

*“The ULTRADRIL\* drilling fluid system exhibits near oil-base fluid performance and cuttings were hard and dry.”*

Operator Drilling Superintendent

**Well Information**

Location ..... Bohai Bay, China  
 Dates..... 2004 to 2008  
 Hole angle .....Horizontal landing up to 70° tangent section  
 Interval drilled..... 12¼-in. intermediate interval  
 Number of wells..... 100 development wells to date  
 Mud weight..... 9.8 lb/gal (1.18 SG)

**The Situation**

The operator required a highly inhibitive, environmentally acceptable and cost-effective drilling fluid for a multiple-well, multiple-platform development campaign in Bohai Bay, North China.

The formation consists of highly reactive shale interbedded with sandstone and some conglomerates. Offset wells drilled with KCl-PHPA fluids experienced bit and borehole assembly (BHA) balling, wellbore instability and washouts. Trips required extensive back reaming and packoffs and whole mud losses were encountered.

Local environmental regulations did not allow discharges of oil- or synthetic-base fluids and the implementation of waste injection or other forms of waste recovery was to prove costly.

**The Solution**

M-I SWACO engineers proposed the high-performance ULTRADRIL water-base fluid. The system and its components were tested and approved for discharge to the sea by local government authorities. Trial wells using KCl ULTRADRIL fluid impressed the operator; cuttings produced were hard and dry and showed the typical PDC conformation. Rate of penetration was improved, no balling was encountered and trips were much less problematic.

The ULTRADRIL system contained 3% ULTRAHIB\*, 3% ULTRAFREE\* and 3 lb/bbl (8.6 kg/m<sup>3</sup>) ULTRACAP\* in 7% KCl brine with 10- to 20-lb/bbl- (28.6–57.2 kg/m<sup>3</sup>-) sized calcium carbonate to assist in fluid-loss control and maximize the filter-cake quality.

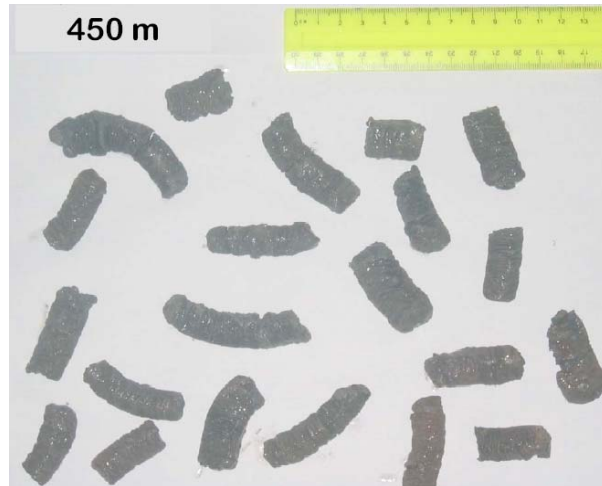
**The Results**

To date more than 100 development, appraisal and exploration wells have been drilled using ULTRADRIL fluid. This includes regional record step-out-ratio extended-reach wells, a high-temperature exploration well and many high-angle, long-tangent development wells. On one well of note the top drive failed during the drilling of a 12¼-in. interval and the drillstring was suspended in the open hole for five days while waiting on parts. The pipe was reciprocated over a stand and the fluid circulated at low rates over this time. When the top-drive drilling system was repaired the BHA was back-reamed out of hole, tripped-in without incident and the well drilled to total depth (TD). The trip out at TD was trouble-free and the 9⅝-in. casing was run and cemented successfully.



## The Details

Typical ULTRADRIL System Properties	
Mud weight, lb/gal	9.8
KCl concentration, %	6–8
ULTRADRIL, %	3
ULTRAFREE, %	3
ULTRACAP, lb/bbl	3
6 rpm	14–16
3 rpm	12–14
PV, cP	25
YP, lb/100 sq ft	25–35
API FL, mL/30 min	3–5
pH	9.5
Solids %	6
MBT, lb/bbl	1.5 to 5



Typical cuttings quality.

### *Questions? We'll be glad to answer them.*

If you'd like to know more about the ULTRADRIL system and how it's performing for our other customers, please call the M-I SWACO office nearest you.

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