

Drilling and Completions Changes from Conventional to Unconventional Developments – Part One

Presented at the 26th International Petroleum Environmental Conference, San Antonio, TX, October 7-9, 2019



Drilling and Completions Changes from Conventional to Unconventional Developments – Part One

Part One – Conventional Well Design

- Targets permeable reservoirs with technologies of the day
- Within a traditional mineral leasing structure
- To develop a conventional field, vertically or directionally

Part Two – Unconventional Well Design

- Targets very low permeability rock with new technologies
- Within a relatively new mineral leasing structure
- To develop an unconventional field, horizontally

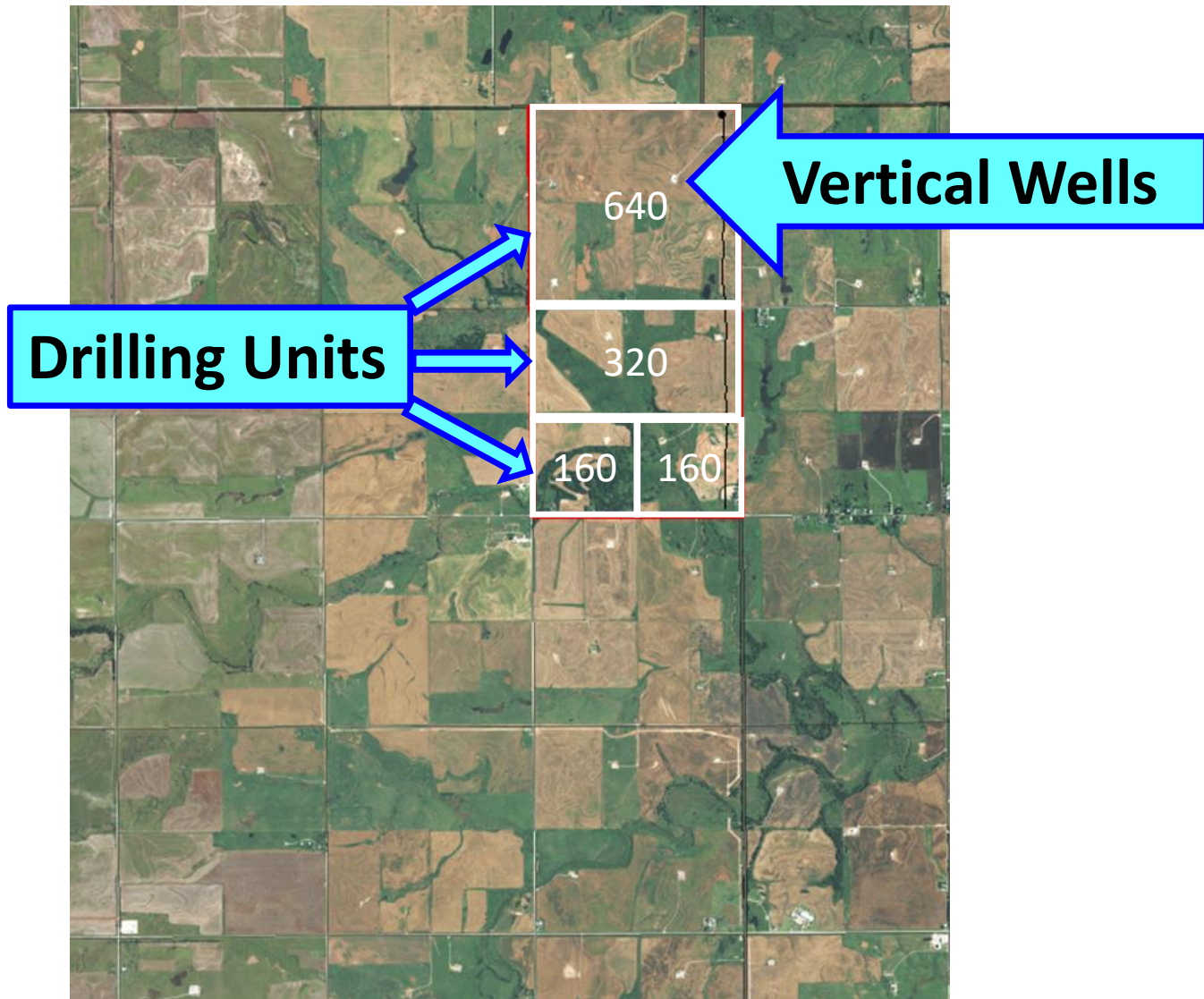
Part Three – Regulatory Response to Unconventionals

- Increased focus on protection of workers, public health, the environment
- Maintain protection of mineral ownership and prevents waste
- Adapting or replacing older paradigms to embrace new technology

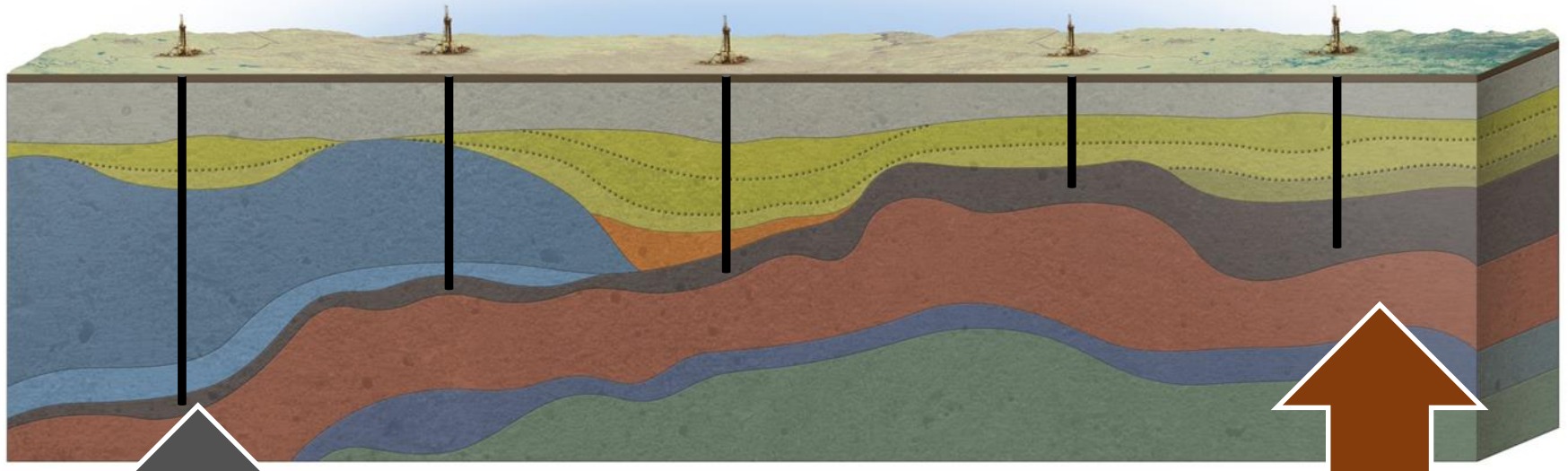
Conventional Rock



Conventional Leasing Framework



Conventional Vertical Development



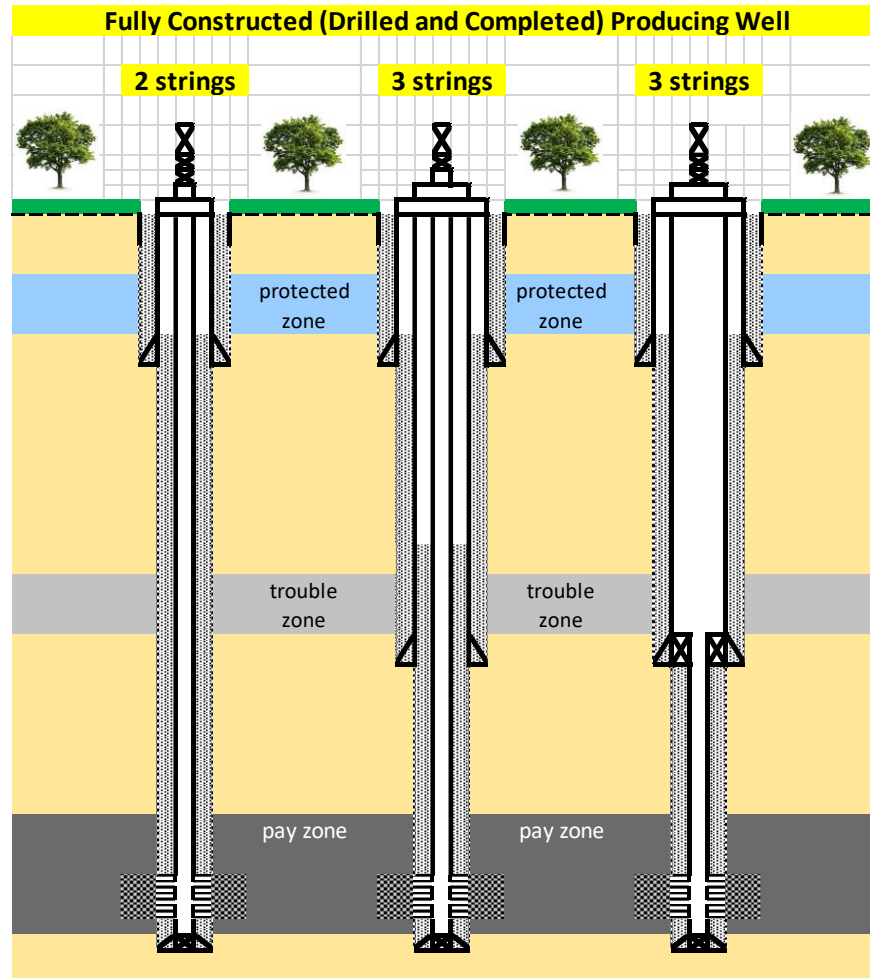
Trapping Formation
Has
Relatively High
Permeability

Source Formation
Has
Relatively Low
Permeability

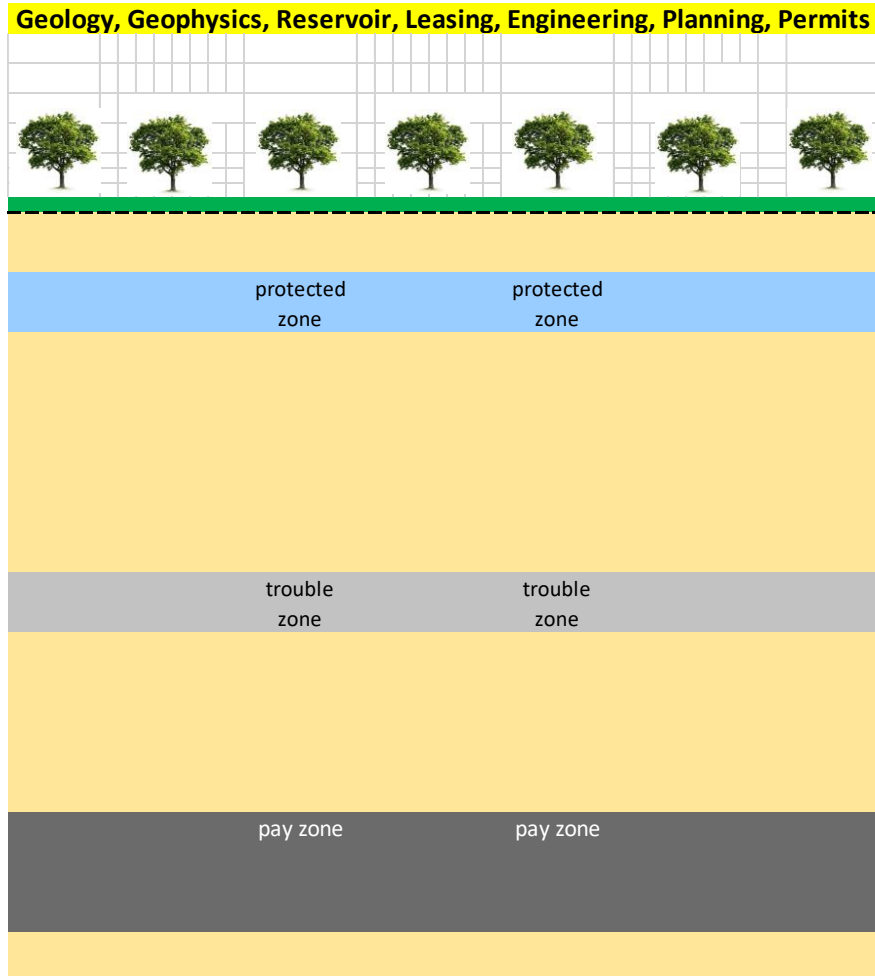
Conventional Vertical Development



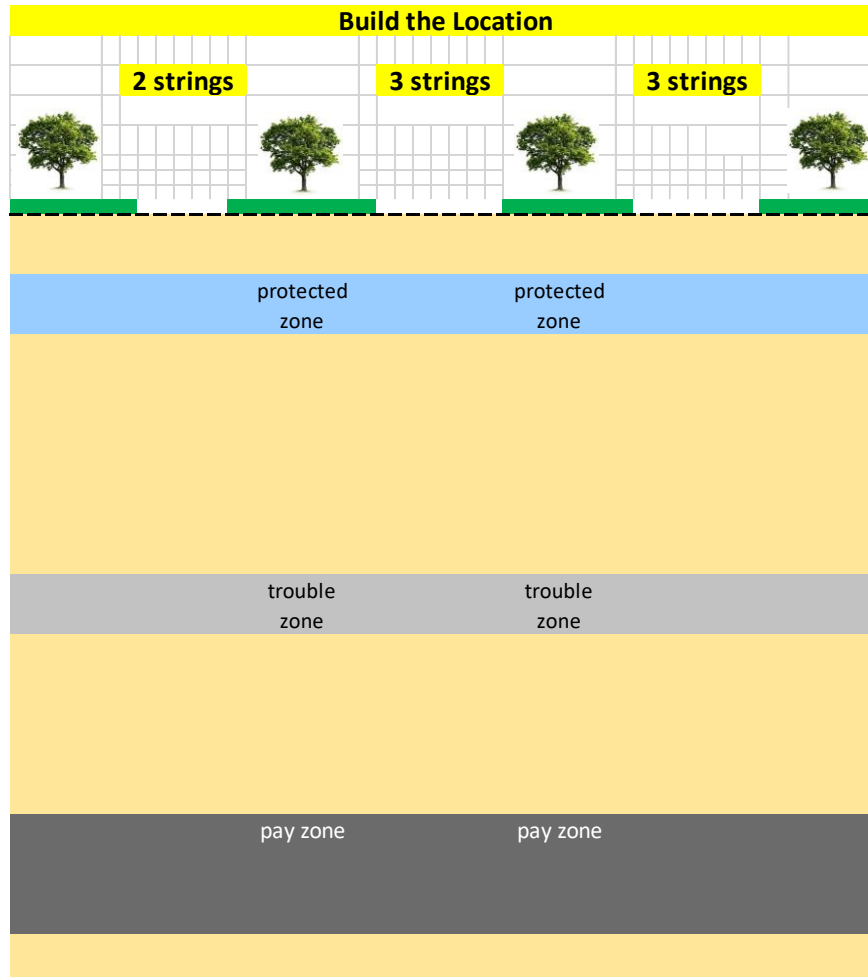
Conventional Drilling



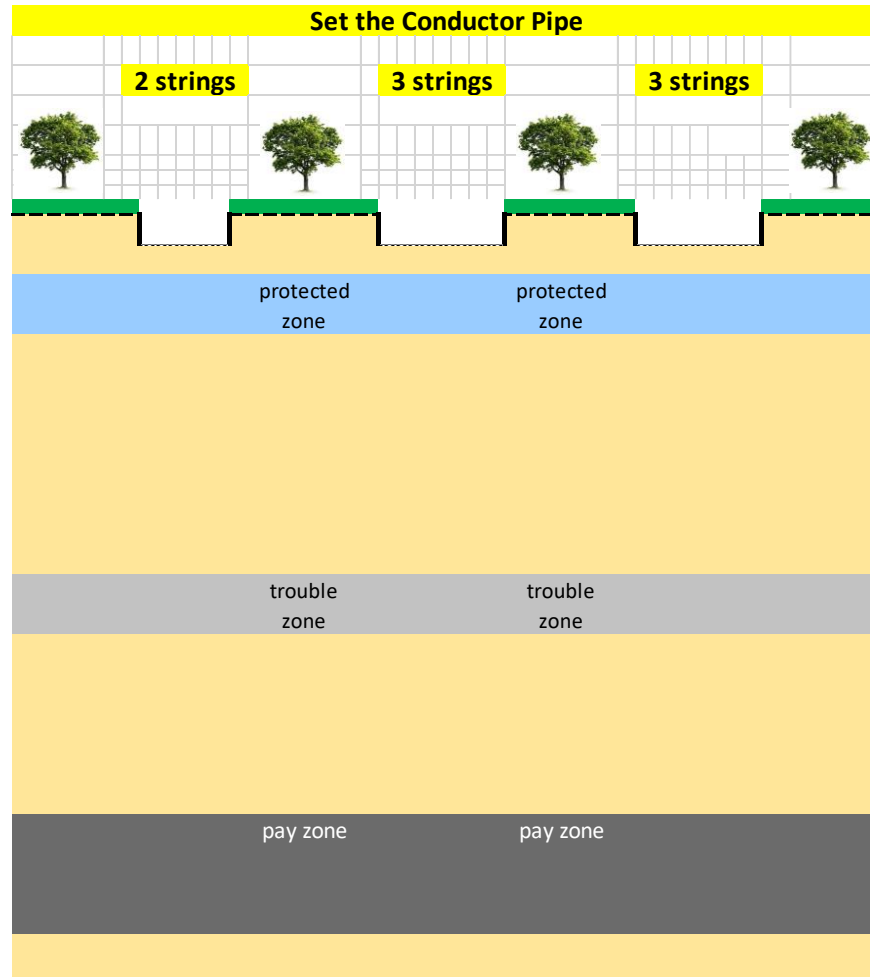
Conventional Drilling



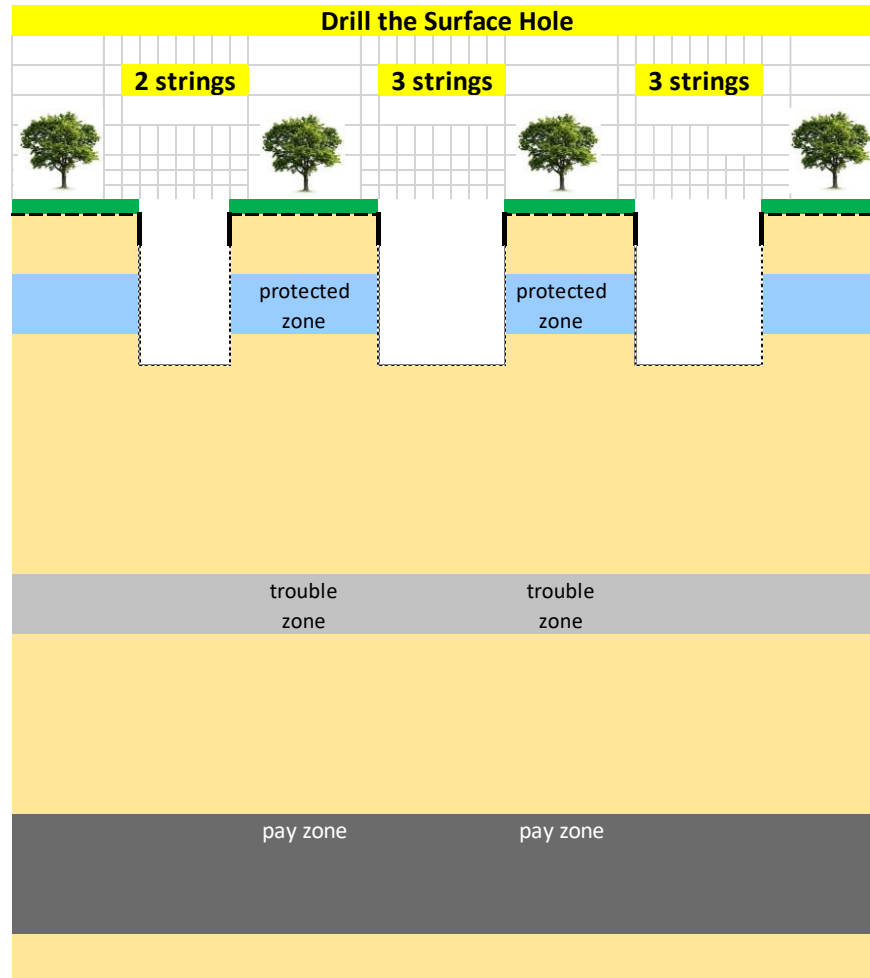
Conventional Drilling



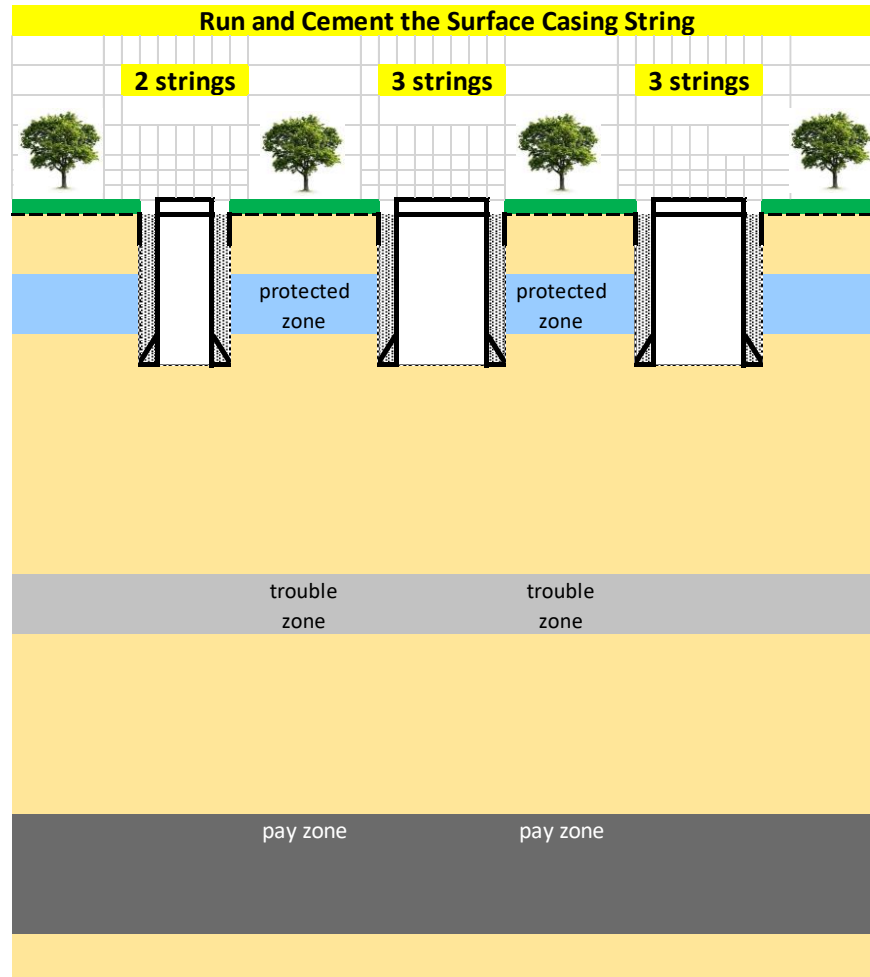
Conventional Drilling



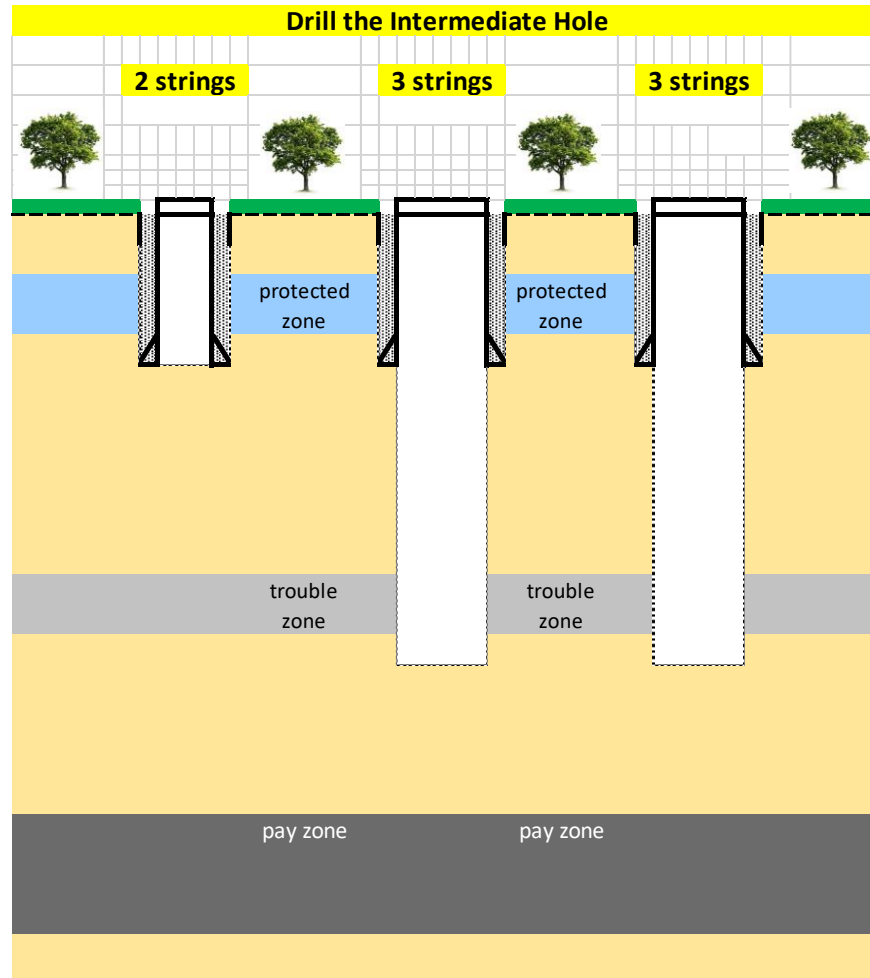
Conventional Drilling



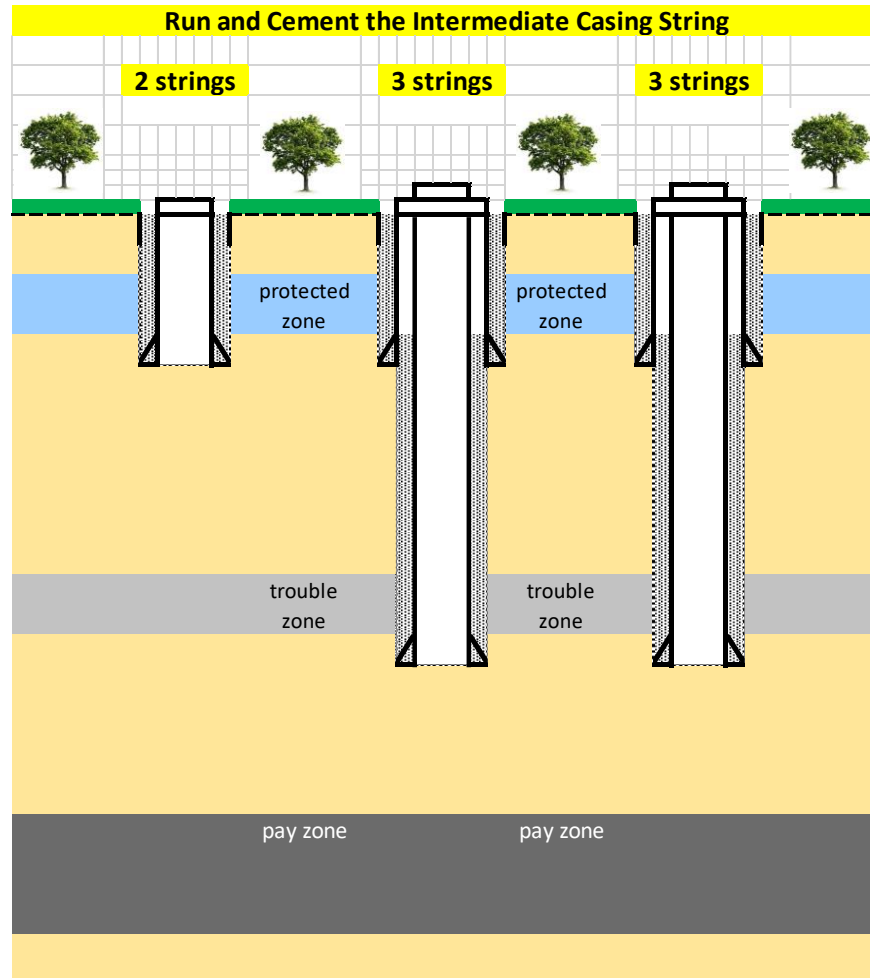
Conventional Drilling



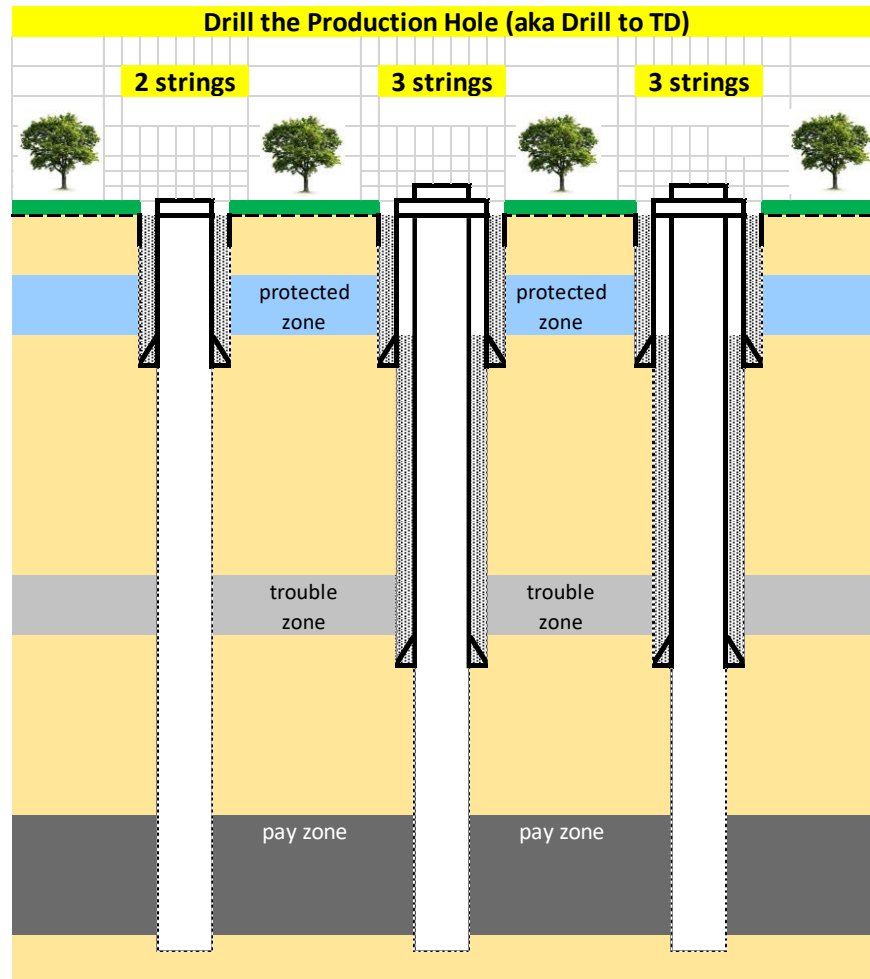
Conventional Drilling



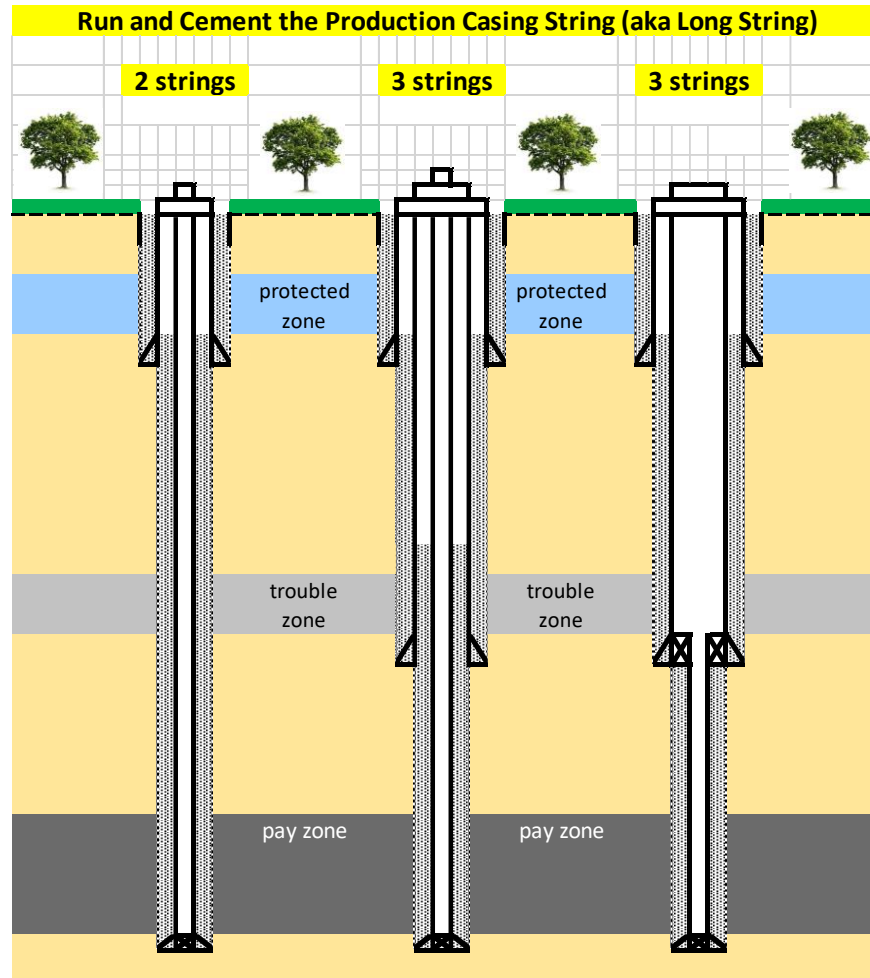
Conventional Drilling



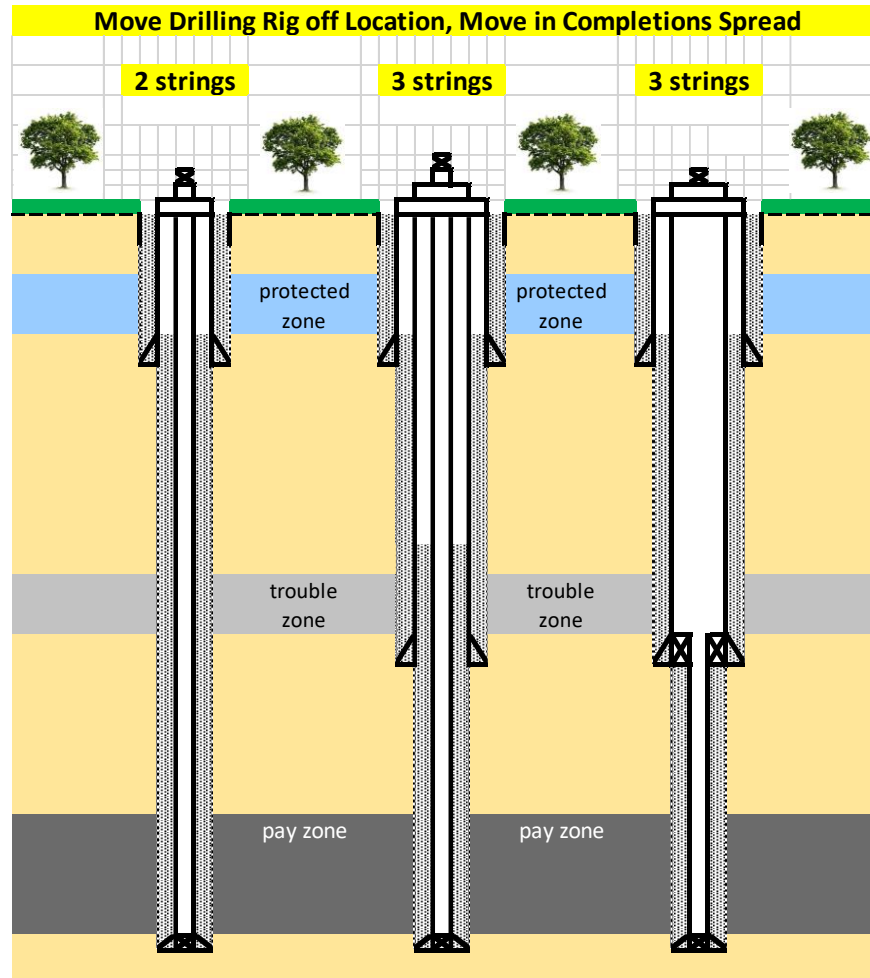
Conventional Drilling



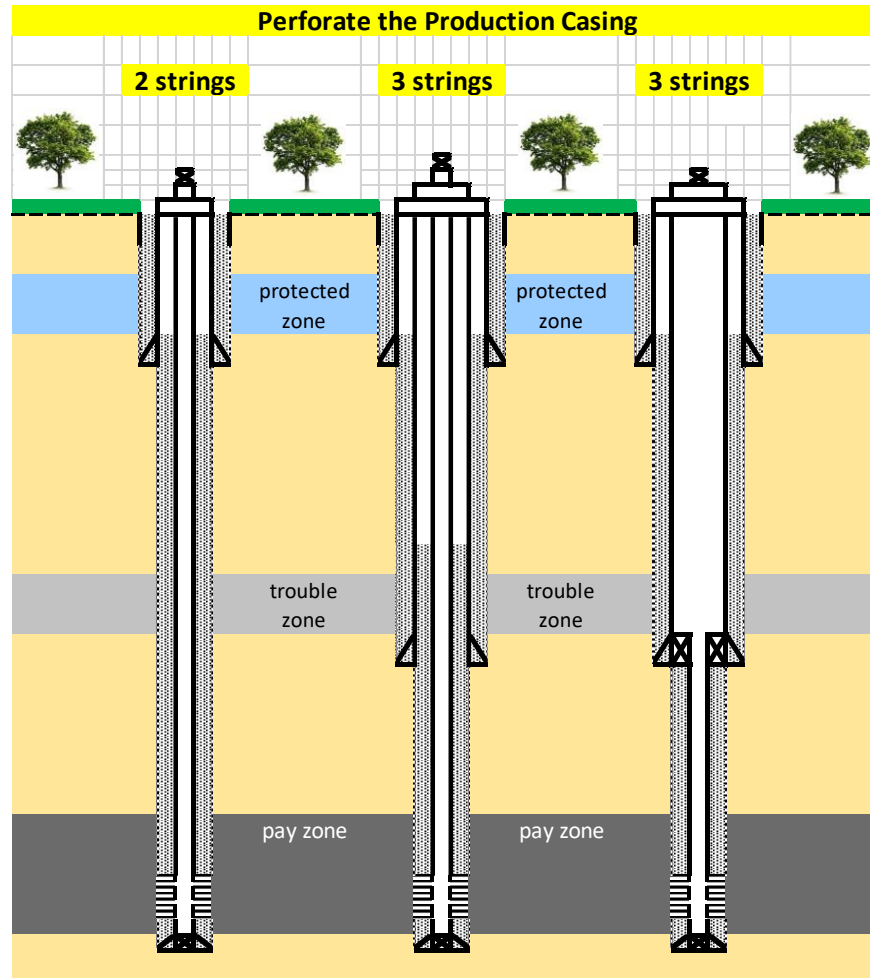
Conventional Drilling



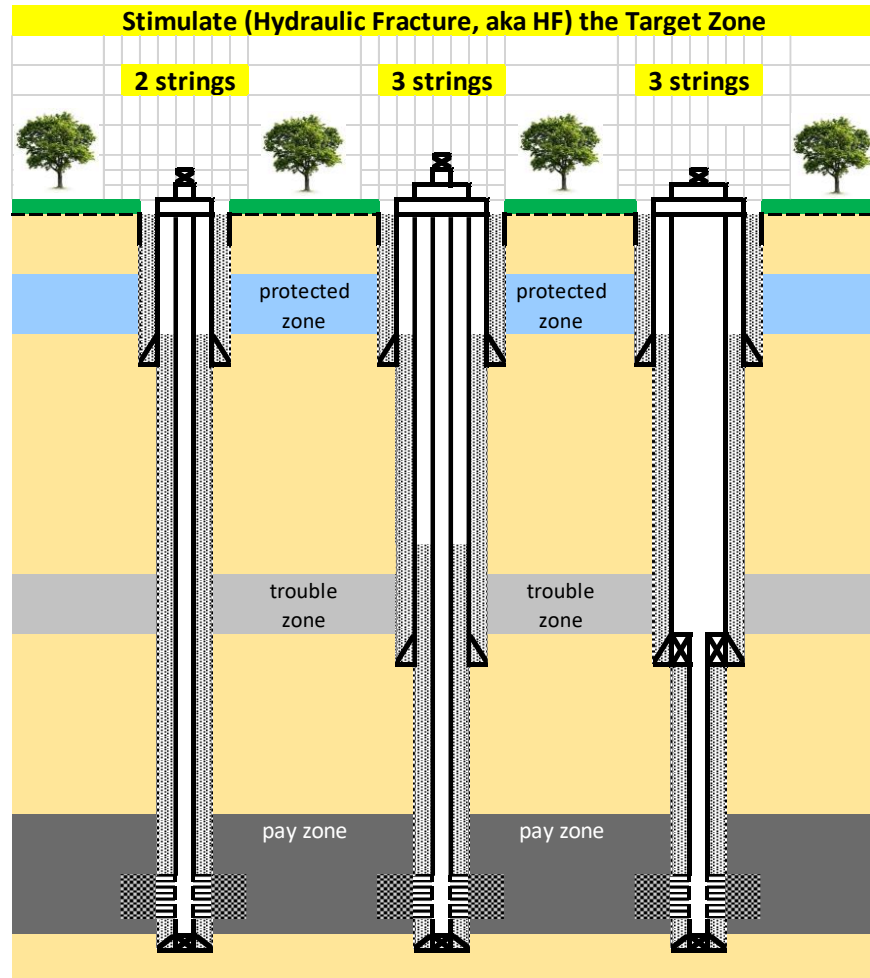
Conventional Drilling



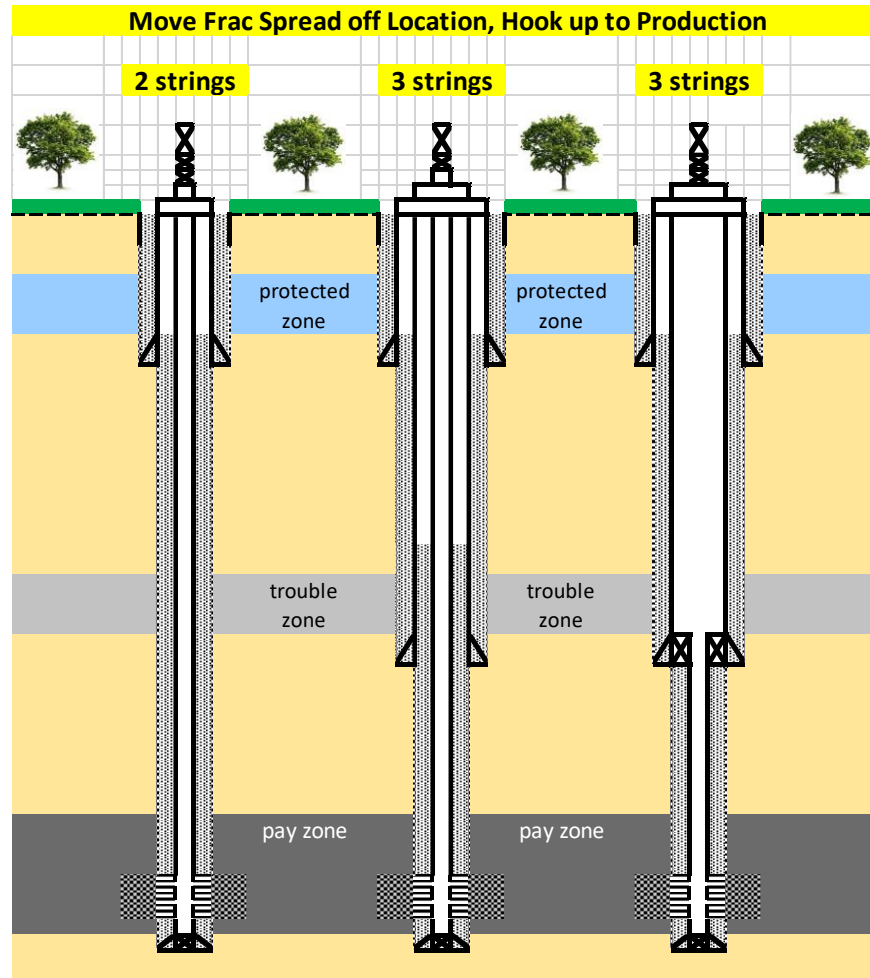
Conventional Completions



Conventional Completions



Conventional Completions



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Contact Information

Lloyd H. Hetrick, P.E., C.S.P
East Shore Investments, LLC
The Woodlands, TX
lloyd.hetrick@eastshoreinv.com
Cell 281-630-6571



D. Steven Tipton, P.E., SPEC
Senior Consulting Engineer
ALL Consulting
Tulsa, OK
stipton@all-llc.com
Cell 918-230-2161



Jesse M. Sandlin, J.D.
Senior Regulatory Policy Advisor
Noble Energy
Denver, CO
Jesse.Sandlin@nblenergy.com
Cell 281-414-2828



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