

DRILLING PROGNOSIS

WELL: **HE #5 => HORIZONTAL RE-ENTRY**

LOCATION: SHL: 736'FSL & 1573'FEL, SECTION 36, T38N, R18W
MONTEZUMA COUNTY, CO

W.O. No.

FIELD: HOVENWEEP / MCELMO

OBJECTIVE: LEADVILLE

ELEVATION: GL = 6490' EST.

A FOCUSED EFFORT WILL BE EXPECTED BY ALL PARTIES TO ELIMINATE ANY / ALL ACCIDENTS DURING THE EXECUTION OF THIS DRILLING PROJECT. NO H2S IS ANTICIPATED DURING ANY PHASE OF THIS OPERATION HOWEVER THE POTENTIAL DOES EXIST IN THIS AREA.

GEOLOGY / FORMATION TOPS

WELL PROGRAM

<u>FORMATION</u>	<u>TVD</u>	<u>SUBSEA</u>	
9-5/8" sfc csg	2920' MD		<p><u>CURRENT WELLBORE:</u> 9-5/8" 36.00# K-55 @ 2920', cmt'd w/ 1100 sks, good returns @ surface 7" 29.00#, 32.00# 13CR @ 8190', Cmt'd w/2000 sks, good returns. Open Hole Completion: Leadville => 8190' - 8336'</p> <p><u>WELL PREPARATION:</u> None required - Well was drilled 9/02 and is the current "tubingless" completion design</p> <p><u>KICK OFF PLUG:</u> RIH with 6" bit and circulate to TD @ 8336' Set a 100 sk cement plug => Class G +0.75% CFR + 0.1% HR-5 @ 17.5 ppg / 0.94 ft3/sk WOC ~24 hrs dress off cement to ~8198' with 6" bit</p> <p><u>DIRECTIONAL TARGET INFORMATION:</u> KOP @ 8198' TVD w/ a 4-3/4" bit Target Depth in the Leadville @ 8290' TVD, $\pm 1'$ - assume formation to be flat Entire curve is in the Leadville, a smooth curve w/ a consistant build rate of ~55°/60° per 100', this is a CRITICAL FACTOR FOR SUCCESS Target Inclination @ 90°, $\pm 2^\circ$, goal is to land the curve as close to the base of the good porosity in the Leadville @ ~91°, desired wellpath to be started up dip at this point Azimuth @ 0° $\pm 5^\circ$, least critical parameter Horizontal length of 2000' minimum w/ the desired length @ ~2500'+ GOAL: have 100% of horizontal footage in the Leadville - dissecting the 4 Leadville intervals</p> <p><u>SURVEY / BHA INFORMATION:</u> Run a complete gyro after dressing off the cement plug, if significant departure exists from a vertical well consult w/ engineering. Curve: 3.75° fixed angle motor, MWD, 2-7/8" AOH Drill pipe Lateral: 1.50° fixed angle motor, MWD, 2-7/8" AOH Drill pipe</p> <p><u>DRILLING FLUIDS:</u> Spotting and dressing off cmt plug: attempt w/ fresh water system, pump sweeps as needed for hole cleaning Curve + Horizontal: Fresh water, under balanced system will be used. NO BARITE OR NON-ACID SOLUBLE LCM WILL BE USED AT ANY TIME, consult w/ engineering if conditions are not conducive to fluids program.</p>
Upper Hermosa	4660'	+1830'	
Desert Creek	5945'	+545'	
Top of Salt	6145'	+345'	
Killer Shale	6605'	+115'	
Base of Salt	7535'	-1045'	
Lower Hermosa	7850'	-1360'	
Leadville	8134'	-1624'	
7" Prod Csg	8190' MD		
Open Hole	8336' MD		



OBJECTIVES:

- 1) Drill ~2000' of horizontal hole in the Leadville.
- 2) Maintain the hole preparation, drill, case and complete cost at \$900,000 or less.
- 3) A focused effort by all parties to eliminate any / all accidents during the entire program.

**RE-ENTRY PROGNOSIS
HOVENWEEP HE#5 => HZ RE-ENTRY PROJECT
MONTEZUMA COUNTY, COLORADO**

PROSPECT INFORMATION

The McElmo Dome HE #5 well was drilled in the summer of 2002 and is located in the western-most cluster in Hovenweep Canyon. Current well test results show the HE5 well to have a productive capacity of approximately 5 MMCFPD with little or no associated water. The HE5 is an attractive candidate for three reasons. First the HE5 has a very geologically similar open-hole section through the Leadville as did the HF1 well (2002 years horizontal re-entry well). Unlike most wells in the McElmo Dome, the HE5 section is primarily all tight Limestone as opposed to a set of tight-limestone/porous- dolomite sequences that are traditionally found in McElmo. Secondly, the HE5 has 13 chrome casing in the wellbore so the additional expense of some materials is bypassed. Thirdly, the HE5 has a 7" wellbore compared to the HF1 well that has 5" casing. The HF1 well has proven to be wellbore limited so if the same results are obtained with the HE5 a higher production rate can be expected with the larger wellbore.

WELL OBJECTIVE

The main objectives for the re-entry operation on the HE #5 are:

1. Successfully sidetrack off a cement plug, and drill a horizontal re-entry well in the Leadville with a total lateral length of ~2000'.
2. Maintain the hole preparation, drill and case cost at \$900,000 or less.
3. Have a focused effort by all parties on location to eliminate any / all accidents during the program.

POTENTIAL PROBLEMS

- 1) **Hole Preparation:** The goal during this part of the procedure is to identify major well problems, such as collapse or parted casing or major isolation problems. This should not be an issue since the HE #5 is only 2 years old. This will involve spotting a cement plug through the openhole section and dressing it off to the KOP.
- 2) **Drilling the Curve:** A smooth curve that lands close to the base of the Leadville porosity (middle of the Leadville formation), at near parallel, is the critical factor for success in meeting the goal of a re-entry with a lateral reach of ~2000'.
- 3) **Drilling the Lateral:** Maintaining a slight under balance fluid density while drilling the lateral is critical to allow us to reach the lateral length goal of 2000' and provide adequate hole cleaning.

KICK OFF PLUG

A 500' cement plug will be set through the open hole and into the 7" casing. Allow plug a minimum of 24 hrs to set up prior to dressing off. The plug design is as follows:

200 sacks - Class "G"+0.75%CFR + 0.1%HR-5 17.5ppg/0.94ft3/sk

DIRECTIONAL DETAIL

Surface Hole Location - Permit:	736' FSL	1573' FEL	Sec. 36
Bottom Hole Location - Permit:	2736' FSL	1573' FEL	Sec. 36
Surface Hole Location - Reference:	0' North	0' East	
Bottom Hole Location - Reference:	-2000' North	+0' East	
Kickoff Point:	8198' TVD / -1708'SS		
Azimuth:	0 degrees		
Minimum Build Rate:	~55/60 degrees / 100'		
Up Dip Rate:	0.5' / 100'		
Target Depths:	8134' TVD / -1644' SS	- Top Leadville	
	8160' TVD / -1670' SS	- Top Leadville porosity	
	8336' TVD / -1846' SS	- Base of Leadville	

- Survey Details:
- 1) Run a complete GYRO after dressing off the cement kick-off plug
 - 2) The GYRO will be used during the initial kick-off at 2' - 5' intervals, minimize usage due to expense.
 - 3) A MWD system will be used for the rest of the curve @ ~5' intervals and in the lateral section @ 30', 60', or 90' intervals.

The curve design is based on an average build rate of $\sim 55/60^\circ / 100'$. A smooth curve with a constant build rate is essential to achieve the desired lateral reach of $\sim 2000'$. The curve should be landed at $\sim 91^\circ$ in the middle of the Leadville @ $\sim 8170'$ TVD.

BHA INFORMATION

CURVE: 4-3/4" Bit, 3.60° fixed angle motor, MWD, 2-7/8" 10.40# Grade E Drill pipe.
LATERAL: 4-3/4" Bit, 1.5° fixed angle motor, MWD, 2-7/8" 10.40# Grade E Drill pipe.

GEOLOGIC SETTING

The geologic setting of the surface hole location for the HE #5 is on the far west flank of the McElmo Dome. The projected wellpath is an up dip direction estimated at $0.5^\circ / 100'$, resulting in a target inclination of $\sim 91^\circ$.

MUD PROGRAM

- 1) Well bore preparation and dressing off the cement plug will be attempted with a fresh/produced water system.
- 2) The curve and lateral sections of the well will be drilled with an under balance clean fresh/produced water system with PH control.

The following general guidelines should be noted:

- Maintain the fresh water system as clean and solid free as reasonably possible.
- Do not maintain any fluid loss control.
- DO NOT pump barite slugs.
- Do not pump any gel sweeps.

TELEPHONE NUMBERS

OFFICE #

HOME #

Houston Operations	Doug Frederick	(713) 369-9208	(281) 225-6960
Reservoir Eng.	Jim Skurner	(713) 369-8722	(713) 974-2038
Cement	Halliburton	(505) 324-3500	
Directional/Underbalance	Weatherford	(713) 874-6405	
Mudlog	Geo Xploration Steve Labowski	(970) 946 - 1235	

Recommended:

Approval:
