Implementing Drilling Practices in Cased Hole

CIMAREX

2016 AADE Symposium
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Overview

- Introduction
- Problem
- Cause Identification
- Comparison of Hole Cleaning Practices
- “New” Hole Cleaning Procedure
- Conclusion

"If you could kick the person in the pants responsible for most of your trouble, you wouldn't sit for a month."

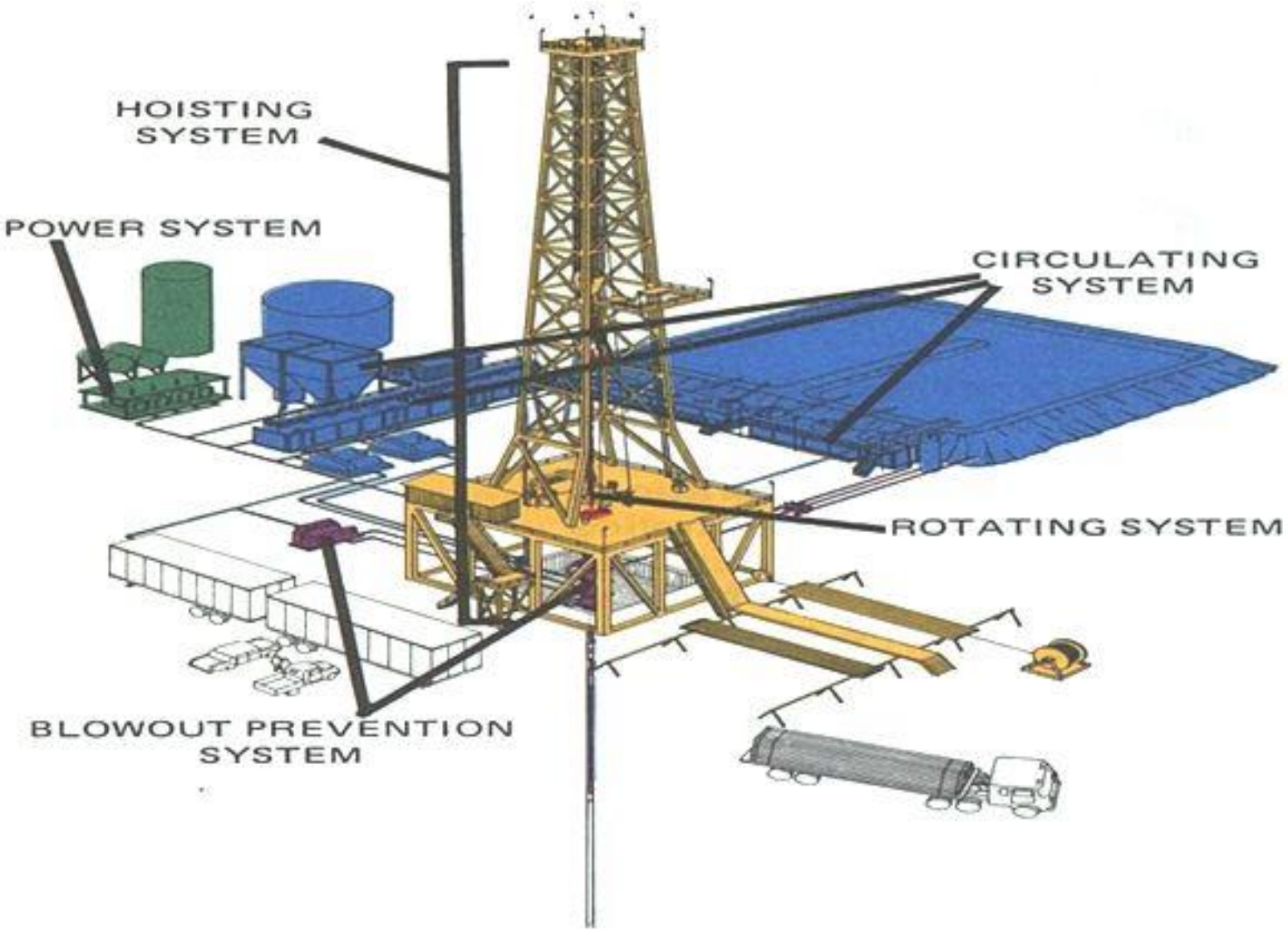
Theodore Roosevelt, 1858 – 1919

26th President of the United States

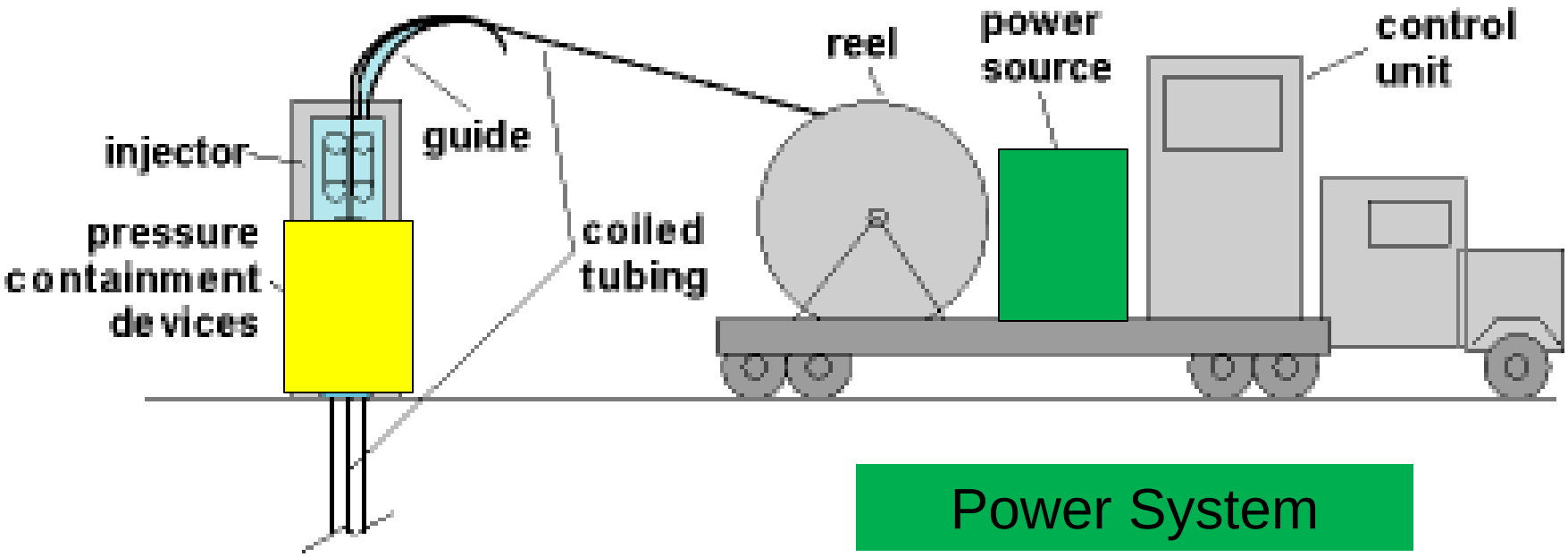
Financial Impact

- **Between Jan 2014 to April 2015**
  - Completed 230+ operated wells
  - 11 stuck coiled tubing events
  - Impact to well costs: $5,674,000
  - Expected cost for coiled tubing operation - $100,000 - $250,000

Drilling Operation

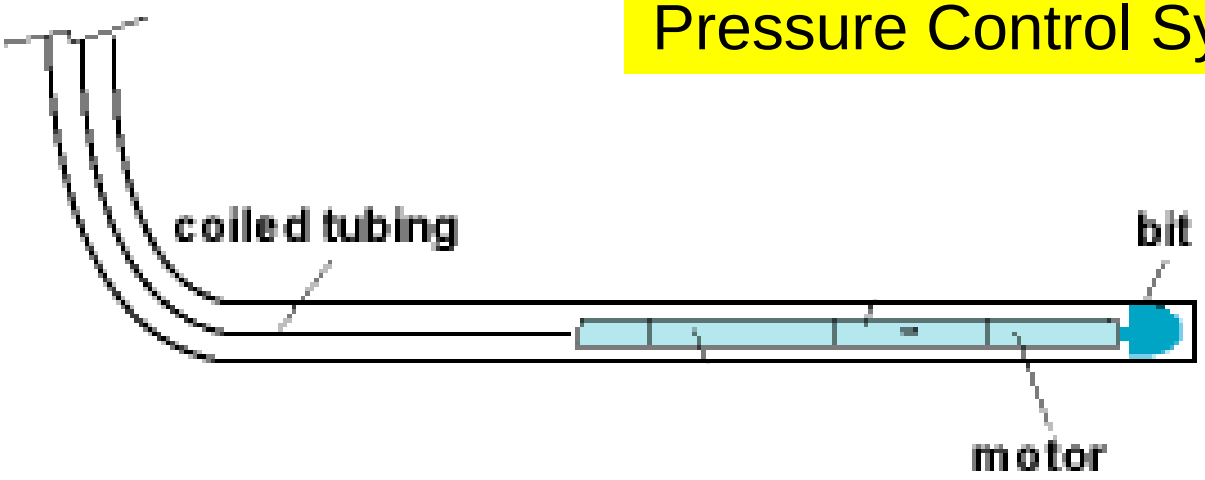


Coiled Tubing Operation



Power System

Pressure Control System



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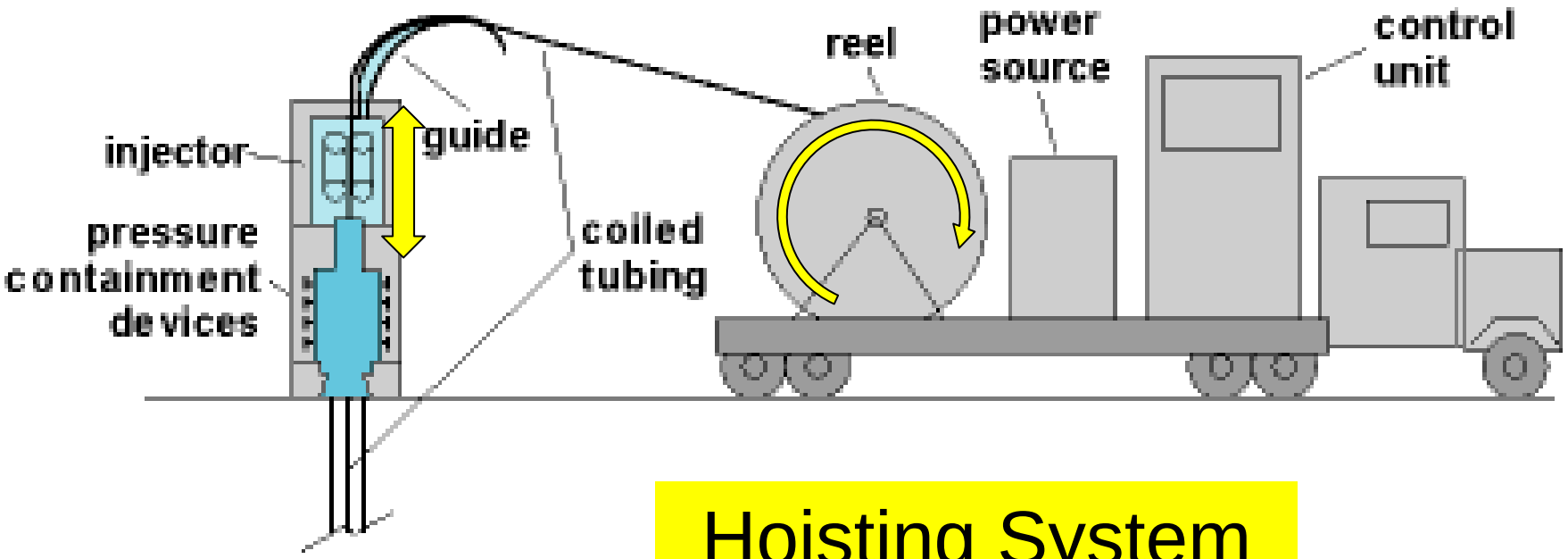
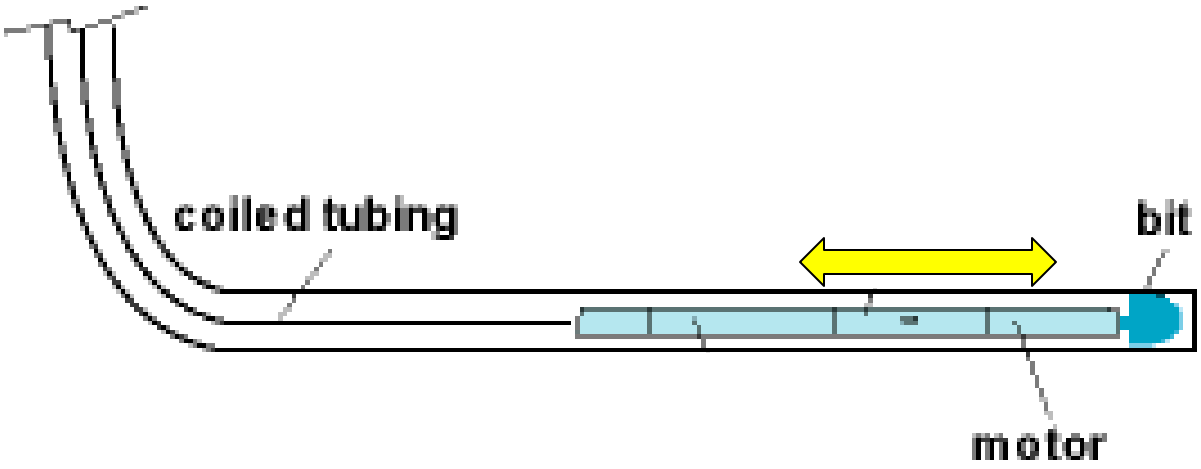


Hoisting System



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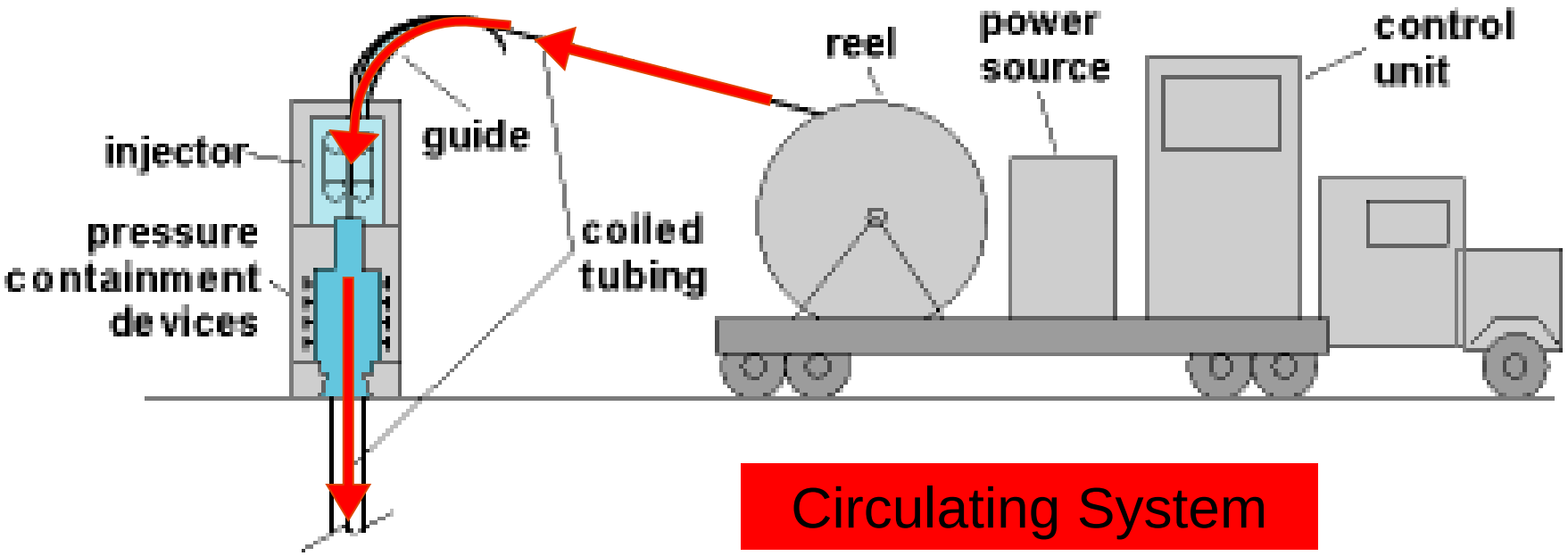
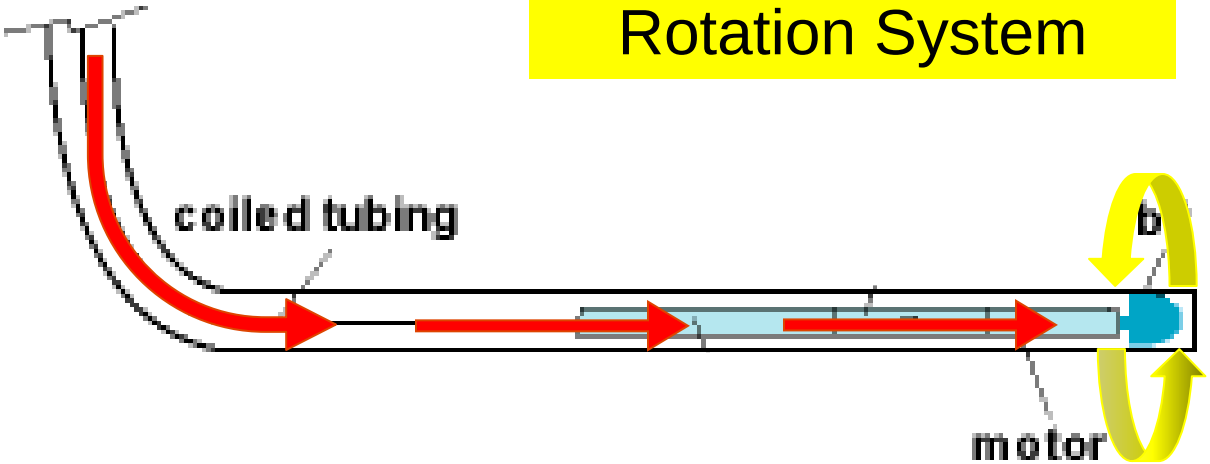
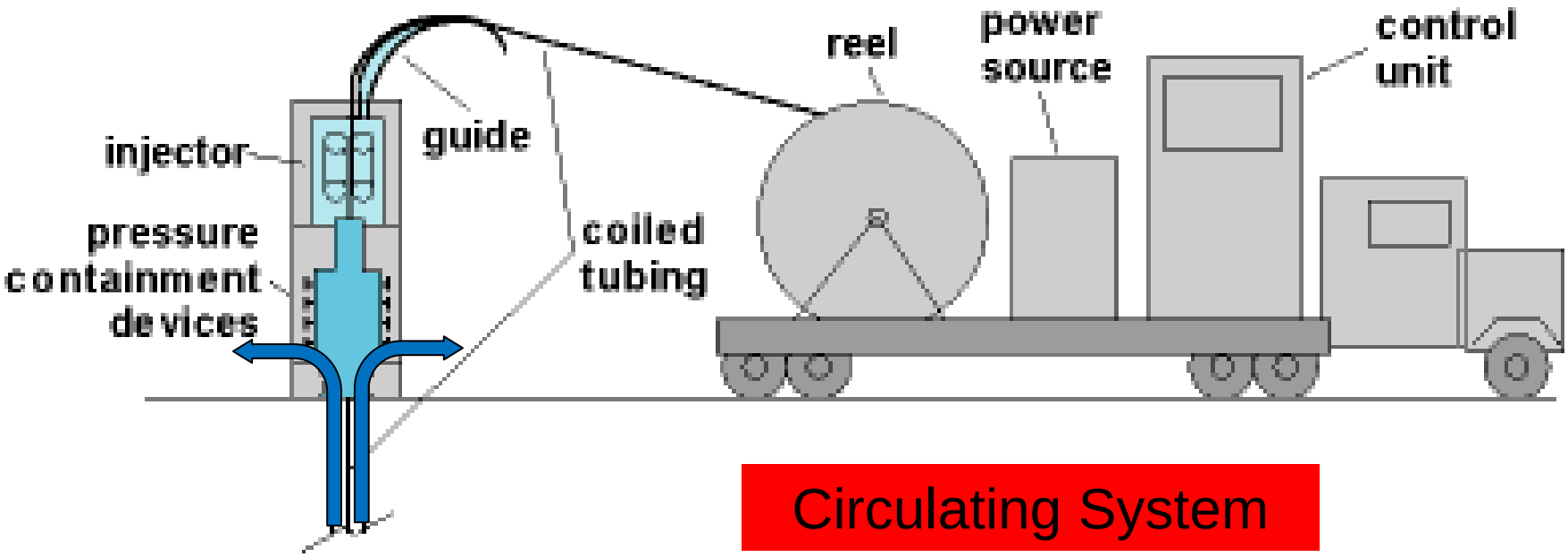


Circulating System

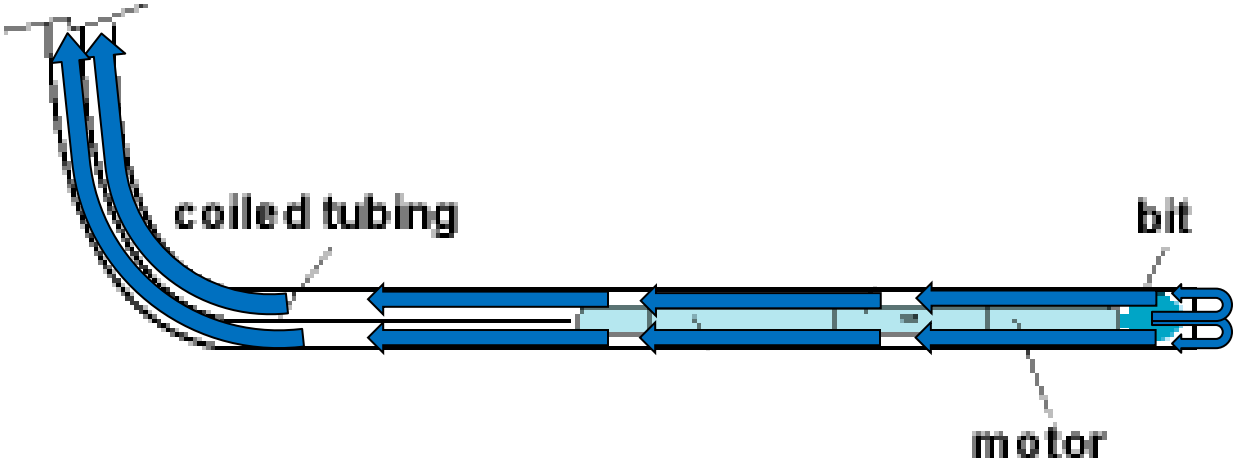
Rotation System



Coiled Tubing Operation



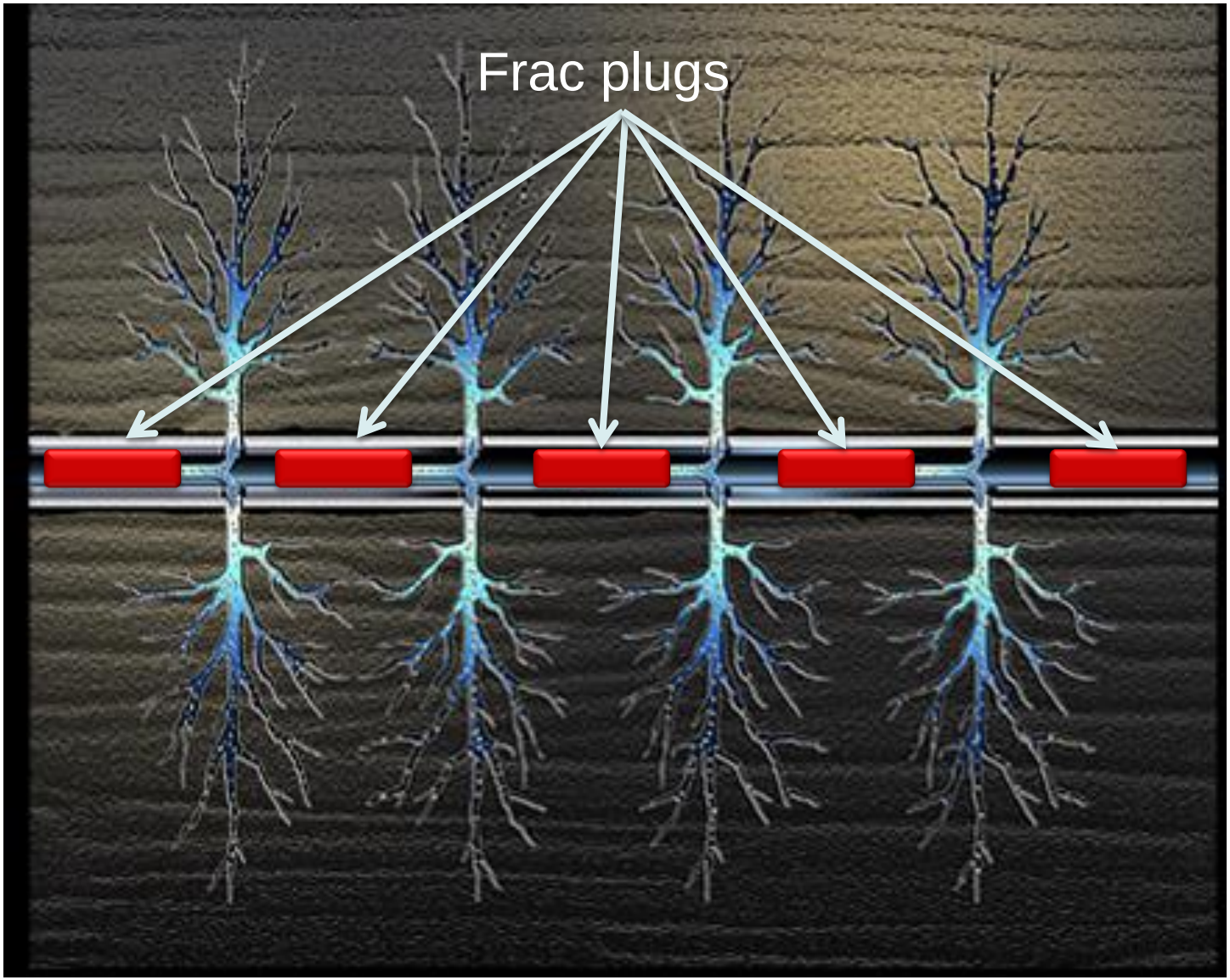
Circulating System



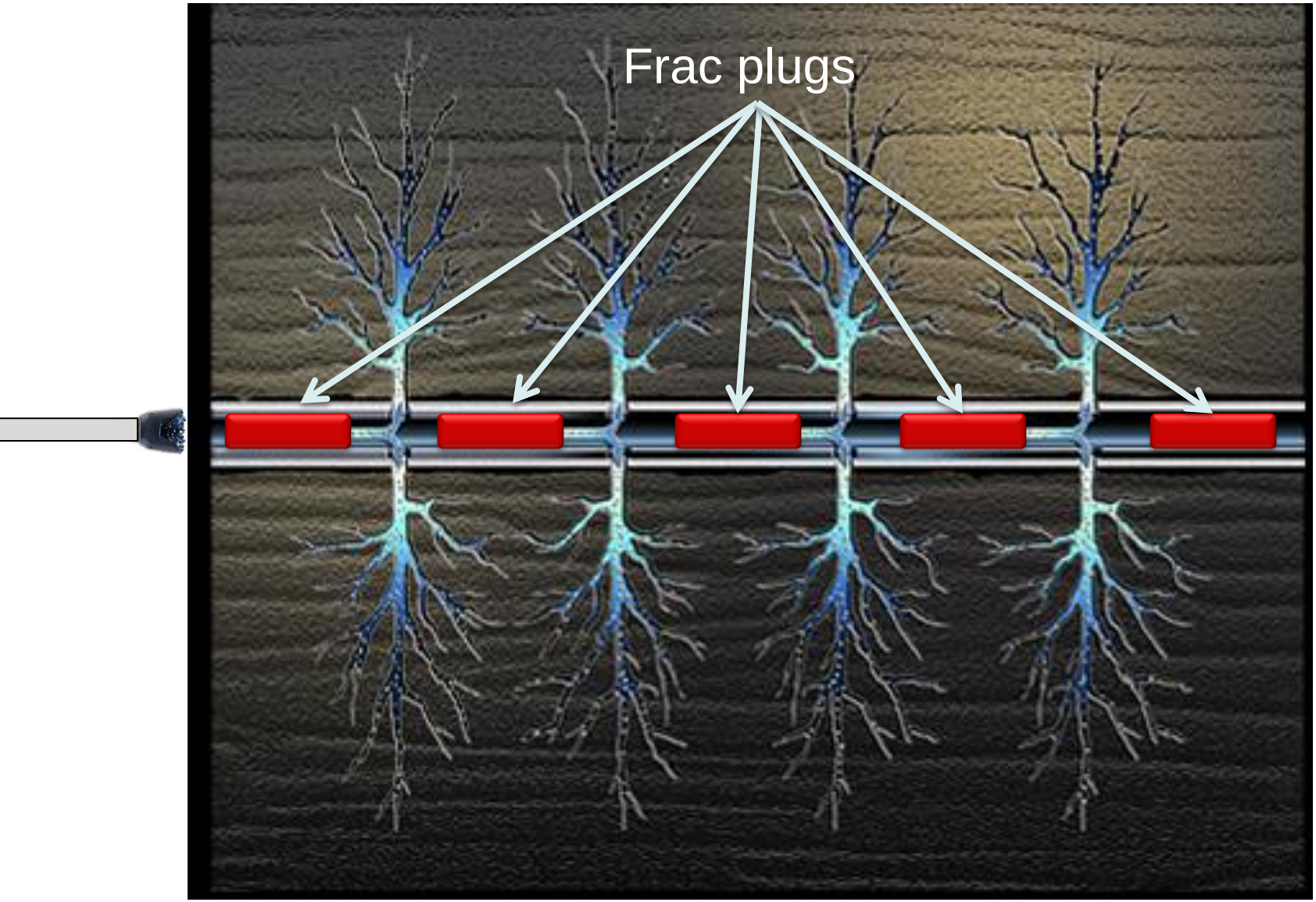
Coiled Tubing Operation

- **Many similarities to drilling operations**
- **Notable differences**
  - Constrained by the inability to rotate pipe
  - Able to pump steadily while tripping pipe
  - Pressure/hydrocarbons limit access to returns

Coiled Tubing Drill Out



Coiled Tubing Drill Out



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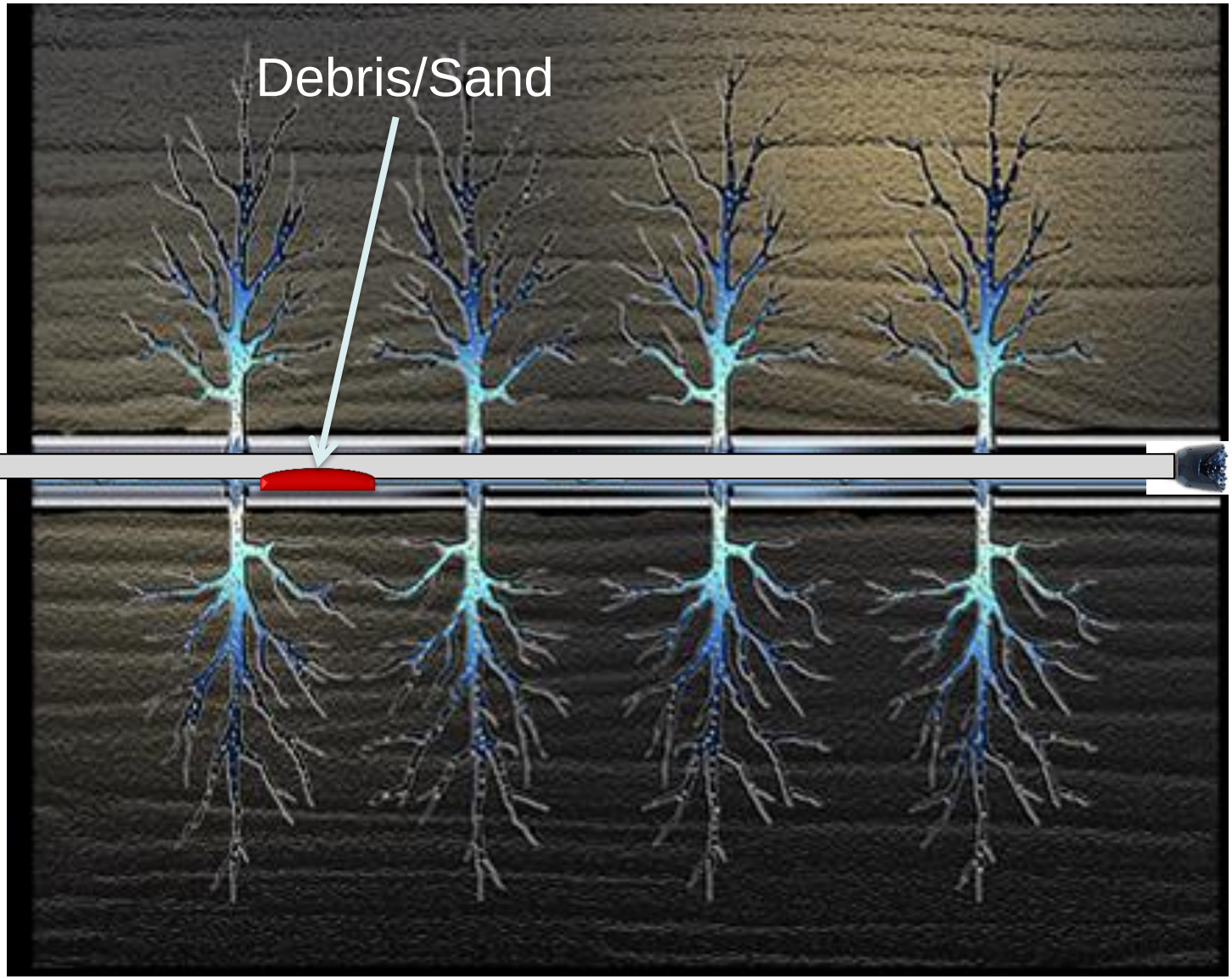


Causes of Stuck Coiled Tubing

- **Generally occurred while tripping**
- **Lack of engineering in hole cleaning practices**
- **Hole cleaning was inadequate**

Comparison of Hole Cleaning Practices

Drilling Operation

- Based on K&M Guidelines
- No sweeps
- No short trips

Completion Operation

- Based on supervisor / vendor experience
- Sweeps to clean lateral
- Short trips to clean lateral

Comparison of Hole Cleaning Practices

Drilling Operation

- Engineered and monitored fluids
- Several bottoms up before trip
- Procedure for overpull situations

Completion Operation

- Fluid quality visually monitored
- No clean up time before trips
- No overpull guidance

Comparison of Hole Cleaning Practices

- **If downhole physics are the same, why are practices so different?**
  - Vendors focused on tools / equipment
  - Engineering tends to be focused on stimulation
  - Horizontal “science” based on conventional reservoirs

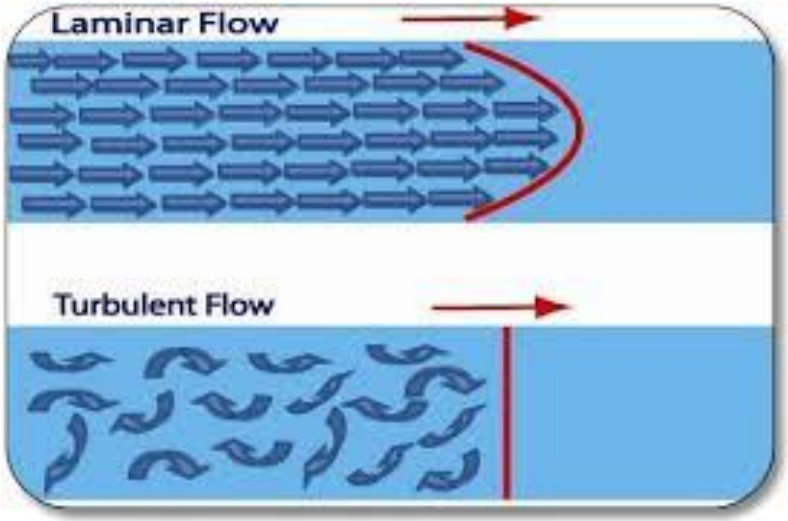
Comparison of Hole Cleaning Practices

- **If downhole physics are the same, why are practices so different?**

We failed to capitalize on our knowledge and apply it to like situations.

“New” Hole Cleaning Procedure

1. **Periodic sweep procedure with quantitative fluid monitoring**



2. **Specific plug drill times**
   - Used to control debris size
   - Used to allow clean up between plug drilling

“New” Hole Cleaning Procedure

3. **No short trips for hole cleaning**
   - Short trips used to check hole cleaning rate

4. **Specific trip procedure**
   - Limit trip speeds
   - Clean up procedure

5. **Overpull guidance**

Conclusion

- **No stuck pipe incidents when procedure followed**
  - Successful drill out on 70+ wells in various environments
- **Learning curve**
  - Buy-in from ALL supervision
  - Optimizing details of procedure

Conclusion

- **Identified other “drilling norms” that would be beneficial for completions**
  - Real-time data monitoring
  - Third-party fluids engineering

Questions?