

# China: WELL COMMANDER successfully activated with flapper valve to stop losses

“The WELL COMMANDER\* functioned flawlessly with two operating and one isolation ball dropping through a flapper-type float valve above the WELL COMMANDER tool”

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## Well Information

Location ..... Sichuan China  
 Date ..... March 2011  
 Tool type ..... 8 ¼ in. WELL COMMANDER  
 Hole Size ..... 12 ¼ in Hole Section  
 Mud type and density ..... Polymer mud 13.3 Kpa/m (11.3 lb/gal) 1.36 s.g.

## The Situation

A China operator experienced losses and kicks while drilling the 12 ¼ in. section of an onshore well. Owing to the predicted losses in this section, as a contingency the operator needed to pump lost circulation material (LCM) pills while drilling. The operator preferred to use a tool that would ensure full isolation of the BHA to avoid tripping out of hole. The well characteristics required float valves be incorporated in the string to help control the expected kicks.

The drilling team’s main concern was passing any and all circulating sub activation balls through the float valve and avoid potential blockage of the drill pipe should wireline be required. Normally circulating tools require darts or balls to be retrieved or use activation balls of increasing sizes, therefore raising the need to pass the through flapper valves when multiple cycles are needed.

## The Solution

M-I SWACO Specialized Tools recommended the WELL COMMANDER multi-ball-activated drilling valve. The tool would comprise a flapper type float valve above the WELL COMMANDER valve to serve as a barrier for any kick during the circulation through the open ports of the tool. The WELL COMMANDER tool would allow the operator to accurately place the LCM while isolating the sensitive BHA below it. The flapper-type float valve ID was designed to be large enough for the smooth passage of the WELL COMMANDER operating ball. Should losses occur while drilling, the WELL COMMANDER could be opened by dropping the balls through the flapper valve and pumping the required LCM. After successfully curing losses, the WELL COMMANDER could be closed with the ball pumped through the flapper valve to re-establish circulation through the bit and allow continued drilling without the need to pull out of hole. With its unique BYPASS BALL CATCHER, the WELL COMMANDER is designed to allow the tool to function when wireline is run through the tool and even after activation balls from multiple cycles have been dropped. The operator agreed to conduct a field trial.

## The Results

A field test was first performed to establish whether the WELL COMMANDER activation balls would pass through the flapper valve. The drilling BHA with 8 ¼ in. WELL COMMANDER tool comprising the BYPASS BALL CATCHER and flapper float valve was run in the hole to drill the 12 ¼ in. section. While drilling at 2,498 m (8196 ft) a static loss of 8m<sup>3</sup>/hr (50.3 bbl/hr) was observed. The 8 ¼ in. WELL COMMANDER valve was opened and closed successfully by pumping balls through the flapper valve. The tool facilitated the pumping of two volumes of 15 m<sup>3</sup> (94.3 bbl) LCM pills and successfully stopped the losses and allowed drilling to continue.

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## The Details

During the drilling operation, three WELL COMMANDER activation balls were dropped through the flapper valve to cure losses.

Flapper Valve ID	-	2.813 in.
Operating Ball OD	-	2.500 in.
BHA isolation Ball OD	-	2.438 in.

The 12 ¼ in. section BHA consisted of the bit, positive displacement motor (PDM) and a float valve below the BYPASS BALL CATCHER and WELL COMMANDER assembly, followed by the flapper valve and drill pipe above the tool. At 2498 m (8196 ft) with a 5° hole inclination, dynamic losses were observed. The BHA was picked up off bottom and pumping stopped. The pipe was connected to the trip tank to keep the well full. Static loss of 2 m<sup>3</sup>/hr (12.6 bbl/hr) was recorded, increasing to 8 m<sup>3</sup>/hr (50.3 bbl/hr) when the BHA was picked up one stand. At that point, it was decided to open the 8 ¼ in. WELL COMMANDER valve to spot the LCM and remediate the losses. The WELL COMMANDER opening ball was dropped and pumped down slowly. Pressure was built up to 1800 psi and a positive shear and pressure bleed off was observed, while circulating parameters confirmed the WELL COMMANDER tool was open. A BHA isolation ball was dropped and pumped slowly to isolate the entire BHA. The first volume of 15 m<sup>3</sup> (94.3 bbl) LCM pill (35 lb/bbl - 100 kg/m<sup>3</sup> of CaCO<sub>3</sub>) was spotted through the WELL COMMANDER ports and displaced with 30 m<sup>3</sup> (188.7 bbl) of drilling mud. The string was picked up another three stands to monitor losses. Static losses persisted at 8m<sup>3</sup>/hr (50.3 bbl/hr). A second volume of 15 m<sup>3</sup> (94.3 bbl) LCM pill (70 lb/bbl - 274.8 kg/m<sup>3</sup> of CaCO<sub>3</sub>) was pumped through the WELL COMMANDER and displaced with 30 m<sup>3</sup> (188.7 bbl) drilling mud. The loss rate decreased and the well was observed static after four hours. A circulation test was conducted with a flow rate up to 3,000 l/min (793 gal/m) after which the WELL COMMANDER closing ball was pumped down slowly. Pressure was applied to the string when the ball landed and again a positive shear with a pressure drop signaled the WELL COMMANDER tool was closed. This was verified after a comparison of the previous circulating rates. After successful curing of the losses, drilling the remaining 12 ¼ in. hole section continued without any further issues.

The WELL COMMANDER valve protected the sensitive BHA equipment whilst also saving a trip out of hole.

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

If you'd like to know more about our WELL COMMANDER tool and how they are performing for our other customers, please call the M-I SWACO office nearest you.



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