SlicFrac™

Innovative Frac Diversion Technology

Thru Tubing Solutions

THRU TUBING SOLUTIONS

What is SlicFrac?

SlicFrac is a new patented technology that selectively diverts the frac to untreated formation, efficiently increasing the stimulated reservoir volume.

Benefits:

- Intra-wellbore diversion
- Maintain near-wellbore frac
- Reduce or eliminate plugs and all associated time and costs
- Improve frac efficiency
- Minimize risk of frac hits on neighboring wells

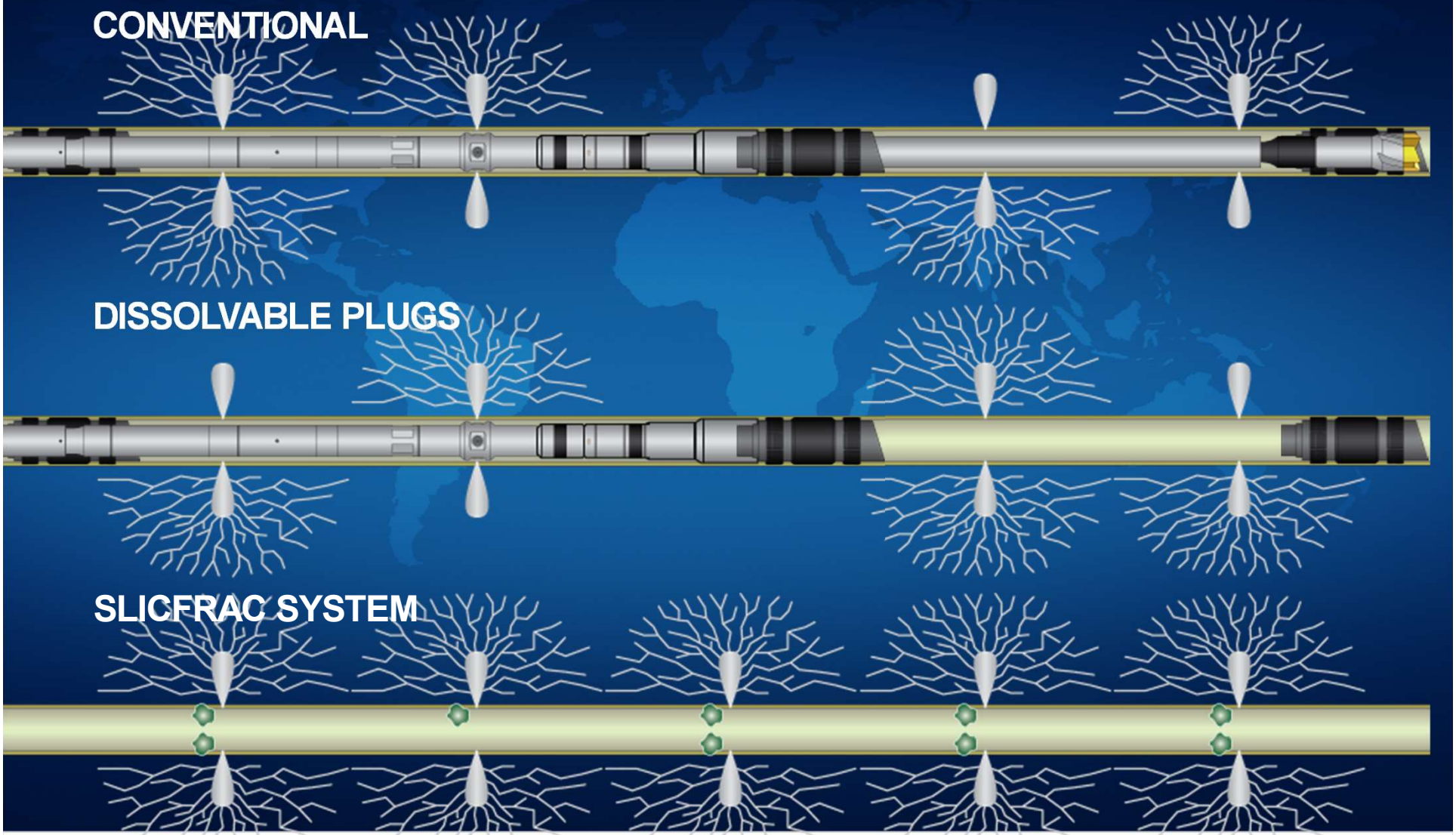
What are Perf Pods™?

Perf PODs are perforation plugging devices that can be deployed in a wellbore to efficiently attach to and block perforations; sealing irregularly shaped holes. Perf PODs selectively plug perforations that are taking the most fluid.

Specifications:

- Pressure Rating – up to 10,000 psi
- Millable or Self Degrading versions available
- Acid Resistant PODs available for chemical diversion
- "Packaged" in frangible shell for precise surface deployment or launched downhole via Wireline Deployment Tool.

Why SlicFrac?



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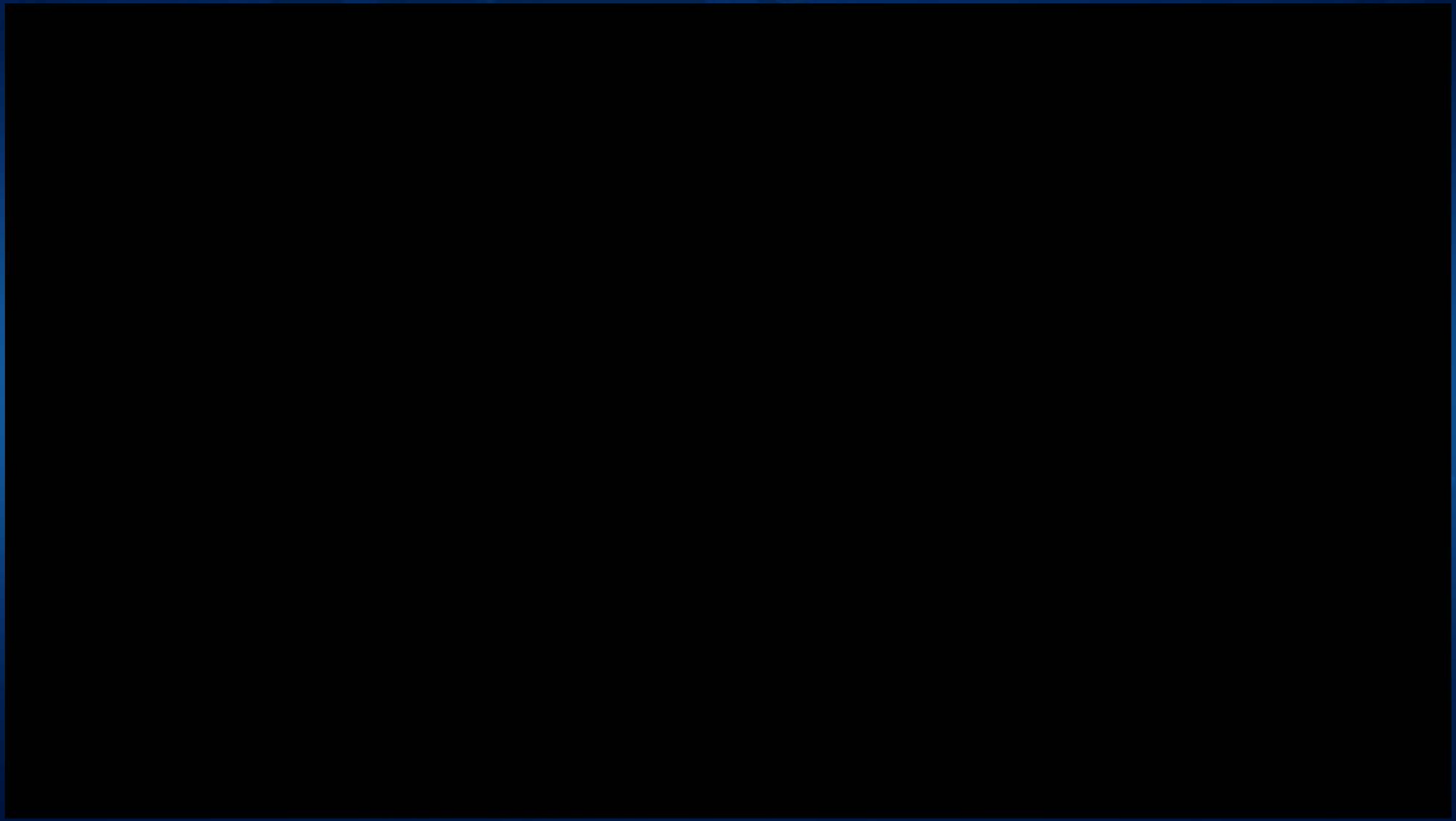
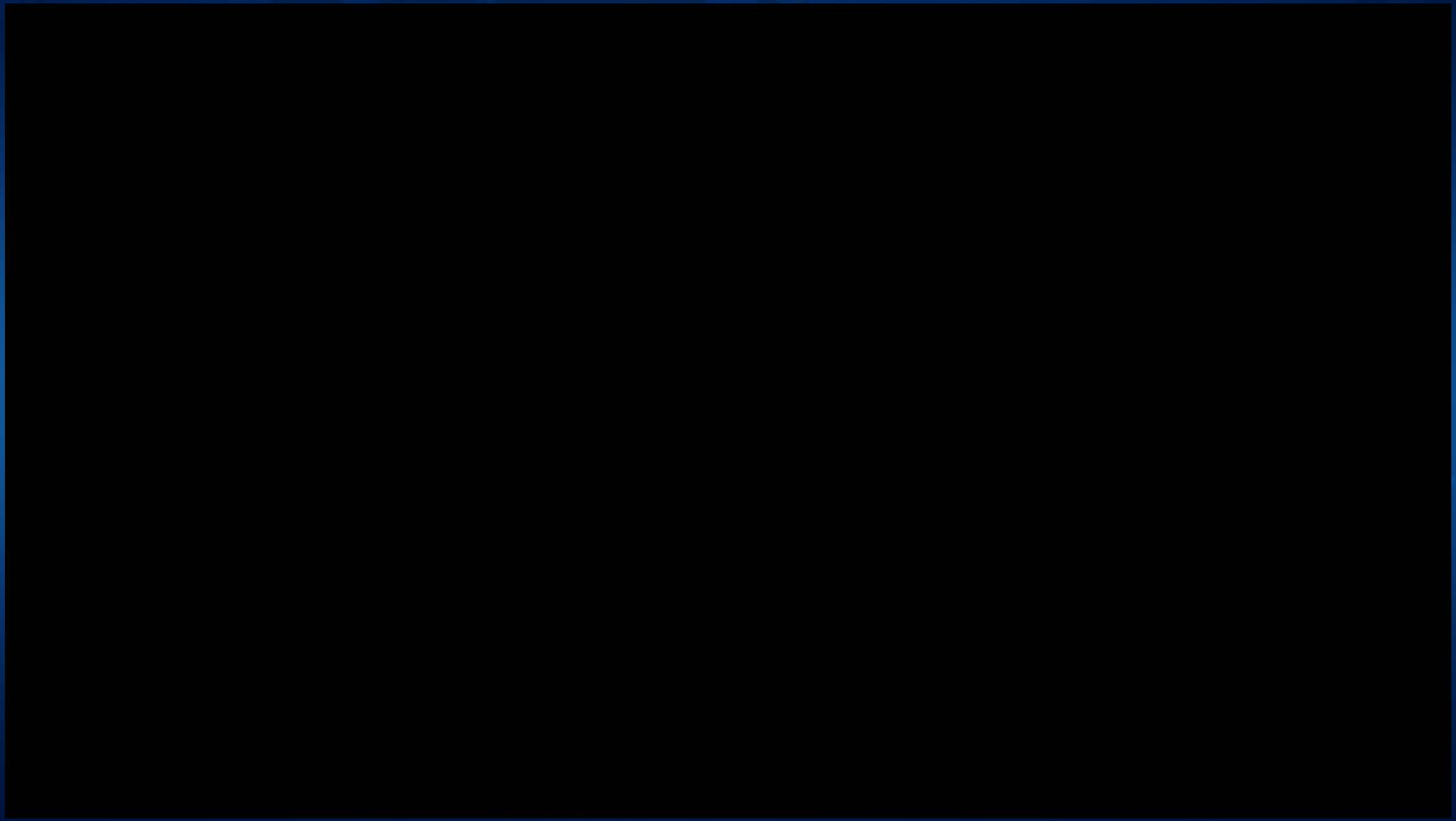
SlicFrac Diversion Test (0.42” perf holes)

Utilizing 3,000 psi burst discs to simulate diversion

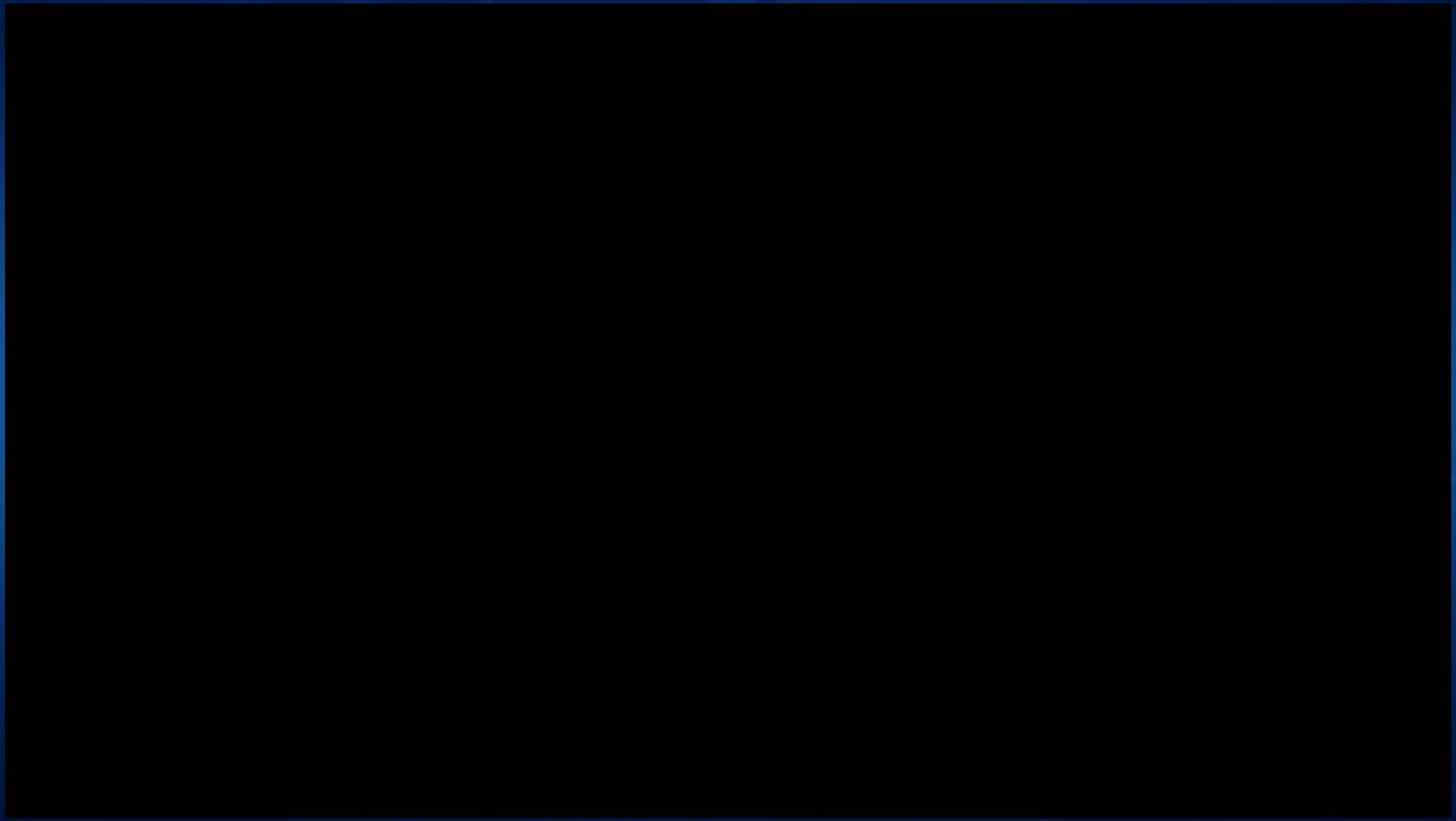


SlicFrac Diversion Test (varied hole sizes)



SlicFrac Irregular Perforations

Self Degrading POD

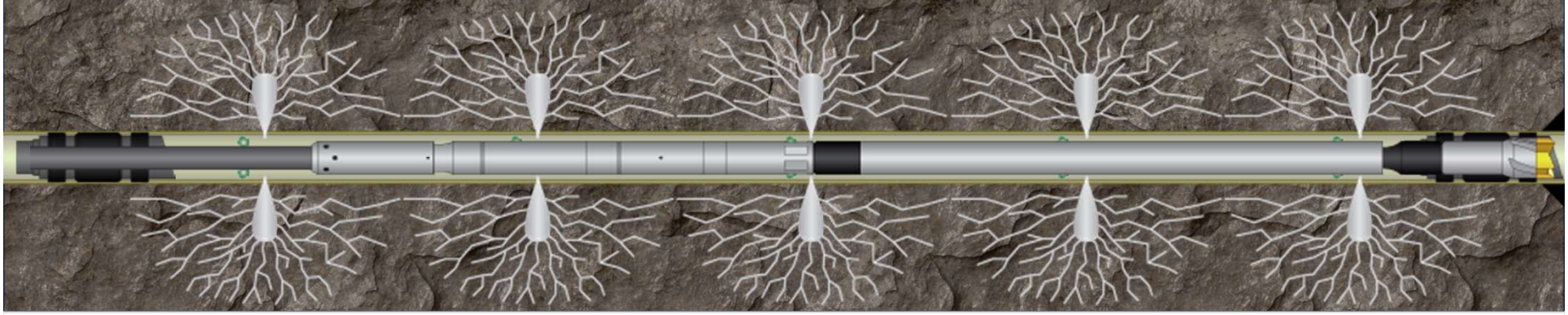


Degradation charts available for specific operating parameters

New Well – Plug & Perf w/SlicFrac Diversion

Combine stages to reduce number of bridge plugs

- After perforations are made, initiate 1st portion of the frac stimulation
- Deploy PODs from surface to divert the frac
- Continue with remainder of the stage and flush
- Deploy additional Plug and Perf BHA's for subsequent stage
  - Note: Frac treatment can be divided further for a smaller treatment across the stage
- Once all stages have been fractured, run Milling BHA to clean out well to TD
- Well is now ready for production



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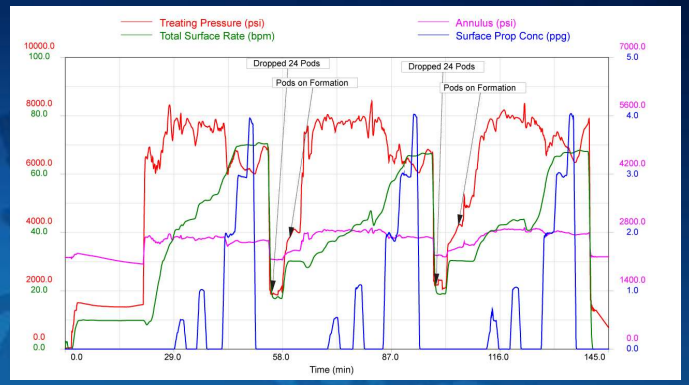
Case Study – Cottage Grove Formation, Custer County, OK

- New Well – Plug n' Perf Style Diversion Frac
  - E-Line to set plugs and perforate
    - 72 perforations per stage
    - 12 stages
      - 50% bridge plugs eliminated
      - PODs used to optimize frac
- PODs used for diversion frac on every stage
  - Millable PODs
    - 10,000 psi differential rating
  - Multiple smaller POD drops each stage to maximize diversion
- Removal of PODs
  - Milling assembly used to drill bridge plugs and clean to TD



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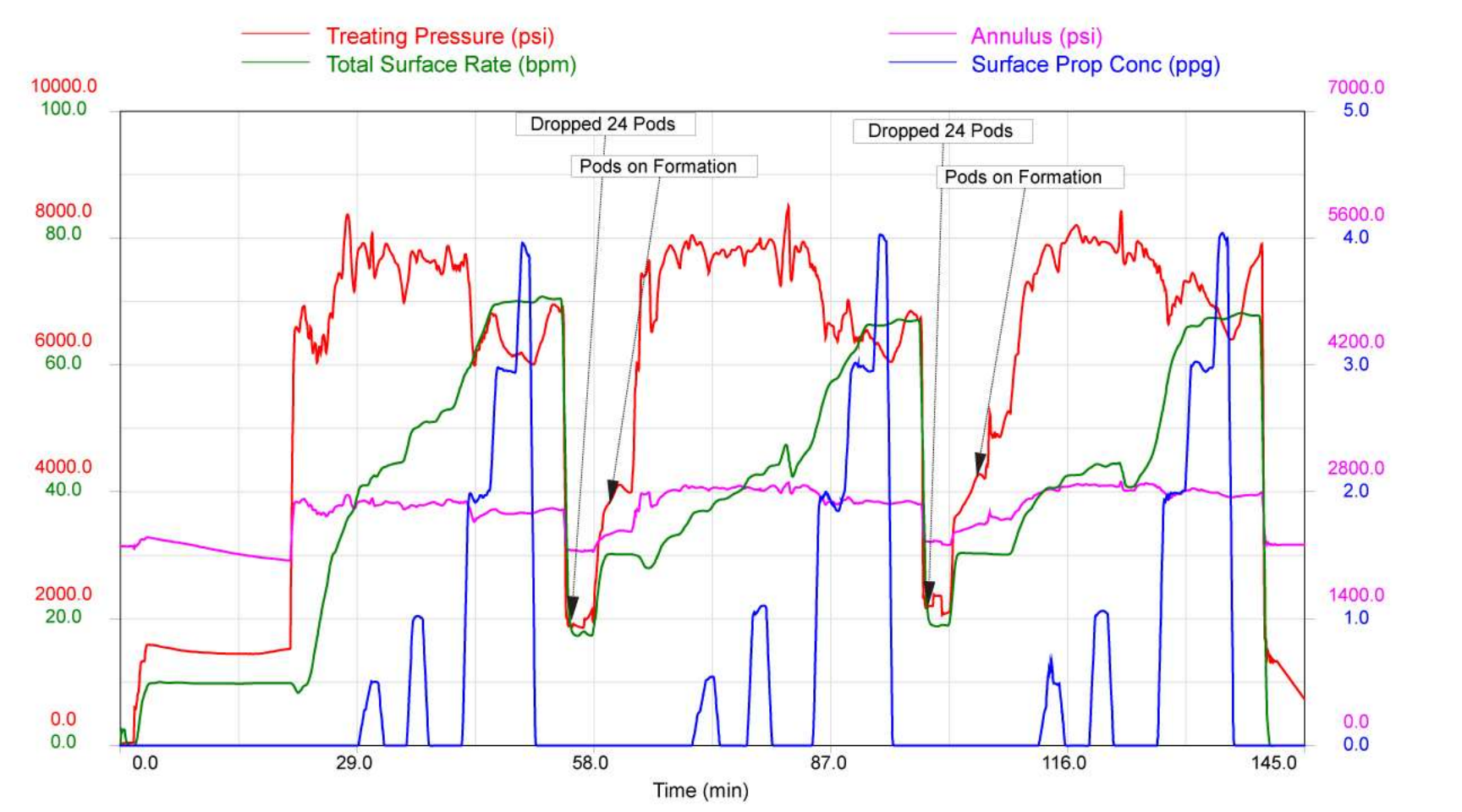
Case Study – Cottage Grove Formation, Custer County, OK



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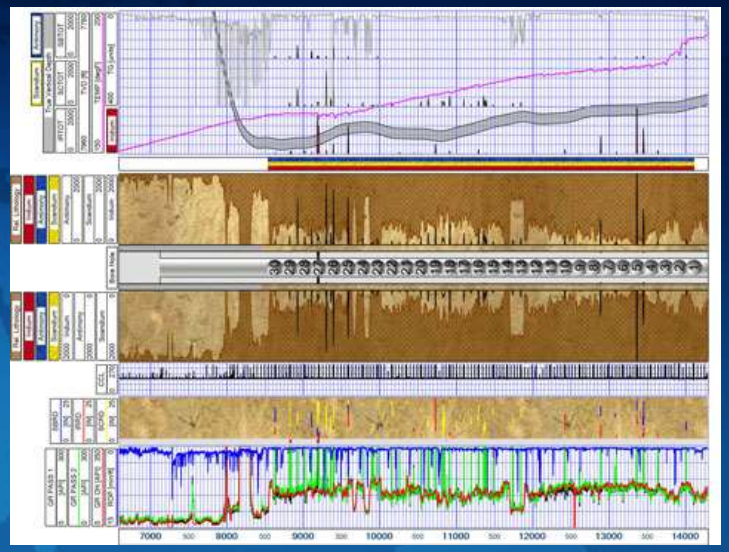
Case Study No. 6202

SlicFrac Diverts Multistage Sleeve System for Successful Re-Frac

DETAILS:

- Formation: Bakken
- Operation Depth: 13,710’ – 14,400’
- POD Type: PCL-Large Millable PODs
- Type of Operation: Horizontal Re-Frac



Click to enlarge…

RESULTS:

- Added new perforations between existing sleeves
- Same Perf PODs were used to plug sleeves and new perforations
- Radioactive tracer showed diversion throughout entire lateral with stimulation to sleeves and new perfs

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SlicFrac Diverts Multistage Sleeve System for Successful Re-Frac

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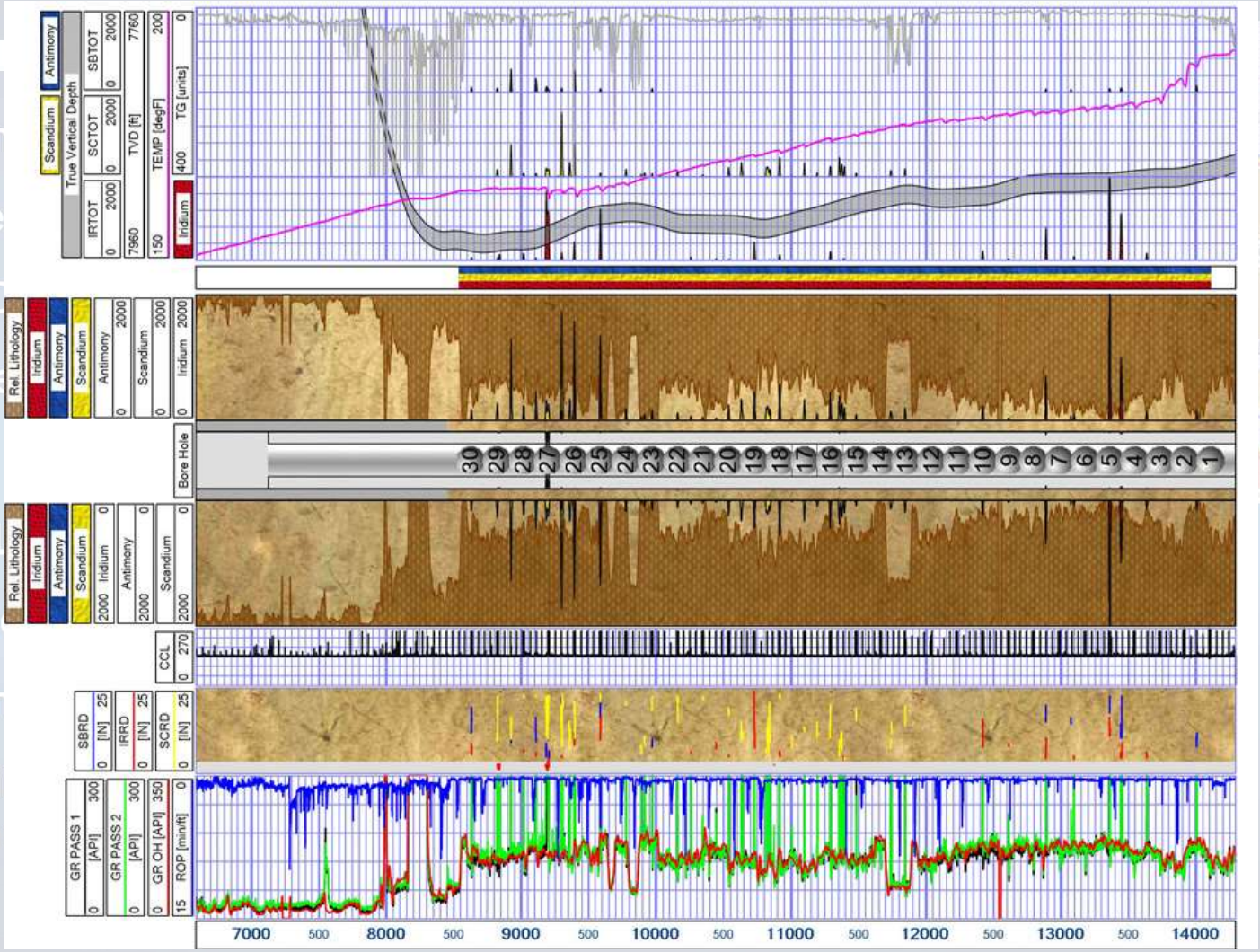

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Case Study No. 6203

Diverting with SlicFrac Reduces Bridge Plugs and Risk of Pre-Sets

Eliminated

50%

of Plugs

DETAILS:

- Formation: Permian
- Operation Depth: +/- 21,000’
- POD Type: PCL Millable PODs
- Type of Operation: Plug ‘n’ Perf SlicFrac

RESULTS:

- Utilized SlicFrac to divert frac between Plug ‘n’ Perf stages
- Combining stages eliminated half of the plugs; reduced risk of pre-set
- Total cost savings attributed to reduction in plug cost, wireline runs, water usage, total frac time, millouts and overall time for services on location

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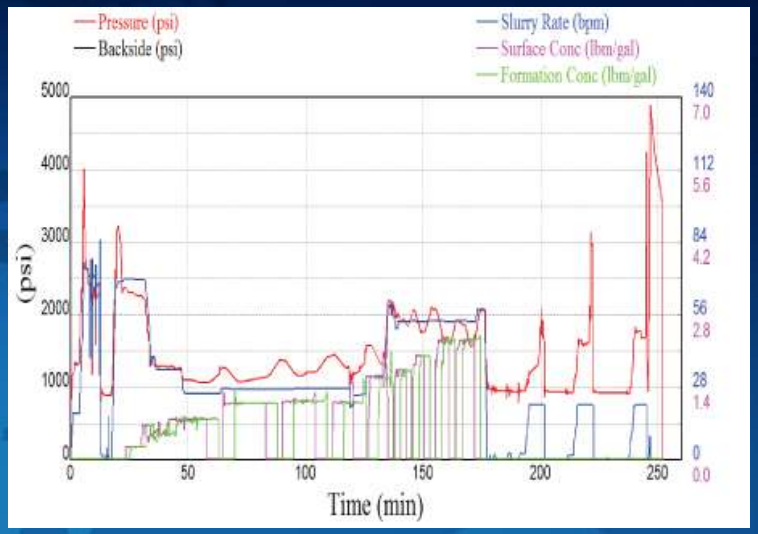
Case Study No. 6204

Diverting with SlicFrac During a Vertical Recompletion

DETAILS:

- Formation: Clearfork
- Operation Depth: 6,500’
- POD Type: PCL Millable PODs
- Type of Operation: Vertical Recompletion



RESULTS:

- Added new perforations across missed pay zones
- Successfully refractured existing perfs and stimulated new perfs
- Perf PODs obtained 100% seal within perforations; increasing frac efficiency
- Completely “POD Out” all perforations; maintained a complete pressure test

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Case Study No. 6205

Eliminate Plugs with Wireline Deployed PODs and Mid-Stage Diversion

DETAILS:

- Formation: Woodford
- Operation Depth: 14,800’
- POD Type: Bio-Rez Lo Degradable PODs
- Type of Operation: Pod ‘n’ Perf™

Eliminated

89%

of Plugs

RESULTS:

- Minimized number of bridge plugs deployed
- Maintained customer’s planned stage spacing and cluster volume
- PODs deployed via wireline tool and from surface for mid-stage diversion
- The post frac cleanout consisted of milling out 2 bridge plugs

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SlicFrac Operational Summary

300+
Total Jobs Completed

6750+
Stages Stimulated

60+
Different Customers

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Questions?

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