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Drilling Engineering Association
Technology Forum
November 13, 2013

Rigless Solutions for Well Abandonment
and Late Stage Intervention
Agenda

- Well Abandonment Types and Services
  - Phases of Well Abandonment
- Operational Comparisons
  - Performance Data Analysis
- Case Studies
  - Gulf of Mexico
Well Abandonment

Subsea Wellhead Removal & WA

Fixed Platform Well Abandonment

Rigless Operations

Procedure for the actual abandonment of the well itself is similar for all scenarios
Well Abandonment Services

**Rental Services**
- Tubulars
- Handling tools
- Blowout preventer (BOP)
- Power swivels

**Intervention Services**
- Reservoir analysis
- Perforating
- Electric line/slickline

**Project Management**
- Planning, compliance, engineering analysis
- Scope of work, scheduling and implementation
- Well pipeline and abandonment
- Pipeline abandonment

**Tubular Running Services**
- Casing pulling
- Tubing pulling

**Cutting Services (Wellbore/Topside)**
- Hydraulic casing-cutter services
- Guillotine saws, boring and pinning
- Abrasives

**Pipeline Services**
- Purging, capping
- Decommissioning
- HP water jetting
- Topsides cold cutting

**Subsea Cutting Services (ROVD)**
- Legs, jackets, caissons, pipeline, structures
- Split-frame cutting system
- Subsea pipeline and conductor
- Guillotine cutters

**Specialty Services**
- High-pressure conductor cleaning

**Rigless Services**
- Rigless unit services
- Light duty work deck services
- Conductor jacking services

**Plugging Services**
- Cement plugs
- Inflatables
- Bridge plugs

**Intervention Services**
Phases of Well Abandonment Operation

- 5 phases of operations
  - 1. Well head & well bore diagnostics
  - 2. Reservoir Isolation. Plug all open perforations
  - 3. Secure and pull production tubulars
  - 4. Cut & pull intermediate casing
  - 5. Pull conductors
Phases of Abandonment Operation

- Phase 1 – Wellhead & wellbore Diagnostics
  - Pressure integrity of wellheads, production tubing and conductor
  - Slickline Operations- gauge runs
  - Wireline Operations – wellbore diagnostics, tubular integrity
  - Wellhead Repair
Phases of Abandonment Operation

- Phase 2 – Reservoir Isolation
  - Coiled Tubing Operations to kill well, set plugs, spot cement
  - Reservoir Squeeze Cementing and Pressure Testing
  - Wireline Operations – perforations, tubing cutting

  - Procedures
    - Kill Well,
      - Bullhead or Coiled Tubing
    - Access to reservoir
    - Isolate Reservoir
      - Cement Plugs, Inflates, Packers
    - Clean out wellbore
      - Scale, Sand, Remove obstructions
    - Establish circulation path
    - Ensure good cement bond
    - Cut production tubing
Phases of Abandonment Operation

- Phase 3 – Secure & Pull Production String
  - Fishing Operations
  - Completion String Recovery
  - Internal multi-string cutter on drill pipe using the top drive or a down hole motor
Phases of Abandonment Operation

- Phase 4 – Cut & Pull Intermediate Casing
  - Fishing Operations
  - Casing String Recovery
Phases of Well Abandonment

- **Phase 5: Conductor Removal**
  - Retrieve single and nested conductors, hydraulic saw, bore and pin the nested strings.
    - Bore and pin the casing string to secure it together.
    - Lift the casing string to the desired height and secure.
    - Bore and pin the casing again below where it will be cold cut. Cut the casing strings, and lay them down.
  - Pressure-wash the conductors and lay down in a safe environment.
Comparisons

Rig-Based Operations

• Features
  – Familiarity
  – Potentially faster trip times when pulling doubles and triples
  – Jackup rigs are self-sustained

• Limitations
  – Downgraded platform capacities when using existing equipment
  – Cost and time to upgrade
  – Jackup rigs not suitable for deepwater applications
  – Increased logistical costs due to crew and equipment requirements
  – Standby coverage
  – Higher day rate
Comparisons

Crane-Based Operations

• Features
  – Flexibility to address all well/platform configurations
  – Low day rate
  – Minimal POB
  – Smallest footprint

• Limitations
  – Limited operating capabilities with platform cranes
  – No rack back storage
  – Nonproductive time (NPT) due to wind speeds, mechanical downtime and lack of SimOps
  – Less flexibility/contingency in dealing with changing well conditions
Rig vs Rigless Operations

- Bridging the gap…Rigless / Modular Systems
Rigless Operations

Intervention and Abandonment Unit

- Lifting capacity: 600,000 lb
- Jack size: 36 in.
- Pulling capacity: 220,000 lb
- Pulling stroke: 60 ft
- Milling stroke: 30 ft
- Racking capacity: 10,000 ft of 3-1/2
- Heaviest lift during mob: 27,000 lb
- API-certified to operate in 60 knot winds
- Hurricane preparedness time: 24 hours
Pulling and Jacking Unit

Intervention and Abandonment Unit

• Features
  − Accelerated rig up time of modular based assembly
  − Modular lifts can be tailored to platform crane capacity
  − Minimized foot print per platform requirements
  − Support riser heights are designed to accommodate different abandonment or workover requirements
  − Efficient skidding operations (with BOP)
  − Rack back storage for tubular products
  − Dropped object mitigation integrated into the design of Unit
  − Typical operations consist of two (2) five (5) man crews working 24 hour operations
Pulling and Jacking Unit

- BOP’s under Jacking Floor
- Complete with environmental retention berms
- Can be secured to the underbelly of the Unit during skidding operations
Pulling and Jacking Unit

North – South and East – West skidding capabilities
Pulling and Jacking Unit

- Capable of storing 323 joints of 3-1/2” IF drill pipe (10,000’)
- Integrated Gantry System
- Hydraulic Pipe Catchers
Operational Data

Abandonment Time, NPT and Cost Analysis

Average Days per Well

- P&J Unit: 27%
- Rig: 111%
- Crane: 111%
Operational Data

Abandonment Time, NPT and Cost Analysis

Total NPT Hours

- P&J Unit: 162%
- Rig: 183%
- Crane: 183%
Operational Data

Abandonment Time, NPT and Cost Analysis

Average Cost per Well

P&J Unit

Rig 134%

Crane 60%
Case Studies

- Gulf of Mexico
  - Hurricane damaged platform abandonment
  - Well abandonment and intervention project
Hurricane damaged platform
Operational Data

- Successfully plugged and abandoned all 11 wells
- Zero environmental or safety issues during the operation, which took an estimated 49,476 hours (Weatherford) and a total 204,708 hours (contractor’s hours included)
- Project was completed successfully in 299 days, significantly ahead of the authorization-for-expenditure (AFE) target of 365 days
- Cost savings of US$6.6 million
Case Study Gulf of Mexico

Intervention & Well Abandonment Project

• 11 well, 10 abandonment and 1 intervention campaign in 1000-ft water depth

• Minimal necessity of platform crane allows for simultaneous operations

• Carried out coil tubing operations when high winds (up to 60 knots) would have prevented crane usage

• Well-trained, multidisciplinary, safety-focused personnel logged over 80,000 hours

• Project was completed 108 days ahead of schedule with a cost savings of US$10.8 million
Conclusion

• Our working goal is to provide a single source for all well abandonment and intervention operations with more advantages and efficiencies while maintaining focus on the environment and safety culture.

• Decommissioning and abandonment are specialized activities that require meticulous planning and the best use of technology, equipment and resources to control costs, ensure worksite safety, protect the environment and maintain operator reputation.

• The ideal equipment design is fit-for-purpose and inherently safe while having the mobilization characteristics of a crane system but the operational capabilities of a rig.
Weatherford Well Abandonment and Rigless Intervention Systems

• Questions
• Discussion

Thank you!