

# Completion and Development of Horizontal Water Wells

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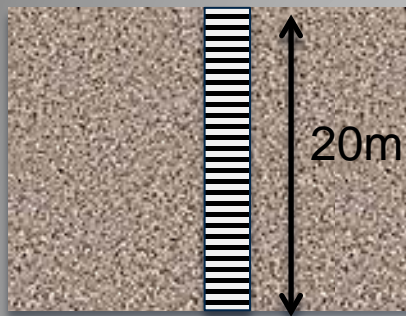


# Outline

- Why Horizontal Wells?
  - Completion Options
- Why do we Develop Water Wells?
  - Development Options
- Questions

# Horizontal Water Well - Why?

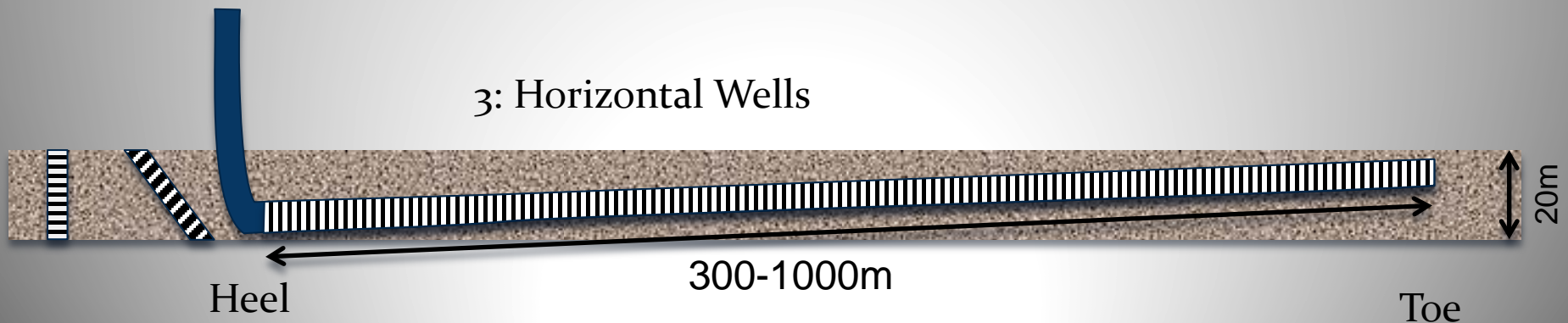
1: Vertical Wells



2: Slant Wells



3: Horizontal Wells





# Why Choose A Horizontal Water Well?

- More water!
  - Smaller footprint
  - Longer screen means lower entrance velocities
  - Use available drawdown efficiently



# Where To Use Horizontal Wells?

- “Competent and predictable” Fms 
  - Mannville Gp
  - Spirit River Gp
  - Devonian carbonates (?)
  - Deep Neogene (Empress Fm ?)
  
- Shallow(er) unconsolidated Quaternary 
  - Laterally discontinuous?

# Completion Types - Slotted Liners

- Fractured bedrock
- Competent Fms
- Can be used for borehole stability prior to running screens (if needed)

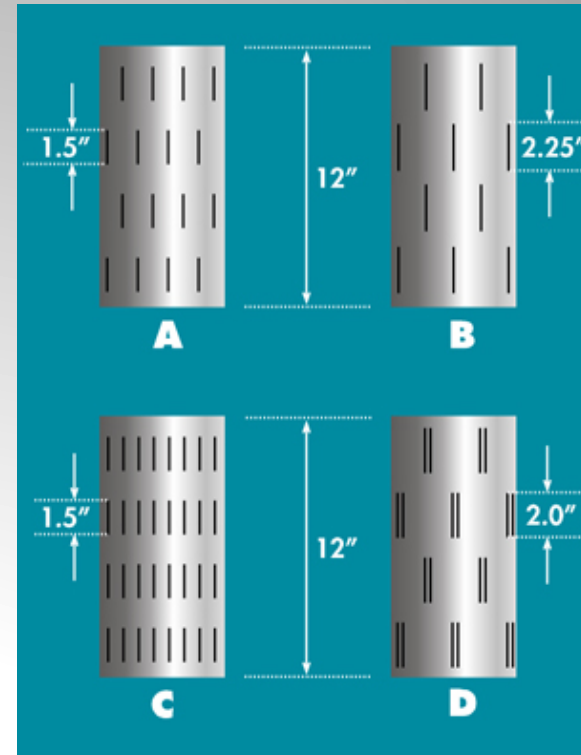


Image From: G&L SLOTCO ([www.gl-slotco.com](http://www.gl-slotco.com))



# Completion Types - Basepipe

- Continuous wire-wrap
- Variety of formations
- Slot size based on grain size analysis
- Promotes well efficiency
- **NOTE:** Be conservative in the “d<sub>10</sub>” used for well screen design



# Completion Types - Pre-packs

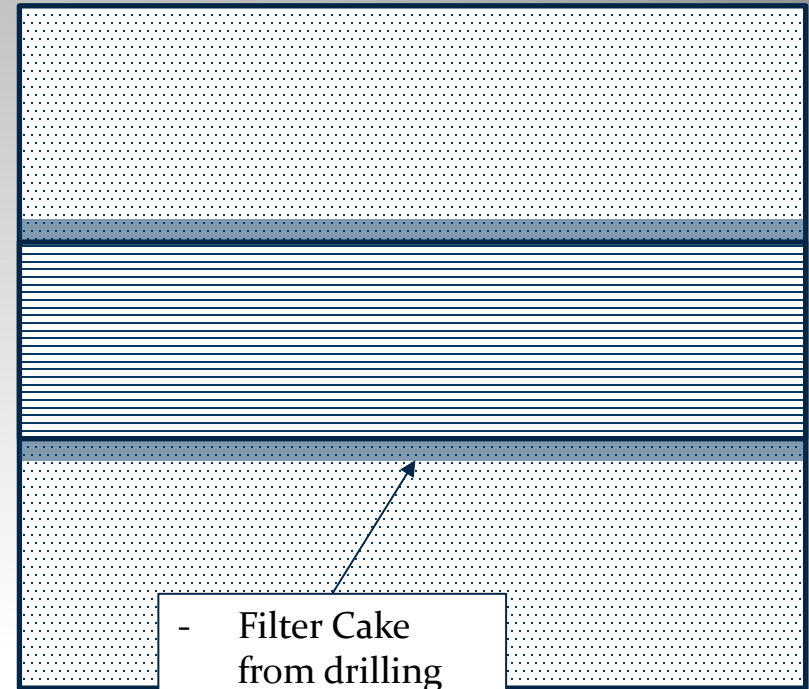
- Continuous wire-wrap
- Used in poorly sorted or heterogeneous systems
- When uncertainty in grain size exists





# What Is Well Development?

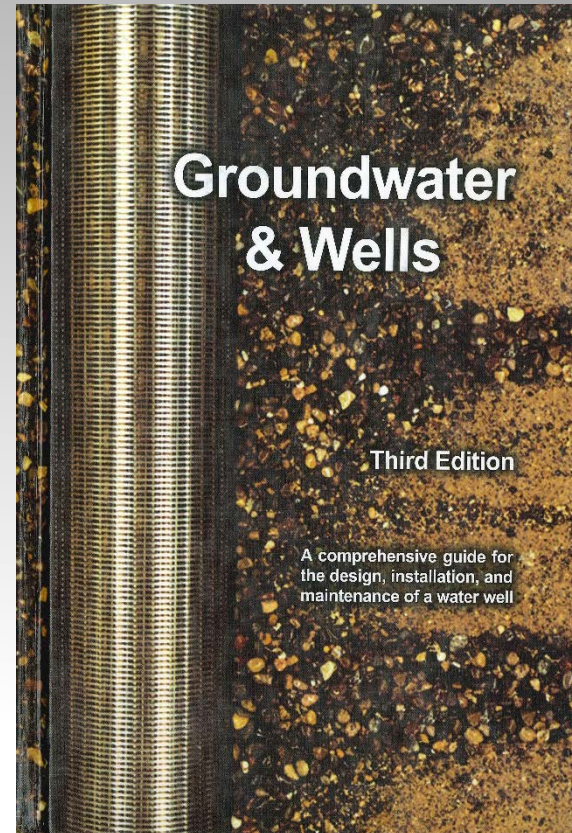
- Procedures that are designed to maximize efficiency and production
- Repair aquifer damage
- Maximize efficient flow rates



- Filter Cake from drilling fluids
- Drilling Fluid invasion

# Why Do We Develop Wells?

- To produce sediment free water at the highest possible flow rates
- Increase flow of water to the well

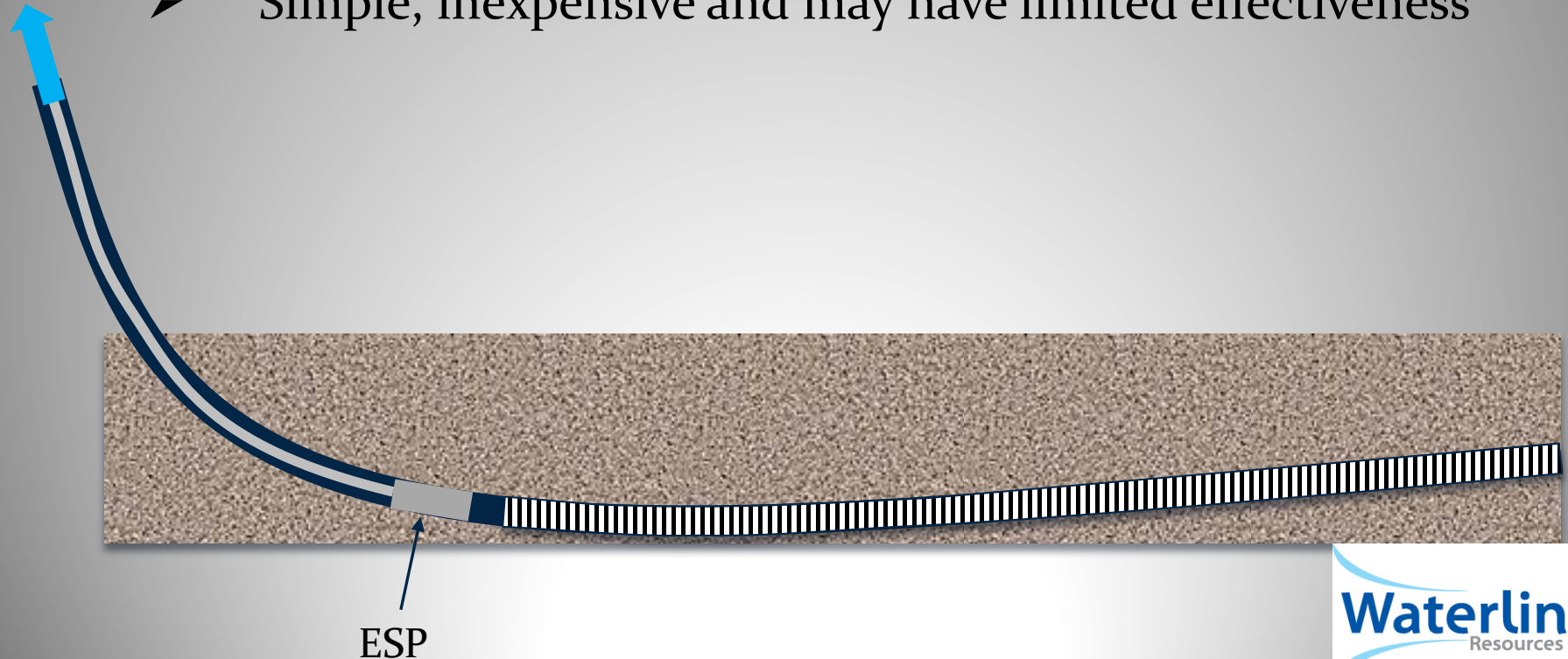


# Well Development

- Once the liner/screens have been installed
  - Use of a chemical additives to break down and help remove the filter-cake
  - Displace (flush) fluids from well

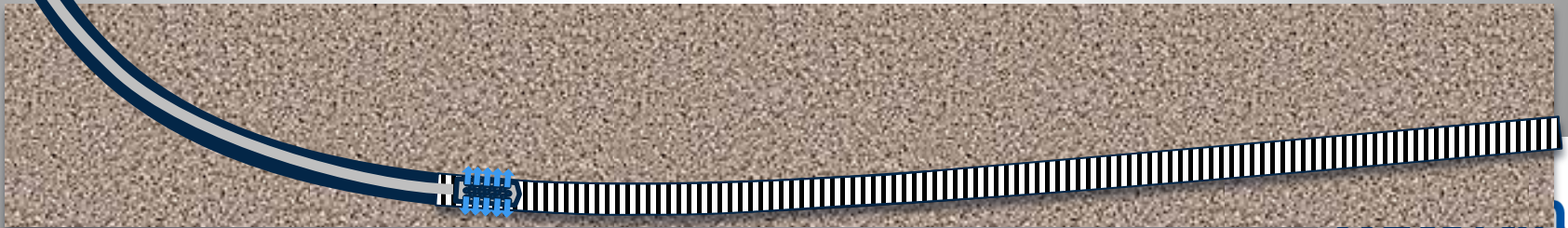
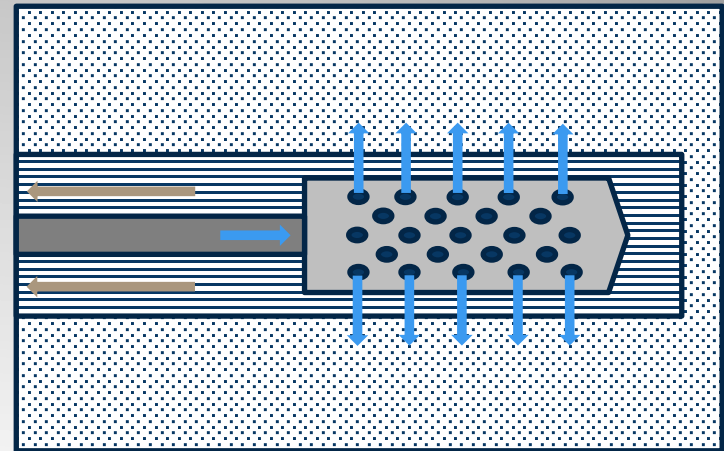
# Well Development – One Option

- Initiate pumping, gradually increase rates
  - Simple, inexpensive and may have limited effectiveness



# Well Development – Alternate Option

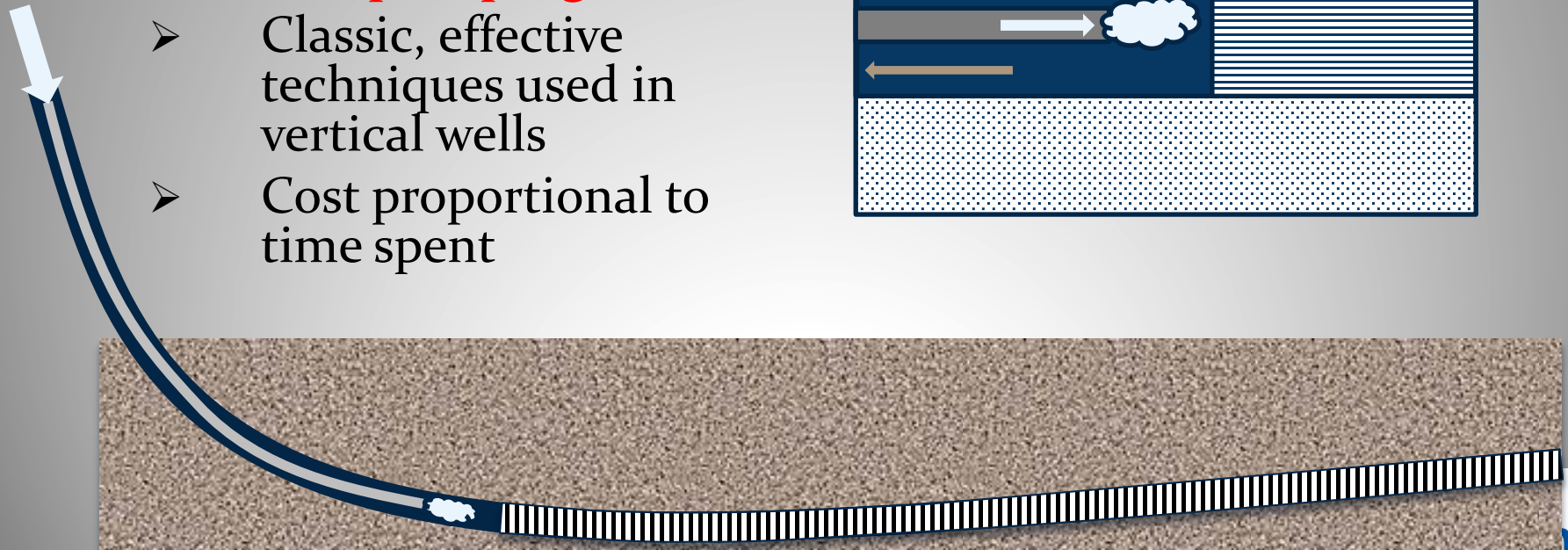
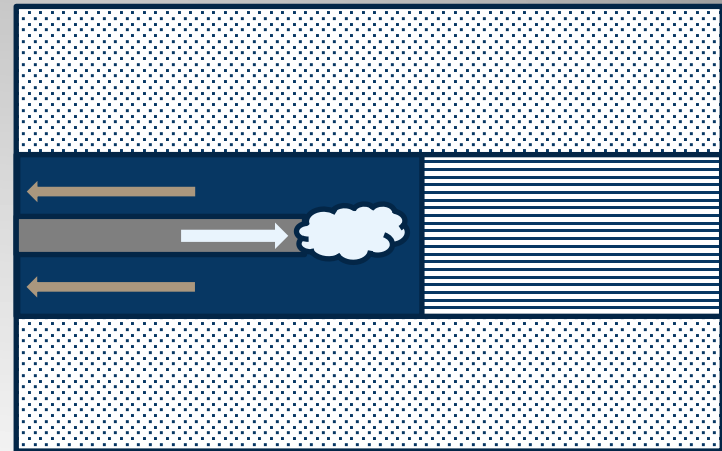
- Swabbing 🙅
- **Water/Air Jetting** 👍
- Air-Lift pumping
  - Classic, effective techniques used in vertical wells
  - Cost proportional to time spent





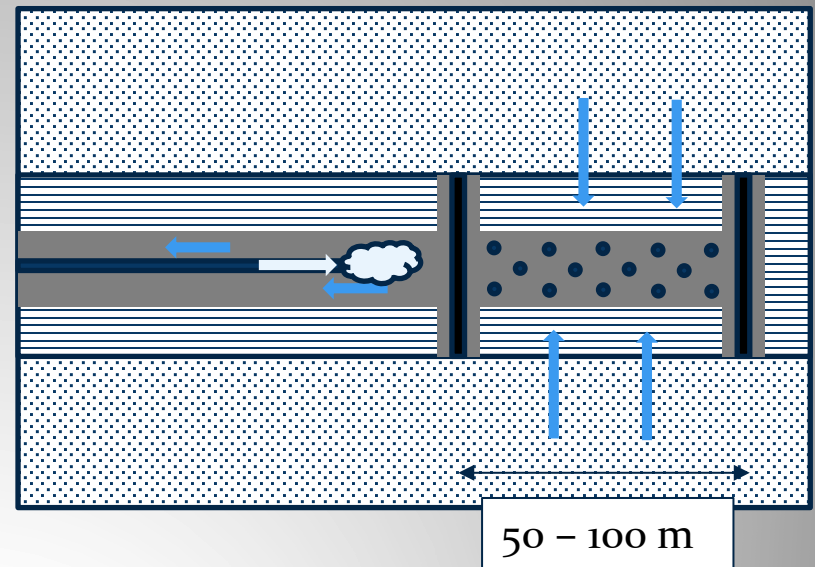
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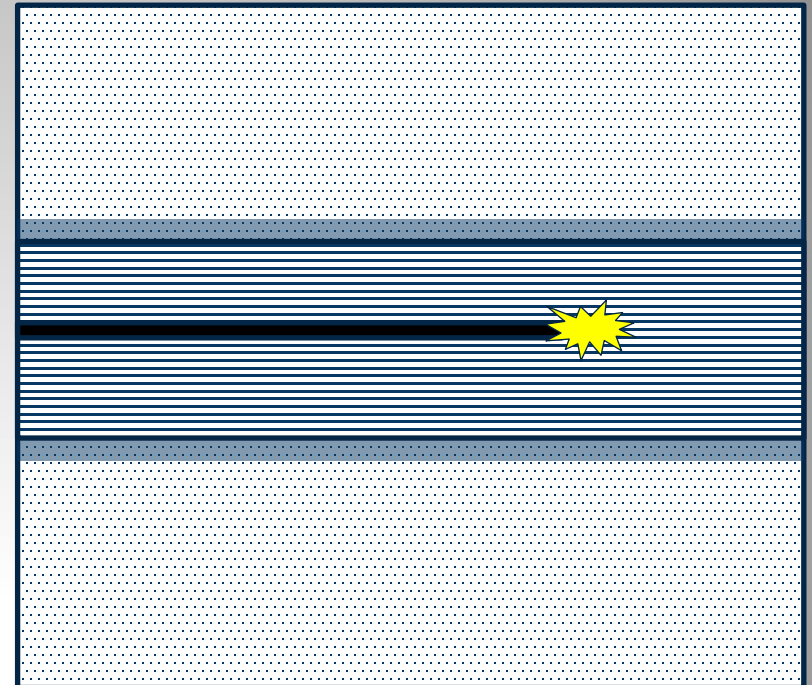
# Well Development – Alternate Option

- Packer Isolated Development
  - Use downhole packers to isolate sections of the screen
  - Allows individual screen sections to be developed



# Well Development – Alternate Option

- “New”
- Near Wellbore stimulation
  - Downhole tool run on wireline
  - Breaks down filter cake and fines outside of the screen
  - Electrical/hydraulic pulse



# Summary

- Horizontal Water Wells are applicable in many situations
- Construction materials will depend on lithology and cost
- Due to their screen length, multiple development options are available

# Questions?

