

The Halliburton logo is a large, red, downward-pointing triangle. Inside the triangle, the word "HALLIBURTON" is written in white, bold, sans-serif capital letters.

**HALLIBURTON**

An offshore oil rig with a red and white structure, situated in the blue ocean under a clear sky.

# Emerging Trends & Technologies For Unconventionals 非常规开发的潜在趋势和新技术

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Senior Vice President of Global Business Development  
and Marketing

全球业务拓展和市场开发高级副总裁

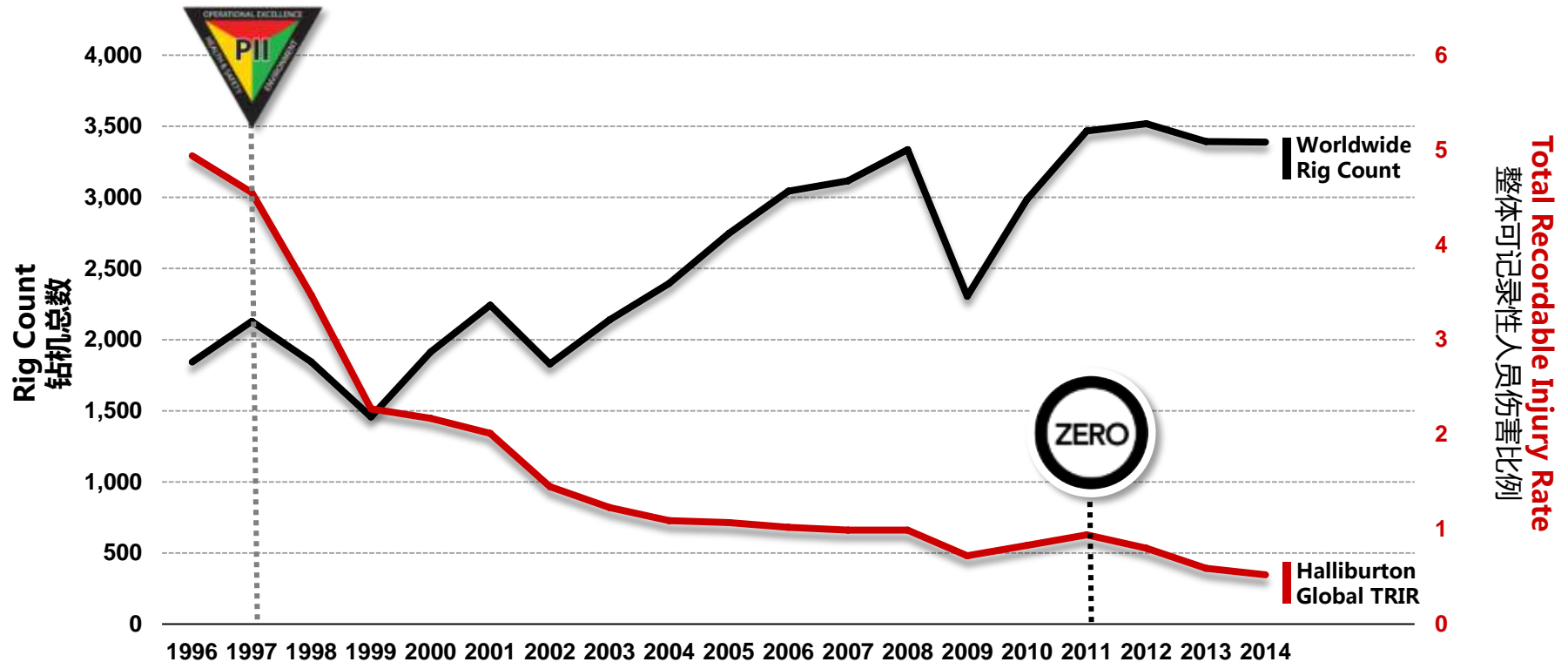


**2014 OGIF**

**Solving challenges.™**

# Halliburton Global Safety Performance

## 哈里伯顿全球安全绩效



Data as of 02/2014

# Halliburton Global Footprint

## 哈里伯顿足迹遍布全球



Founded in | 创立于

**1919**

Employees | 员工

**Over  
77,000**

Operational Countries  
作业国家

**80**

Research Centers | 研发中心

**15**

Corporate Headquarters | 总部


**Houston  
Dubai**

# Product Service Lines

## 完善的作业产品线





An aerial photograph of a vast, green rural landscape. In the center, a large industrial drilling rig is visible, surrounded by various vehicles and equipment. A dirt road leads towards the rig. In the foreground, a small, old, two-story house with a dark roof sits on a grassy field. The sky is clear and blue. A diagonal line divides the image, with a dark grey triangle on the right side.

# Unconventionally 非常规

We deliver the lowest cost per BOE in unconventionally via surface efficiency, customized chemistry, and subsurface insight.

通过提高地面作业效率、定制化学品和井下针对性方案最大程度提高客户的经济效益



**HALLIBURTON**

**Surface Efficiency**  
**地面时效性**

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# Frac of the Future™ – A Cumulative Effect

## 压向未来-先进技术的集成



Transient to Permanent  
使非常规开发成为“常规”

- Sustain extended pumping hours  
提高持续泵注时间
- Reduced energy requirements  
降低燃料消耗
- Reduced complexity  
减小作业复杂性

Environmental Sustainability  
与环境和谐共存，实现可持续性发展

Collaborative Reservoir  
Exploitation  
多学科协作的储层开发模式

- Fracture imaging  
裂缝监测
- Live optimization  
实时优化

# SandCastle™ Proppant Storage Unit - PS-2500

## 支撑剂筒仓



### Benefits 优势:

- Reduced footprint 减少用地面积
- Self contained 自车载式，运输方便
- Solar powered 太阳能动力
- Gravity feed 重力供砂
- Weighing system 实时砂量测量系统



# Remote Operation Centers

## 远程操作中心



### Benefits 优势:

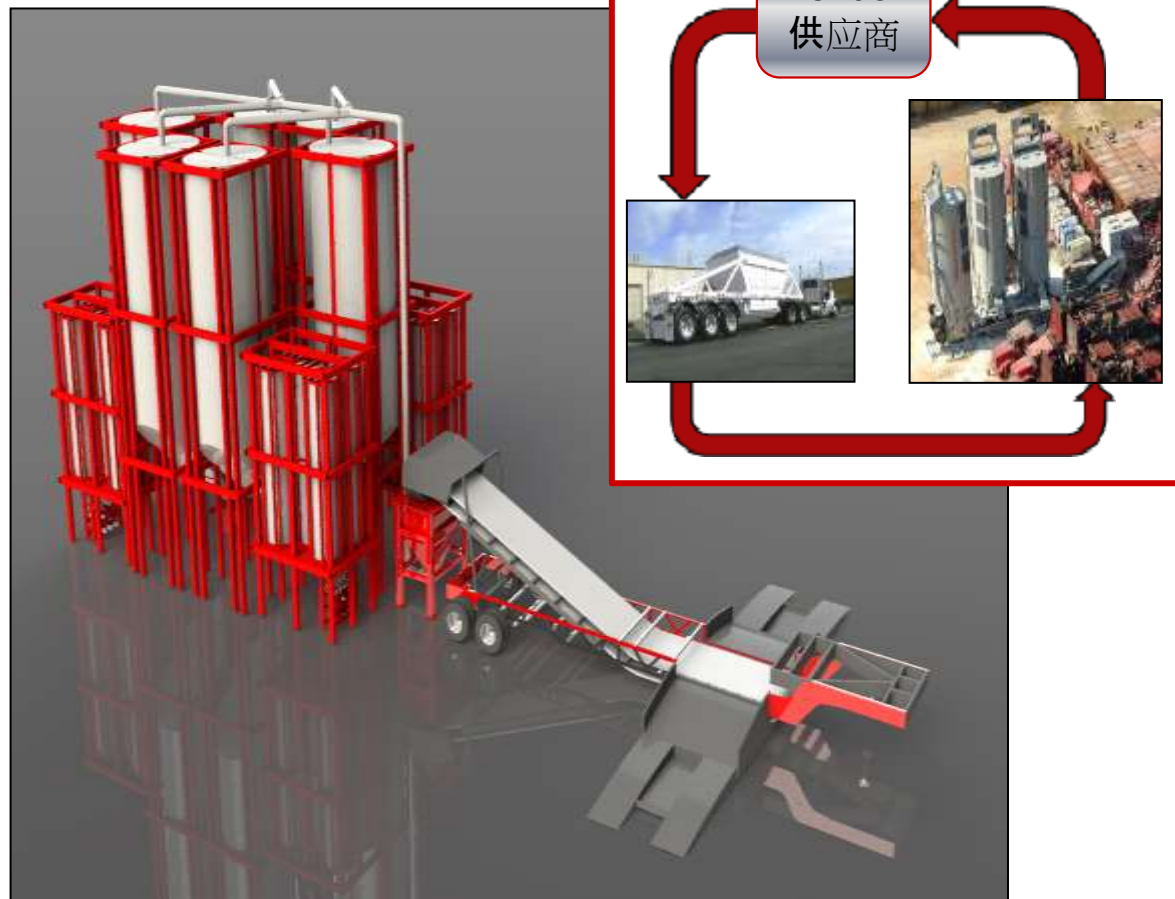
- Service Quality  
服务质量
- Knowledge transfer  
知识转移
- Technical oversight  
技术监督
- Real time job control  
实时作业管理
- Multi-service hub  
多服务枢纽

# Proppant Management System 支撑剂管理体系

## Benefits 优势:

- Real time inventory  
实时库存监控
- Reduced demurrage  
减少滞待花费
- Shortened cycle times  
缩短供货周期
- Reduced NPT  
减少非生产时间
- Increased productivity  
增加生产效率
- Reduced footprint  
减少用地面积
- Alternate power capable  
替代动力系统

## Automated Inventory Control 自动化库存控制



# Advanced Manifold System

## 高级压裂管汇系统



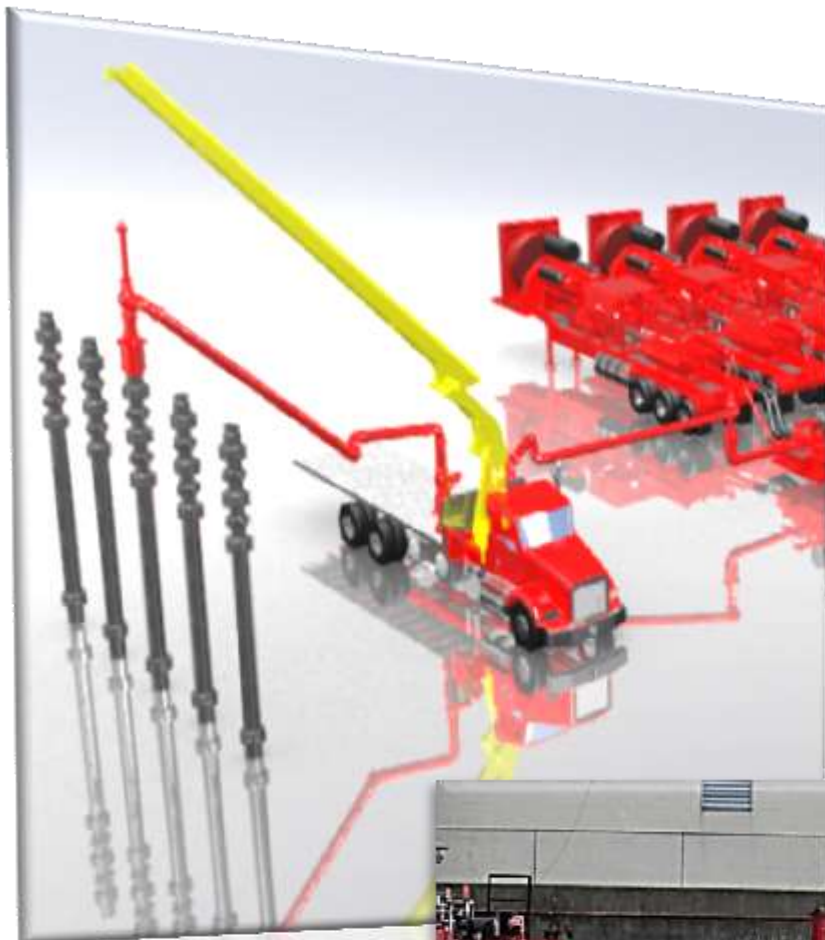
### Benefits 优势:

- Remote control valves  
远程控制阀门
- Personnel not required in high pressure areas  
避免人员在高压环境作业
- Improves pump fluid end life  
增加高压泵液力端寿命
- Reduces NPT  
减少非生产时间



# Wellhead Connection Unit

## 压裂井口连接系统



### Benefits 优势:

- Reduced HSE exposure 减少HSE问题
- Shortened cycle times 缩短作业周期
- Reduced NPT 减少非生产时间
- Increased productivity 增加生产效率
- Improved service quality 提升服务质量



# Q10™ Pumping Units

## Q10™ 压裂泵

OEM Equipment Builder



### Q10™ Pump

	Legacy Pump 传统泵车	Q10
Pressure (psi) 施工压力	10,000	10,000
Rate (bpm) 施工排量	8.16	8.16
HHP水马	2000	2000
F.E. Life时效	X	14X

### Benefits优势:

- Reduced NPT 减少非生产时间
- Improved Service Quality 提升服务质量
- Duty cycle appropriate 优化作业周期
- Total lifecycle model 提高总泵注周期

# Environmental Advancements in Fracturing Technology

## 着眼于环保的先进压裂技术



### ADP™ Advanced Dry Polymer Blender 高级干粉连续混配车

- Introduces gelling agent in dry powder form into fracturing fluids  
直接用干粉配制压裂液
- Mix directly with water eliminating the need for carrier fluids (mineral oil)– LGC no longer needed  
干粉直接和水混配压裂液，消除了对携粉液（如柴油）的使用
- No more fluid is mixed than required for the treatment  
实用实配



# Halliburton's Frac of the Future Equipment

## 哈里伯顿压向未来设备体系

Reduced NPT  
降低非生产时间

Reduced emissions  
降低对环境的影响

Reduced footprint  
降低占地面积

Reduced HSE exposure  
降低HSE风险

Reduced labor requirements  
降低劳工数量



Improved productivity  
提高生产效率

Enhanced Service Quality  
增强服务质量

Real time job optimization  
实时工作优化

Improved inventory management  
优化库存管理



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**Customized Chemistry**  
**定制化学品**

**Solving challenges.™**

# AccessFrac<sup>SM</sup> Stimulation Services

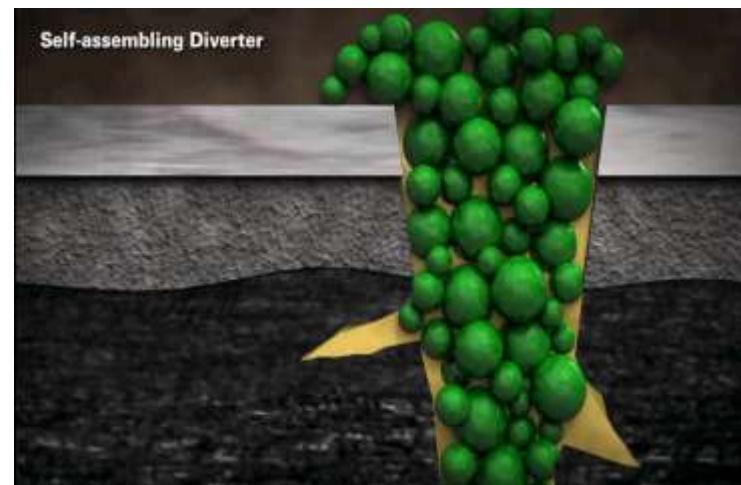
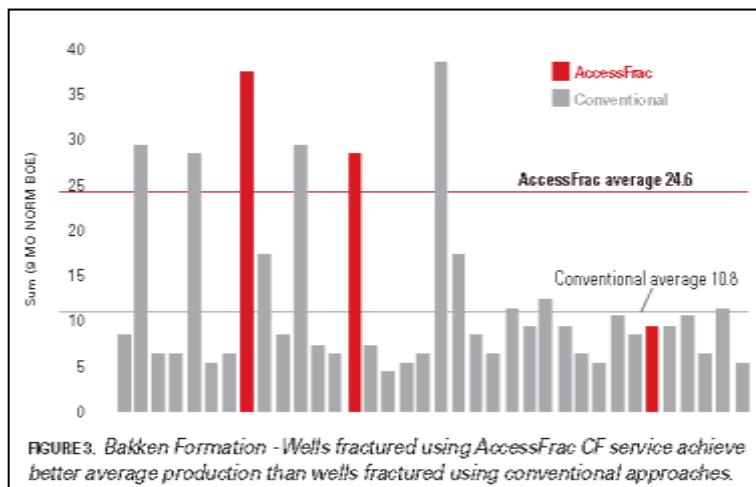
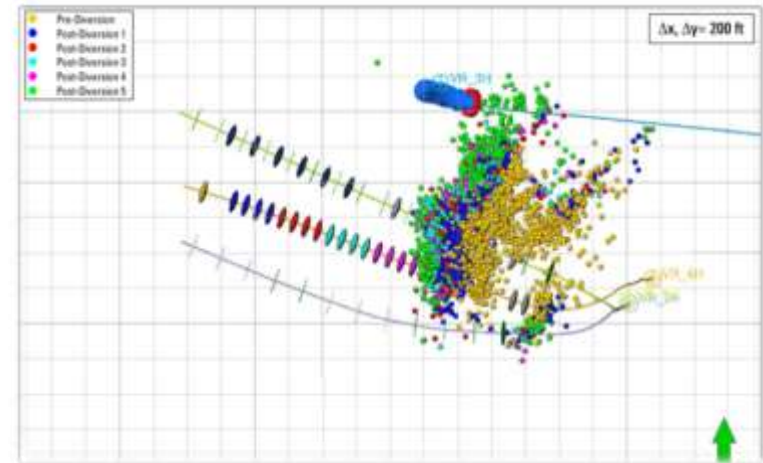
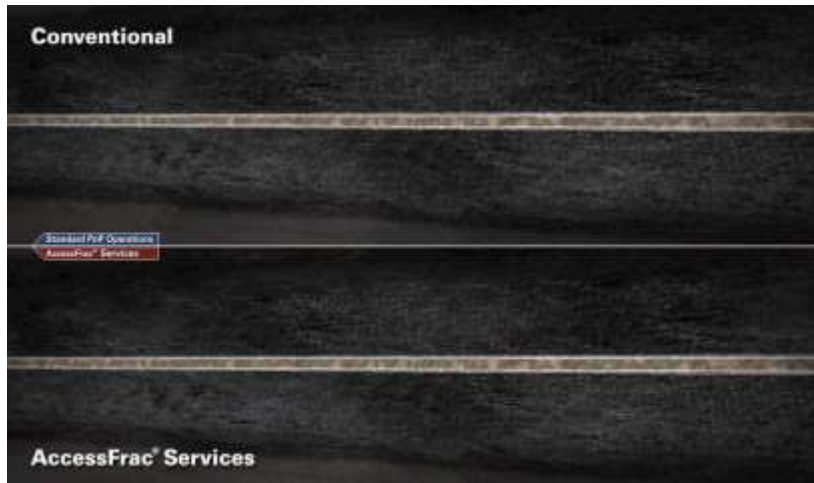
## AccessFrac<sup>SM</sup>通道导向压裂技术服务





# Access Frac<sup>SM</sup> Stimulation Services

## Access Frac<sup>SM</sup>通道导向压裂技术服务



# AccessFrac<sup>SM</sup> Case Study: China HPHT Well

## AccessFrac<sup>SM</sup>通道导向压裂技术服务案例：中国高温高压井



70m<sup>3</sup> Proppant | 加砂70m<sup>3</sup>

2300m<sup>3</sup> Fluid | 泵入液体2300m<sup>3</sup>

Complete 3 Stages in 7Hrs | 7小时内完成3层压裂施工

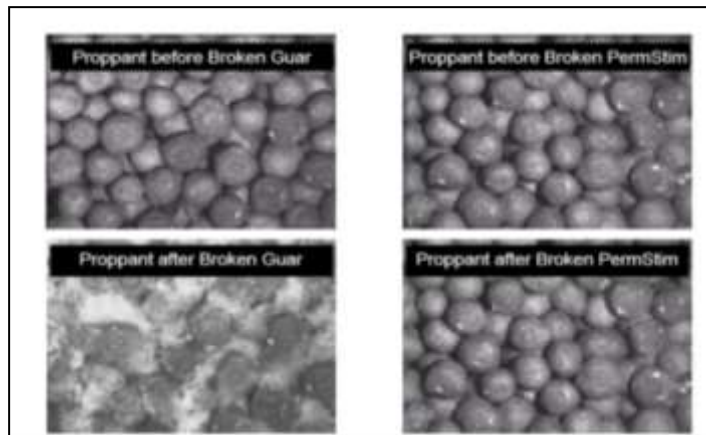
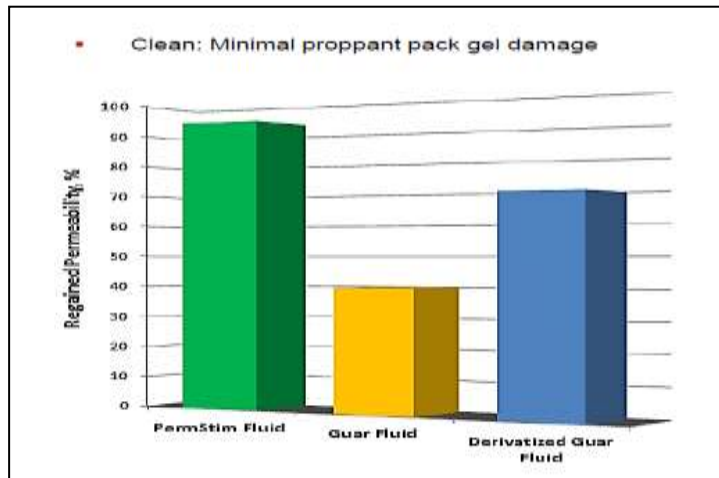
2 Divert Stages | 2次转向



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# PermStim® Fracturing Service

## PermStim®超清洁压裂液体系



### Laboratory simulation of this process included:

- breaking frac fluid for 24 hours at reservoir temperature
- flowing ten pore volumes of the broken fluid through a 20/40 mesh proppant pack
- determining the permeability damage to the proppant pack

### Gel Residue

PermStim → <<1%  
 Guar → 8-15%  
 HPG → 5-9%  
 CMHPG → 2-5%



# History of Halliburton Water-Based Frac Fluids and Services

## 哈里伯顿水基压裂液发展历程和服务

1969 HyGel™/LoGel™  
 1972 VersaGel™  
 1974 Kleer-Gel™ II  
 1977 AcidGel Frac II™  
 1982 VersaGel™ HT  
 1986 Pur-Gel™  
 1986 Thermagel™  
 1987 BoraGel™  
 1991 HyborGel™  
 1997 Delta Frac®  
 2001 HMP  
 2002 SilverStim® LT  
 2002 Sirocco®  
 2003 SeaQuest®  
 2004 DeepQuest®  
 2005 pHaserFrac®  
 2008 OmegaFrac®  
 2009 XTS  
 2010 CleanStim®  
 2011 PermStim<sup>SM</sup>  
 2012 UniStim™

Decade 年代	Technology 技术
1940	Oil and Viscosified Oil Frac 油和增粘油压裂
1950	Viscosified Water 增粘水
1960	Crosslinked Fluids 胶联液
1970	Foamed Fluids 泡沫压裂液
1980	Improved Breakers 改进的破胶剂
1990	Reduced Polymer Fluids 低稠化剂浓度压裂液
2000	Reduced Residue Fluids 低残渣压裂液
2010	Guar-Free, Green Fluids 非胍胶基环保压裂液
2012	High TDS Crosslink Fluids 抗高矿化度基液压裂液

# UniStim™ Hydraulic Fracturing Fluid System – What is it?

## UniStim™ 水力压裂液体系-它有什么特别的吗？

■ High performance hydraulic fracturing fluid system that enables operators to use 100% produced or flowback water  
可以完全用返排液配制的高性能压裂液体系

■ Crosslinked gelled water system that has the ability to tolerate salt concentrations in excess of 300,000 ppm, as well as other contaminants

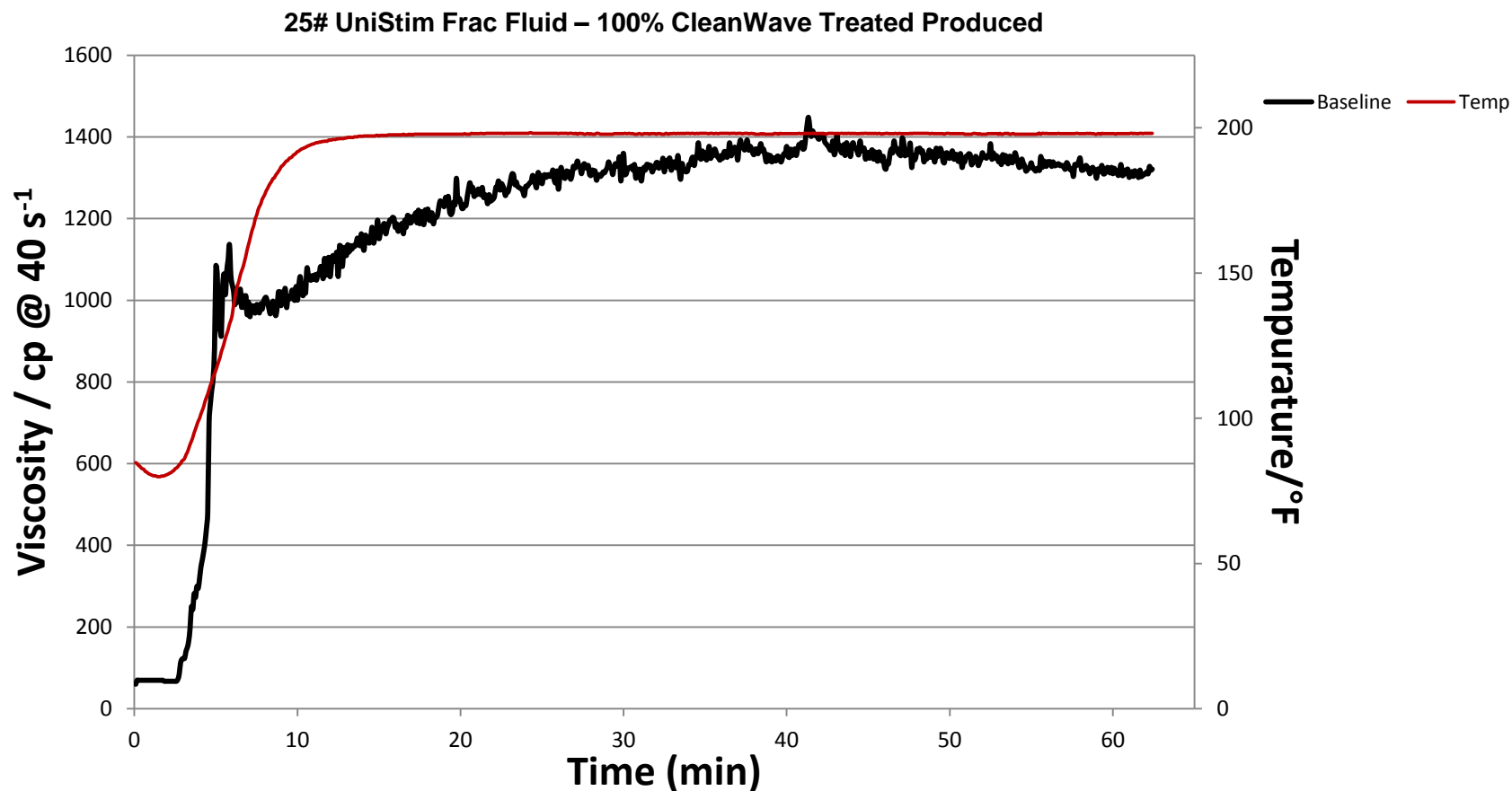
胶联胶体系，可以和高于300,000ppm含盐度的水质配伍，对水中所含的其他杂质也有免疫力



Bakken SWD – CleanWave® Treated 100%

25 lb UniStim™ Frac Fluid at 200°F

巴肯废水重复利用案例-200°F下25磅稠化剂浓度UniStim压裂液体系





# Challenges Addressed Using 100% Recycled Water

## 100%废水重复利用的挑战

■ Meet the needs of a growing fracturing market

- 快速发展压裂市场的需求

■ CleanWave® system treated 17,777,428 gallons of 100% produced water for 60 different wells for a total of 260 stages frac completions.

- CW 返排水处理系统已有可观业绩

■ Success on all 260 stages in water >270,000 TDS with no crosslink issues and no scaling issues

- 迄今CW返排水压裂液复配成功率达100%

■ No production decrease vs. fresh water

- 井压后产量和用淡水配制压裂液效果一样

■ Avg. savings \$100-200K per well

- 平均每口井节约10-20万美元





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**Subsurface Insight**  
**洞悉井下储层特点**

**Solving challenges.™**

# CYPHER<sup>SM</sup> service: What is it?

## CYPHER<sup>SM</sup> 服务：有什么特点？

Seismic-to-stimulation solution that provides asset understanding, planning, and engineering for shale and tight reservoirs

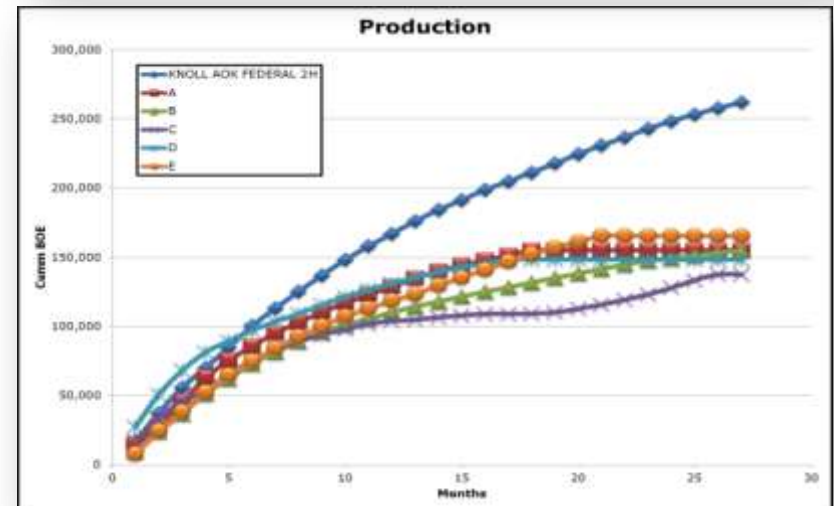
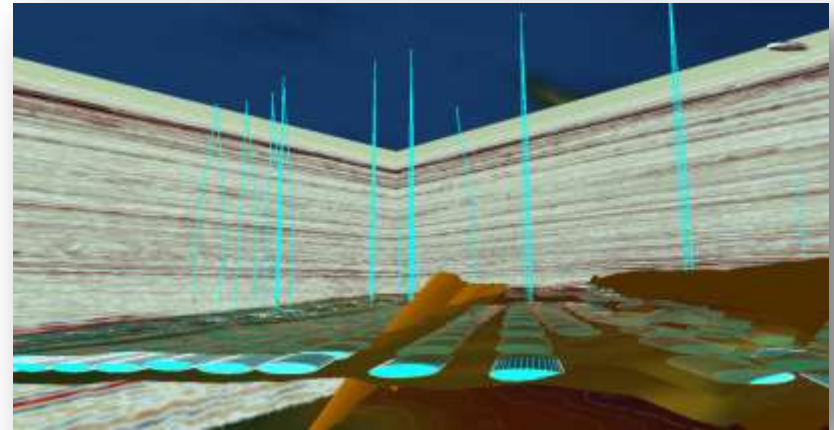
- 通过“地震分析到增产方案”一体化研究，深入了解储层，为页岩和致密油气藏开发提供针对性方案

Identifies key reservoir attributes to determine optimal well placement and completion design

- 识别储层关键属性，优化钻完井设计

Can help deliver maximum productivity at lowest effective cost

- 降本增效

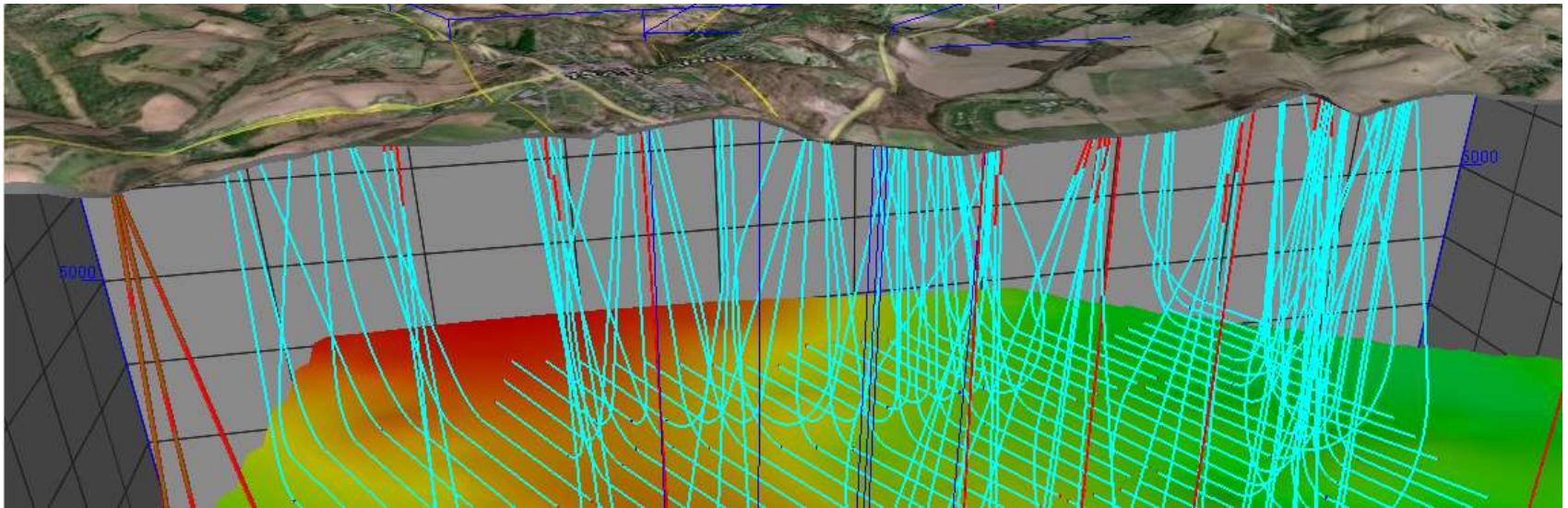




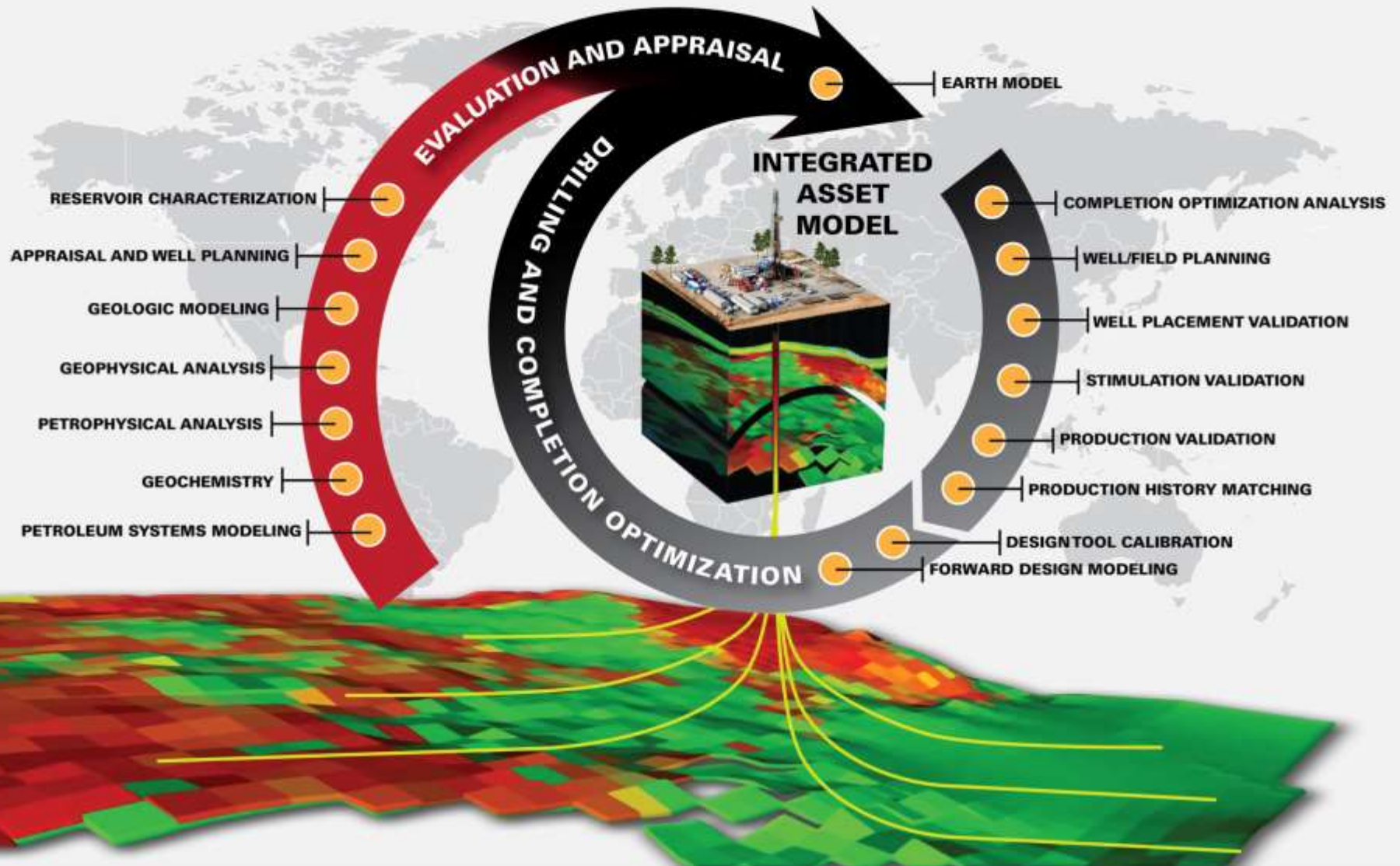
# The CYPHER service can help:

## CYPHER服务的作用：

- Enhance asset profitability - 增加油气井资产收益率
- Reduce risk and eliminate trial and error - 降低风险，消除反复试验摸索
- Maximize production while minimizing costs - 降本增效
- Maximize the net present value - 最大化净现值



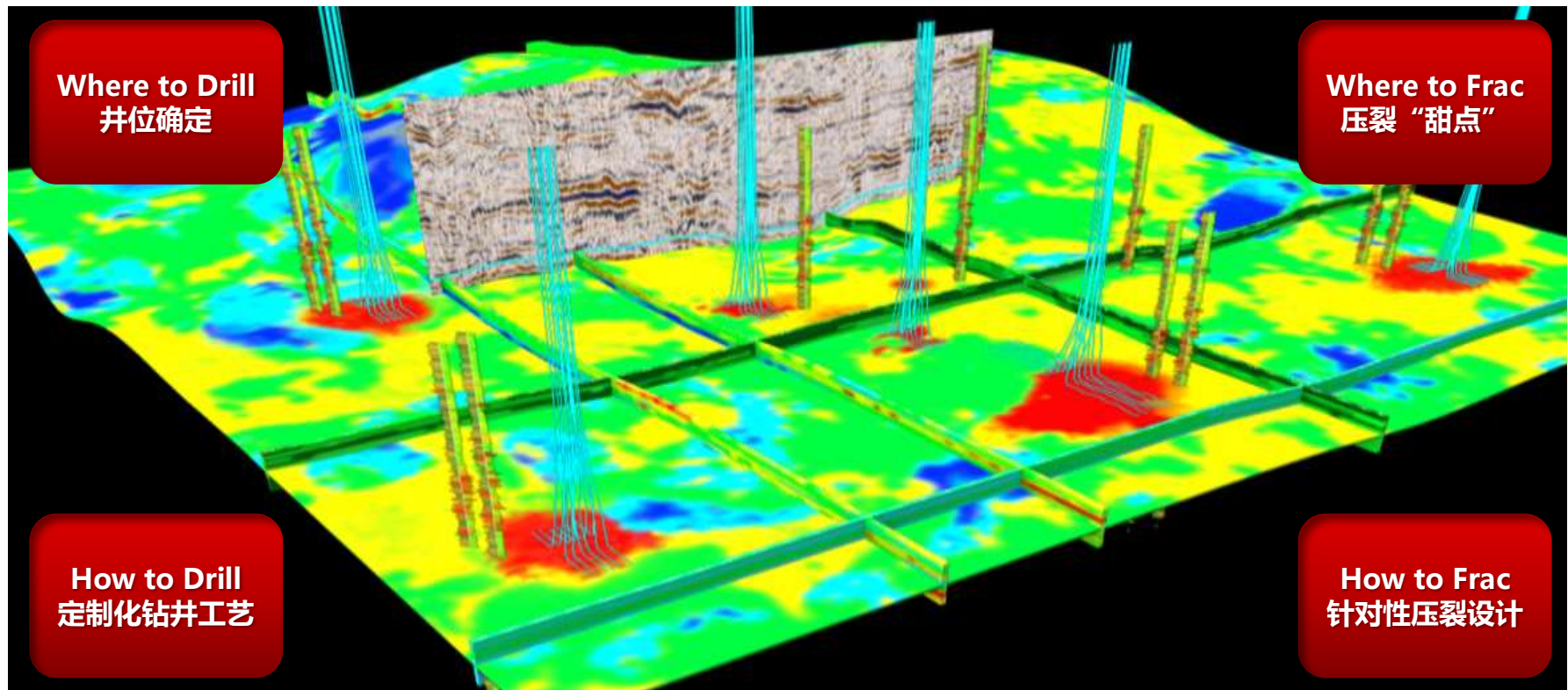
# CYPHER<sup>SM</sup> Seismic-to-Stimulation Service





# CYPHER™ Seismic-to-Stimulation Service

## CYPHER™从地震到增产一体化服务



### CYPHER<sup>SM</sup> Service

- Common data platform, multi-user capability | 常规数据集成平台，提供多用户操作接口
- All reservoir & well information in a single environment | 所有储层信息和井数据落于一个单独处理环境
- Links data to drilling to fracturing to production for best performance for the basin or individual well | 关联整个盆地或任意单井的钻井、压裂和生产数据，最大程度挖掘储层潜力
- Collaborative environment | 协同化的操作环境
- Continuous learning and optimization | 可持续学习和优化的平台



# Summary小结

■ The challenge is to pair mother nature with technology

- 技术方案必须和储层特点紧密关联:



■ The Keys to Success in Unconventional in North America today go beyond this with

- 北美非常规成功开发的其他核心因素:

- Development scale economies reducing costs and allowing for efficiency gains
  - 通过增加总工作量来降低单井成本并提高效率.
- Tailored solutions for unique subsurface conditions – because every field reservoir and play is different
  - 针对特定储层特点提出针对性方案—因为每个储层都不一样.
- Subsurface information integrated & leveraged immediately & constantly to make better decisions throughout asset lifecycle
  - 洞悉储层特点，才能在整个油气田开发周期作出最佳决定

The graphic features a large red chevron pointing downwards, which serves as the background for the Halliburton logo. The chevron is flanked by three images: an offshore oil rig on the left, an aerial view of an onshore drilling site in the top right, and a 3D seismic cross-section of a wellbore in the bottom left.

**HALLIBURTON**

谢谢 - *Thanks*

Brady Murphy

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