Wednesday, March 27, 2019

Petroleum Club of Houston • 1201 Louisiana (Total Building)
Social Hour 11:15 a.m.
Luncheon 11:45 a.m.

Cost: $35 Preregistered members; $40 non-members/walk-ups

To guarantee a seat, pre-register on the HGS website & pre-pay by credit card.
Pre-registration without payment will not be accepted.
Walk-ups may pay at the door if extra seats are available.

If you are an Active or Associate Member who is unemployed and would like to attend this meeting, please call the HGS office for a discounted registration cost. We are also seeking members to volunteer at the registration desk for this and other events.

HGS General Luncheon Meeting

Engineering Perspective of the Oil Industry – What is the Correct Inter-well Spacing?

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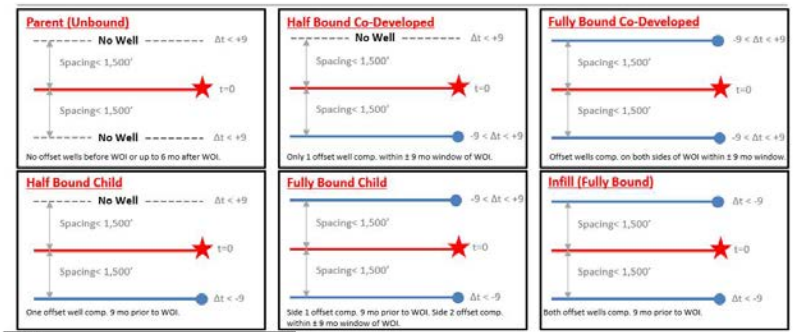
A recent (January 2, 2019) Wall Street Journal article entitled *"Fracking's Secret Problem—Oil Wells Aren't Producing as Much as Forecast"* has made statements and conclusions that have stoked the concerns of oil and gas investors related to potentially systemic over-optimistic reporting of oil and gas reserves and economic returns associated with horizontal drilling inventories in unconventional resource plays.



The article provides fodder for the debate of numerous topics that will not be addressed herein, however, with regard to the impacts of well spacing on a well's ultimate recovery, the article states the following:

> *"EUR estimates from many companies were grounded on two assumptions: that they could pack wells closer together, squeezing more value from the land they leased, and that they could replicate their best early wells. The results to date suggest those assumptions were often wrong."*

As resource plays mature, the remaining wells will necessarily have closer inter-well spacings and will contend with depleted regions around existing older wells. The purpose of this talk is to discuss the following topics related to well spacing:

1. **Discussion of induced fracture geometry and stimulated rock volume ("SRV")** Numerous technical papers have been submitted that discuss the geometry of induced fractures, the rock mechanics that drive certain geometries, and how the SRV will ultimately drive drainage patterns within the reservoir. The key findings of these papers will be summarized and reviewed in light of what geologic factors provide the largest impact to SRV for a given stimulation.
2. **Provide well spacing framework for type well analysis in unconventional plays that could help reserves estimators achieve more consistent forecasts with higher certainty** The following illustration summarizes a framework for classifying existing and future wells in terms of relative distance and timing from other wells. This proposed framework can be used to more rigorously choose analogous wells for the purpose of building "Type Curves" that better represent future performance:
3. **Review the impacts of inter-well spacing on individual well performance using a Williston Basin case study**; The above framework was applied to certain wells located within the Williston Basin to provide an example of how the framework should be applied as well as to observe the well performance of each of the six classifications shown above.
4. **Discuss the economic optimization of well spacing** – Optimum spacing is really an economic question, and largely is derived by the objectives and outlook of individuals or companies. The optimum spacing may differ if one's objective is to maximize single-well rate-of-return rather than total present value. Additionally, one's outlook on commodity price may also drive spacing optimization decisions. We will review various illustrative economics based upon the Williston Basin case study to observe the impacts of various drivers on optimum well spacing. ■

Biographical Sketch

Mr. Valdez is a Petroleum Engineer with 22 years of diversified industry experience. Mr. Valdez is currently the President of VSO Petroleum Consultants, Inc. and provides property evaluations, drilling prospect evaluation and field and play studies for numerous oil and gas investors. Mr. Valdez is a 1996 graduate of Texas A&M University with a BS degree in Petroleum Engineering and is a Registered Professional Engineer.