Surface Margin in SPE Rule

ISCWSA Collision Avoidance Subcommittee guidance

Revision History			
Revision	Revision Details	Issuer	Date
0.1	Draft	Gary Skinner	March 2022

Purpose

This document expands the discussion on surface margin (*Sm)* in SPE paper SPE-187073, to provide a reference for people seeking to alter its value based on procedural changes.

Equation 1: SPE WPTS Rule

$$\frac{Dist - \left(HoleRad_{ref} + HoleRad_{off}\right) - Sm}{k\sqrt{\sigma_s^2 + \sigma_{pa}^2}}$$

Background

SPE-187073: Well-Collision-Avoidance Separation Rule defines a fixed-distance term for surface margin. It increases the Minimum Allowable Separation Distance (MASD) between two wellbores, and has a recommended default value of 0.3m.

SPE-187073 provides the following information

> *The surface margin term increases the effective radius of the offset well. It accommodates small, unidentified errors and helps overcome one of the geometric limitations of the separation rule, described in the Separation-Rule Limitations section. It also defines the minimum acceptable slot separation during facility design and ensures that the separation rule will prohibit the activity before nominal contact between the reference and offset wells, even if the position uncertainty is zero.*

Examples of unidentified errors (position uncertainties that may not have been accounted for) are underestimation of the WRP's position uncertainty, underestimation of project ahead uncertainty and the error model's underestimation of position uncertainty in large diameter near vertical hole sections.

Although possibly small effects, their omission can be a significant risk when centre to centre distances are small, such as when drilling from a pad, platform or template.

The recommended rule's project ahead term (σ_{pa}) and modifications to the Misalignment and SAG terms in rev 5 of the ISCWSA error model go a long way to accounting for these effects.

Adjusting Surface Margin

Surface margin may be reduced if all sources of surface uncertainty are accounted for, have been estimated conservatively, and feed into calculations of reference and offset well position uncertainty.

When looking to adjust surface margin a full engineering analysis and risk assessment should be performed and documented.

In tight drilling situations, a fixed reduction in centre to centre distance of 0.3m may still be a prudent safety factor.

Using Surface Margin for Ancillary Rules

The surface margin term can be used in ancillary, or planning, rules to create space-defined corridors to capture offset wells surrounding the planned wellpath that could pose a collision risk if there is deviation from the well plan.

Pre-identification of possible collision risk wells ensures they can be categorised, evaluated and documented before drilling commences. This alone is justification for including the Sm term in a well separation rule.