ThruBit® Conveyance Presentation

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Statement: FACT or FICTION ??

- All horizontal wells are homogeneous and anisotropic over their entire lateral section.
- A Gamma Ray Log can be used both for geo-steering and formation evaluation effectively.
- Offset analogous wells, if completed with the same frac stage spacing, will have the same production.
- All zones perforated and completed have equal production contributions.
- A well whose production declines prematurely, can be properly analyzed at a later date without well bore formation data.

Are we shooting in the dark?

Agenda

I. Equipment & Method

I. Facilities
II. Experience
III. Conveyance Equipment
IV. Conveyance Method
V. Levels (horizontal video)

II. Benefits

I. Conveyance Benefits
II. Log Examples
III. Horizontal Deployment Benefits

III. Questions

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Deploy slim logging tools through a PDC drill bit to obtain open hole log data under ANY well conditions

- **Drilling with the Portal™ Bit**
  - Rig time savings eliminating conditioning time
  - Logging tools deployed through pipe after final section is drilled and logging out on memory
- **Tough Hole Logging Conditions**
  - Logging tools can be deployed through the pipe wherever the bit can go.
  - Eliminated risk of “no logs”
  - Retrievable tools to prevent lost in hole risks
- **Horizontal and S Shaped Directional Wells**
  - Economically obtain data of wellbores for stimulation optimization
  - Excellent alternative to LWD and other logging methods

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Components of the ThruBit® Logging System

Portal™ Bit – PDC Drill Bit

- Can be designed to fit any size and blade configuration
- Releases center portion with latching mechanism
- Allows access to borehole through center of drill pipe
- In horizontal wells it is used to ream to TD for tool deployment

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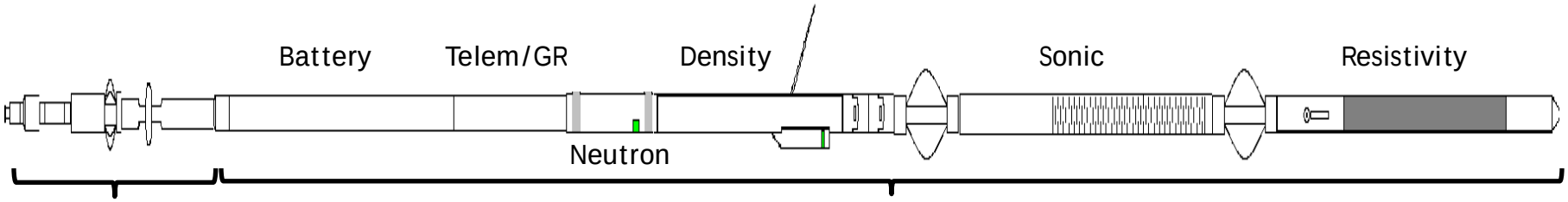
Components of the ThruBit® Logging System



Portal Bit™ Hangoff & Release Tools

SureLog™ Logging Tools

SureLog™ Logging Tools – Quad Combo

- 2 ⅛" OD & 300˚F & 15,000psi rating. *Milestone:* 29.5˚dog-leg, 22,875' MD
- Operate in Memory mode and Real-time mode
- Measurements: Induction Array, Density(pe), Neutron, GR, Caliper, Sonic(fullwave monopole)
- In horizontal wells use memory mode by extending from the DP

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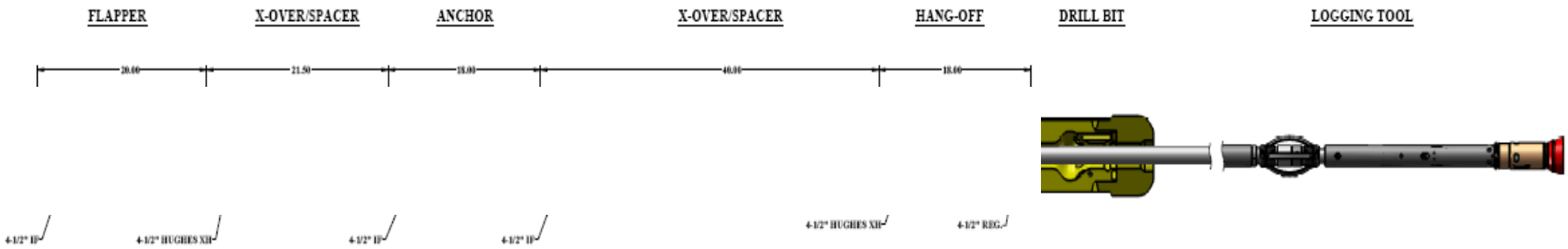
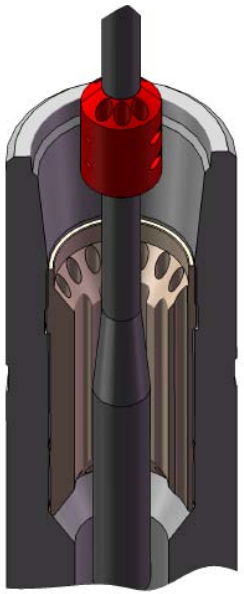
Components of the ThruBit® Logging System



TBL Running Hardware & Hang-off Sub

- Running tool activates latching mechanism when necessary
- Hang-off allows logging suite to hang from the bit without loosing circulation
- 2 ½" drift ID necessary for deployment and hang-off
- In horizontal wells logging tools can be retrieved at any time (vertical & horizontal hole position)



Hang-Off

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Five Levels Of Deployment For ThruBit Logging Solutions

Level 1

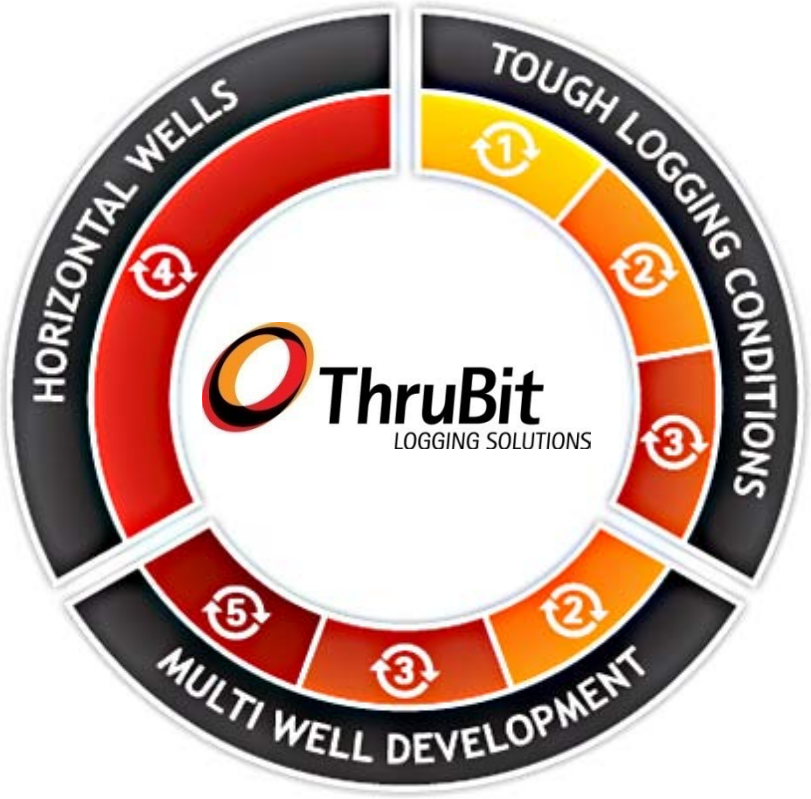
- Ultra-slim Conventional Wireline

Level 2
Security Deployment

- Wireline Logging Through The Bit And Pipe

Level 3
Security Deployment

- Memory Logging



Level 4
Security Deployment

- Pump-Assisted Memory Logging (Horizontal)

Level 5
Direct Drill Deployment

- Wireline/Memory Logging (Vertical)

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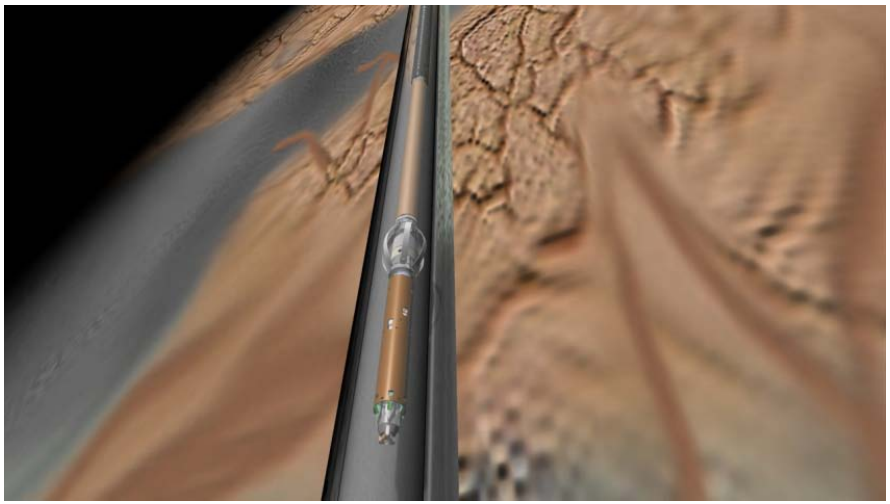
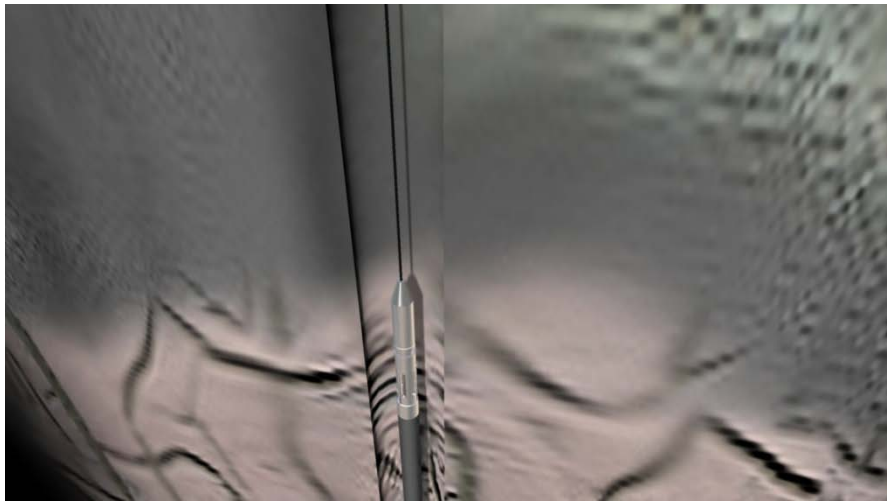
Level 1 Conveyance





Benefits using Level 1 Conveyance

- Slim logging suite 2 1/8 OD utilizing real-time data
- Able to maneuver past difficult hole conditions with patented Flex joints
- High temp/pressure in small package (300°F/15,000 psi)
- Can be ran first before alternative conveyance methods are needed

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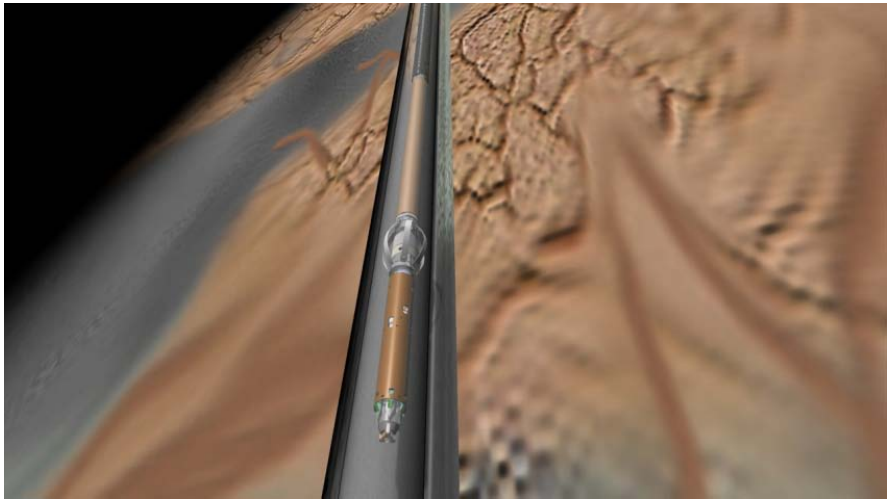
Level 2 Conveyance



Benefits using Level 2 Conveyance

- Used when poor hole conditions prevent conventional logging methods
- Portal™ bit and drill pipe are used as a conduit past adverse hole sections
- Using real-time acquisition method before memory runs are needed
- Saves rig time and AFE costs eliminating multiple tripping and conditioning

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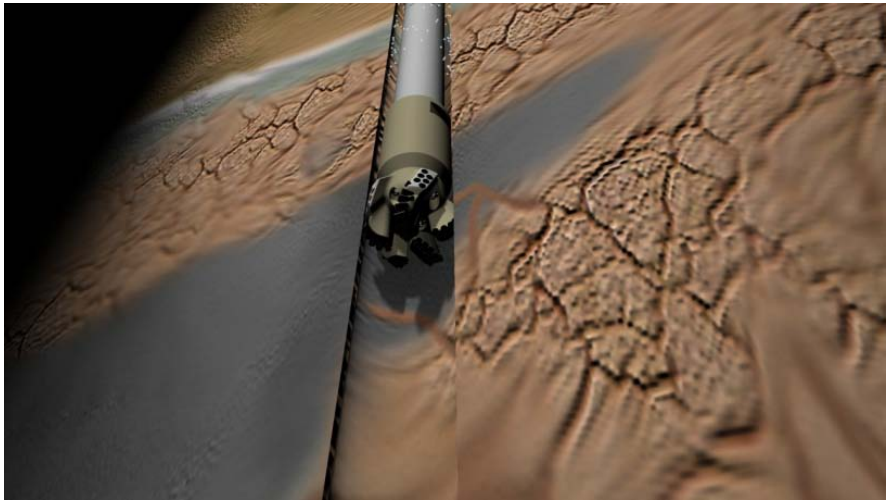
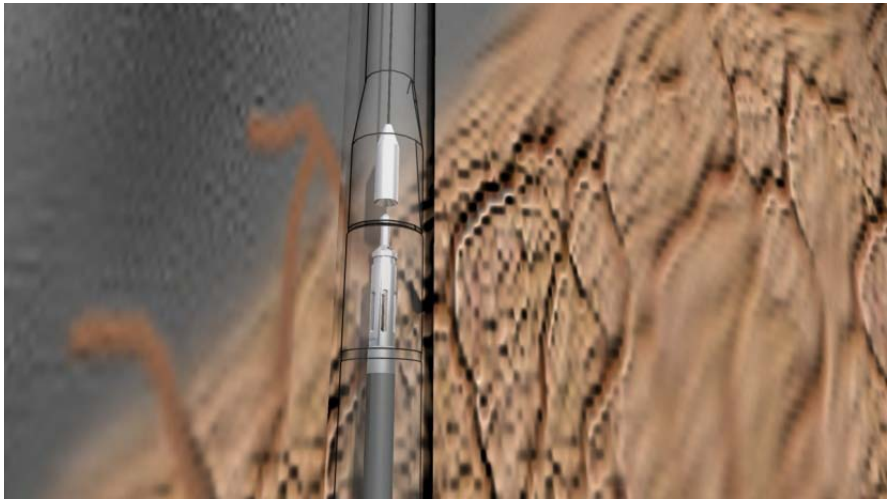
Level 3 Conveyance





Benefits using Level 3 Conveyance

- Used when memory mode logging is required (multiple bad sections of hole)
- Used when hole conditions require having the bit on bottom before logging
- Acquires data as pipe is tripped from the hole
- Fully retrievable logging tools and sources at any time when required

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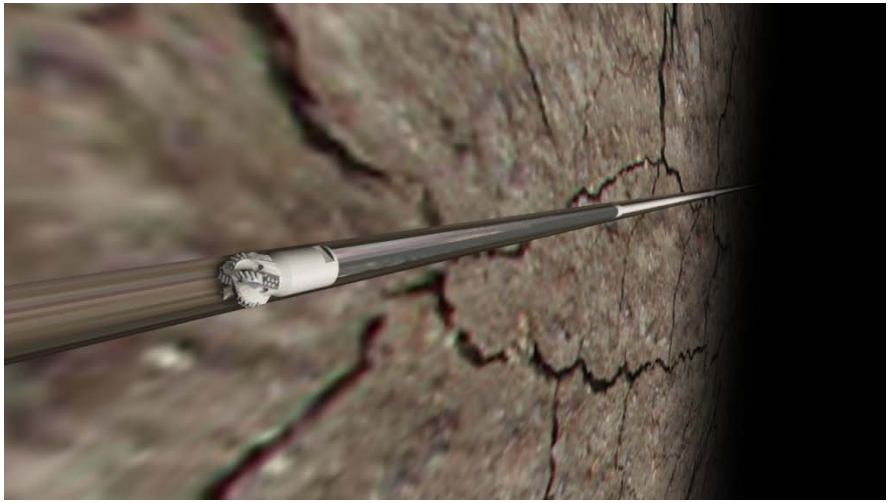
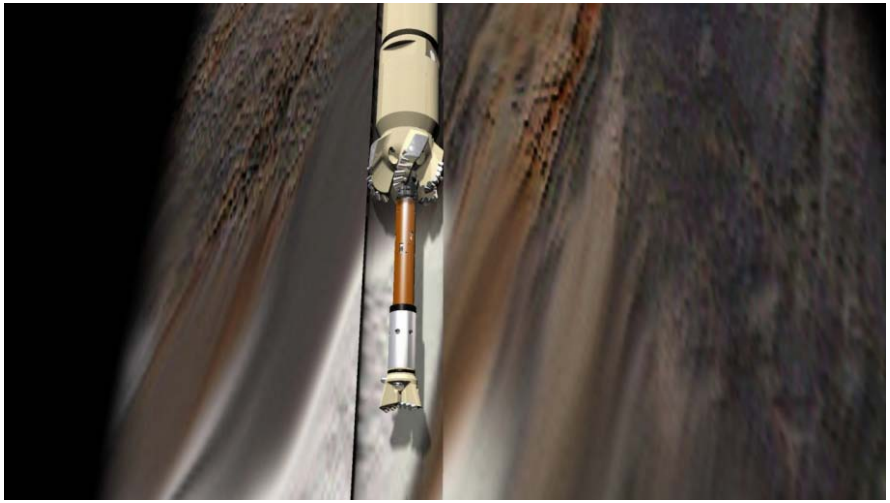
Level 4 Conveyance





Benefits using Level 4 Conveyance

- Ability to log highly deviated and horizontal well bores on memory
- Formation data in horizontal well bores optimizing completion decisions
- Lower costs and risk than LWD and Toolpusher logging methods
- Pipe circulation and rotation can be maintained while logging out

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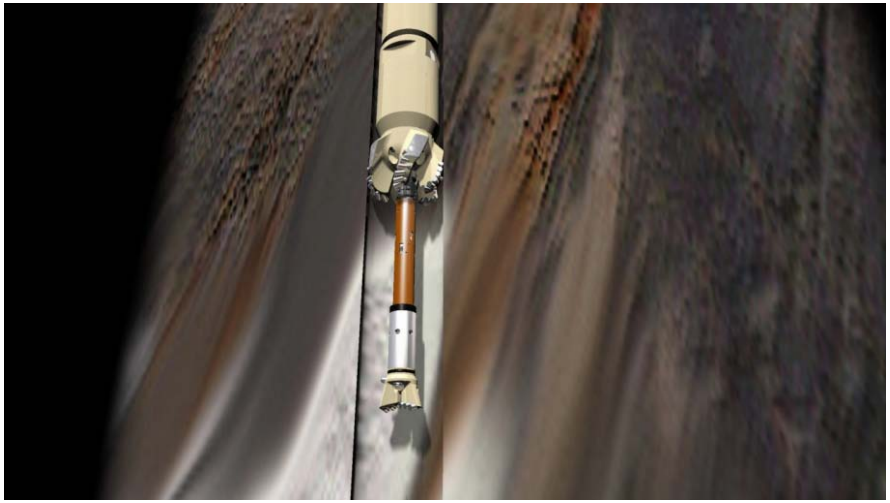
Level 5 Conveyance



Benefits using Level 5 Conveyance

- Drill final section and log open hole section without tripping pipe
- Save rig time and AFE costs through elimination of conventional logging
- Obtain an open hole log on every well while reducing risk of Lost-in Hole
- Replaces Convention logging, LWD, and TLC operations and reduces risk

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Through-the-Bit Benefits

I. **Versatility on location with 5 Levels of conveyance to fit the well conditions**
   1. Ultra slim conventional wireline
   2. Wireline through pipe
   3. Memory Logging, pipe conveyed
   4. **Pump down memory logging**
   5. Direct Drill

II. **Retrieving decreases Risk of LIH tools**

III. **A PDC Bit is always in the hole if conditions become tough**

IV. **Horizontal wellbores can be logged efficiently and safely**

V. **Reduces overall AFE costs by adapting the conveyance method to replace conventional logging techniques**

VI. **Avoid multiple logging attempts**

VII. **Optimize Completions – number of stages, packer placement, and perforation selection**

VIII. **Cost lower than LWD & TLC operations**

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