Integrated Waste Injection Services: Cuttings Reinjections

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Cuttings Reinjection (CRI)........ safe disposal of oilfield waste into sub surface strata, both onshore and offshore, in a multitude of operating environments........

Cuttings/waste are seized, grinded, suspended in a slurry and pumped within a suitable formation determined by sound science and engineering

It constitutes the most environmentally friendly Elimination Method rather than a Treatment Method

It is the only compliant ZERO discharge waste management technology

Technology rebrand to highlight SLB’s key differentiation: iWISE
Why is Cuttings Reinjection (CRI) the preferred waste management solution?

- Environmental regulations are becoming tighter globally
- CRI is the only zero discharge compliant technology
- The industry is moving into remote & inaccessible areas
- CRI minimizes costs & HSE risks
- The logistics of hauling waste can be cost prohibitive
- CRI is the only in-situ permanent disposal technology
- IBAMA: Drilling Fluids and Cuttings time line
  - 2012
    - New directives: adoption of sediment toxicity test and improvement of drilling fluid and cuttings monitoring
  - 2013-2017
    - Changing from paraffin to olefin
    - Analysis of monitoring reports
    - Problems with RPE test
  - 2018 – NORMATIVE INSTRUCTION N1/2018
    - Cuttings from the reservoir phase discharge prohibited
    - Land disposal report
    - Establish 2022: ZERO DISCHARGE at the sea
  - In the future ????
    - ZERO DISCHARGE

*According to the law: Federal Law n12305/2010: no residues discharges at the sea*
87 Mil bbl injected (125 jobs) with an increasing market into environmentally sensitive areas
The iWISE SubSurface assurance workflow ….. risk minimization approach

Pre drilling:
- Well Logs, well path, top correlation
- Rock Mechanics Analysis
- Geomechanical Model & in-situ stress profile
- Fracture simulation & containment assessment
- Risk categorisation
- Well Design
- Surface Equipment Design

Post drilling:
- Drill and evaluate
- Step Rate Test
- Model calibration
- Operational procedures calibration
- 24/7 monitoring and diagnostics (iWISE Live)
- Injection management strategy
- Report and continuous assessment

TECHNOLOGY RELIABILITY EFFICIENCY INTEGRATION
Fracture Containment Assurance Simulation
TerraFrac™ Fully Planar 3D Frac Code
Case Study - Success Stories Abu Dhabi Offshore

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First Implementation of Real-Time Subsurface Monitoring for Cuttings Re-injection Offshore Abu Dhabi

Salamat Gumurov, Said Benekeid, Eduardo Blanco, Shaun Woelfl, and Chris Hardy, Schlumberger; Haastaha Ido, Masatoshi Tanioka, Naohito Torimura, Katsuyuki Yamasaki, and Takeno Ohsawa, ADNOC Japan

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Drill Cuttings Injection Done Right: First Million Barrels Injected with Ultimate Subsurface Uptime Offshore Abu Dhabi

Mohamed Haddad, Ahmed Rashid Al-Aweli, Takehito Toki, and Rudra Pratap Narayan Singh, ADNOC Offshore; Salamat Gumurov, Said Benekeid, Eduardo Blanco, Craig Mitchell, and Phil Burton, Schlumberger

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Last remarks

- Drill Cuttings Subsurface Injection is one of the most promising waste management techniques.
- Integrated Sub-surface Assurance Workflow address all possible subsurface injection complexity and uncertainty to ensure environmentally and seamless drill cuttings subsurface injection operations.
- Pressure analysis diagnostic in Real-time monitoring of injection data and parameters helps to identify and reduce hidden risks in a timely manner to avoid potential injectivity failures.
- In-depth pressure analysis allows monitoring of the progression of fracture primary parameters to regularly validate and update the current geomechanical model and to significantly extend the well life.
- Successful application of recent advancement in modelling and real-time monitoring.
- Regulations for Cuttings - offshore drilling with zero discharge is that possible in Brazil?
- Feasibility Studies can be a good start... best candidates followed by a pilot project