75"	4.300	1301-1401	6560	MR	F5/8" one way nipple
3	3	3	7.25"	4.300	1301-1401	6560	MR	F3/4" 12.0' upper extension
4	4	4	2.30"	4.000	1301-1401	6560	MR	F3/4" 1/2" x 1/2" coupling screw on square
5	5	5	7.25"	4.300	1301-1401	6560	MR	F3/4" 12.0' lower extension
6	6	6	8.25"	4.300	1301-1401	6560	MR	F3/8" 1/2" x 1/2" nipple
7	7	7	2.96"	4.200	1301-1401	6560	MR	F3/8" 1/2" x 1/2" lower extension
8	8	8	2.18"	4.200	1301-1401	6560	MR	Make up with F3/8" 1/2" x 1/2" 180 degree
9	9	9	3.05"	4.184	1301-1401	7030	TRC	F3/4" 1/2" x 1/2" Pipe Joint
10	10	10	1.08"	4.000	1301-1401	5000	MR	4.25" 1/2" 1/2" 1/2" Copper Flange
11	11	11	6.33"	4.278	1301-1401	5000	MR	S.S. 1/2" 1/2" 1/2" 1/2"
12	12	12	11.89"	4.278	1301-1401	5000	MR	S.S. Eccentric Blank 200'
13	13	13	11.89"	4.278	1301-1401	5000	MR	S.S. Eccentric Blank 200'
14	14	14	6.13"	4.278	1301-1401	5000	MR	S.S. Eccentric Blank 200'
15	15	15	6.13"	4.278	1301-1401	5000	MR	S.S. Eccentric Blank 200'
16	16	16	6.13"	4.278	1301-1401	5000	MR	S.S. Eccentric Blank 200'
17	17	17	6.13"	4.278	1301-1401	5000	MR	S.S. Eccentric Blank 200'
18	18	18	1.52"	4.725	1301-1401	8031	TRC	S.S. Blank Pipe 1/2" x 1/2"
19	19	19	1.72"	4.126	1301-1401	8031	TRC	S.S. Double Flange



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 Programmes:** Prepare procedure, schematics, tool simulations, and request for engineering on new equipment
- **POs:** Define delivery timeline, issue purchase order, order equipment, and manage delivery



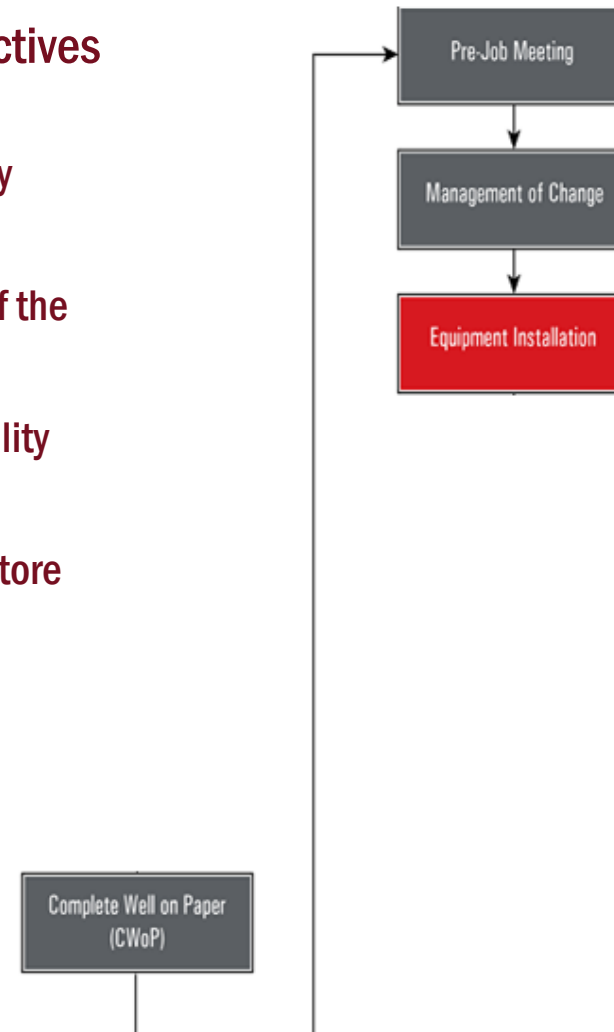
First Phase: Design and Engineering—Benefits

- 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



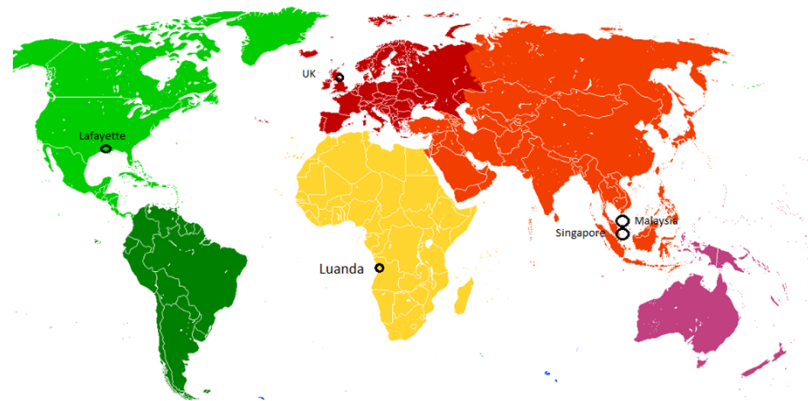
Second Phase: Mobilization and Execution—Objectives

- 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



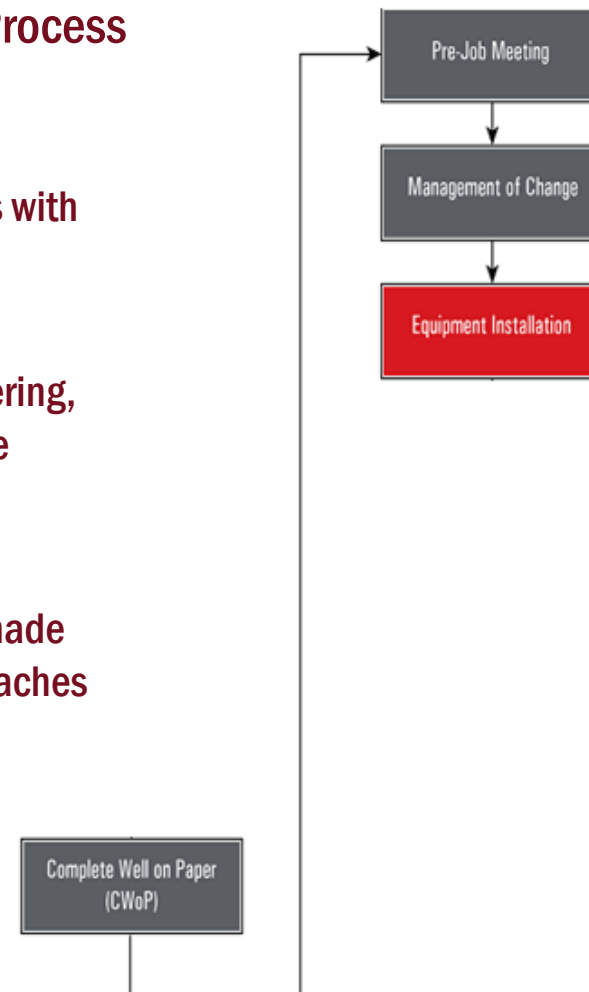
Second Phase: Mobilization Challenges

- 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.

The image displays the SMARTSTRING PLUS software interface, which is used for wellbore design and data management. The interface includes a central wellbore diagram with various components labeled, and several data tables providing detailed information about the wellbore design and equipment.

The software title is SMARTSTRING™ PLUS, with the subtitle NET TECHNICAL SOFTWARE • BMS PROCESS FORMS GENERATOR. The version is v2.8.5.13648. The interface is branded with HALLIBURTON.

The data tables include:

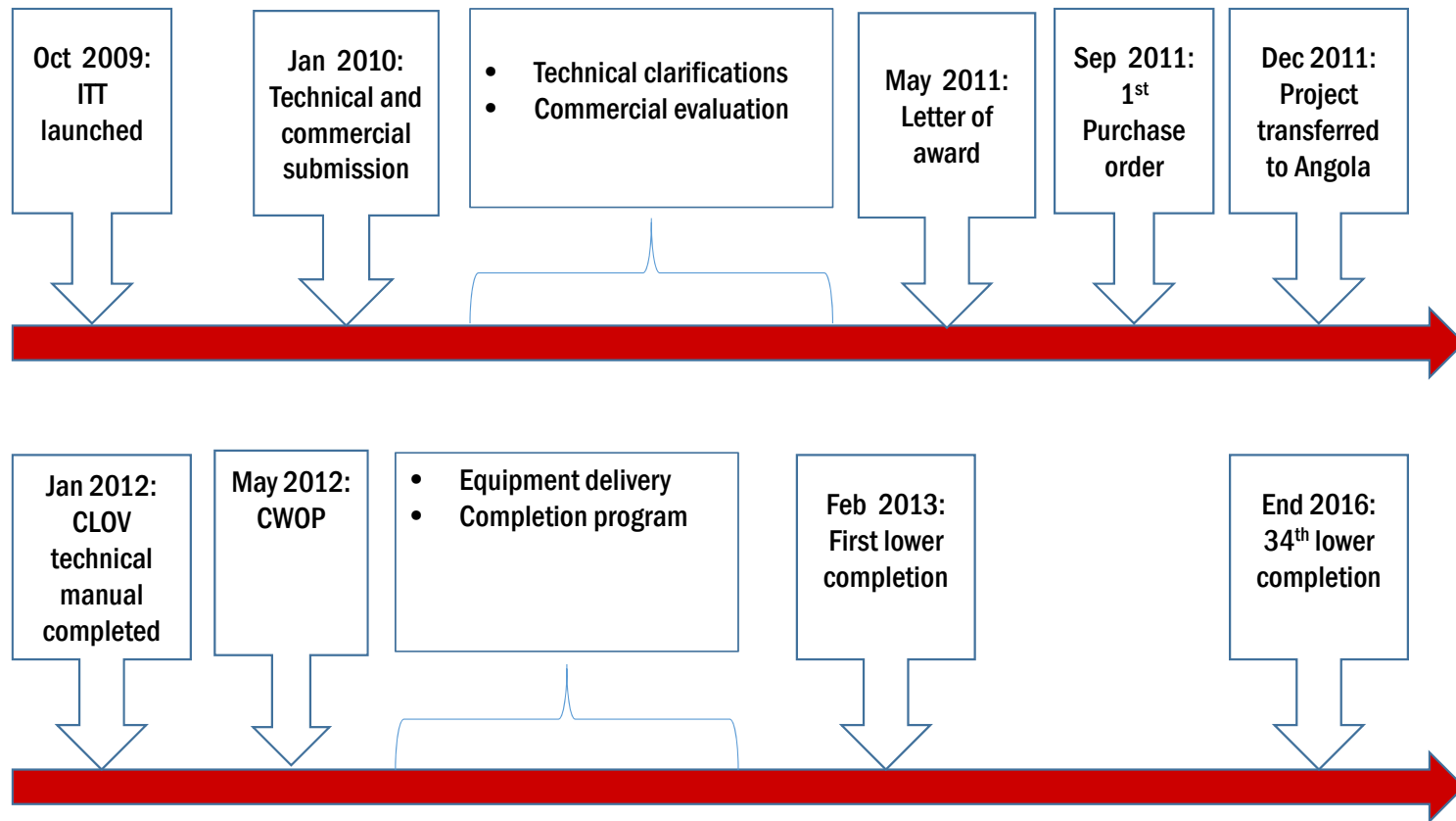
- Wellbore Data:** A table with columns for Well ID, Well Name, Well Type, Well Status, Well Depth, Well Diameter, Well Completion, Well Completion Date, Well Completion Status, Well Completion Location, Well Completion Description, Well Completion Notes, Well Completion Reference, Well Completion Source, Well Completion Date, Well Completion Status, Well Completion Location, Well Completion Description, Well Completion Notes, Well Completion Reference, Well Completion Source.
- Equipment Data:** A table with columns for Equipment ID, Equipment Name, Equipment Type, Equipment Status, Equipment Depth, Equipment Diameter, Equipment Completion, Equipment Completion Date, Equipment Completion Status, Equipment Completion Location, Equipment Completion Description, Equipment Completion Notes, Equipment Completion Reference, Equipment Completion Source.
- Wellbore Profile Data:** A table with columns for Wellbore ID, Wellbore Name, Wellbore Type, Wellbore Status, Wellbore Depth, Wellbore Diameter, Wellbore Completion, Wellbore Completion Date, Wellbore Completion Status, Wellbore Completion Location, Wellbore Completion Description, Wellbore Completion Notes, Wellbore Completion Reference, Wellbore Completion Source.
- Wellbore Completion Data:** A table with columns for Wellbore ID, Wellbore Name, Wellbore Type, Wellbore Status, Wellbore Depth, Wellbore Diameter, Wellbore Completion, Wellbore Completion Date, Wellbore Completion Status, Wellbore Completion Location, Wellbore Completion Description, Wellbore Completion Notes, Wellbore Completion Reference, Wellbore Completion Source.

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



Project Success

- Planning
- Review
- Preparation
- Inventory Management
- Management of Change
- Execution
- Improvement
- **ZERO NPT**

