

"The IFE team was involved from planning the well to helping design the site location, to preparing the environmental program and final disposition of the waste. The operator was very pleased that we met all the objectives for the project, especially in reducing the time and costs."*

Don Kissum, IFE Regional Coordinator

Well Information

Location Colombia
Spud/Completion July 4, 1998/August 2, 1998
Total footage spilled 11,000 ft (3353 m)
Mud system Partially Hydrolyzed Poly Acrylamide (PHPA)

The Situation

An operator drilling in the foothills of Colombia selected the M-I SWACO INTEGRATED FLUIDS ENGINEERING* (IFE) program for a challenging well. The IFE project team was involved from the very beginning of the project, from helping design the site location, to preparing the environmental program and final disposition of waste.

On the basis of local experience, the operator planned for 50 days to reach TD in the 11,000-ft (3353-m) well, with another 19 days estimated for site closure.

The Solution

M-I SWACO prepared a detailed IFE drilling-fluid, solids-control and waste-management plan for the well. The M-I SWACO team recommended a semi-dispersed PHPA drilling fluid system based on its excellent hole inhibition, high penetration rates, and cost effectiveness.

Early in the project, the IFE engineer stressed the importance of maintaining good flow properties and minimizing low-gravity solids content to achieve high rates of penetration (ROP). Other important objectives were the need to minimize mud volumes and generated waste.

The Results

By employing the M-I SWACO IFE program, the operator dramatically reduced both the planned drilling time and the estimated site-closure time. The well was drilled in only 30 days, which constituted a 40% reduction from the planned costs. Site closure was achieved in only 16 days, which was three days less than the plan (15.8% reduction in the planned costs).

Based on an average daily operating cost of \$78,454/day, the 20-day savings translated into an aggregate \$1.5-million cost reduction for the operator.

Although the amount of equipment and number of personnel increased, using the M-I SWACO IFE approach resulted in a 39% reduction from the planned drilling-fluid, solids-control and waste-management costs. Savings came from the reductions in drilling-fluid volumes and dilution, waste-volumes, and waste-treatment costs.



M-I SWACO surpassed several performance benchmarks on this project, including:

- A 12.5% improvement in solids-control efficiencies over the planned 80% efficiency seen on other wells in the area
- The selected fluid systems resulted in near-gauge hole conditions and reduced cuttings volumes
- The improved solids-control efficiencies, good fluid inhibition and recycling/reuse of mud resulted in reduced volumes of waste and mud required to drill the well. These improvements are evident in the average mud cost/bbl of hole drilled and mud-to-cuttings ratio benchmarks
- The average dilution rate for the well was 4.02:1—a 65% improvement from the plan
- Through efficient management of the different water sources at the rig-site, actual water-treatment volumes were 26% less than expected.

This level of success resulted from early and thorough planning, integrating the fluids, solids-control and waste-management technologies and systems, forming a cooperative wellsite team, and efficiently executing the plan.

The Details

To achieve the goal of minimizing fluid volumes and waste generation while achieving the ROP goals, M-I SWACO created a complementary solids-control/waste-management plan to minimize dilution requirements, reduce waste generation, and facilitate recovery and recycling of the drilling fluid. To achieve maximum efficiency, the M-I SWACO ALS* shakers were fitted with fine-mesh screens and used in conjunction with a mud cleaner and centrifuges to maintain solids content and reduce dilution volume.

M-I SWACO established an operating schedule for the equipment for each interval of the hole based on the interval size, anticipated drilling rate and efficiency of the rig solids-control equipment. Mud volumes that were normally dumped, such as sand-trap volumes, were processed and recycled.

During trips, the mud cleaner screens were used to remove sand, after which the mud was processed through the centrifuge and returned to the active mud system. The team used a similar process to recover mud from the cement-lined cuttings pits.

Fewer Days to TD Statistical Summary

Category	Planned	Actual	Percentage Improvement
Days to drill	50	30	40
Days to close location	19	16	15.8
Total	69	46	33

Fluids and Solids-Control Performance

Category	Planned	Actual	Percentage Improvement
Solids control efficiency, %	80	90	12.5
Average dilution rate	11.75	4.02	65
Mud cost per foot drilled	\$39.02	\$7.20	81

Note: Planned volume and cost numbers are based on a washout of 20%, solids-control efficiency of 80% and dilution required to maintain low-gravity solids at less than 6%. Actual values were determined using caliper log data.

Questions? We'll be glad to answer them.

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



This information is supplied solely for informational purposes and M-I SWACO makes no guarantees or warranties, either expressed or implied, with respect to the accuracy and use of this data. All product warranties and guarantees shall be governed by the Standard Terms of Sale. Nothing in this document is legal advice or is a substitute for competent legal advice.