

***Well Planning to Reduce Costs Associated with
Borehole Instability in Western Canada***

***Abstract for a paper submitted for presentation at the
CADE CAODC Drilling Conference, May 17, 2005, Calgary, Alberta***

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Borehole instability and its consequences during well construction can take many familiar forms such as stuck pipe, poor hole cleaning, hole squeezing, lost circulation, severely enlarged hole, expensive drilling fluids, and difficult directional control. Many related problems can arise when these problematic boreholes are drilled to TD and are completed, including: uncertain formation evaluation, poor cement isolation, casing deformations, casing wear, and ineffective perforating. This presentation describes how several new innovations in borehole stability analysis have been used to reduce the high costs associated with borehole collapse, lost circulation and undesirable fracturing in a variety of difficult geological settings in Western Canada.

Over the past few years several new technical innovations have been used by AGI to reduce well costs for many operators including: colour polar plots to highlight risky well trajectories; new methods to account for the effects of natural fractures and bedding plane parallel weakness; predictions of the ultimate hole enlargement for a range of operating conditions, i.e., a virtual caliper log; calibration techniques that improve our confidence to forecast performance; and linkages to wellbore hydraulics and hole cleaning software. This paper will highlight several key learnings from the following cases: a challenging Foothills directional well; a coalbed methane horizontal well; a Mackenzie Delta well penetrating permafrost and gas hydrate; an oil sands horizontal well in a steam-affected area; and a directional underbalanced well drilled with coiled tubing.