DEA 161
Proposal to Develop an Improved Methodology for Wellbore Stability Prediction

Will Standifird
Senior Vice President
Knowledge systems Inc.

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Constructing a Stable Wellbore

Low Wellbore Pressure Differential

- Major Kick or Blowout
- Oriented Shear Failure
- Non-Oriented Splintering
- Stable Wellbore
- Hole Ballooning
- Hydraulic Fracturing

- May produce angular caving visible in surface returns
- Pore pressure "pops chips into Wellbore"

- Well "breathes", alternately producing and taking fluids
- Major fluid losses

MORE KNOWLEDGE. FEWER SURPRISES.
Case Study

Anadarko
Deepwater Gulf of Mexico
Development
West-East Section

Water Depth > 4500’
Key Challenges

High Inclination > 65°
- Stress anisotropy in inclined hole creating shear stresses

Down-Dip Drilling w/Bedding Planes
- Lower rock strength

Known Hazards in Well Path
- Depleted sand
- Large fault
- Weak rock zones
Real-Time Wellbore Stability

• Field Deployment for 14 days

• Resistivity, GR and Operational Data used for Analysis
  • Resistivity | Synthetic DT for RS Correlation

• Mud Weight Adjusted based on Analysis
  • No Formation Fluid Influx
  • No Drilling Fluid Loss
  • No Wellbore Instability

• $9.1M AFE versus $3.2M Actual
Wellbore Stability Prediction
Current Practice

• Not widely practiced, despite the cost of instability problems
• No industry consensus regarding methodologies
• Hard to select which methods to use under varying geologic conditions
• Lack of training
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Objective
Identify and develop best practices for wellbore stability analysis

Sponsor
Marathon Oil Company

Participants
Firms actively engaged in drilling or providing drilling services
5 participants minimum…15 target

JIP Structure
Patterned after prior KSI-managed JIP initiatives
(DEA 119 Deepwater Pore Pressure Prediction, Sub-Salt)
DEA 161 Overview

• Study 5 World Regions
  – ~50 wellbore/region
  – Utilize public data/no contribution required

• Participants allowed to submit one dataset per enrollment for confidential analysis (problem well or field)

• Special pricing for larger confidential project submissions

• Technology Enhancements to Geostress

Knowledge Systems

MORE KNOWLEDGE. FEWER SURPRISES.
DEA 161 Deliverables

• Improved methods, models and procedures for the prognosis of wellbore stability
• Wellbore Stability Prognosis Manual, printed & electronic
• A Wellbore Stability School for drilling engineers, held in each of the project’s geographic areas
• Database for future research and study to include testing new models and methods.
• Wellbore Stability website
DEA 161 Participants

Enrollment Started in February 2007

– Marathon & Pemex enrolled
– Baker Hughes Inteq and Hess imminent
– Considering Proposal
  • ~6 NOC’s, ~10 independents & 3 Super-Majors
DEA 161 Challenges

Super-Major Participation (XOM, BP, Shell or Chevron)

- Many will not join w/o one Super-Major
- Project deliverables are desperately needed by industry
- Domain experts are not the customer for this project

Kick-Off with 5 participants…

- 15 needed for full budget