

SLAP-31

Reaching additional reserves behind multiple string of casing

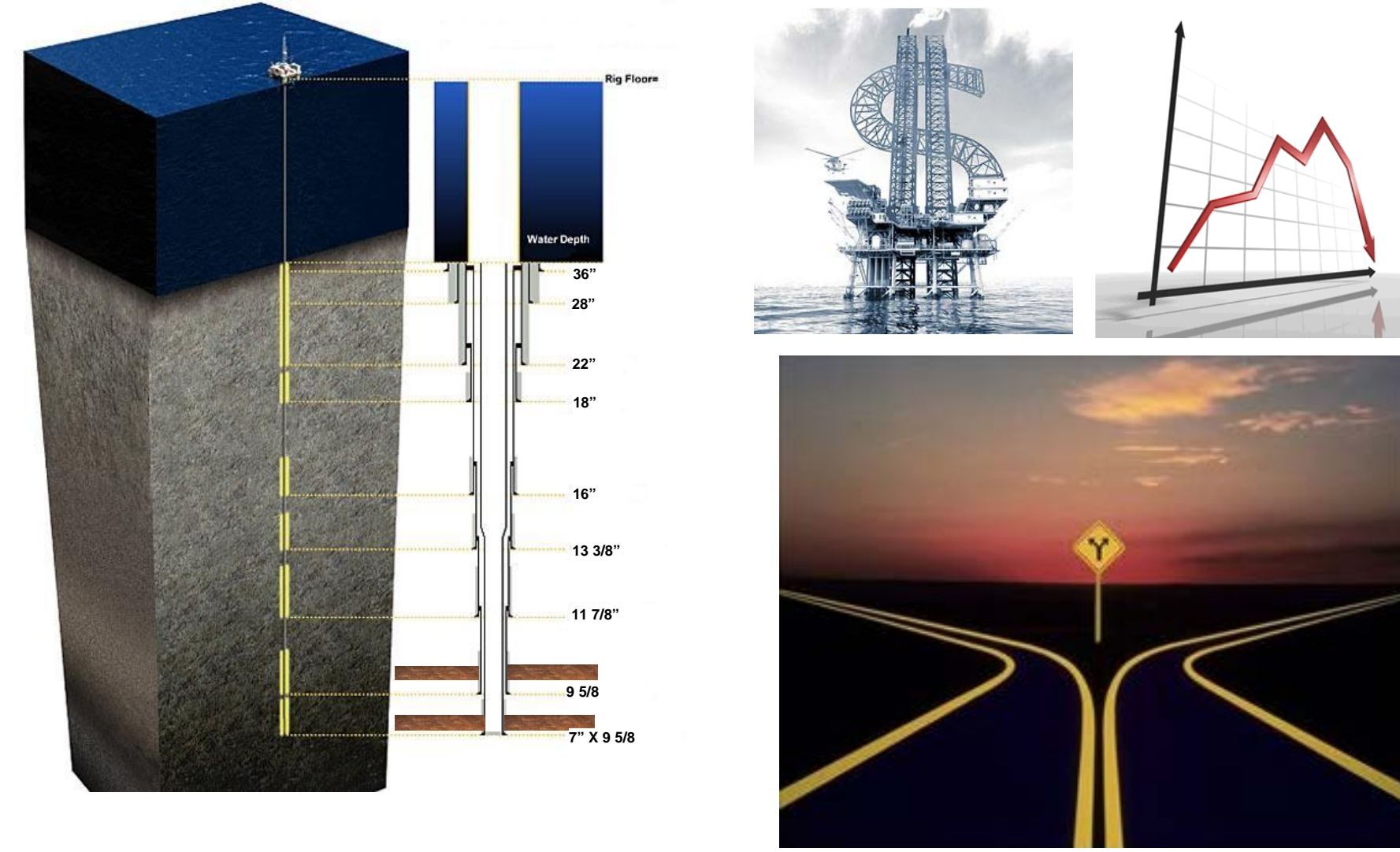
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ABSTRACT:
It is rarely by design, but many wells suffer from hydrocarbon bearing formations sealed behind two casing strings. This presentation will focus on some of the challenges of dual string perforating as well as systems that have been developed to specifically overcome these challenges. The presentation focuses on both big hole and deep penetrating charge solutions as well as the impact that these solutions have to operators in deep water completions. The presentation covers the challenge from the operator, how they engaged the perforating community, the development and testing of the solution as well as the execution of the technology into deep water completions.

Dual String Genesis

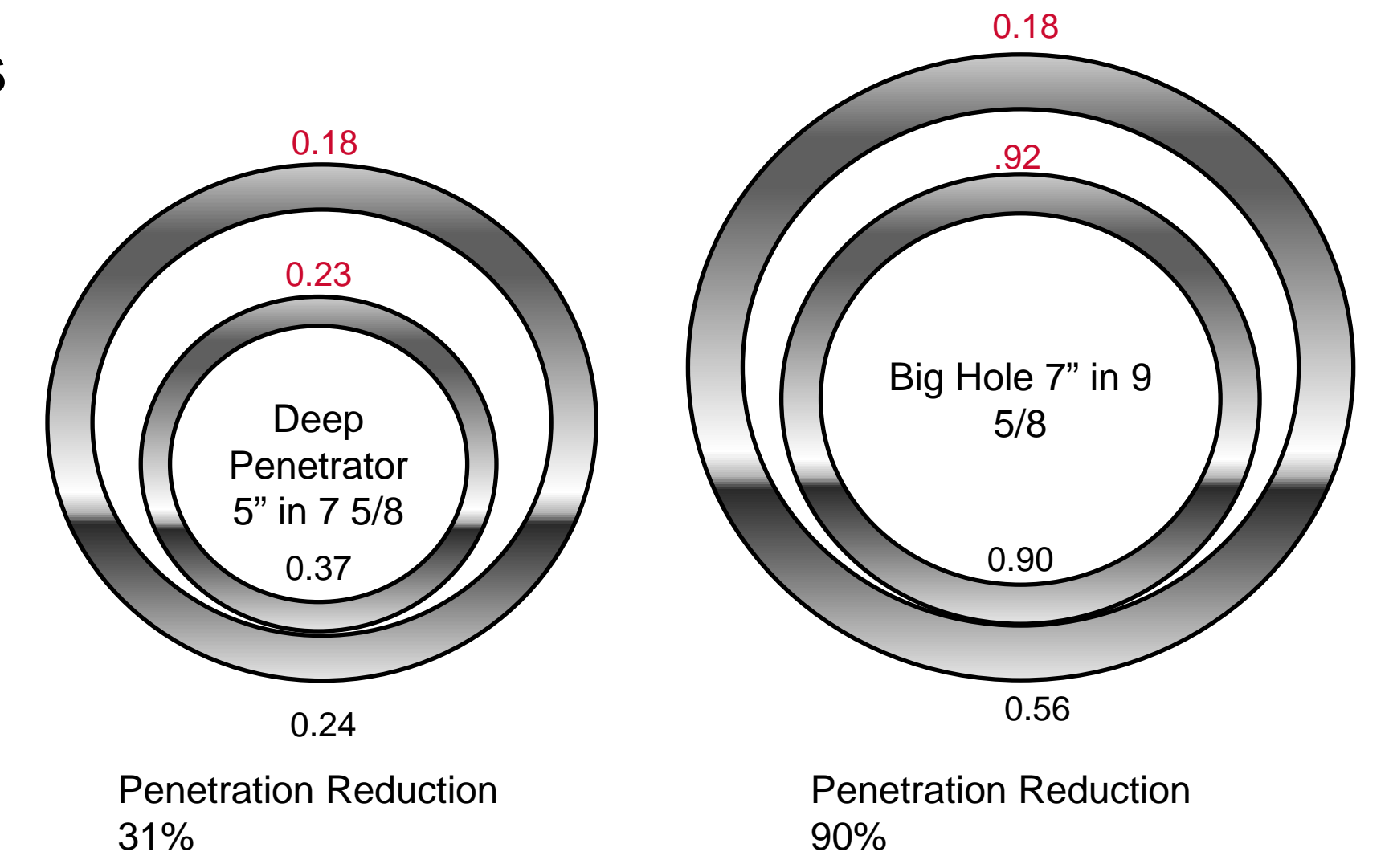
- If the well went left and did a side track, minimum 15 million Dollar sidetrack cost
- If the well went right potential right off of reserves

This is Genesis well completed in two zones 7" and a dual casing 7" X 9-5/8".

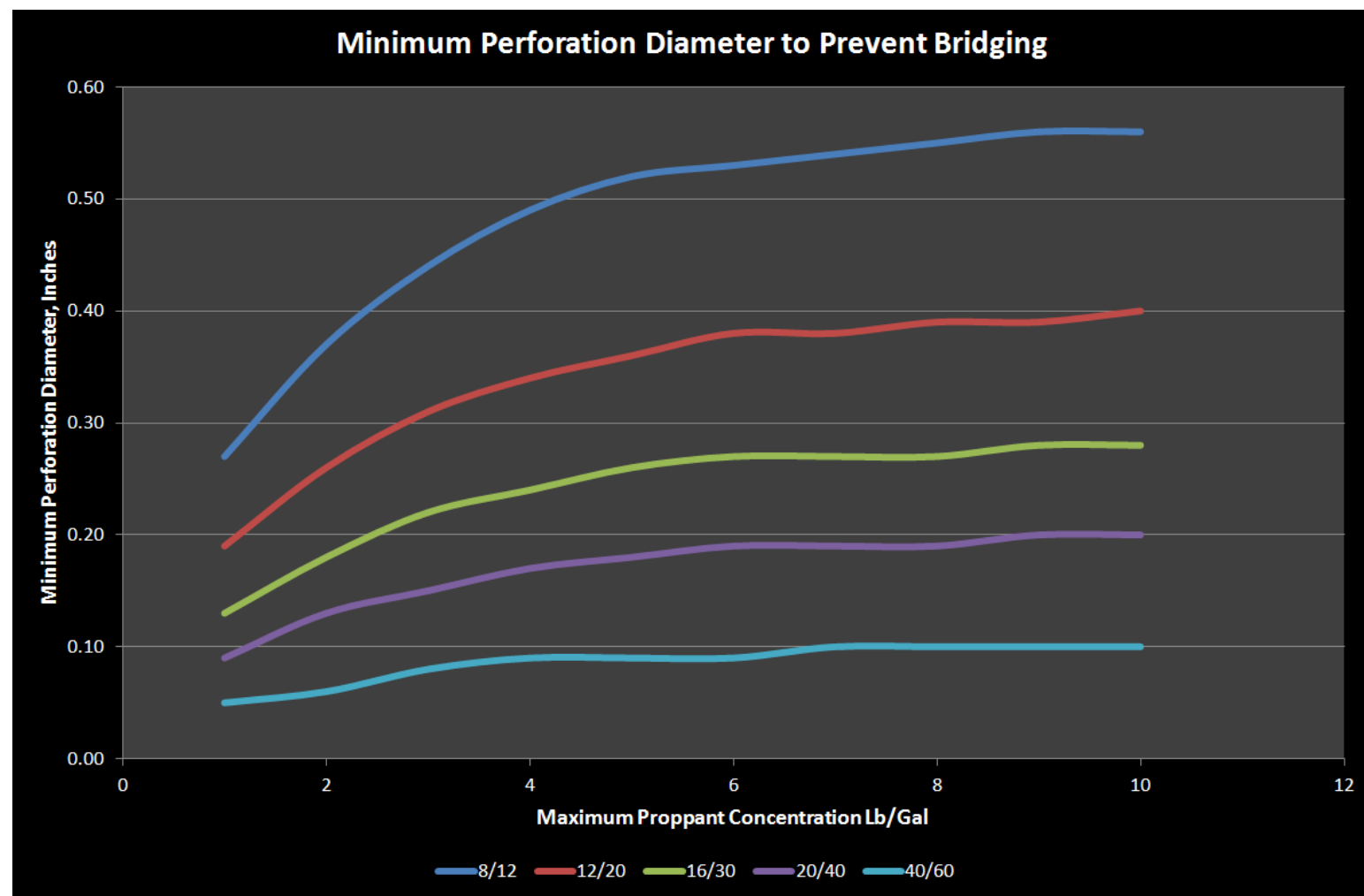


Dual Casing Challenges

Deep Penetrating Dual String, Charges inside of 5 in 26 lb P-110 inside 7.62 52.8 lb Q-125 2 groups of 6 shots.xls



Dual String Complexity with Fracturing



Maximum Proppant Concentration Lb/Gal	Proppant Mesh Size				
	8/12	12/20	16/30	20/40	40/60
Minimum Perforation Diameter, Inches					
1	0.27	0.19	0.13	0.09	0.05
2	0.37	0.26	0.18	0.13	0.06
3	0.44	0.31	0.22	0.15	0.08
4	0.49	0.34	0.24	0.17	0.09
5	0.52	0.36	0.26	0.18	0.09
6	0.53	0.38	0.27	0.19	0.09
7	0.54	0.38	0.27	0.19	0.10
8	0.55	0.39	0.27	0.19	0.10
9	0.56	0.39	0.28	0.20	0.10
10+	0.56	0.40	0.28	0.20	0.10

Initiating the solution



They had a handful of wells in their inventory. They were the leaders in this area and knew that no one else had tackled this problem yet. Job is to manage risk. So they decided to look for the key to the solution which was to fund technology development.

Needs and Wants

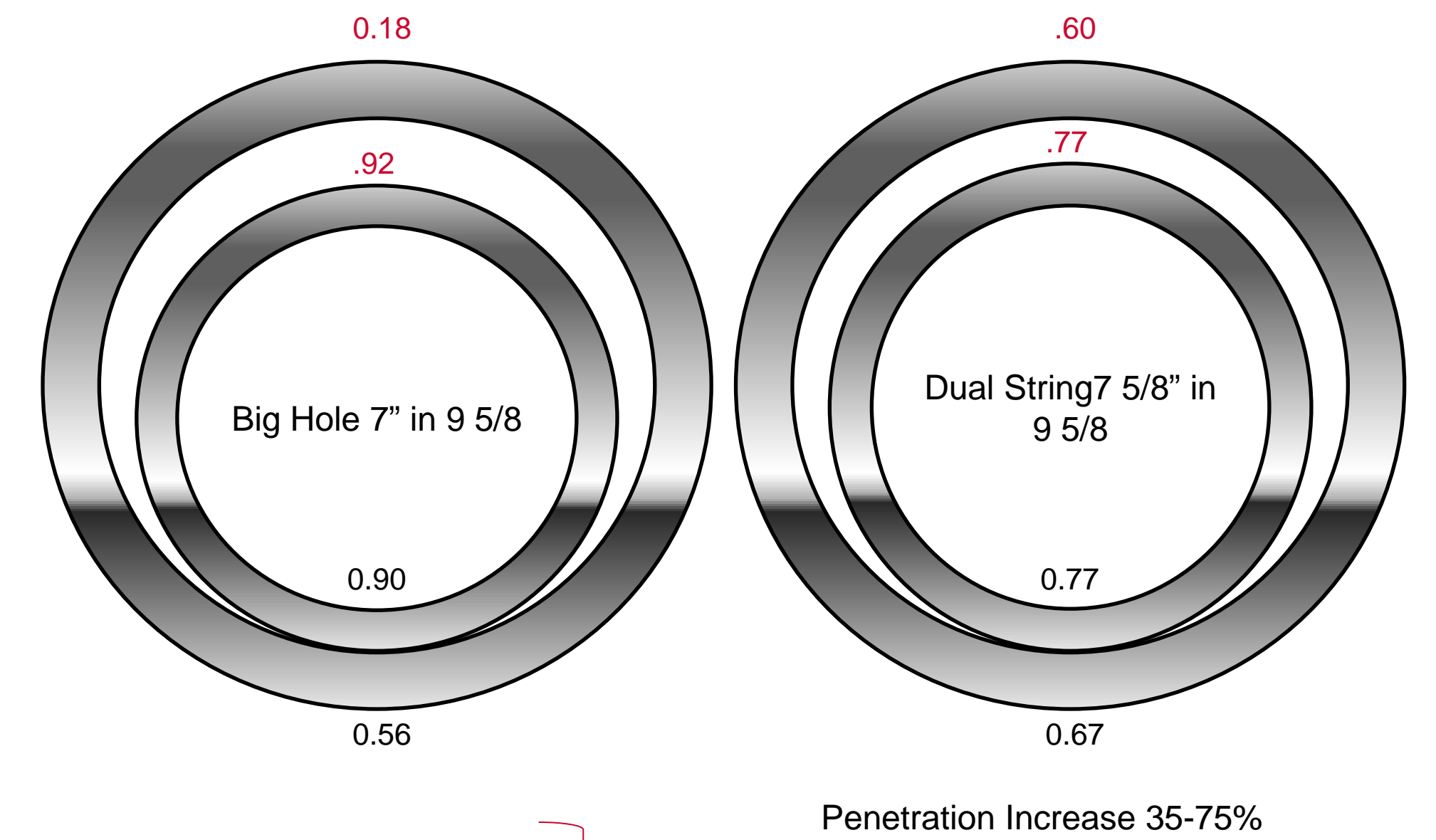
- Large Hole size in second string >0.5in
- Similar hole size in first string
- Consistency in hole size in decentralized casing
- Better Penetration than the Big Hole type charges
- Low Cost
- Shot density of 12 spf
- One run solution
- Sooner the better

Developing the Solution

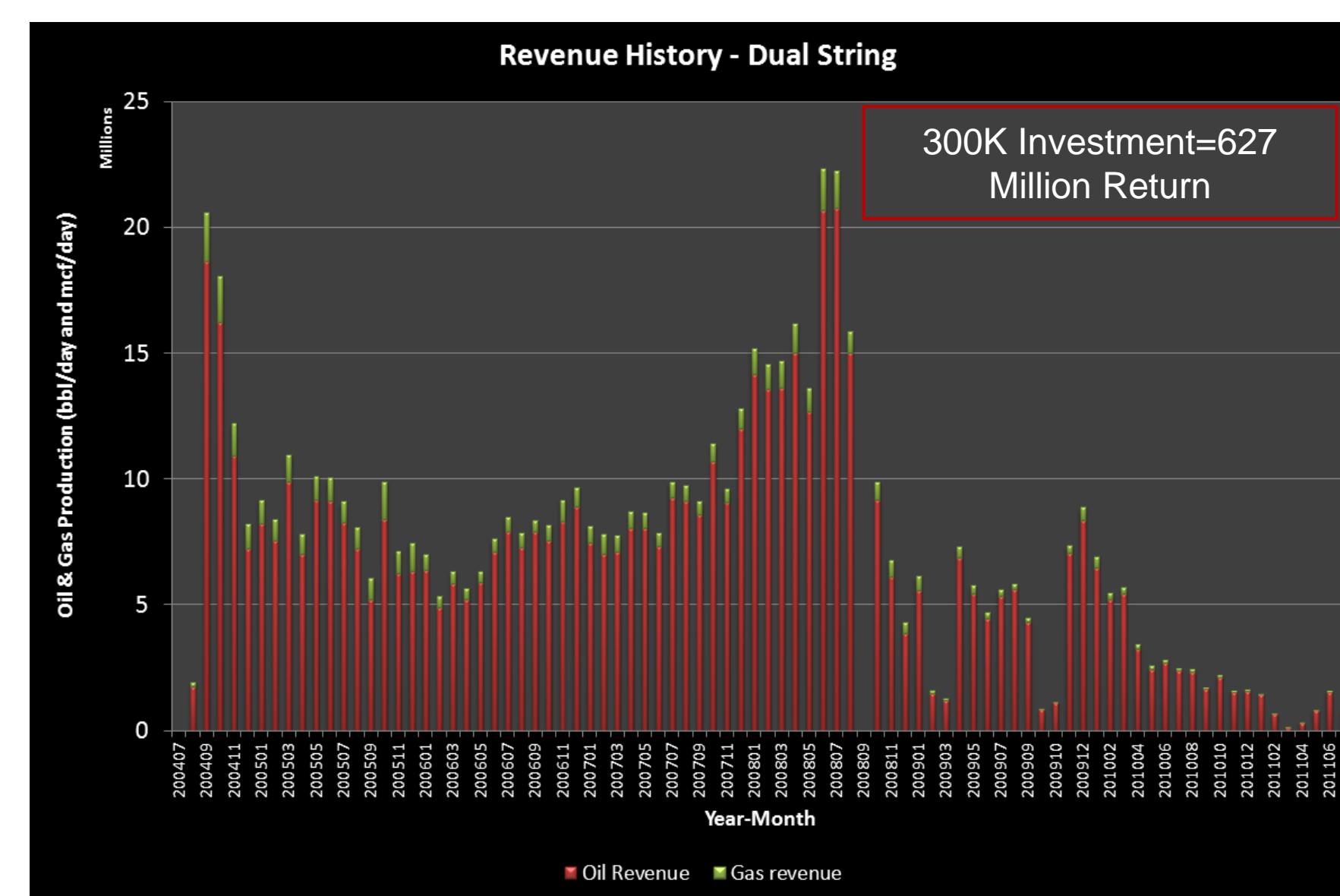
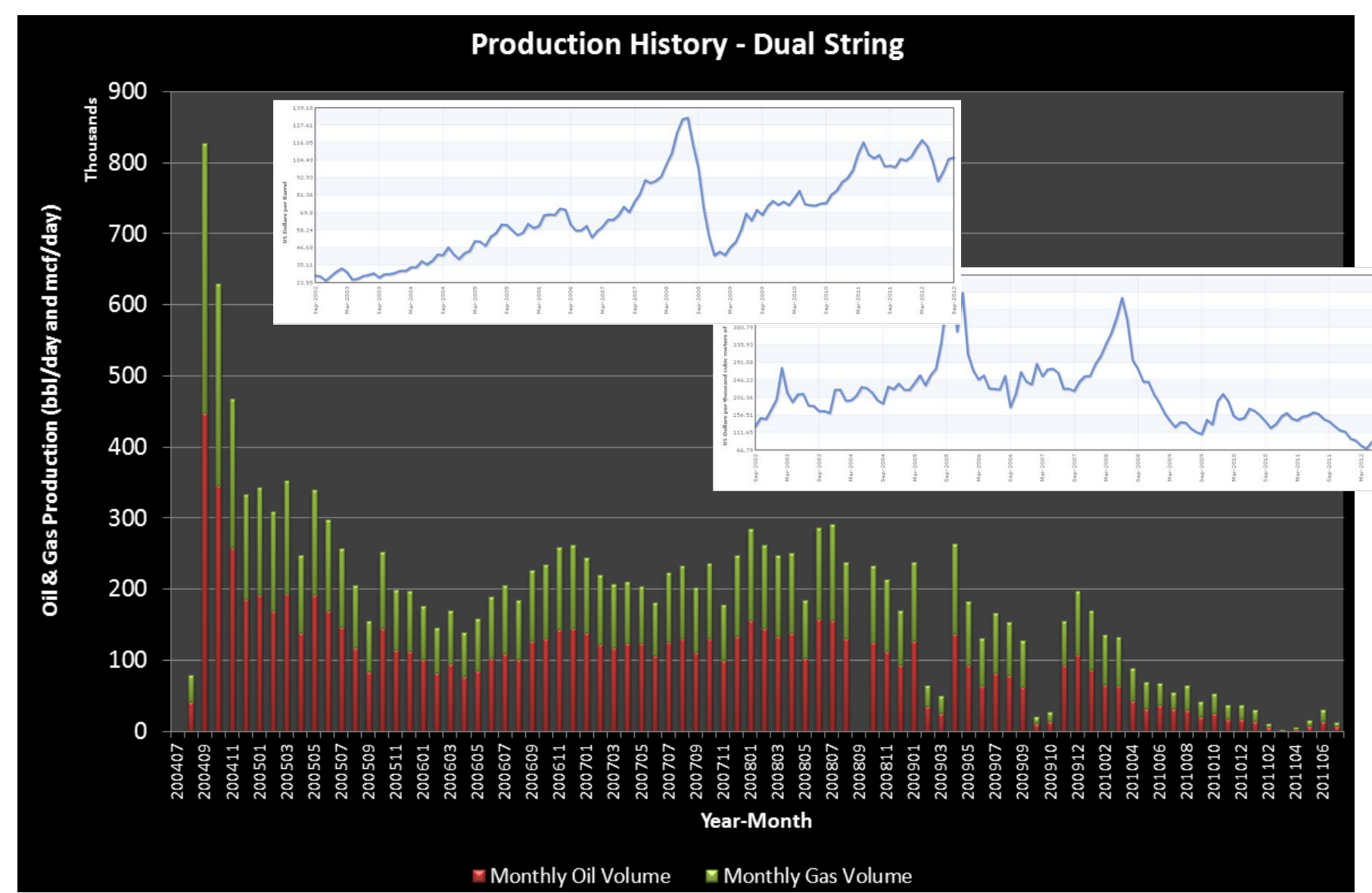


Internal Casing	Outer Casing	HoleSize in	Penetration in
7 5/8" 39 ppf	9 7/8" 65.1 ppf	0.67	8.11
7 5/8" 47 ppf	9 5/8" 47 ppf	0.67	5.98
7 3/4" 46.1 ppf	9 7/8" 62.8 ppf	0.63	7.99
9 5/8" 47 ppf	13 3/8" 73 ppf	0.67	8.70
9 7/8" 62.8 ppf	13 3/8" 73 ppf	0.63	6.89
10 1/8" 79.2 ppf	11 7/8" 72 ppf	0.67	6.50

Dual Casing Solution



Production in Dual String



Return On Investment

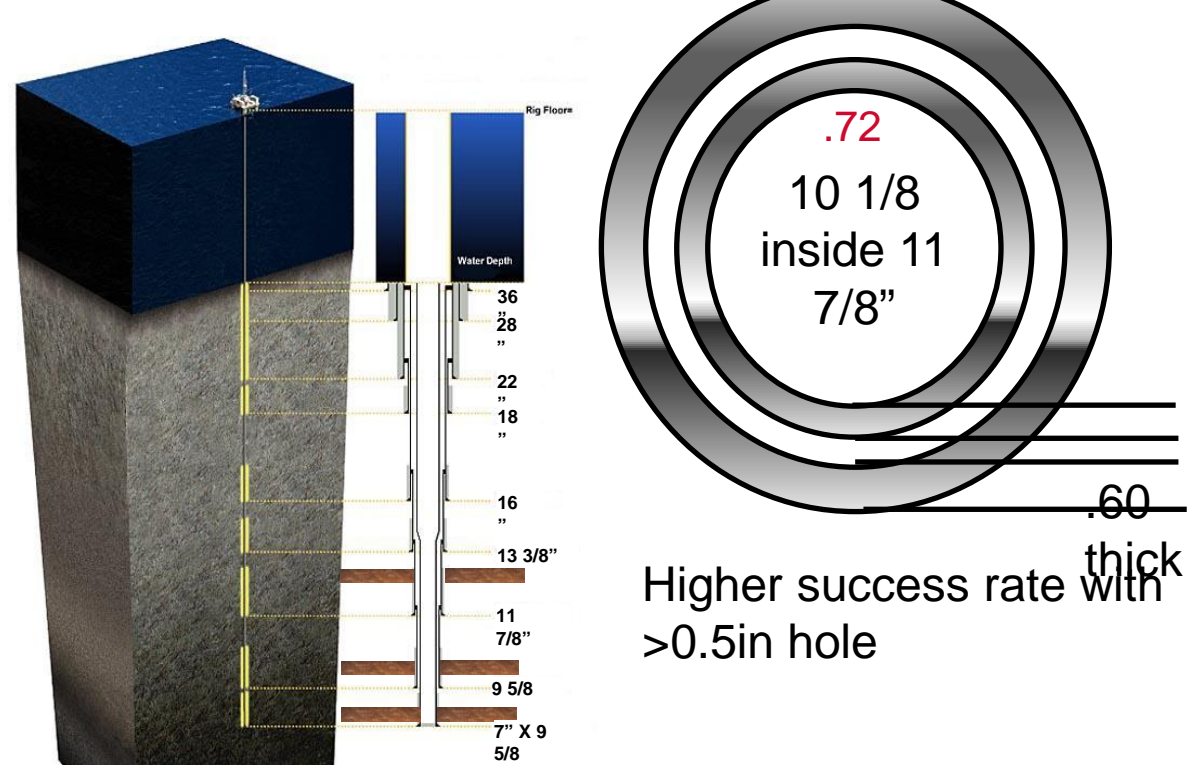
Additional Capability

Cement Placement

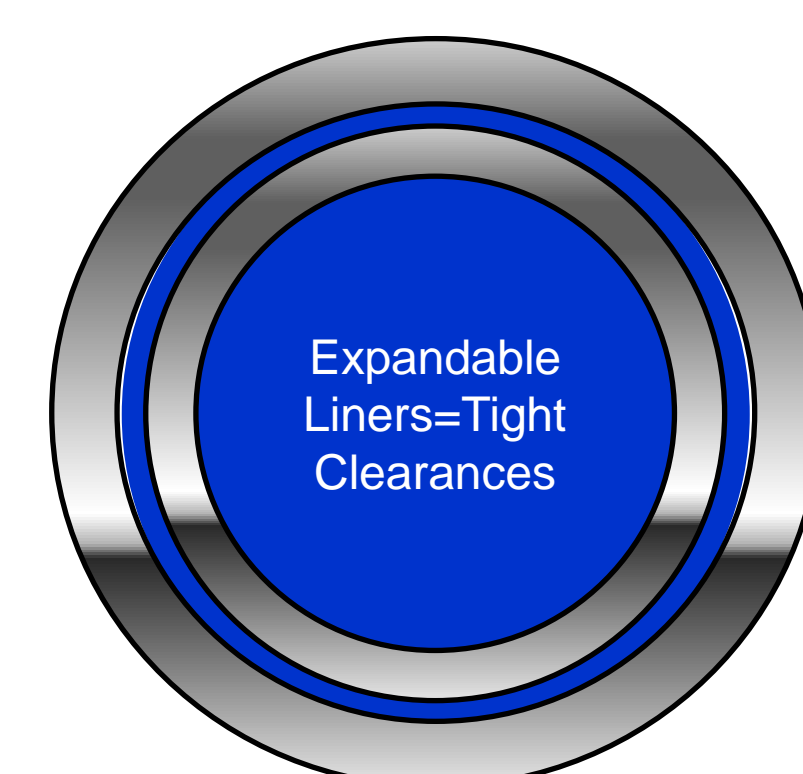
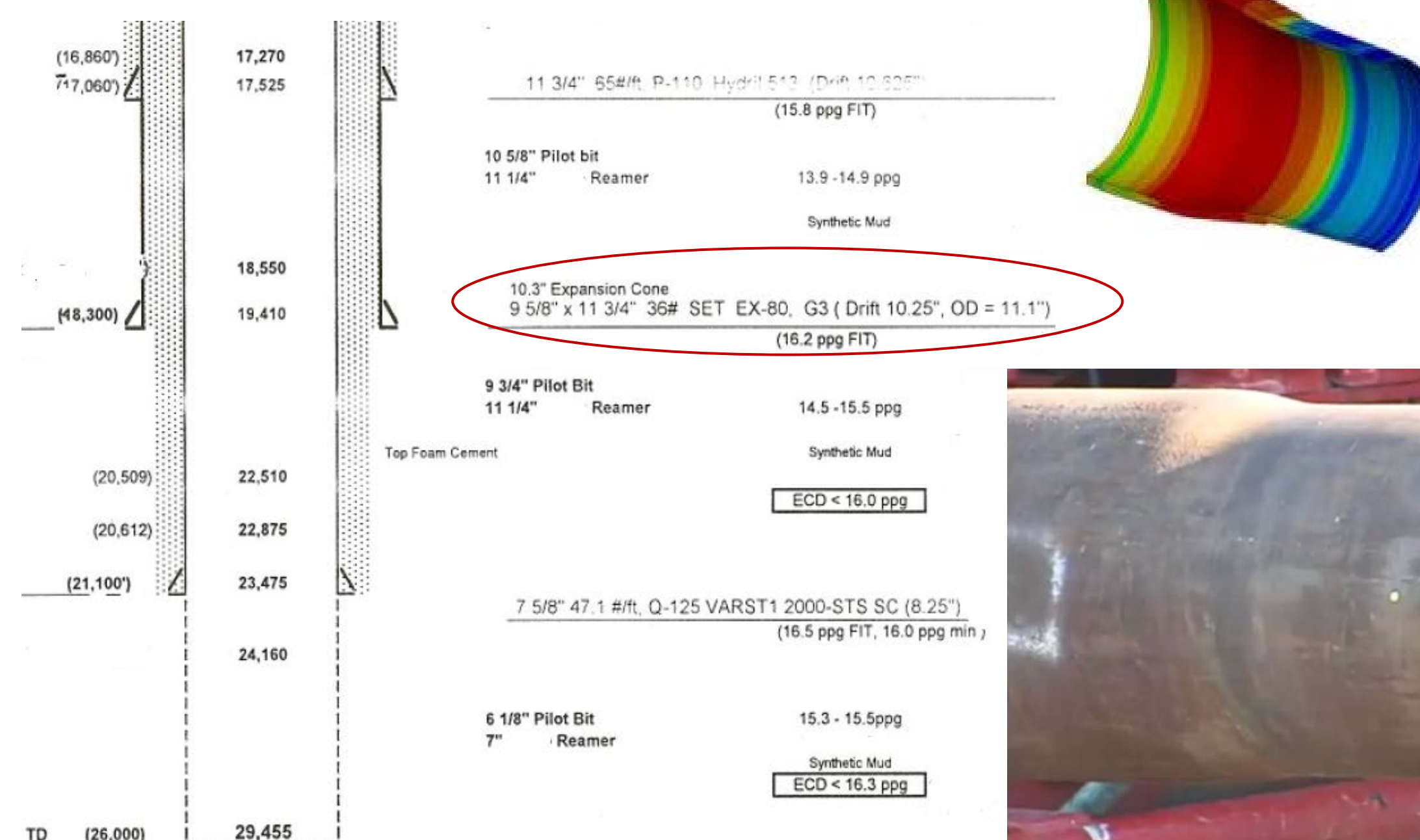
Getting to TD

Completion in Expandable Liners

Cement Placement



This is Genesis well completed in two zones 7" and a dual casing 7" X 9-5/8". A third zone is completed in dual casing. Is this expandable casing?



Internal Casing	Outer Casing	Fluid / Cement	HoleSize in	HoleSize in	Penetration in
7" 37 ppf	9 3/8" Expandable	Cement	0.79	0.67	8.19
		Fluid	0.79	0.59	7.80
6" Expandable	8 5/8" 57.4 ppf	Cement	0.83	0.83	7.95

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