

October 3-4, 2017

MCM Grandé, Odessa, Texas

[ShaleTechPermian.com](http://ShaleTechPermian.com)

# SHALETECH™

## PERMIAN



# Improving Operational Efficiency with Downhole Completions

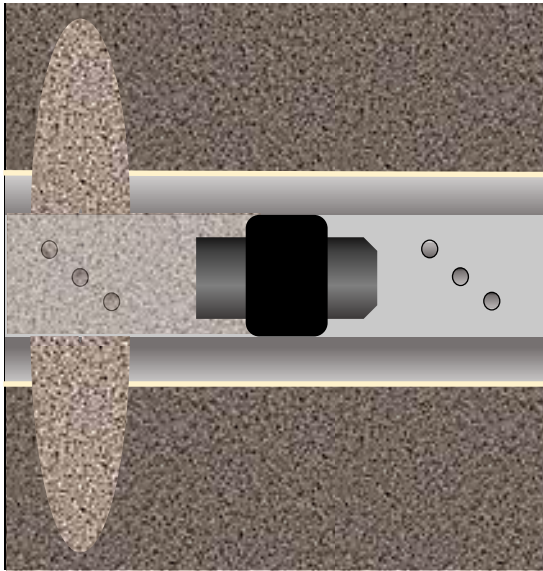
W. Aaron Burton

Instructor and Consultant

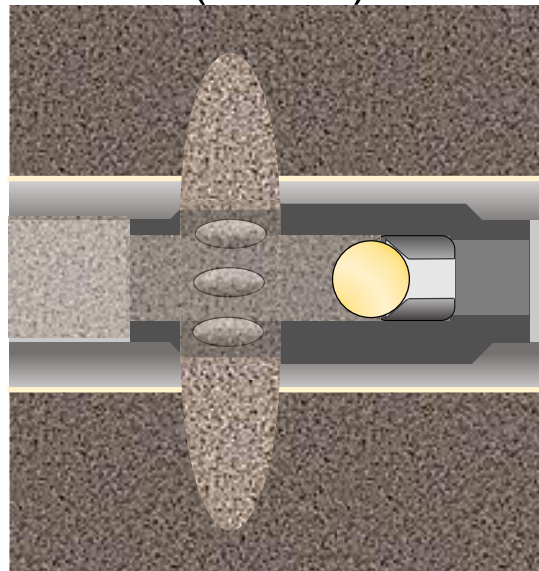
Unconventional Oil and Gas Training

# Completions Overview

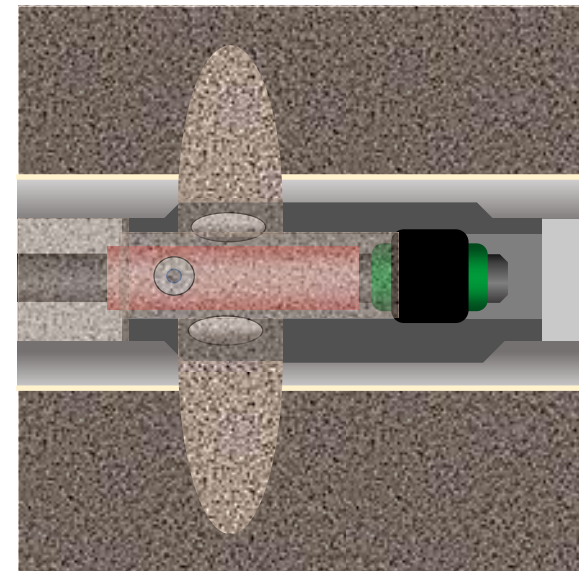
Plug-and-Perf  
(PNP)



Ball-Activated  
Completion Systems  
(BACS)



Coiled-Tubing-  
Activated Completion  
Systems (CTACS)



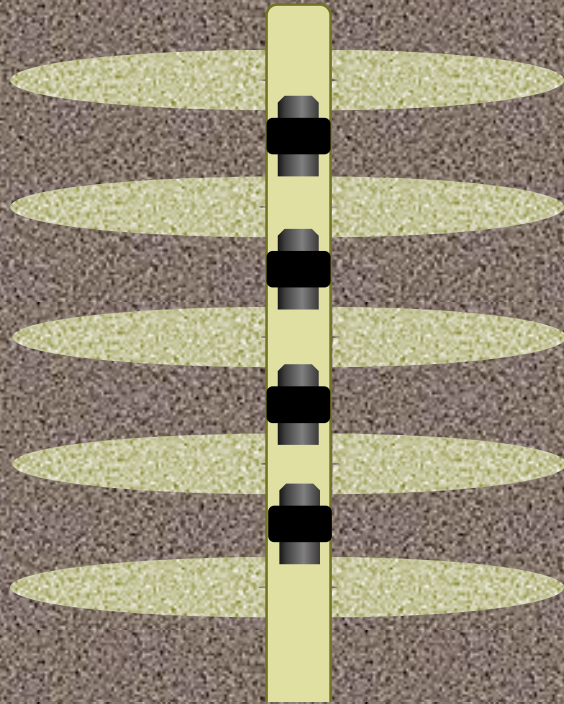
# Improving Plug-and-Perf Efficiency

Traditionally PNP lacks operational efficiency during the frac job, but new technologies and techniques are changing that.

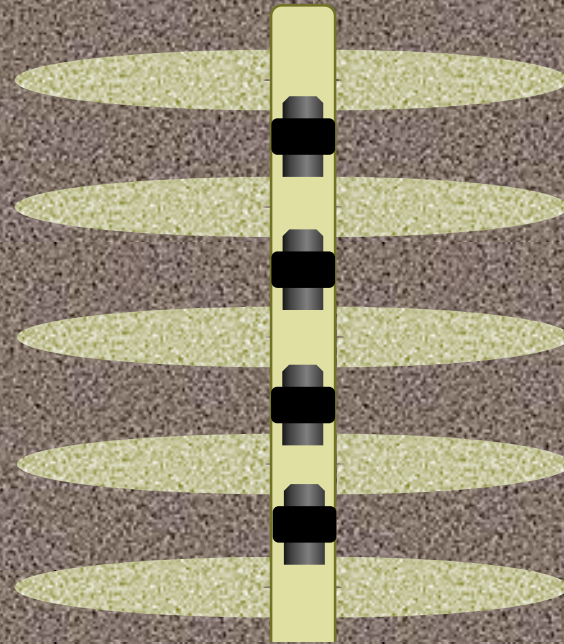
- Multi-well pads allow simultaneous fracturing operations
- New frac designs implement more clusters per stage, tighter cluster spacing, tighter stage spacing, and often times diverters
- New technologies improve efficiency
  - Optimized composite plug designs that are smaller and easier to mill out
  - Disintegrating/dissolving plugs

# Simultaneous Fracturing Operations

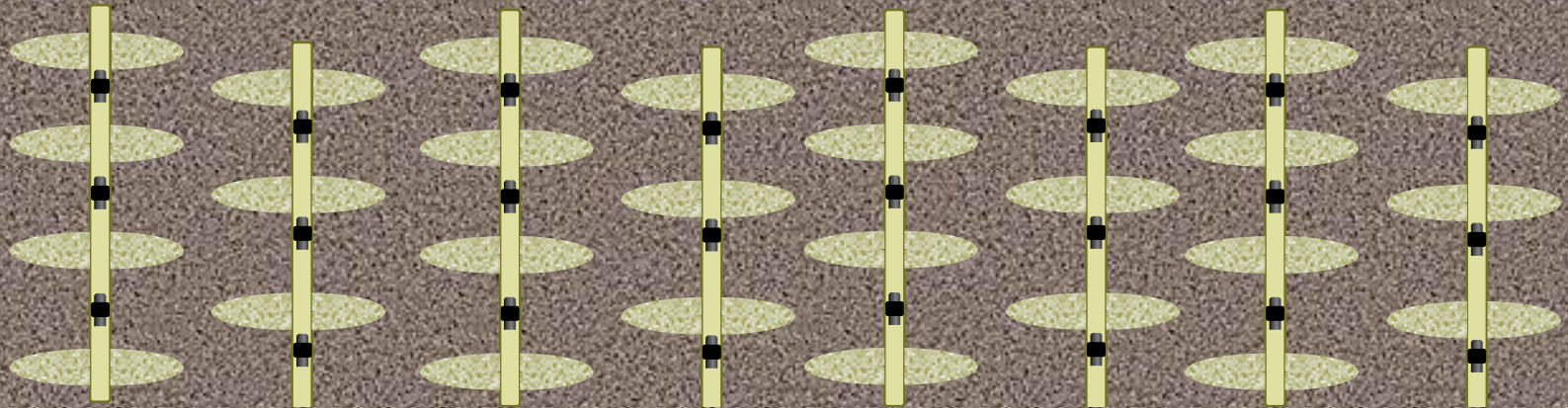
Well A



Well B

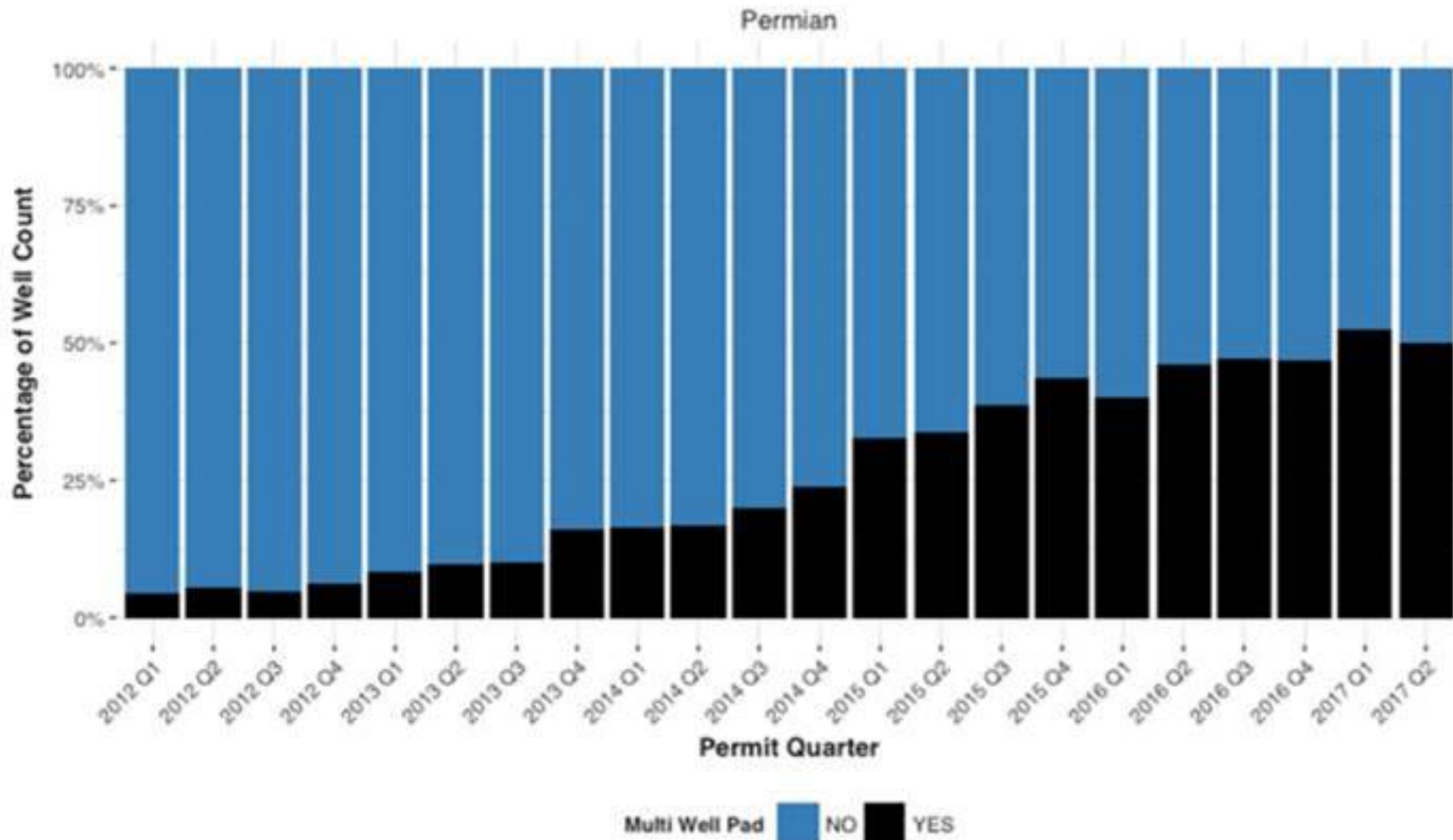


# Simultaneous Fracturing Operations

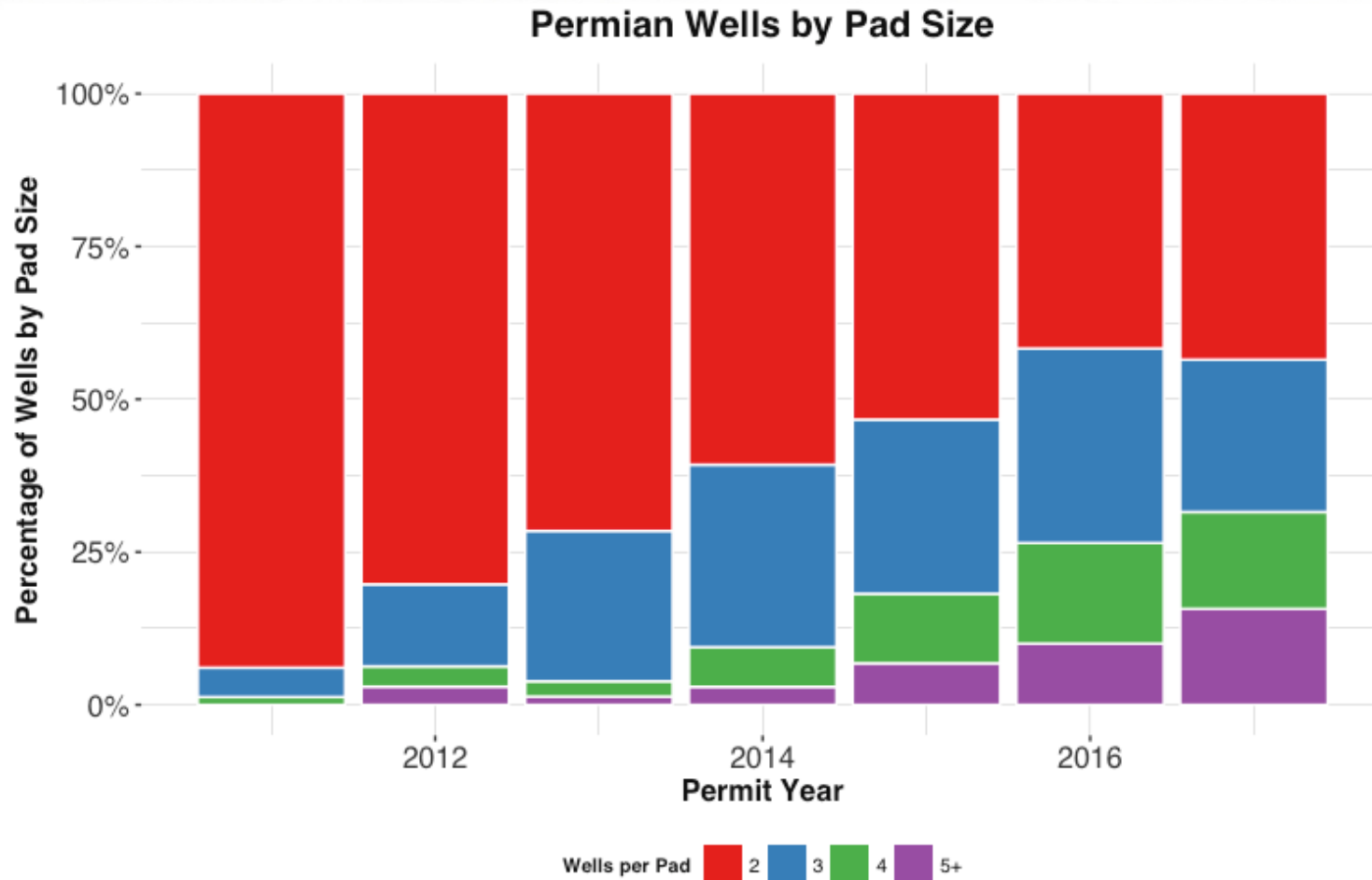


- Some operators report that they have optimized this process to the point they have eliminated the nonproductive time between stages.
- Pressure pumping and wireline units can also be skid-mounted to be moved on large pads without completely rigging down.

# Permian Pad Drilling Trends



# Permian Pad Drilling Trends





# Modern Completion Design

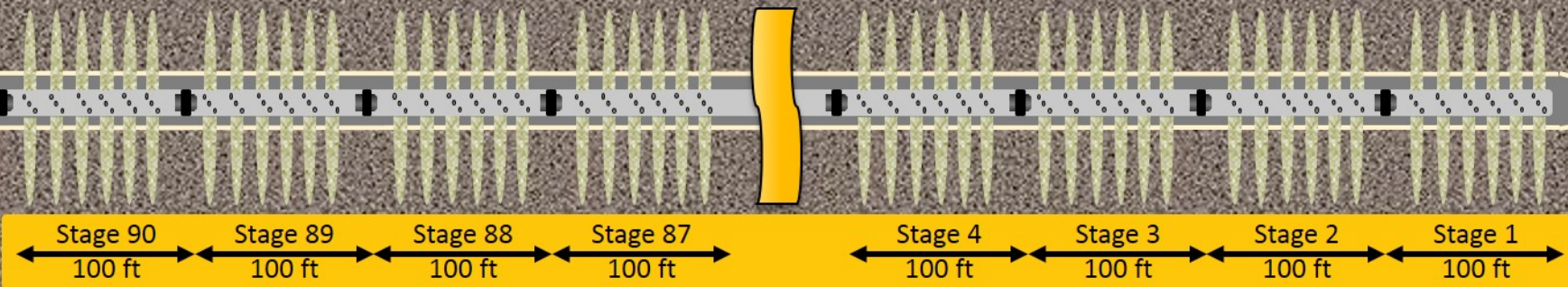
## Well Parameters

9000-ft lateral  
100-ft per stage  
15-ft cluster spacing



90 stages  
6 clusters\stage  
540 injection points

Diverters



# The Future of Multistage Completions

Can the BACS and CTACS make a resurgence?

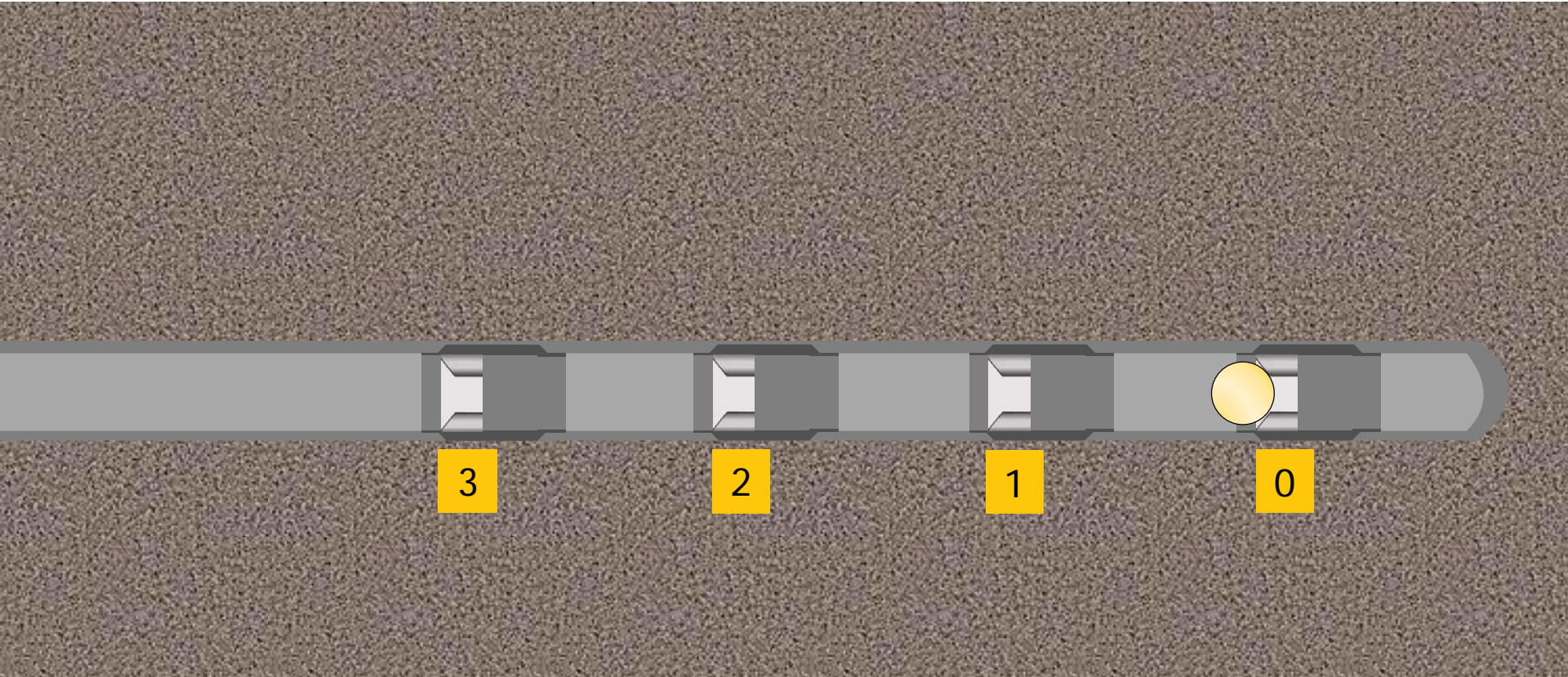
**Yes**

# New BACS Technologies

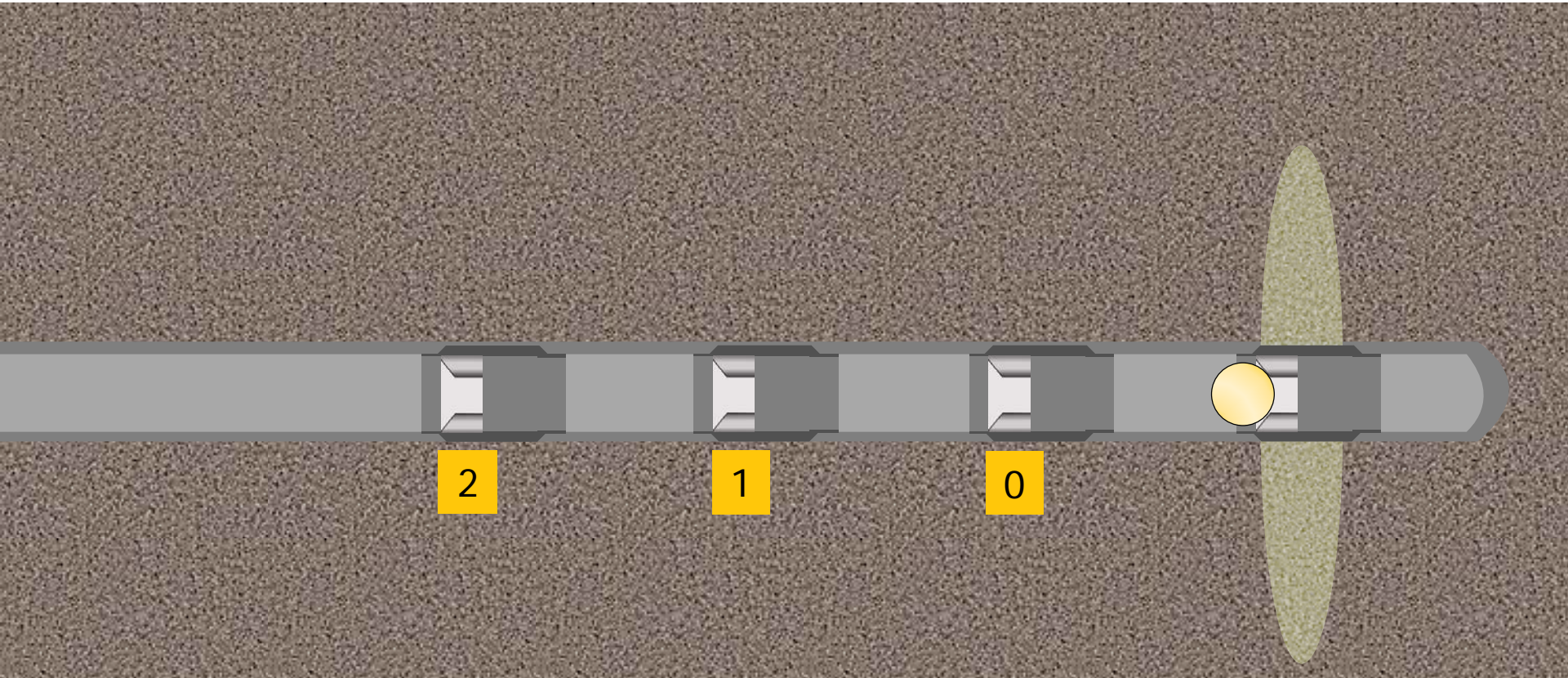
New frac sleeves offer the efficiency of BACS with a virtually unlimited number of stages with little to no diameter restrictions

- Frac sleeves with counter mechanisms
- Frac sleeves that use pump-down ball seats with different size collets

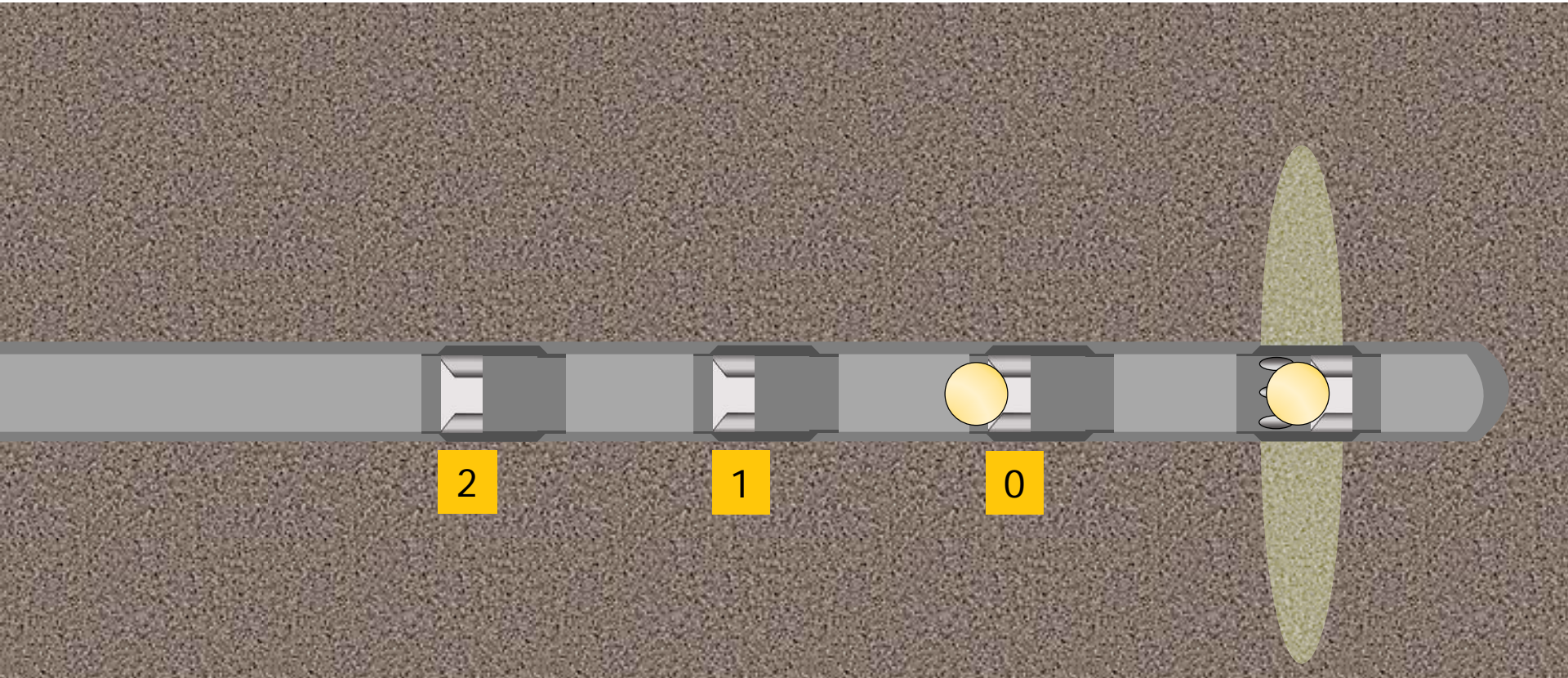
# Frac Sleeves with Counter Mechanisms



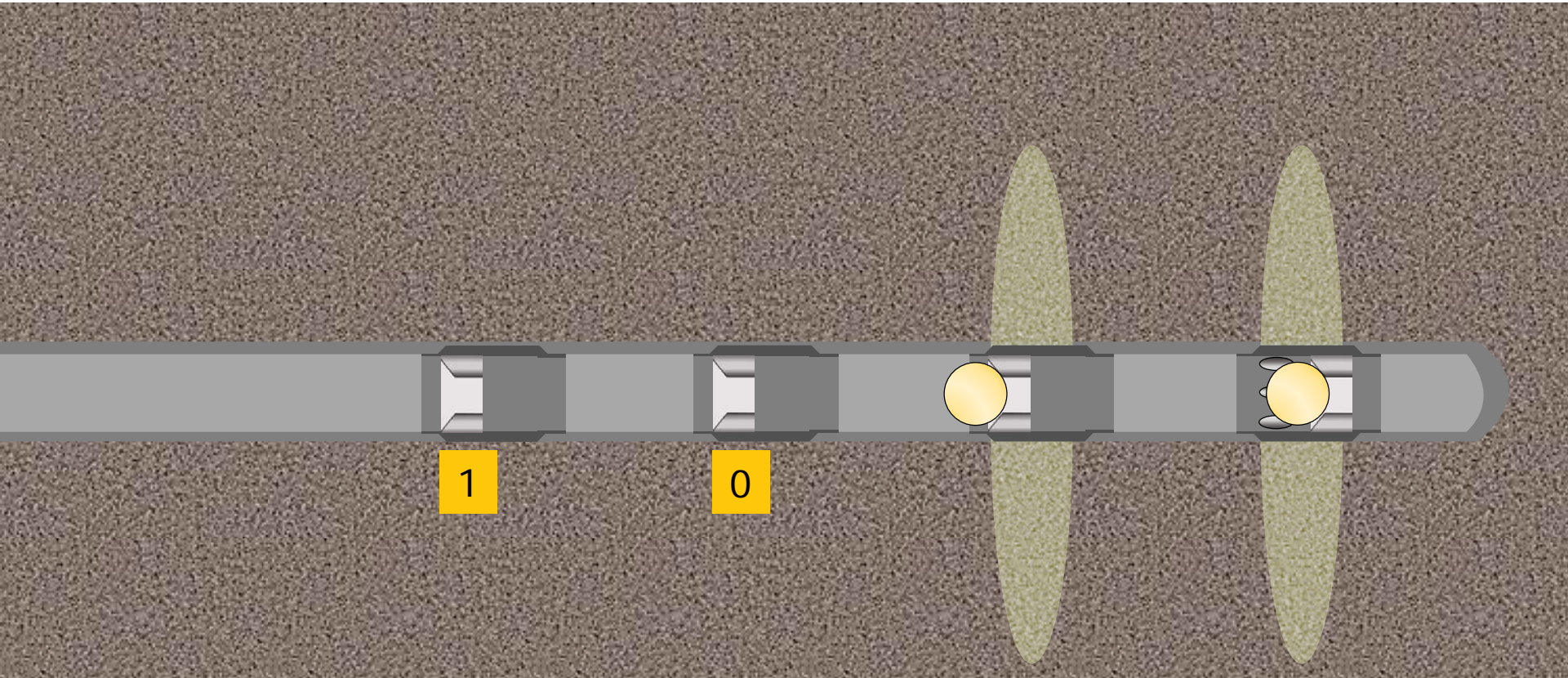
# Frac Sleeves with Counter Mechanisms



# Frac Sleeves with Counter Mechanisms

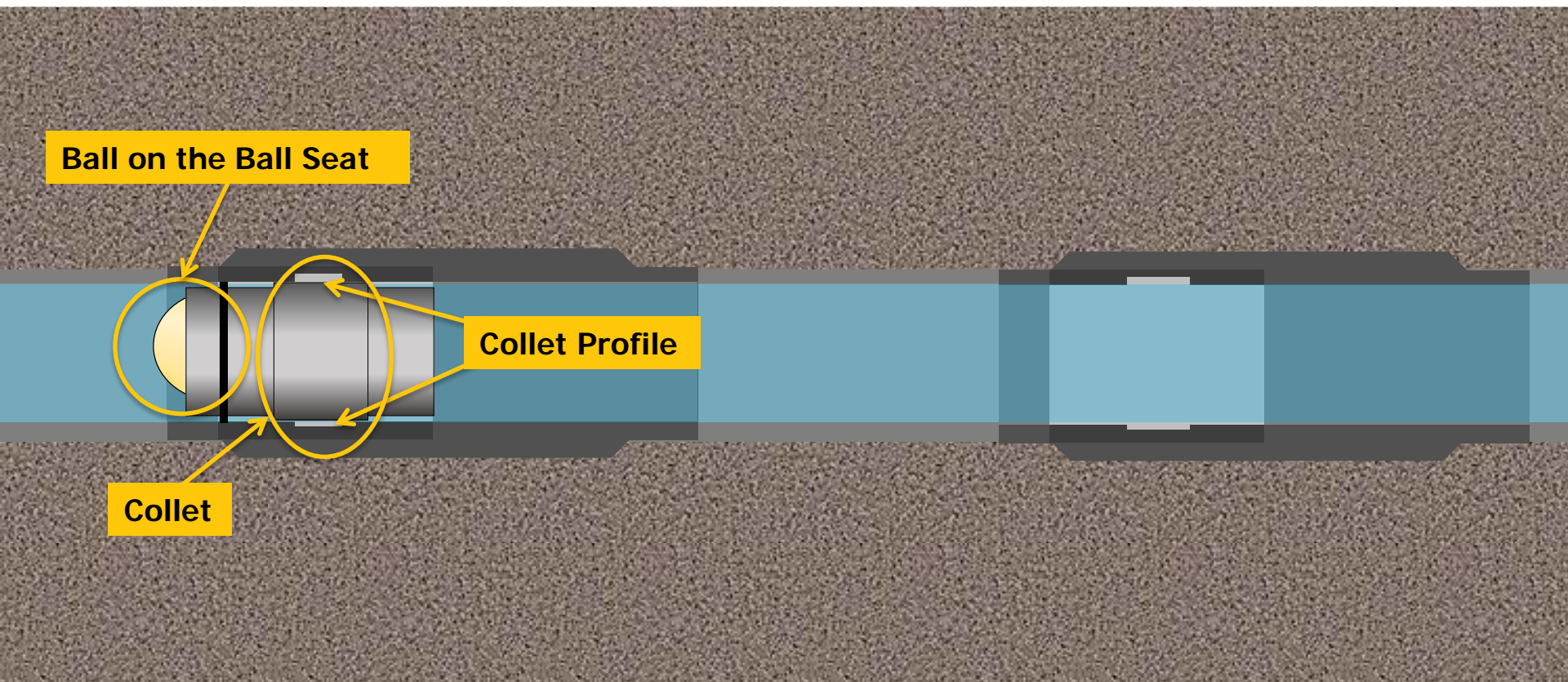


# Frac Sleeves with Counter Mechanisms



# Ball Seats with Collet Locator

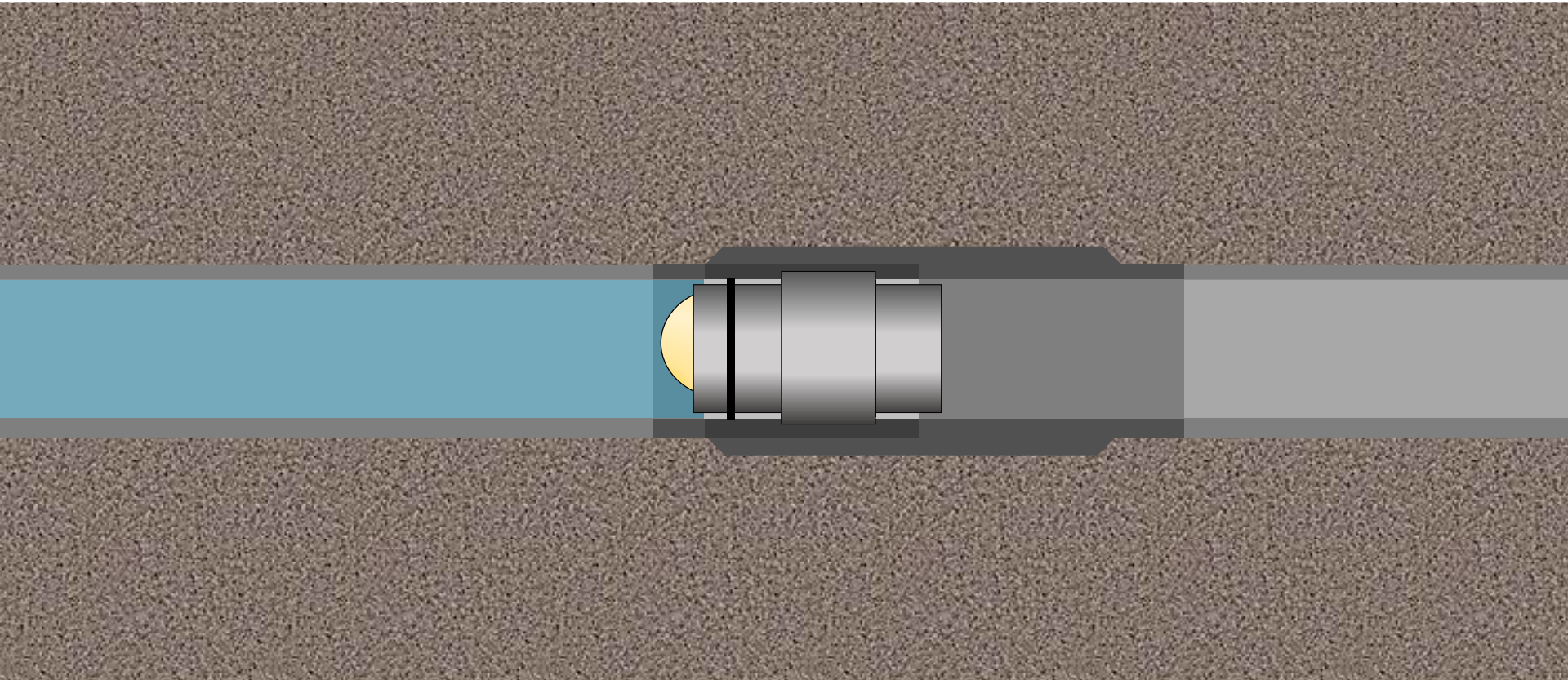
Ball seat with collet locator that is pumped into the well





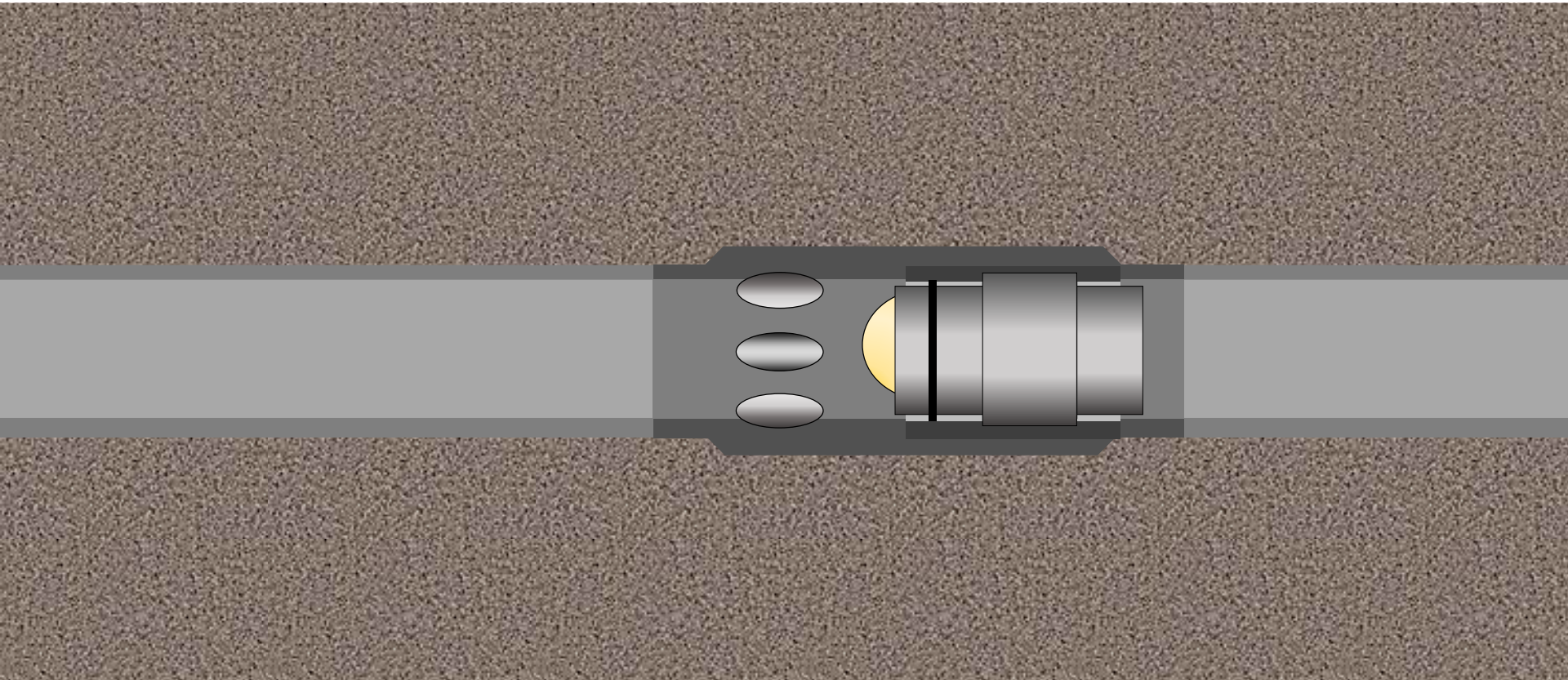
# Ball Seats with Collet Locator

Ball seat with collet locator that is pumped into the well



# Ball Seats with Collet Locator

Ball seat with collet locator that is pumped into the well

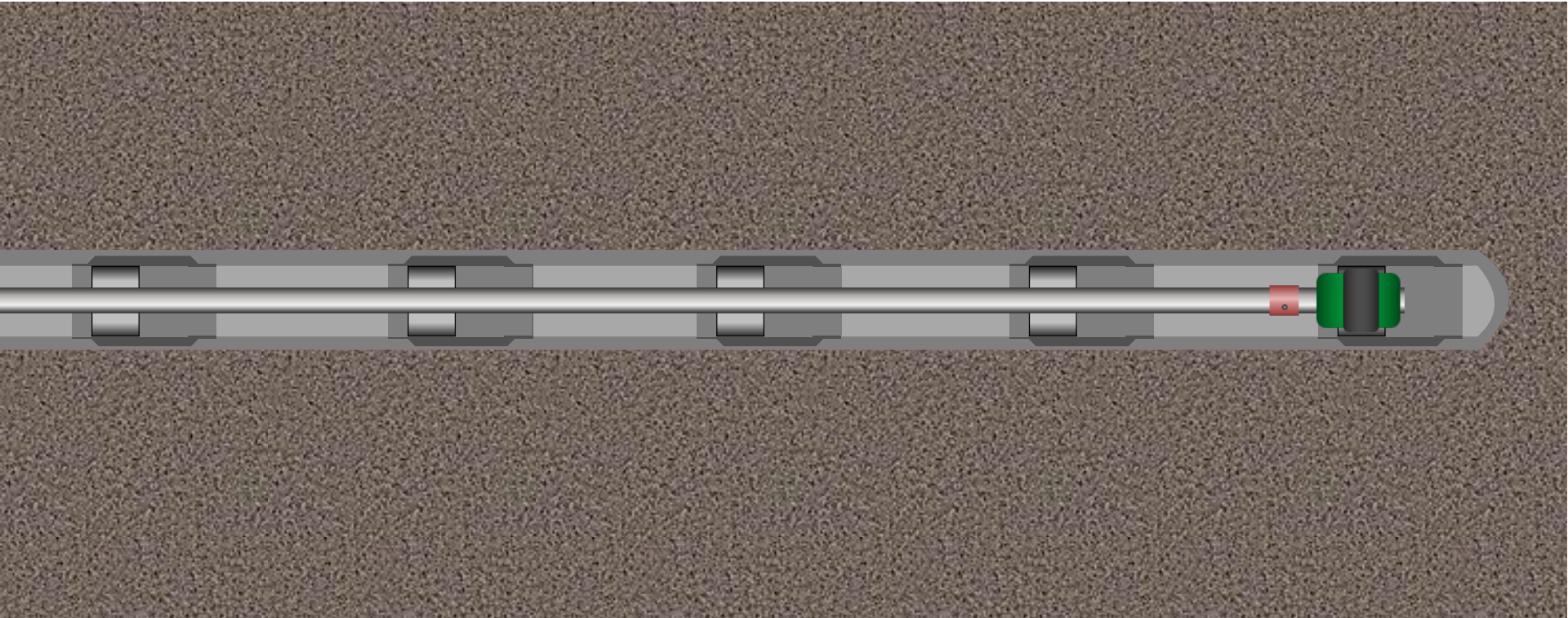


# New CTACS Technologies

- Improved coiled tubing locator devices
  - More reliable in longer laterals
- Reclosable frac sleeves
  - Immediately reclosing the sleeve helps keep near-wellbore proppant in place
  - Enables out-of-order fracturing
  - Refracturing capabilities

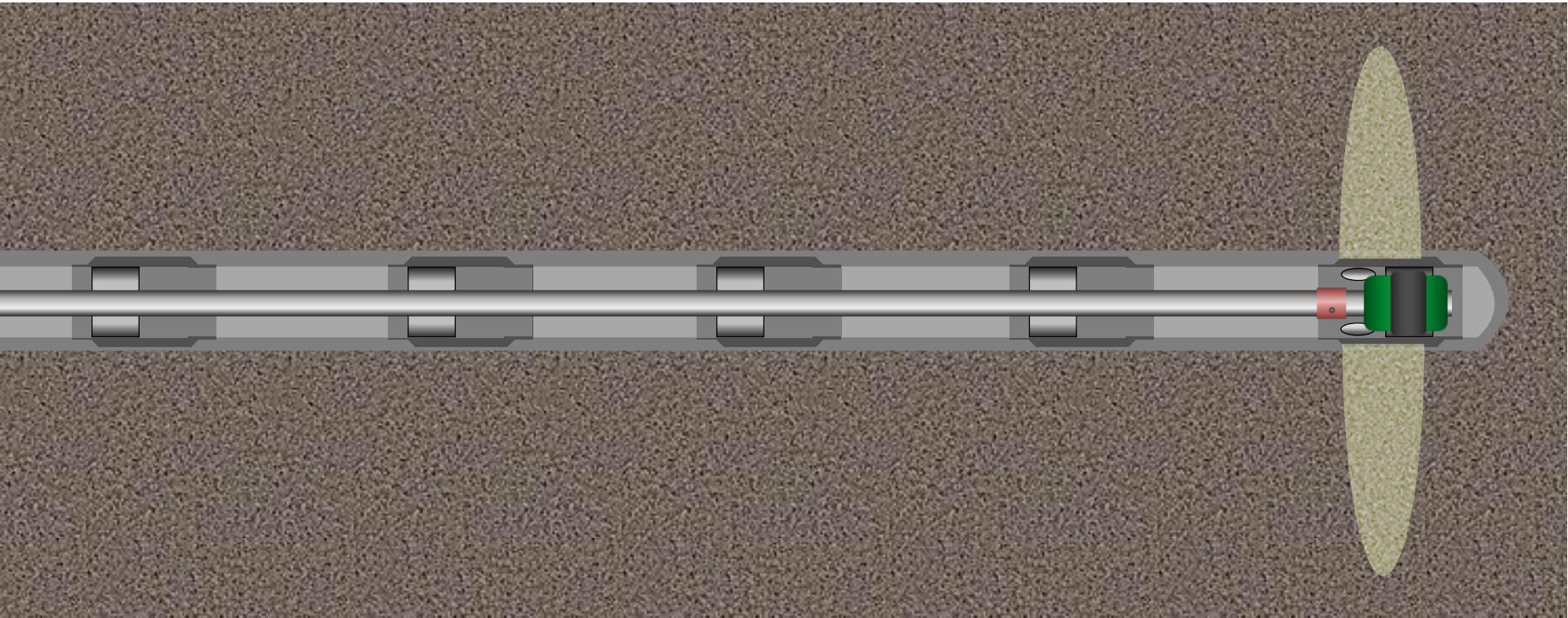
# Reclosable Sleeves for the Primary Frac

Immediately Reclose the Frac Sleeve After Fracturing



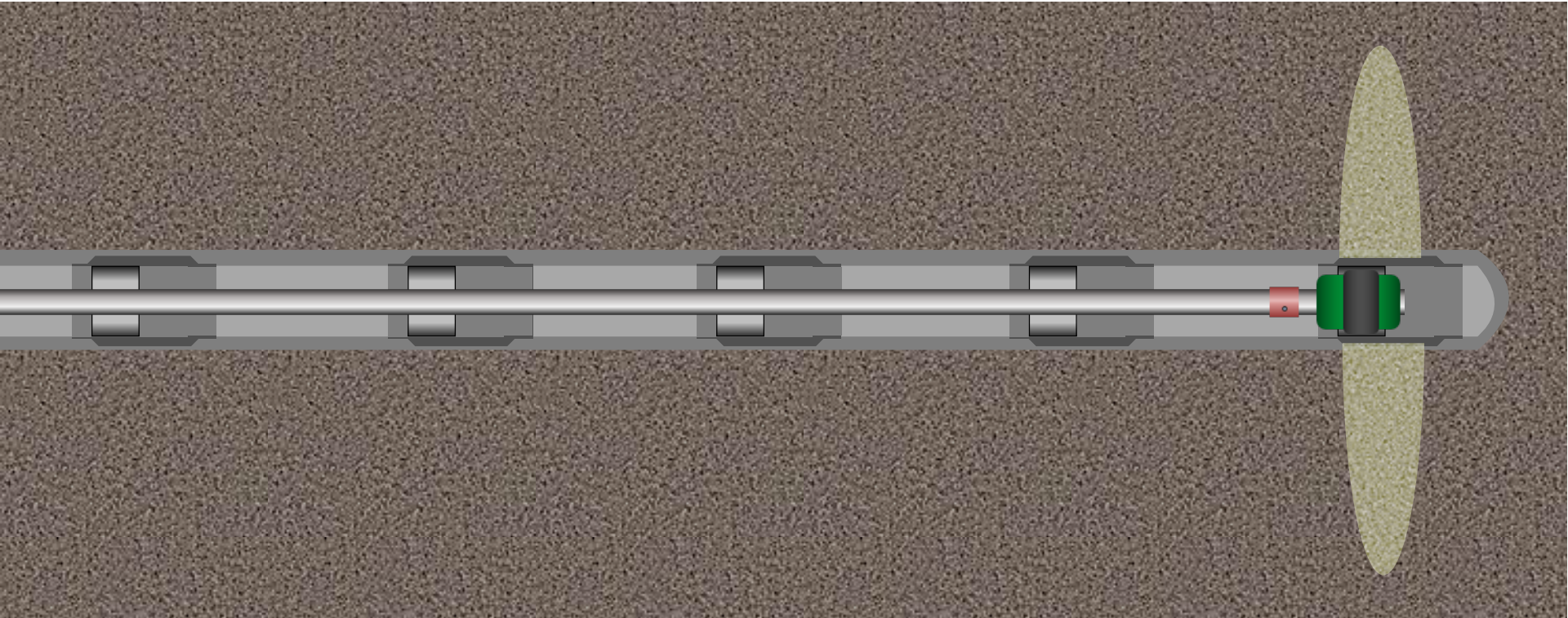
# Reclosable Sleeves for the Primary Frac

Immediately Reclose the Frac Sleeve After Fracturing



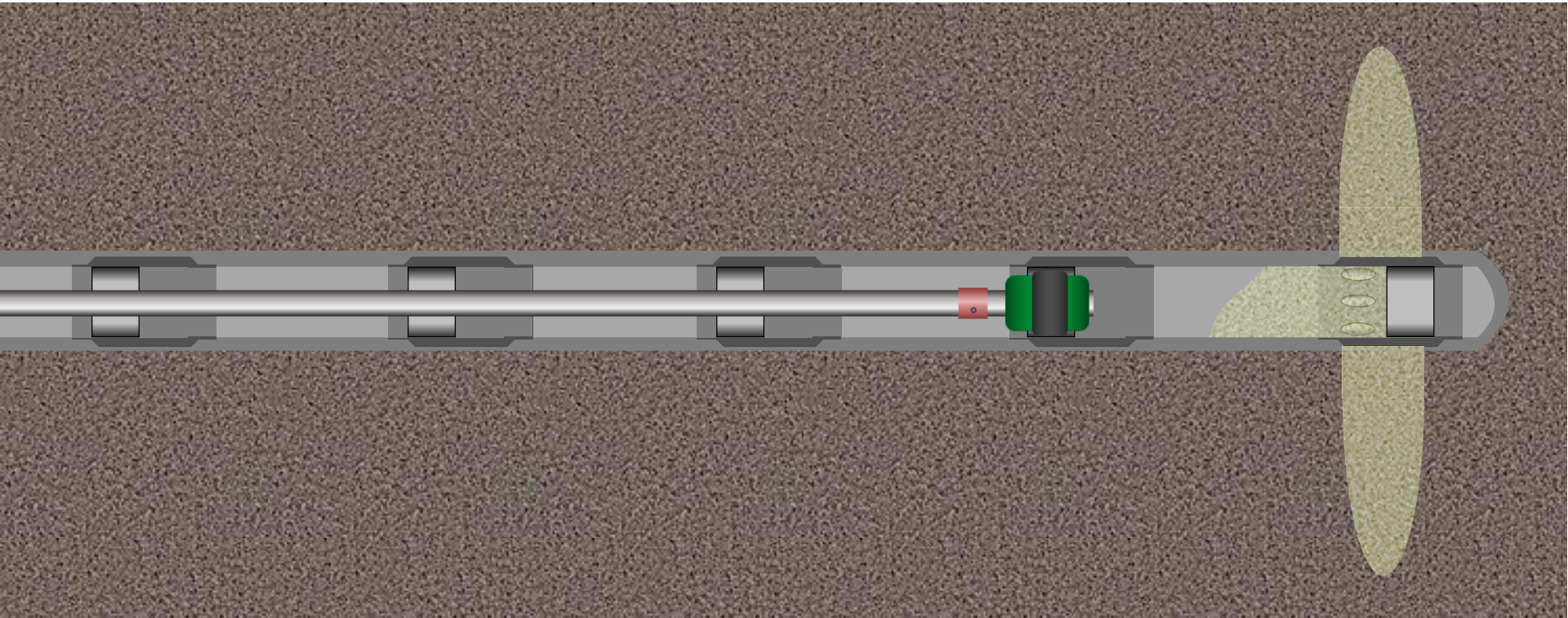
# Reclosable Sleeves for the Primary Frac

Immediately Reclose the Frac Sleeve After Fracturing



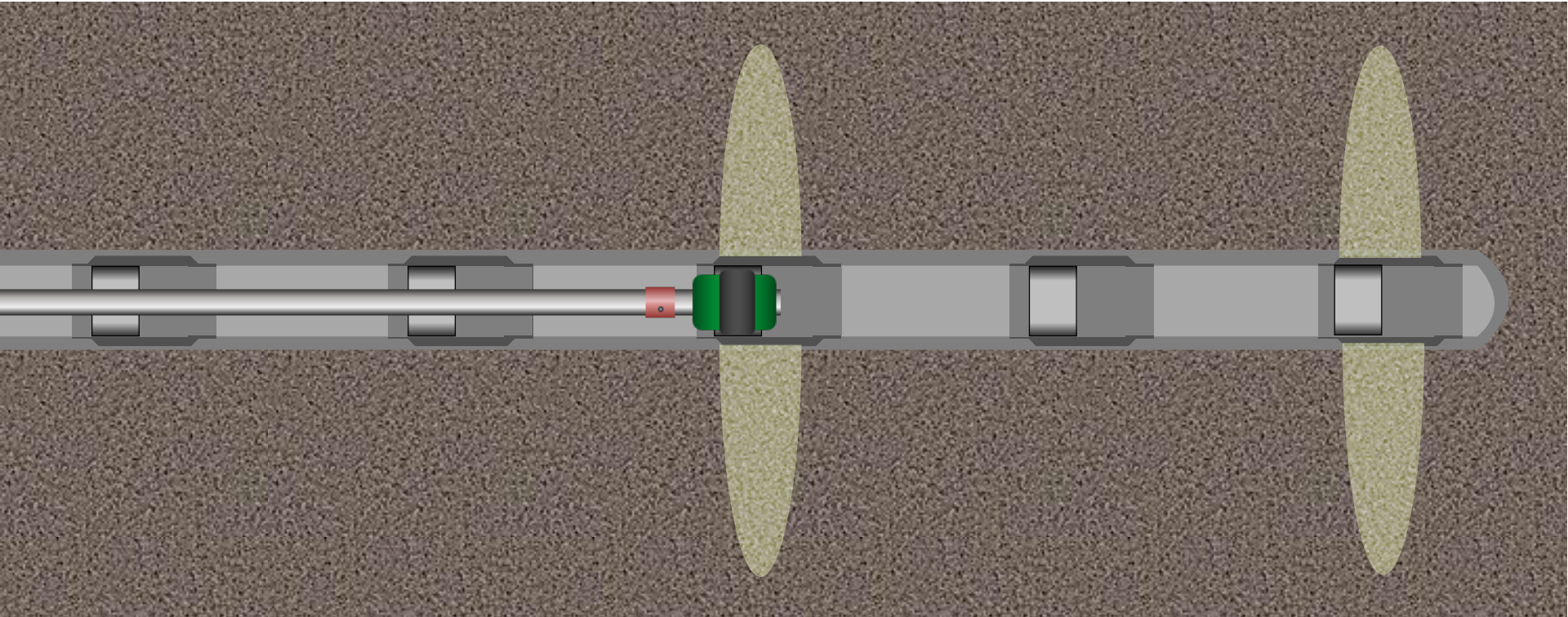
# Reclosable Sleeves for the Primary Frac

Preventing Loss of Near-Wellbore Proppant



# Reclosable Sleeves for the Primary Frac

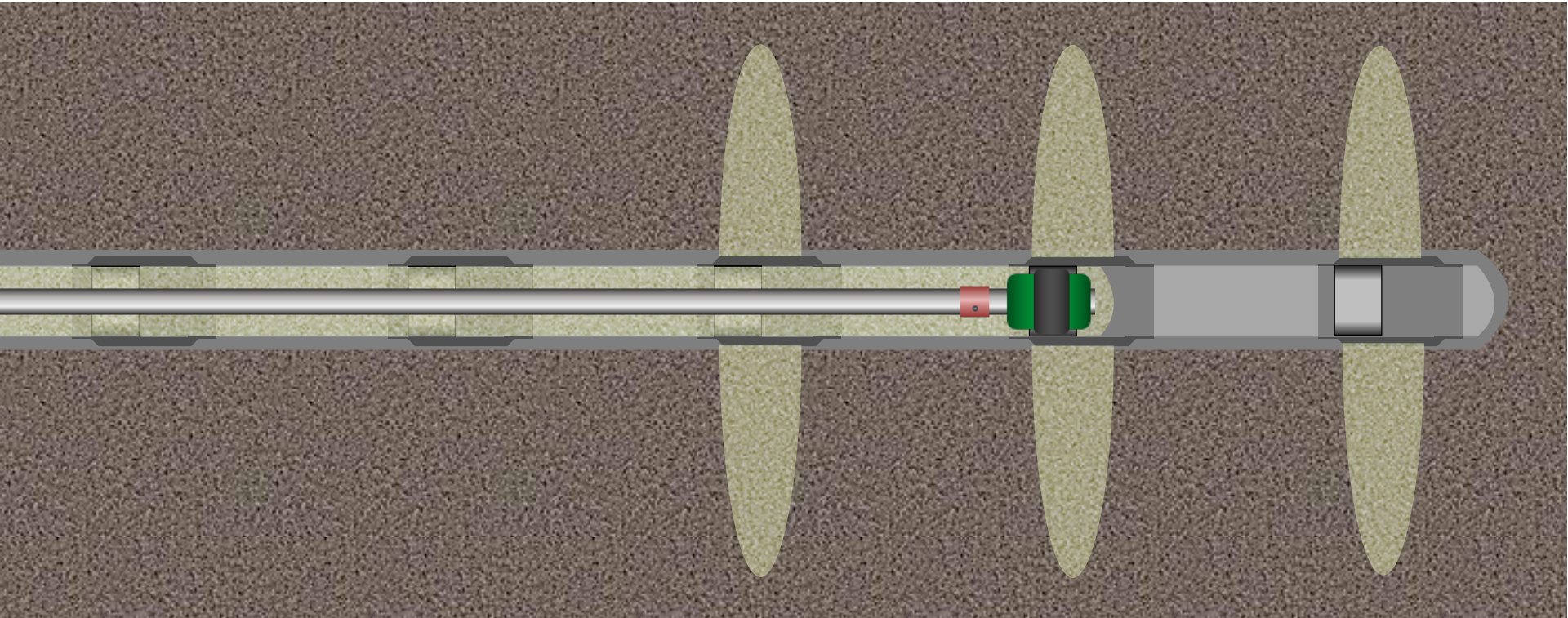
Out-of-Order Fracturing





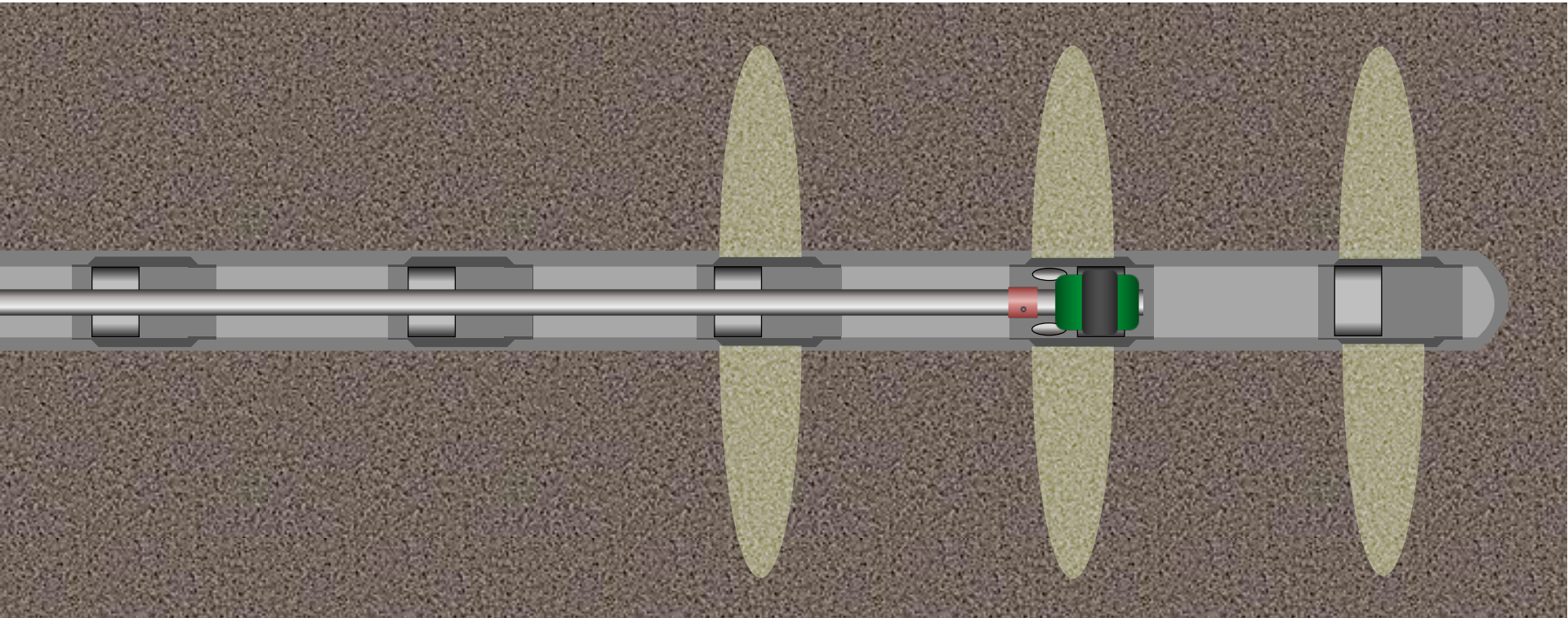
# Reclosable Sleeves for the Primary Frac

Out-of-Order Fracturing

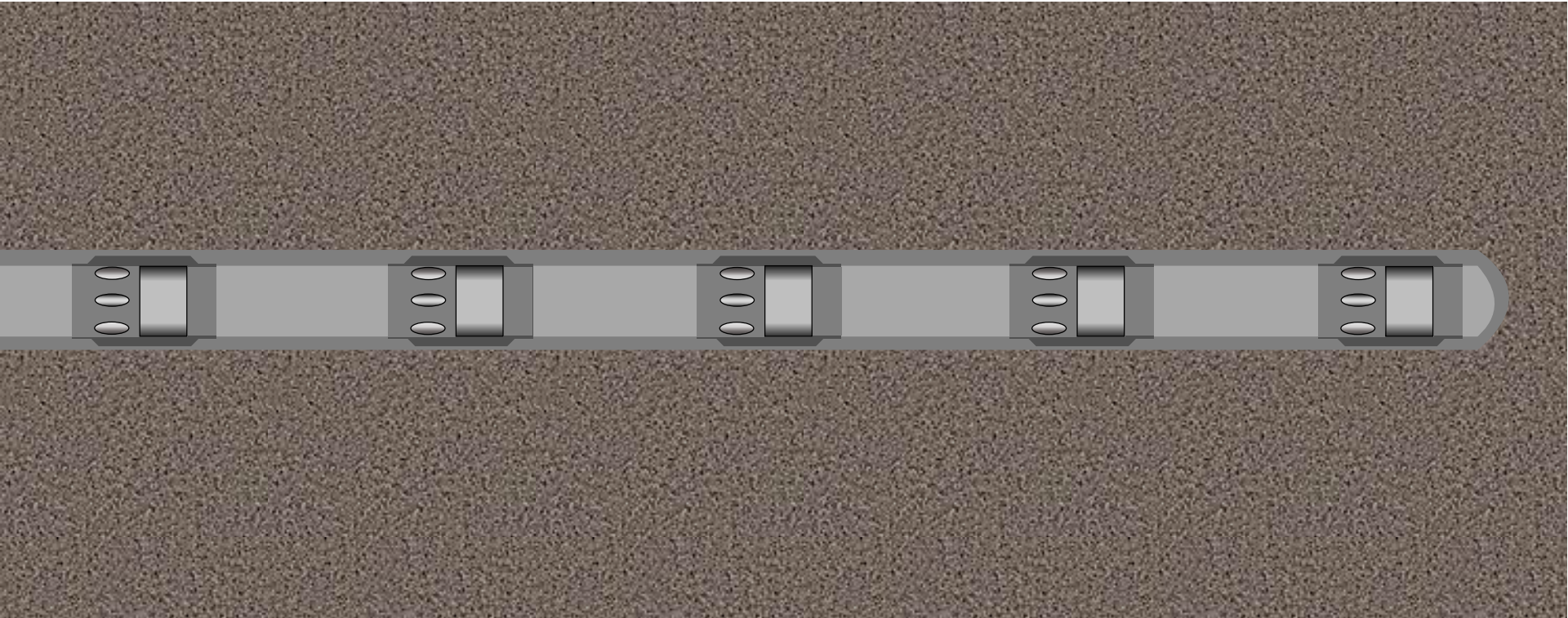


# Reclosable Sleeves for the Primary Frac

Out-of-Order Fracturing



# Reclosable Sleeves for Refracturing

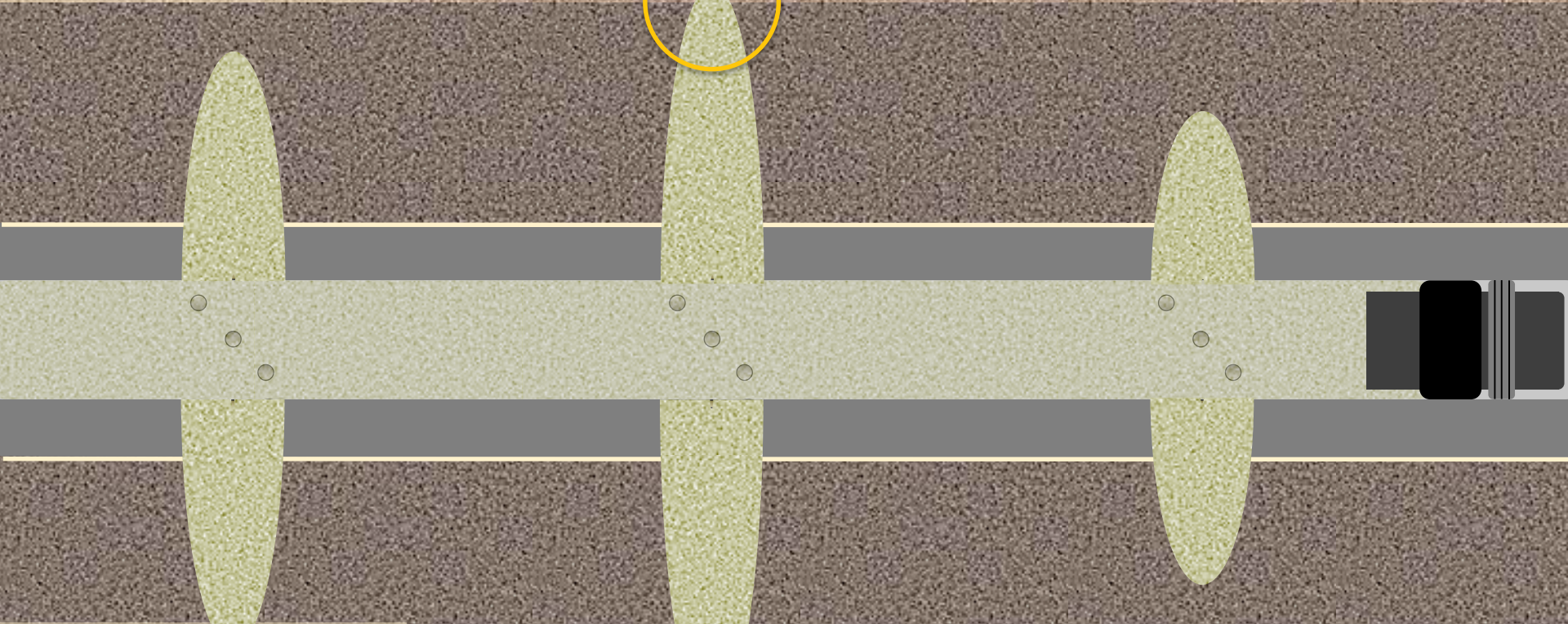


# Choosing the Completion Based on Application

There will always be applications where certain completion types will be superior because of the specifics of that application.

# Fluid Distribution / Height Containment

Target Reservoir #2



Target Reservoir #1

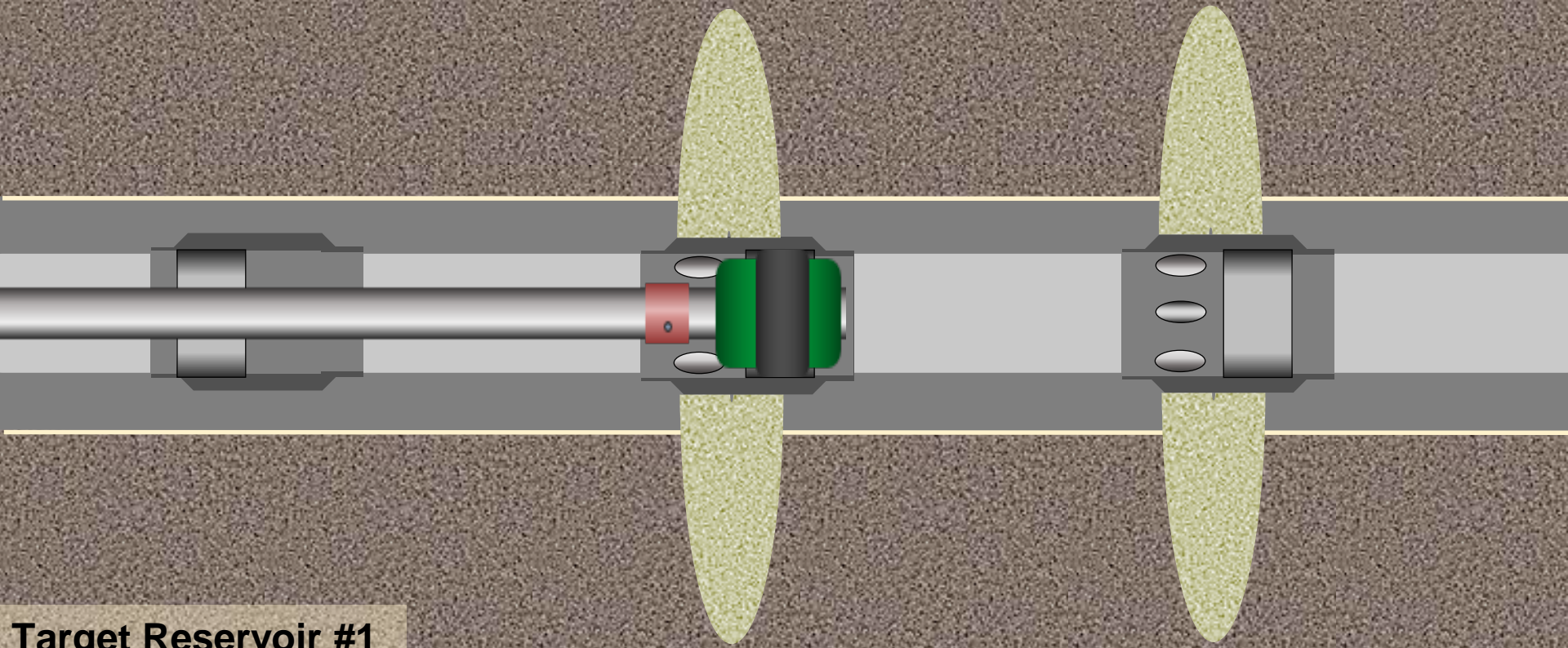
Saltwater Zone

Multi-Entry Technique



# Fluid Distribution / Height Containment

Target Reservoir #2



Target Reservoir #1

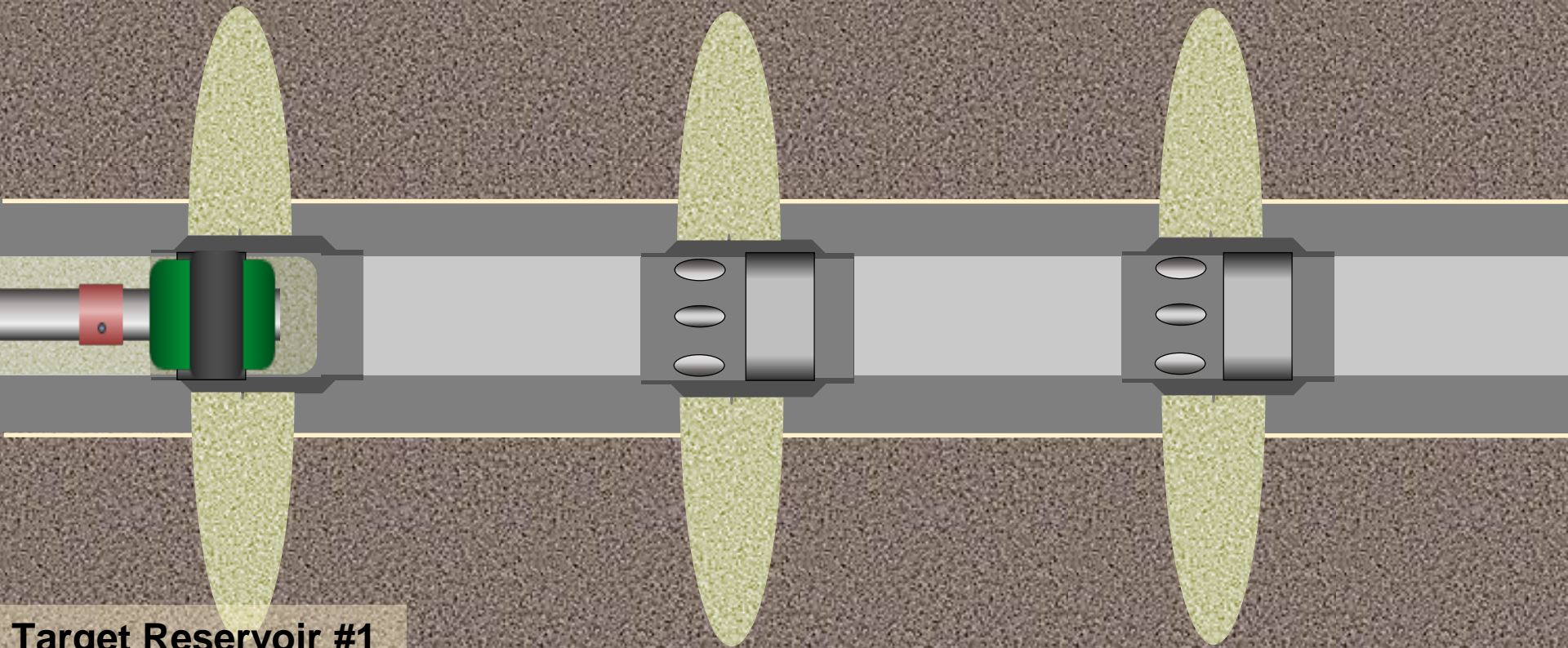
Saltwater Zone

Single-Entry Technique



# Fluid Distribution / Height Containment

Target Reservoir #2



Target Reservoir #1

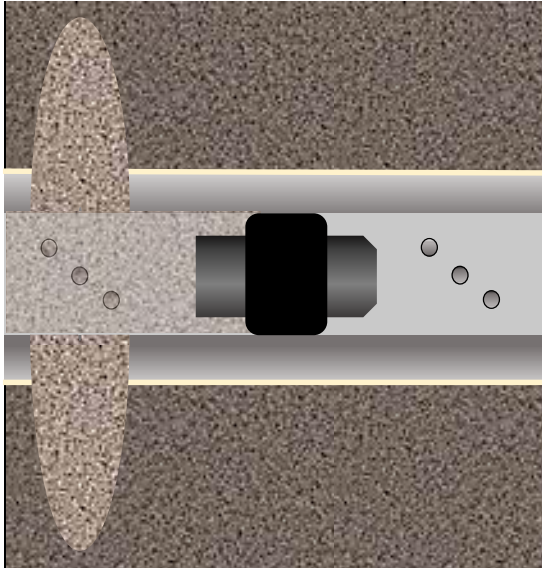
Saltwater Zone

Single-Entry Technique

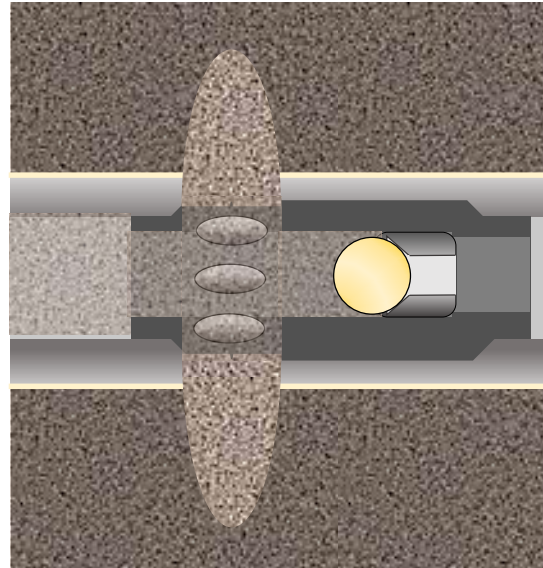


# Conclusion

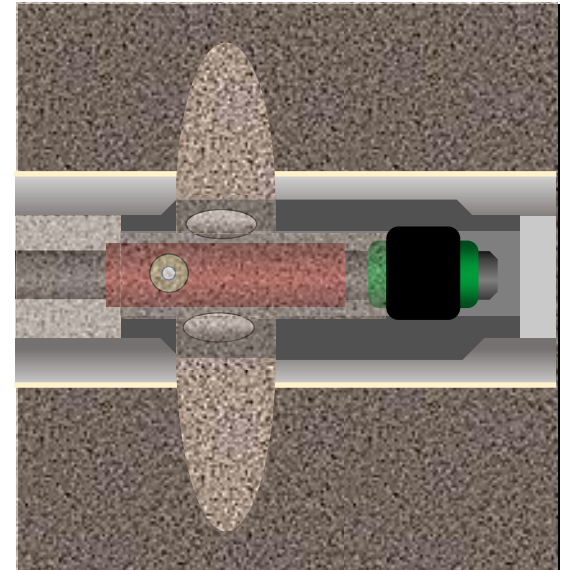
PNP



BACS



CTACS



Thank You



# Contact Info

W. Aaron Burton

Unconventional Oil and Gas Training

[waaronburton@uogtraining.com](mailto:waaronburton@uogtraining.com)

[www.linkedin.com/in/waaronburton](http://www.linkedin.com/in/waaronburton)

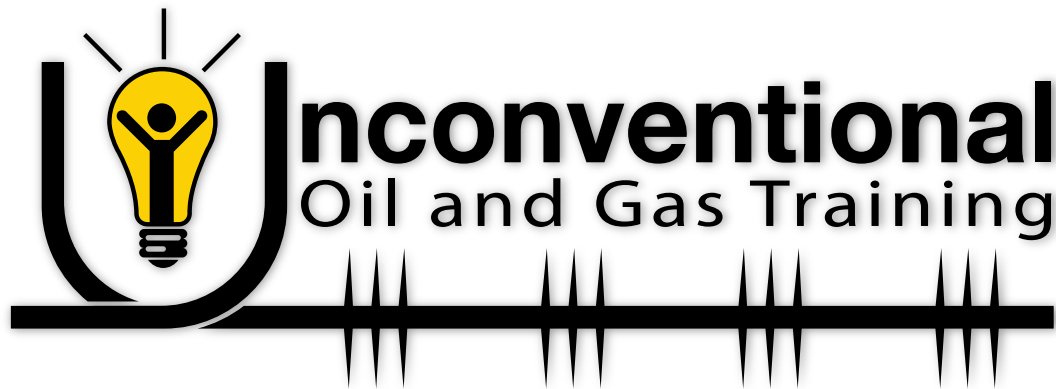
<http://www.unconventionaloilandgastraining.com>

<https://www.linkedin.com/company/unconventional-oil-and-gas-training>

<https://www.facebook.com/unconventionaloilandgastraining>

Check out my video blog on multistage completions for hydraulic fracturing:

<http://www.unconventionaloilandgastraining.com/blog>



SHALETECH™  
PERMIAN