

Sealing, What Are We Risking?

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Abstract

Risking of oil and gas prospects is one of the fundamental activities in Hydrocarbon Exploration, with companies adopting very similar, but often slightly different risking schemes. Seal Risk is one of the elements of these risking schemes, but the exact definition and aspects covered by Seal Risk may vary, or can even be ambiguous. Below are just a few cases which may result in differences in Seal Risk assessment:

- It can have overlap with Structure Risk when fault seal is part of the trapping configuration. In order to avoid this ambiguity, Closure Risk, is proposed, which is the risk of having no closure irrespective top, base and lateral elements of its seal.
- An effective seal at time of charging does not guarantee retention of hydrocarbons post-charge. Sometimes retention is treated as a separate risk element, sometimes it is included as part of Seal Risk. It is proposed to explicitly include retention risk in the Seal Risk for consistency reasons.
- Seal effectiveness may be different for oil and gas.

For overall prospect risking, these subtleties should not matter, as long as they are (i) not overlooked (resulting in underestimation of prospect risk), or (ii) not included in multiple risk elements (with the risk of “double-dipping” and hence overestimation of prospect risk). However, in order to have a useful discussion on Seal Risk, it is essential to properly understand what actually is captured by it.

In addition to above subtleties in Seal Risk definition, the continued search for hydrocarbons is challenging some of the tradition concepts. As a consequence, the established risking schemes, including the concept of Seal Risk, may be too rigid to properly describe and assess the subsurface risk profile of a prospect. Some examples of this are:

- Non-buoyancy, unconventional systems (e.g. Shale Gas, Basin Centered Gas) do not obey the traditional concepts of charge generation, migration and trapping of conventional systems.
- Indications are emerging that some existing accumulations associated with recent restructuration have not equilibrated to their current structural configuration, and are transient between paleo-structure and current structure. In other words, these are accumulations “on the move”.

In both examples, it is difficult to define what Seal Risk actually is, and one should be careful to try to risk such opportunities in the straightjacket of a conventional risking scheme.

Therefore, Seal Risk should be treated as one (important) element of play and prospect risking. Established risking schemes can be useful as a start, but it is up to every explorationist to describe his or her opportunity and portray the risks transparently, which may require challenging these schemes and associated dogmas, and hence the concept and definition of Seal Risk.