[PS]Is It Trap? Is It Seal? A Move Towards Consistent Risking of Stratigraphic Traps*

Mark A. Sykes[1], J. Steve Davis[1], Christopher J. Vandewater[1], Samuel J. Plitzuweit[1], and S. Lance Jackson[1]

Search and Discovery Article #42492 (2020)**
Posted January 27, 2020

*Adapted from poster presentation given at 2019 International Conference and Exhibition, Buenos Aires, Argentina, August 27-30, 2019
 DOI:10.1306/42492Sykes2020

[1]ExxonMobil, Houston, TX, United States (mark.a.sykes@exxonmobil.com)

Abstract

Over the past decade, stratigraphic traps have been targeted for exploration drilling with increasing alacrity. As these endeavors have recorded notable success, it is likely that focus on these plays will continue. Pre-drill estimation of drilling success probability in this trap type is notoriously challenging, often because of confusion surrounding the definitions of the Trap and Seal geologic risk elements. Clarity during exploration is, however, essential if portfolio consistency is to be maintained. At the 2011 AAPG ICE, a Unified Upstream Risk Model was proposed to facilitate a common understanding of definition for nine independent geologic risk elements. This presentation is an elaboration of that scheme and focuses on the distinction between Trap and Seal. The issue is that the clear and simple distinction between the two risks in structural traps becomes potentially confusing in stratigraphic traps. The concept of Trap representing the presence of an antiformal configuration of reservoir rock; and Seal portraying the presence of a fine-grained capillary barrier immediately above the reservoir - is not so obvious in stratigraphic traps. The tangling arises because stratigraphic traps do not present an easily conceived view of Trap closure, i.e. a convex-upward structure. Similarly, Seal becomes perplexing because the presence of fine-grained rock above the reservoir only is no longer relevant. Rather, in stratigraphic traps, the presence of a capillary seal rock laterally adjacent to and below the reservoir must also be considered. Consequently, the differences between the two definitions can be unclear. The most common confusion revolves around into which risk element the up-dip pinch-out of reservoir resides. The same risk judgment is often assigned to both elements, thus double dipping. In addition, judgments are often assigned to the wrong element. Whilst the latter does not affect the overall estimated success chance of the prospect, it fails to accurately portray the geologic configuration of the prospect, rendering past-venture analysis inconsistent. Several schematics are here presented to outline the distinction between Trap and Seal in both trap types. As a codicil to the 2011 presentation on the Unified Upstream Risk Model, the authors offer this material as an opportunity to clarify Trap and Seal definitions in stratigraphic traps, an increasingly important component of many companies' global prospect inventories.

1072435

Is it Trap? Is it Seal?
A Move Towards Consistent Risking of Stratigraphic Traps

Mark A. Sykes, J. Steve Davis, Christopher J. Vandewater,
Samuel J. Plitzuweit & S. Lance Jackson
ExxonMobil Upstream Business Development
22777 Springwoods Village Parkway, Houston, TX 77389, USA

A: Abstract

Over the past decade, stratigraphic traps have been targeted for exploration drilling with increasing alacrity. As these endeavors have recorded notable success, it is likely that focus on these plays will continue.

Pre-drill estimation of drilling success probability in this trap type is notoriously challenging, often as a consequence of confusion surrounding the definitions of the Trap and Seal geologic risk elements. Clarity during exploration is, however, essential if portfolio consistency is to be maintained.
At the 2011 AAPG ICE, a Unified Upstream Risk Model was proposed to facilitate a common understanding of definition for nine independent geologic risk elements. This presentation is an elaboration of that scheme and focuses on the distinction between Trap and Seal.

The issue is that the clear and simple distinction between the two risks in structural traps becomes potentially confusing in stratigraphic traps. The concept of Trap representing the presence of an antiformal configuration of reservoir rock; and Seal portraying the presence of a fine-grained capillary barrier immediately above the reservoir - is not so obvious in stratigraphic traps.

The tangling arises because stratigraphic traps do not present an easily conceived view of Trap closure, i.e. a convex-upward structure. Similarly, Seal becomes perplexing because the presence of fine-grained rock above the reservoir only is no longer relevant. Rather, in stratigraphic traps, the presence of a capillary seal rock laterally adjacent to and below the reservoir must also be considered. Consequently, the differences between the two definitions can be unclear.

The most commonly encountered confusion revolves around into which risk element the up-dip pinch-out of reservoir resides. The same risk judgment is often assigned to both elements, thus double dipping. In addition, judgments are often assigned to the wrong element. Whilst the latter does not affect the overall estimated success chance of the prospect, it fails to accurately portray the geologic configuration of the prospect; rendering past-venture analysis inconsistent.

Several schematics are here presented to outline the distinction between Trap and Seal in both trap types. As a codicil to the 2011 presentation on the Unified Upstream Risk Model, the authors offer this material as an opportunity to clarify Trap and Seal definitions in stratigraphic traps, an increasingly important component of many companies' global prospect inventories.

B: Introduction *(Figures 1-3)*

Over the past decade, stratigraphic traps have been targeted for exploration drilling with increasing alacrity. As these endeavors have recorded notable success, During the risking of exploration opportunities, particularly stratigraphic traps, the distinction between the Trap Closure and Trap Seal geologic risk elements can be confusing. ExxonMobil here looks to clarify the distinction by way of a codicil to the 2011 presentation of its Unified Upstream Risk Model, in which all nine of the company's exploration geologic risk elements were described; the goal being to "Say What We Mean and Mean What We Say". This initiative promotes a common understanding of the definitions of the individual geologic risk elements between geologists and managers, thus promoting clearly informed investment decisions.

Topics

1. DEFINITION: Trap Closure
2. DEFINITION: Trap Seal
3. Application to Risking Stratigraphic Traps

Figure 01 - Topics
On this poster presentation the Trap Closure and Trap Seal geologic risk elements will be defined, and their pertinence to the risking of stratigraphic petroleum traps discussed.

Figure 02 - 2011 AAPG ICE Poster
The materials presented here are an elaboration of those first shown on this poster, presented at the 2011 AAPG ICE in Milan, ITA.

Figure 03 - Unified Upstream Risk Model
These concepts were condensed into ExxonMobil's Unified Upstream Risk Model; a tool that has been used by the company's geoscientists since 2011 to ensure consistency during their risking analysis of petroleum exploration opportunities worldwide.

C: Trap Closure risk element *(Figures 4-15)*

The Trap Closure geologic risk element describes the presence of a subsurface arrangement, geometry or configuration of rocks capable of detaining and retaining hydrocarbons migrated into the feature. It is important when risking exploration prospects to make a clear distinction between this Trap Closure geologic risk element and Trap Seal.

DEFINITION: Trap Closure

"The probability that a geometric geologic configuration of rock containing a significant accumulation of hydrocarbons exists in the sub-surface."

Trap configuration types include:

- four-way dip closures (anticlines)
- faulted anticlines ("three ways")
- fault-dependent closures
- closures against salt domes
- sub-crop closures
- stratigraphic traps

Figure 04 - Trap Closure - Definition
The Trap Closure risk element addresses the probability that a geometrical arrangement (configuration) of rocks exists in the subsurface that is capable of capturing and retaining a significant volume of hydrocarbons. A wide variety of such configurations are encountered in nature. Some of those more frequently encountered are listed here.

Geologic considerations:

- closure height
- closure area
- trap geometry
- trap complexity
- velocity control
- seismic coverage
- seismic quality
- alternate geophysical interpretations
- valid tests of similar trap configurations
- tectonic domain
- structural style

Figure 05 - Trap Closure - Geological Considerations
When evaluating the probability of a valid petroleum Trap Closure existing in the subsurface at a particular geographic location, interpreters should consider these geologic factors.

International Conference & Exhibition

AAPG ICE 2019

27-30 August Buenos Aires, Argentina

ExxonMobil

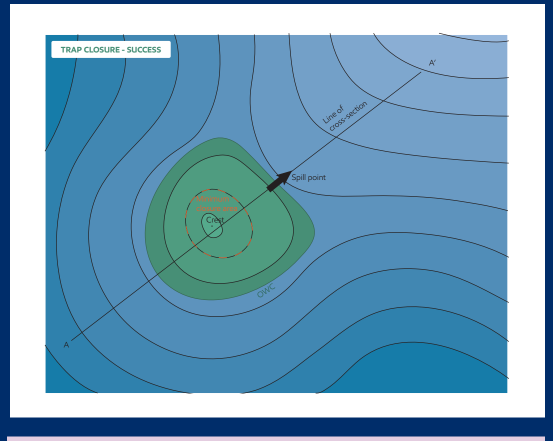

Figure 06 - Trap Closure - Success - Sufficient Closure - Full - Map
This map exhibits a geological feature demonstrating Trap Closure success. The trap's area (and height) are sufficient to collect and retain a significant volume of hydrocarbons, above a defined success minimum value – corresponding to a minimum success closure area. In this case, the trap is filled to the mapped spill point.

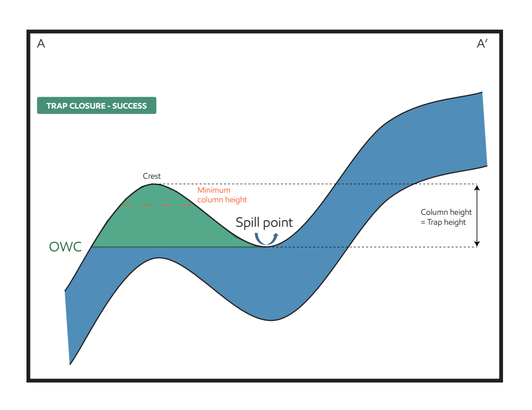

Figure 07 - Trap Closure - Success - Sufficient Closure - Full - X-section
The minimum closure area, featured on the preceding map, corresponds to a minimum column height when viewed in cross section. The actual trap (closure) height – down to the spill point, to which the trap is filled – exceeds this minimum amount and hence denotes success.

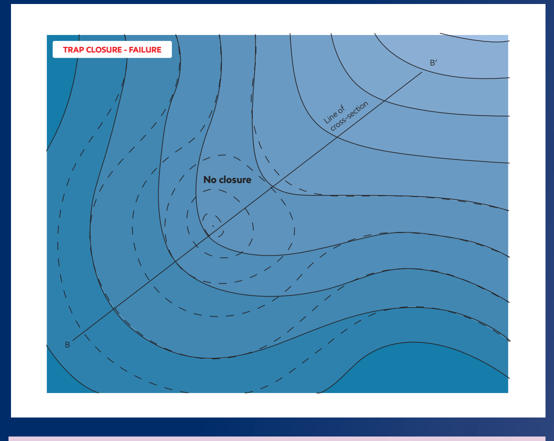

Figure 08 - Trap Closure - Failure - No Closure - Map
This map illustrates an example of Trap Closure failure. The mapped geologic structure (dashed contours) does not actually exist. No structural closure exists anywhere in the mapped area. Instead, the subsurface geologic configuration is a simple run of dip, a structural nose – indicated by the solid contours - plunging to the south-west.

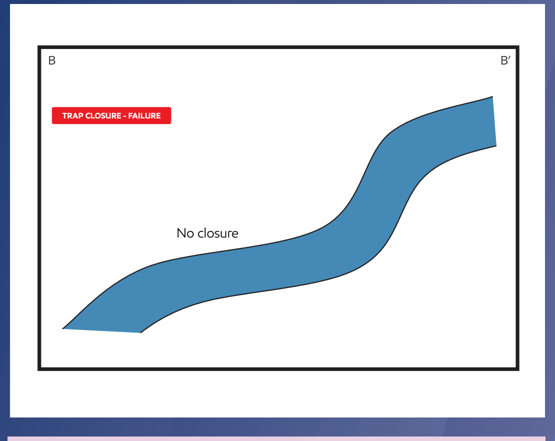

Figure 09 - Trap Closure - Failure - No Closure - X-section
There is no culmination present to entrap hydrocarbons in this geologic configuration. The mapped closure, represented by the dashed contours on the preceding map, does not exist. Instead, there is present merely a run of dip, allowing any inmigrating hydrocarbons to pass unimpeded through the mapped reservoir.

D: Trap Seal risk element

(Figures 16-25)

The Trap Seal geologic risk element describes the presence of an impermeable rock located above, below and alongside a valid geologic Trap Closure that is capable of preventing hydrocarbons migrated into the feature from escaping. It is important when risking exploration prospects to make a clear distinction between this Trap Seal geologic risk element and Trap Closure.

DEFINITION: Trap Seal

"The probability that a valid geologic trap will be adequately sealed above, around and below the interpreted reservoir, by sufficiently impermeable rock, such that a significant accumulation of hydrocarbons exists in the sub-surface."

Types of seals include:

- ❑ Bed seals
  - top seal
  - base seal
  - lateral seal
- ❑ Lithologic interfaces
  - salt
  - salt weld
  - igneous intrusion
- ❑ Fault seals
  - fault juxtaposition seal
  - fault gouge seal
- ❑ Rheologic seals
  - tar/bitumen seal
  - hydrodynamic seal
  - gas hydrate seal

Figure 16 - Trap Seal - Definition
The Trap Seal risk element addresses the probability that the reservoir within a geologic trap is adequately sealed above, below and adjacent such that a significant volume of hydrocarbons can be retained in the trap. The issue of base and adjacent seal adequacy is particularly relevant to stratigraphic traps and will be discussed later in the poster presentation.

Geologic considerations:

- thickness, continuity, heterogeneity, lithology, and facies of seal interval
- mechanical and capillary properties of seal lithology
- lateral transition from reservoir to seal lithology
- aquifer pore pressure
- fault throw relative to seal thickness
- amount of delta throw along fault trace
- properties of fault gouge, salt interface, salt weld, or unconformity
- presence of thief zones
- post-charge deformation or erosion (unconformities)
- timing of overburden (seal) deposition, relative to charge
- valid tests of similar trap-seal combinations

Figure 17 - Trap Seal - Geological Considerations
When evaluating the probability of an adequate Trap Seal existing in the subsurface at the same geographic location as a valid trap, interpreters should consider these geologic factors. A wide variety of seal lithologies are possible in nature – notably shale, but also shaly sandstone, cemented sandstone, tight carbonate rocks, salt, viscous hydrocarbons, and igneous and metamorphic rocks; often facilitated by faults, an unconformity or a weld.

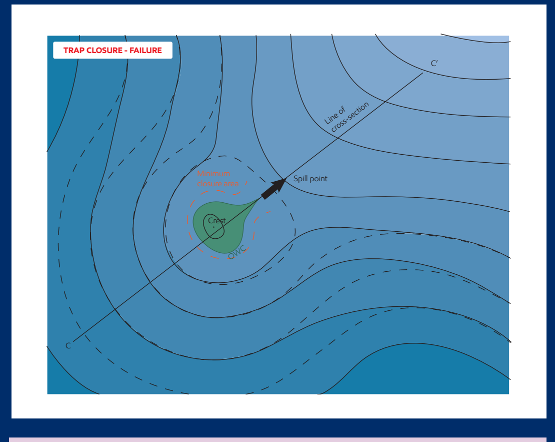

Figure 10 - Trap Closure - Failure - Insufficient Closure - Map
In this example, although a closure containing hydrocarbons is present where interpreted (solid contours), Trap Closure failure is illustrated. This is because the actual structure is smaller than mapped (dashed contours). It is not of sufficient area to contain a success-threshold minimum volume of hydrocarbons. Petroleum spills out of the structure before it can attain the minimum success volume. Therefore, although a small hydrocarbon accumulation is present, the feature is a failure.

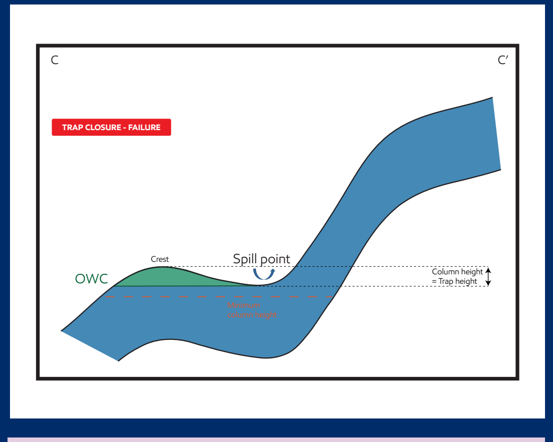

Figure 11 - Trap Closure - Failure - Insufficient Closure - X-section
The trap height - and therefore the maximum column height - attainable by the structure is shorter than the minimum success-case value. Entrapped hydrocarbons spill out of the structure at a point shallower than predicted, and before a minimum successful column height can be attained.

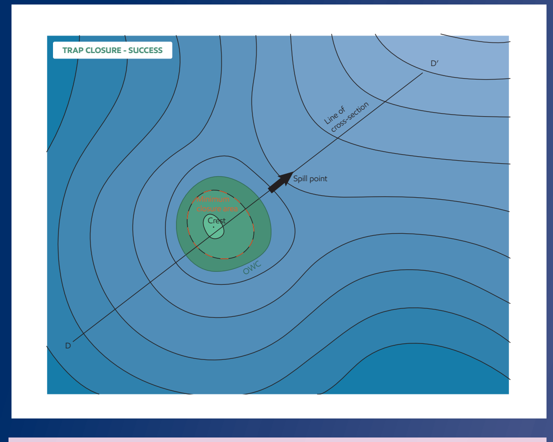

Figure 12 - Trap Closure - Success - Sufficient Closure - Underfilled - Map
Despite not being filled to the interpreted spill point, this map illustrates an example of Trap Closure success. This is because the structure is filled beyond its minimum success-threshold area. The underfilling of this trap, relative to the mapped spill point, may be a consequence of a number of geologic phenomenon, e.g. charge limitation, the presence of a leak point on the flank of the structure, or the exceedance of top-seal capillary or mechanical strength at the crest of the structure.

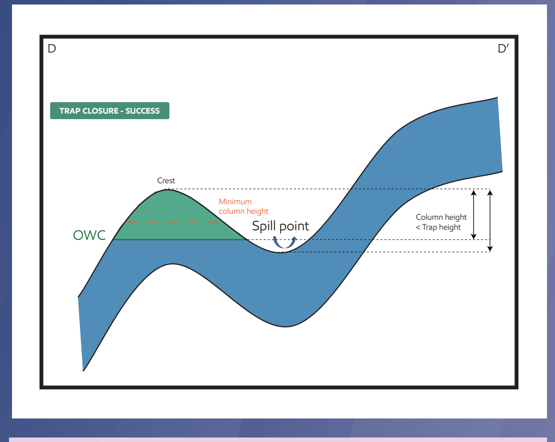

Figure 13 - Trap Closure - Success - Sufficient Closure - Underfilled - X-section
Although the hydrocarbons are not leaving the closure at the correctly-predicted mapped spill point, the culmination is able to fill beyond its defined minimum success-case column height. It is therefore a Trap Closure success, despite being underfilled, relative to its mapped spill-point elevation.

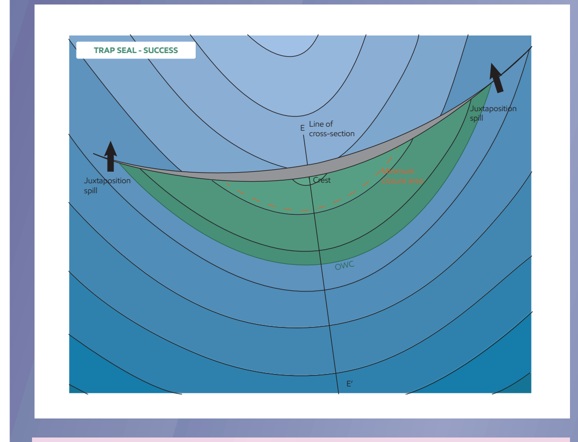

Figure 18 - Trap Seal - Success - Sufficient Seal - Full - Map
This map exhibits a geological structure demonstrating Trap Seal success. The structure's top seal and fault seal are sufficiently strong (adequate) to retain a significant volume of hydrocarbons within the trap – in excess of a defined success minimum, corresponding to a minimum success closure area. In this case the trap is filled to the mapped spill point, defined by reservoir self-juxtaposition across the fault.

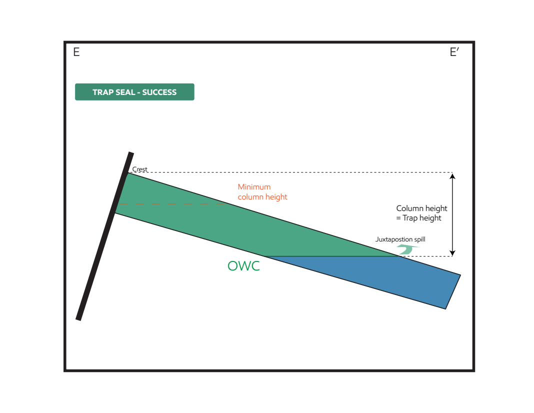

Figure 19 - Trap Seal - Success - Sufficient Seal - Full - X-section
The minimum closure area featured on the map corresponds to a minimum column height when viewed in cross section. The actual trap height – down to the spill point, to which the trap is filled – exceeds this minimum success value. The top seal at the crest of the structure, and the fault seal, all have to be sufficiently strong to facilitate success. Seal is only as strong as its weakest component.

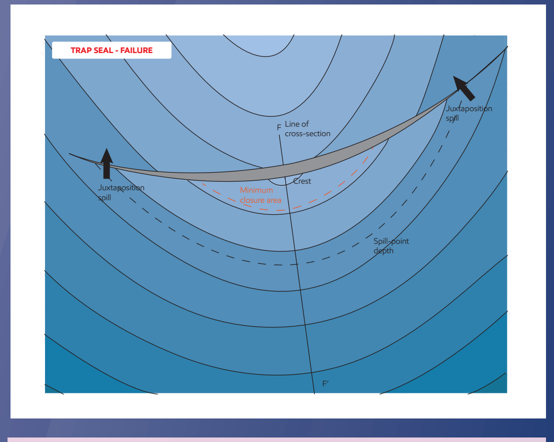

Figure 20 - Trap Seal - Failure - No Seal - Map
This map illustrates an example of Trap Seal failure. The structure's interpreted top and/or faults seals do not actually seal. Instead, any hydrocarbons which have inmigrated to the structure have either leaked up the fault plane or across the fault and into the overburden on the hanging wall.

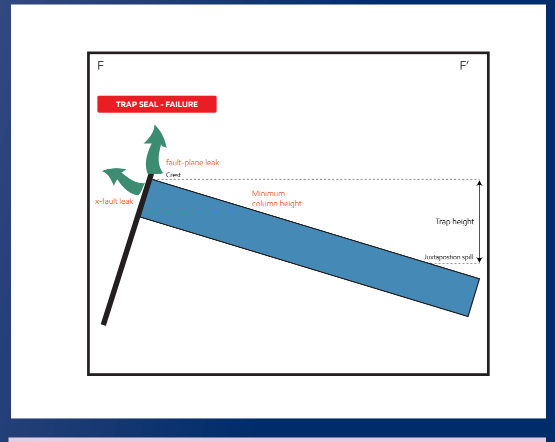

Figure 21 - Trap Seal - Failure - No Seal - X-section
There is no hydrocarbon retained in the trap. Any fluids that have migrated into the structure have been leaked out at the crest. This is an example of a completely dry (wet) trap.

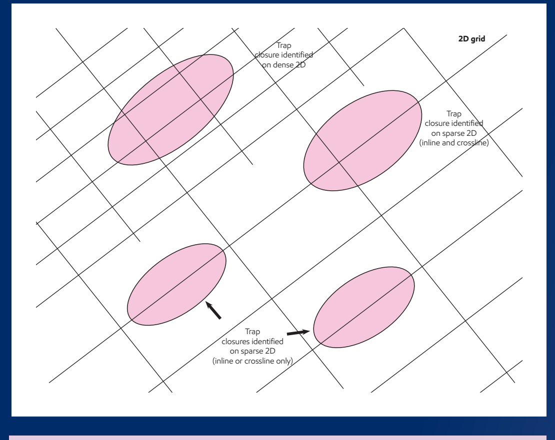

Figure 14 - Trap Closure - 2D to 3D Seismic - 2D
Trap Closure is notoriously difficult to define on 2D seismic. Where 2D coverage is sufficiently dense, it may be possible to confidently determine four-way Trap Closure at a mapped culmination. However, where 2D coverage is sparse, i.e. lines more widely spaced than the wavelength of structural traps in the mapped play, Trap Closure may be suspected on one line (either dip or strike) but cannot be confirmed in the other orientation.

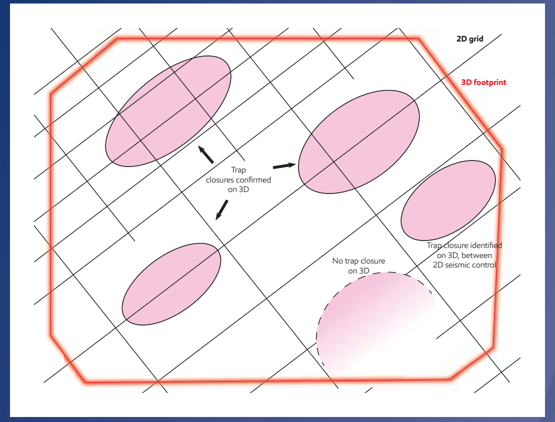

Figure 15 - Trap Closure - 2D to 3D Seismic - 3D
Trap Closure is much easier to confidently define on 3D seismic (of adequate quality at the depth of the mapped horizon). This is because the interpreted structure can be viewed in all possible azimuth orientations in order to determine flank dip. Structures initially mapped on sparse 2D seismic may have their Trap Closure either confirmed or disproven upon the acquisition and interpretation of 3D seismic over the same area.

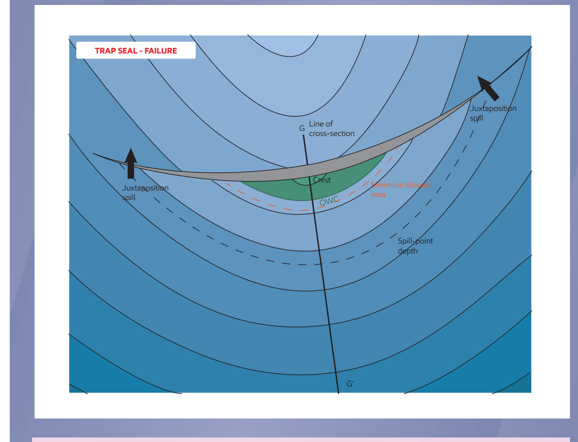

Figure 22 - Trap Seal - Failure - Insufficient Seal - Map
In this example, although a hydrocarbon accumulation is present at the crest of the structure, it does not fill to the minimum area necessary to be classified as a success. This is therefore an example of Trap Seal failure. The hydrocarbon column may have reached a top-seal breech on the flank of the structure, be juxtaposed against a thief sand on the hanging wall of the fault (closer to the crest of the structure than the self-juxtaposition spill points near the tips of the fault), or have exceeded the capillary strength of the sealing rocks in any of these locations.

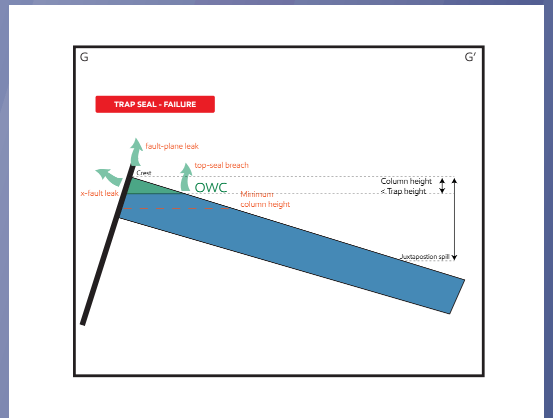

Figure 23 - Trap Seal - Failure - Insufficient Seal - X-section
The entrapped hydrocarbon column does not attain a minimum success-case height, as a result of compromised seal in one of the locations indicated. Therefore, although a small hydrocarbon accumulation is present, this is failure. The additional possibility remains that the presence of a short hydrocarbon column, failing to attain either the success minimum column height or the trap's spill point, may be a function of charge limitation. It is difficult to distinguish between a seal or charge issue under these circumstances.

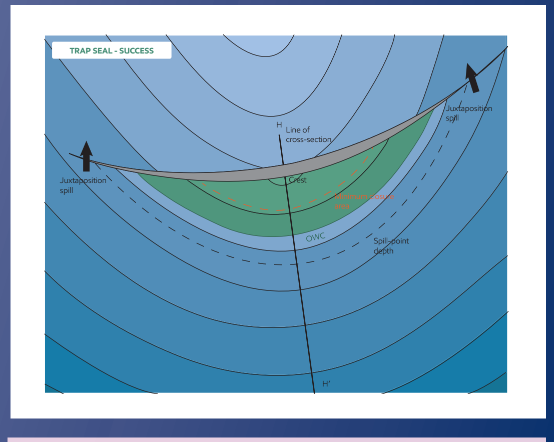

Figure 24 - Trap Seal - Success - Sufficient Seal - Underfilled - Map
Similar limitations to those exhibited in the previous example do not always result in hydrocarbons failing to fill the trap beyond its success-case minimum area. In this case, top-seal or fault-seal limitations occur once the hydrocarbon column has extended beyond the minimum area. It is thus an example of Trap Seal success.

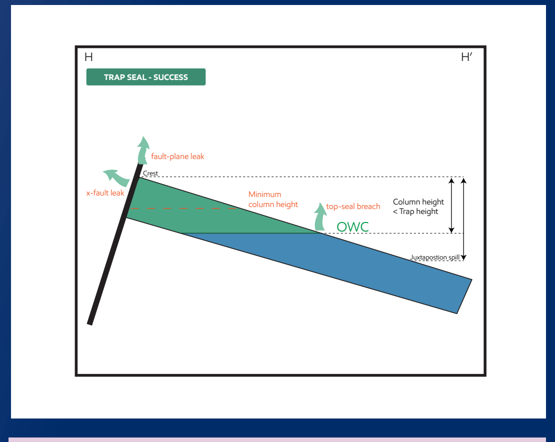

Figure 25 - Trap Seal - Success - Sufficient Seal - Underfilled - X-section
The apparently underfilled nature of the trap in this case could, as in the previous example, be a consequence of charge limitation. If, as is believed usually more likely, it is a Trap Seal issue, it is as a result of compromised top seal either at the crest of the structure, across the fault plane, or on the flanks of the structure.

E: Stratigraphic Traps

(Figures 26-41)

Confusion between Trap Closure and Trap Seal often occurs when risking stratigraphic traps. Geologists are frequently unclear to which geologic risk element particular observations and concepts are relevant. It is important to clearly define the difference between the two. Trap Closure pertains to the chance that a viable geologic configuration will exist in the sub-surface. In stratigraphic traps this is simply a run of dip in the interpreted direction of reservoir termination. Trap Seal, as with structural traps, pertains to the presence of impermeable rock around the reservoir - preventing inmigrated hydrocarbons from escaping the trap. Examples are provided here of success and failure of each, in stratigraphic traps, in order to clarify the definitions in stratigraphic trap circumstances.

What's Required for a Strat-trap Seal?

1. Capillary seal envelope – above, below and around
2. Mechanical seal capacity
3. Favorable fault juxtapositions, if faults exist

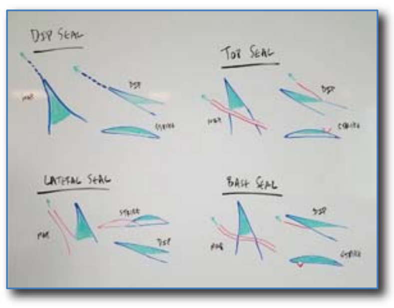

Figure 26 - Strat Traps – What's Required for a Seal?
Stratigraphic traps, unlike structural traps, in addition to possessing an adequate top seal, require the presence of competent dip, lateral and base seals. The reservoir has to, effectively, be surrounded or enveloped by sealing rock. Therefore, they are much more susceptible to seal failure than structural traps. And this fragility is notwithstanding reliance on adequate fault seal, if faults are present. The encumbrance of these additional hurdles to success chiefly explains why stratigraphic traps exhibit a lower historical drilling success-rate than structural traps.

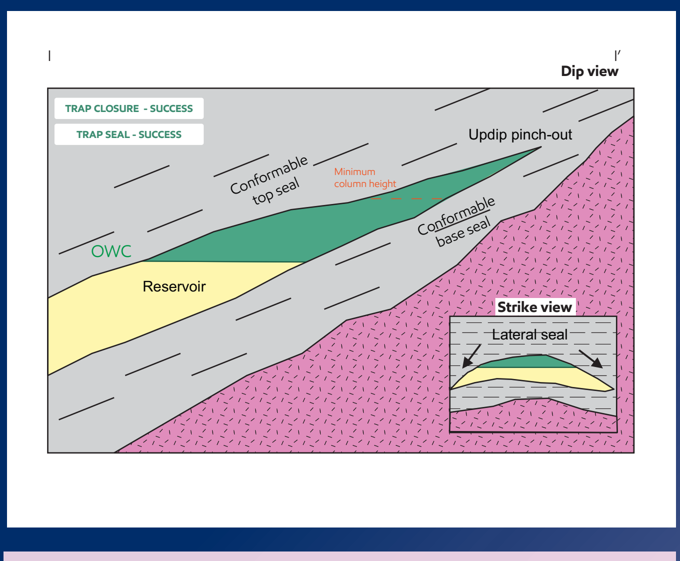

Figure 27 - Strat Traps - Trap and Seal Success - X-section
This cross section illustrates a stratigraphic trap exhibiting both Trap Closure and Trap Seal success. The geological configuration necessary to retain hydrocarbons, namely a consistent run of dip (the Trap Closure element), combined with the up-dip pinch-out of the sandstone reservoir into sealing shales (the Trap Seal element), permit the retention of hydrocarbons migrated into the feature. Lateral seal is provided by the flank dip of the sandstone reservoir body margins. Base seal comprises the shale rock conformably underlying the reservoir.

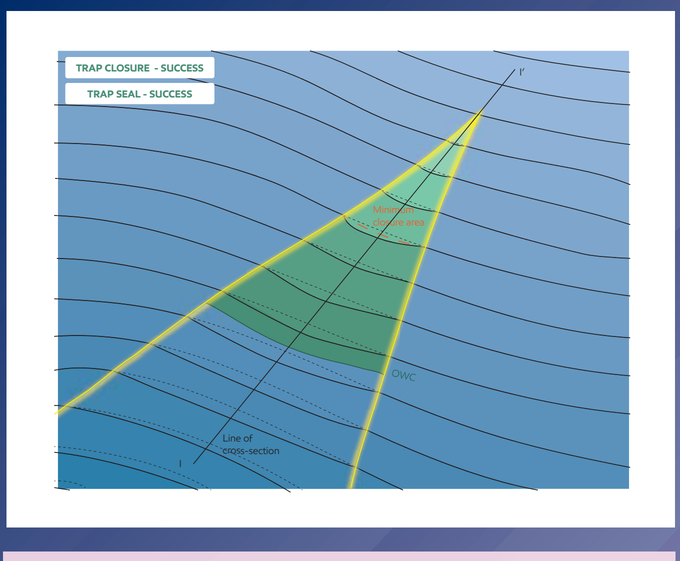

Figure 28 - Strat Traps - Trap and Seal Success - Map
This map illustrates the Trap Closure and Trap Seal success example pictured in the preceding cross section. Sufficient hydrocarbons are retained in the feature for the column to extend beyond the area and height required to exceed the minimum success case. Strat-trap column heights are controlled by the same factors operating on structural traps. However, no spill point is present in this example. It is therefore inferred that column height is constrained by top-seal breech along the flank of the structure at the location of the contact - perhaps by a thief sand or a small fault - or by the capillary strength limits of the sealing rock at the crest of the structure (the pinch-out of the reservoir).

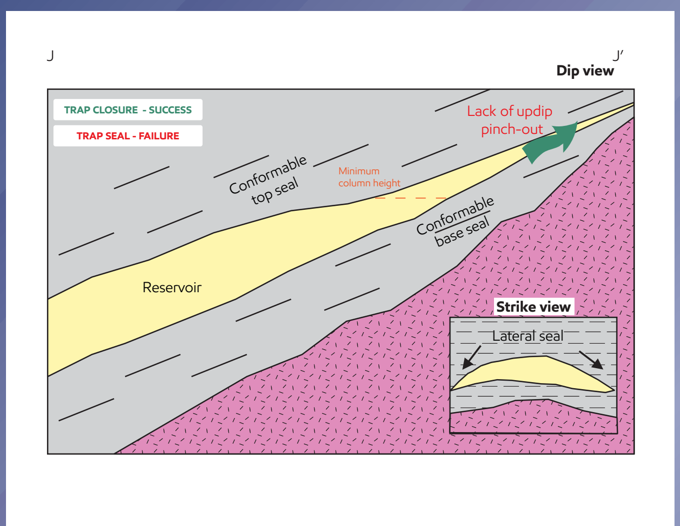

Figure 29 - Strat Traps - Up-dip Seal Failure - X-section
There are no hydrocarbons retained in this trap. The reservoir does not pinch-out. Up-dip seal is therefore absent and this is an example of a Trap Seal failure. Any fluids that have migrated into the structure can progress unimpeded along the run of dip. Having identified the possibility of a reservoir pinch-out, the dip panel – the Trap Closure concept for this feature – is present. This is, therefore, a Trap Closure success despite containing no hydrocarbons.

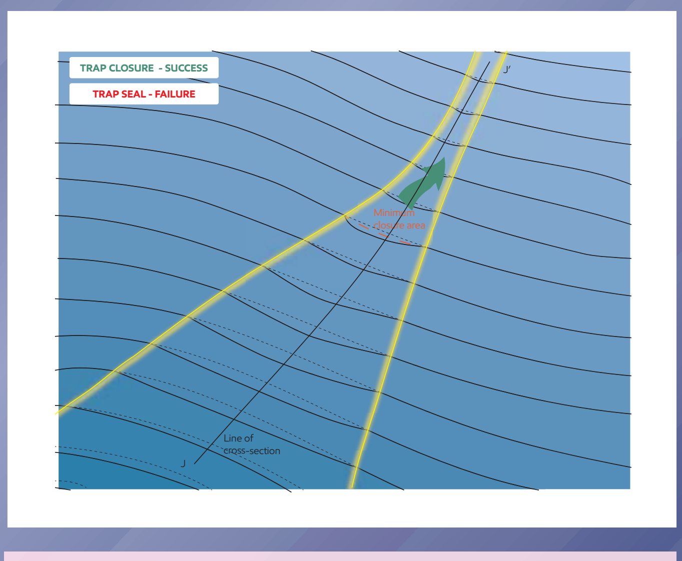

Figure 30 - Strat Traps - Up-dip Seal Failure - Map
The feature contains no hydrocarbons. It is completely wet (dry) as a function of any inmigrated hydrocarbons being able to escape up-dip along the narrow corridor of sandstone – the location in which a seal was needed for success.

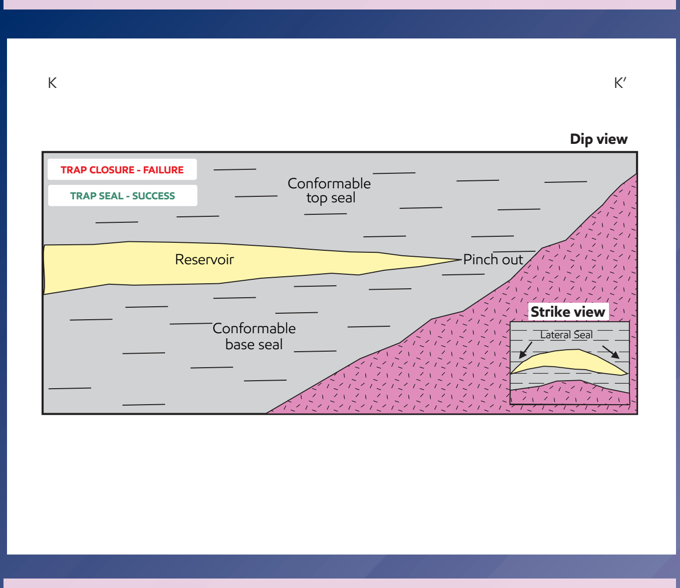

Figure 31 - Strat Traps - Trap Closure Failure - X-section
This cross section illustrates an example of Trap Closure failure in a stratigraphic trap. The run of dip which, when combined with a reservoir pinch-out, comprised the interpreted petroleum retention concept at this feature, is not present. Instead, the beds are flat – both the reservoir and the neighboring base, lateral and top seals. There is no closing geometry in any direction. Inevitably, seismic interpretation or depth conversion issues are usually the cause of Trap Closure failure in stratigraphic traps, particularly where the dips of the strata are low.

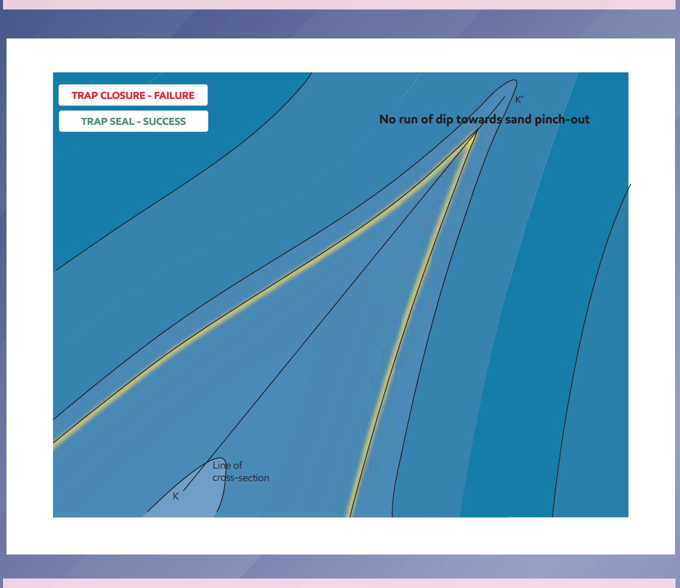

Figure 32 - Strat Traps - Trap Closure Failure - Map
There is no closure present involving the reservoir by which to trap hydrocarbons. The interpreted run of dip to the north-east is absent. Instead, the structure on top of the interpreted reservoir is flat or dipping in the opposite direction. Despite the reservoir pinching out in the manner predicted, there is no way to entrap hydrocarbons in this configuration.

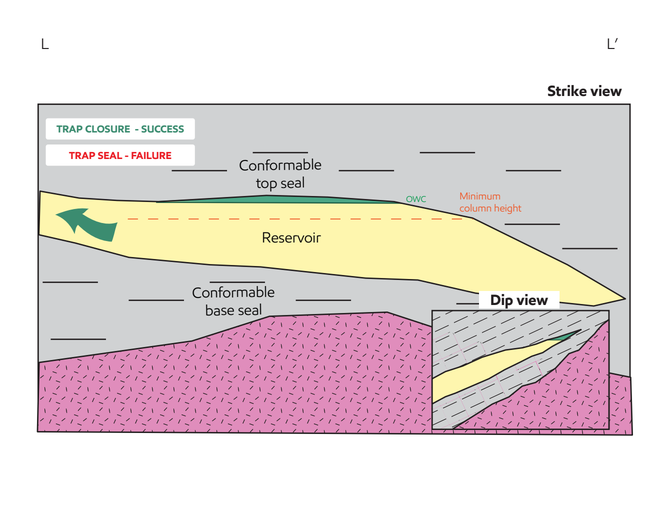

Figure 33 - Strat Traps - Lateral Seal Failure - X-section
Lateral seal is just as important in ensuring the success of stratigraphic traps as dip seal. Failure to close in this direction can, despite the reservoir pinching out parallel to the run of dip, leak hydrocarbon out of the flanks of the structure. If the lateral spill lies within the area (and column height) required for success, this results in a Trap Seal failure.

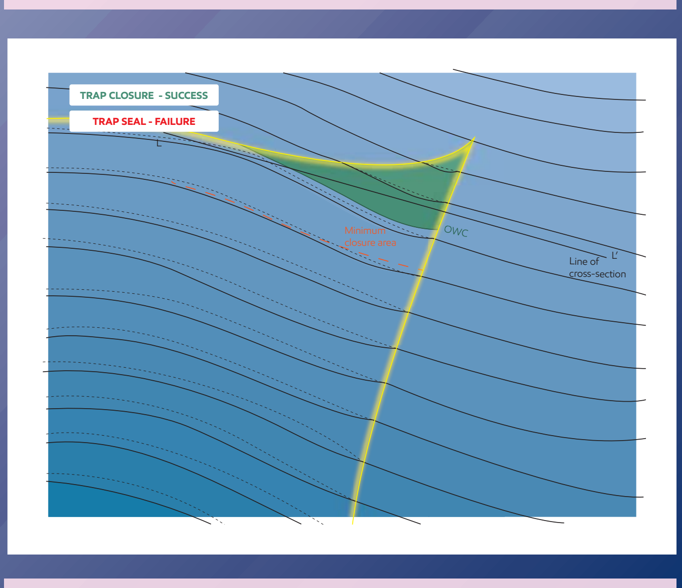

Figure 34 - Strat Traps - Lateral Seal Failure - Map
In this example the lateral pinch-out of the reservoir does not occur sufficiently down dip to allow the accumulation of a column that exceeds the success minimum height threshold. Hydrocarbons spill laterally out of the trap, resulting in failure.

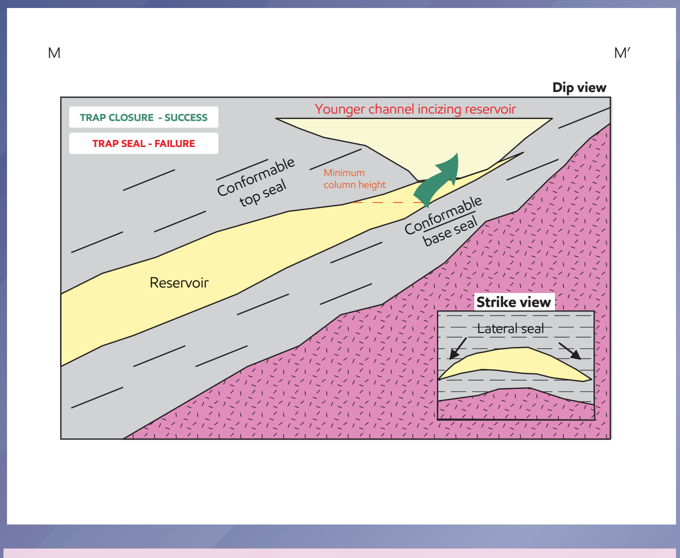

Figure 35 - Strat Traps - Eroded Up-dip Seal Failure - X-section
Top-seal breach by a younger permeable rock body is one of the most frequently encountered agents of Trap Seal failure in stratigraphic traps. In this example, an incisive younger channel has eroded away the top seal from the potential stratigraphic trap, causing any inmigrated hydrocarbons to pass unimpeded through the system, rather than accumulate.

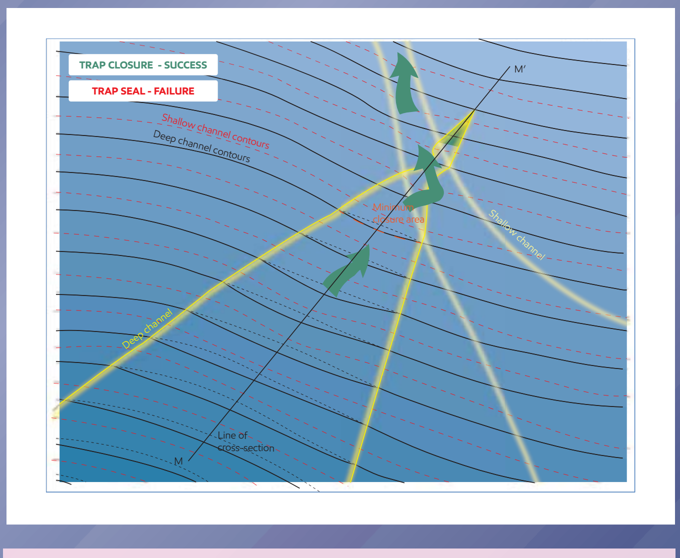

Figure 36 - Strat Traps - Eroded Up-dip Seal Failure - map
In order to be a failure for Trap Seal, this erosion has to occur within the minimum success column height (or area). If the top-seal erosion occurs below this elevation (outside this area) the incision into the older reservoir becomes a control on success-case column height, rather than a risk. This would be a Trap Seal success, but with a limited capacity for hydrocarbon column.

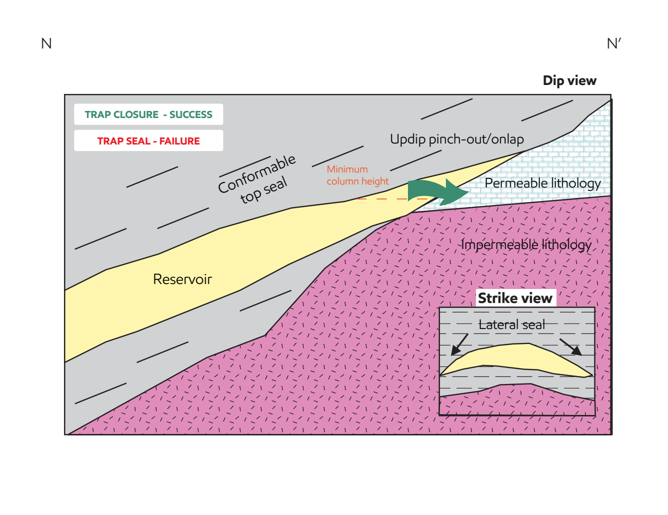

Figure 37 - Strat Traps - Base Seal Failure - X-section
Unlike antiformal traps, adequate base seal is critical for the success of stratigraphic traps, as the base of reservoir is not protected from basal leak by structural closure on all sides. In this example of Trap Seal failure the reservoir onlaps a permeable rock body, which can conduct away any hydrocarbons that migrate towards the up-dip reservoir pinch-out.

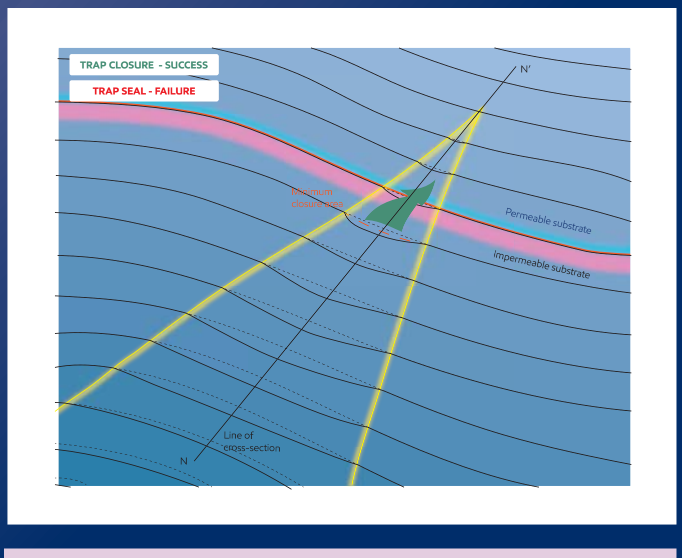

Figure 38 - Strat Traps - Base Seal Failure - map
Again, it is only a Trap Seal failure if the shallowest contact point between the base of the reservoir and the underlying permeable rock occurs within the minimum success area of closure and column height. Otherwise, it becomes a success-case column-height control, rather than a risk.

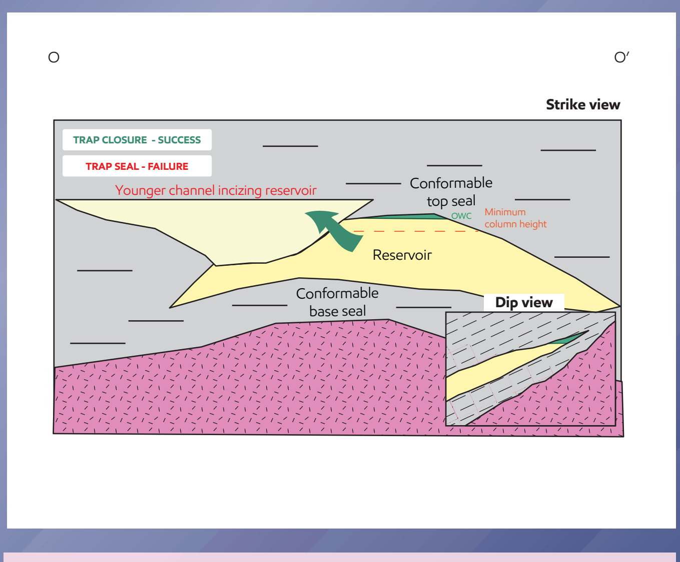

Figure 39 - Strat Traps - Eroded Lateral Seal Failure - X-section
An erosive younger permeable rock body does not have to impinge directly onto the up-dip pinch-out of the reservoir. In this example of Trap Seal failure the incision occurs on the flanks of the reservoir, but within the minimum closure area.

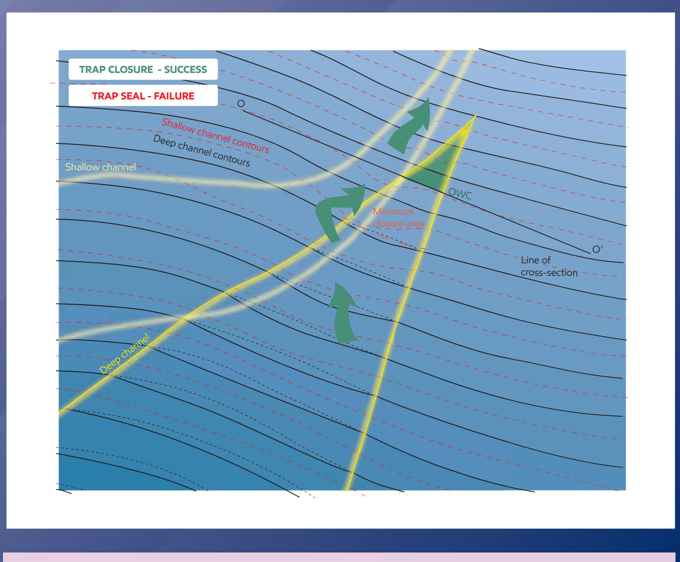

Figure 40 - Strat Traps - Eroded Lateral Seal Failure - map
A small hydrocarbon accumulation will be present near the crest of the structure, at the sand pinch-out, if the top seal is eroded away on the flank of the trap. However, this will not be considered a success if the shallowest point of incision of the younger permeable rock body onto the reservoir occurs close enough to the crest to be within the minimum success area and column.

Takeaway Messages

- Risk in the context of the trap and seal model (scenario)
- The question is:
  - "Is there a geometry?"
  - not necessarily, "Is there a closing contour?"
- An implied "run of dip" in a strat trap is **Trap Closure**
- The implied termination of the interpreted reservoir is **Trap Seal**

Figure 41 - Strat Trap Risking - Take Away Messages
Trap Closure and Trap Seal risking can be confusing in stratigraphic traps. The key logical argument to consider when doing so is to risk these geologic elements within the context of the trapping concept. Is the required configuration present, not necessarily a four-way closure? In stratigraphic traps, an interpreted or implied run of dip is a viable trap geometry (configuration). The presence of that run of dip therefore represents Trap Closure. And it is the interpreted or implied termination of the reservoir that is the Trap Seal.