Sustainable Sand Management Control and Solutions - Balancing Performance, Costs, and Environment

20–21 AUGUST 2024 | KUALA LUMPUR, MALAYSIA

Use of Erosion Resistant Mesh Screen to Unlock Reserves in Sand Producing Slanted Wells

A Case History

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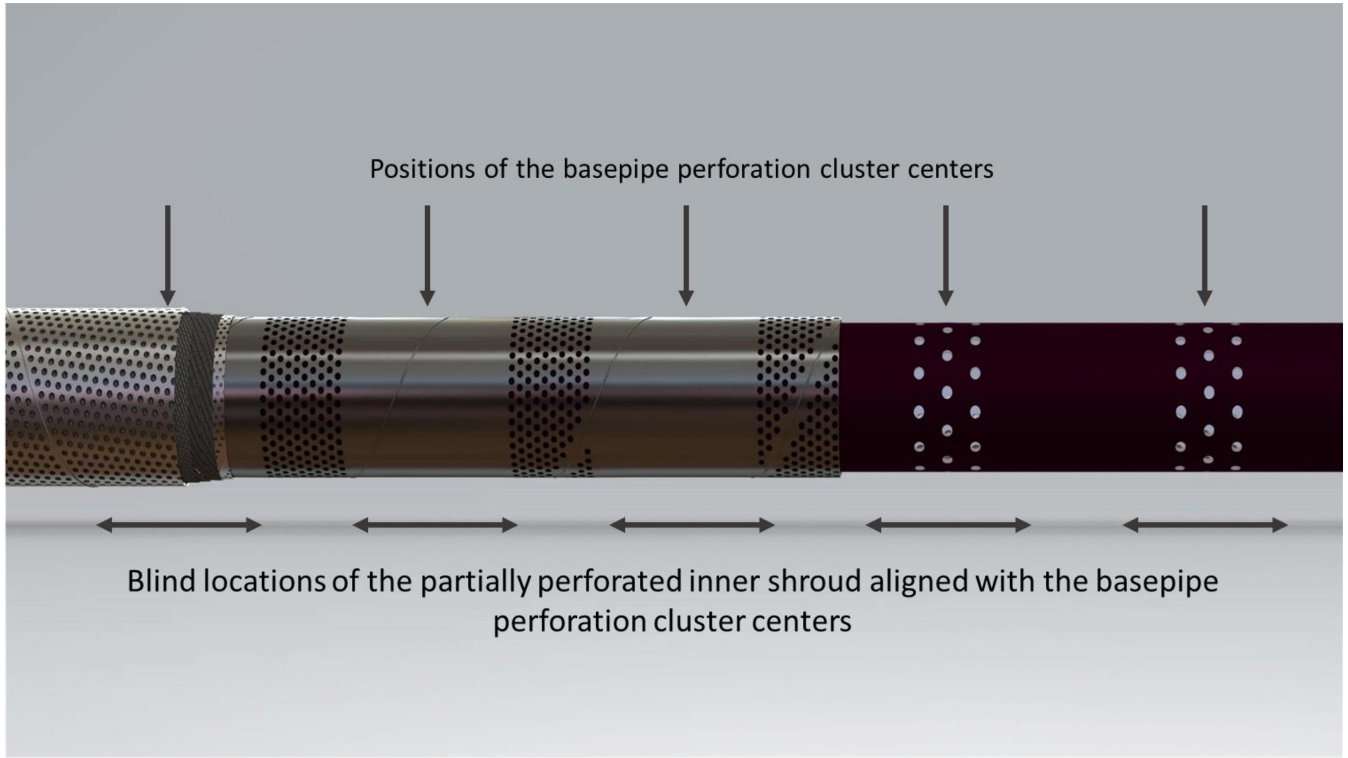
Outline

- Background
- Erosion Resistant Screen as a Stand Alone Cased Hole Completion
- Operator Challenge
- Field Installation and Production Results
- Conclusion

Erosion Resistant Screen Design

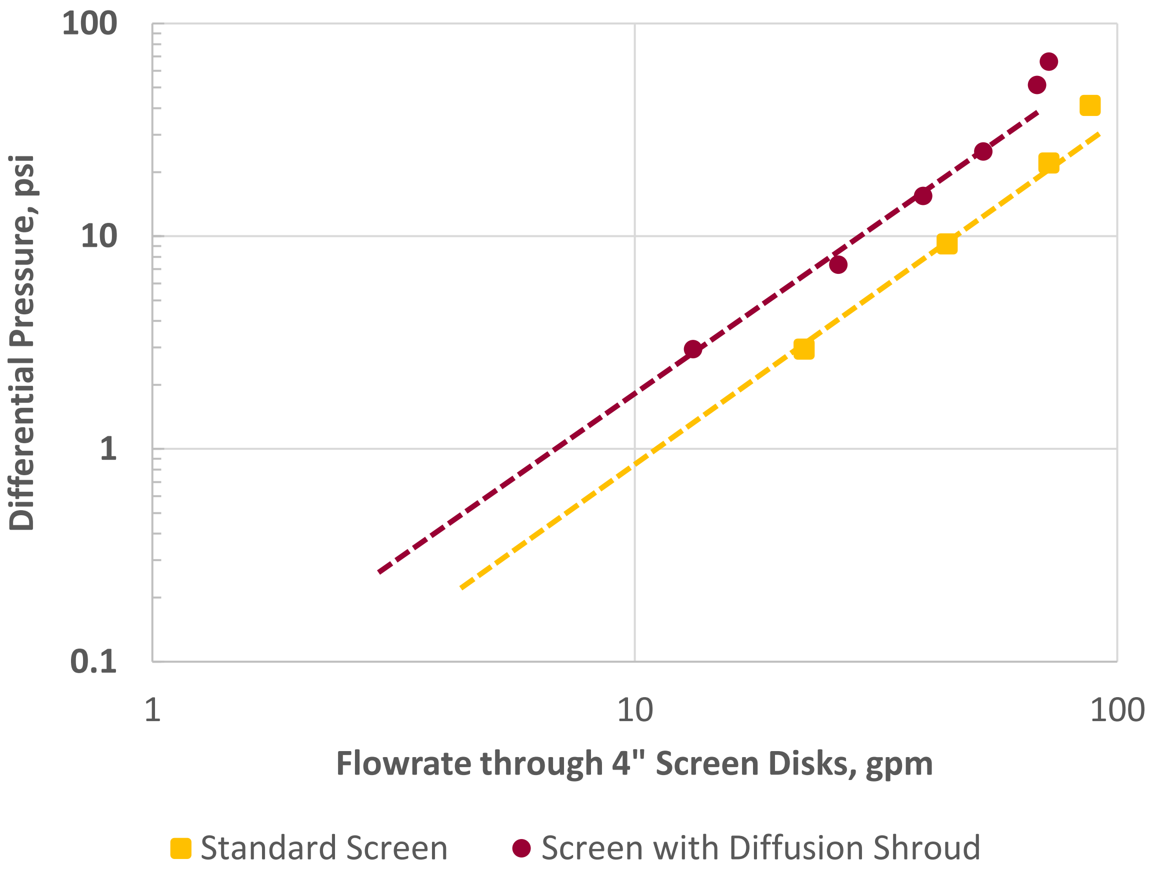


Diffusion Shroud Shields Mesh Screen

from Direct Line-of-Sight Flow at Basepipe Perforations

- **Developed for OHSAS Completion**
- **Field proven mesh screen**
- **Basepipe perforations in clusters behind unperforated metal sections**
- **No damaging direct line-of-sight flow to basepipe perforations**
- **Fluid flow spread over screen surface**
- **Reduced plugging**
- **Increased Erosion Resistance**

Flow Performance Curves



- Flow curve similar to standard screen
- Minimal pressure drop penalty compared to standard screen
- Flow restriction (higher DP) increases effective area over where fluid flows through the screen, reduces fluid velocity and erosion

CFD Modeling

$V_{\text{Shielded Screen}} = ½ \, V_{\text{Mesh Screen}}$

Erosion Resistance Shielded Screen = 5 x Mesh Screen

Benchmarking Erosion Testing

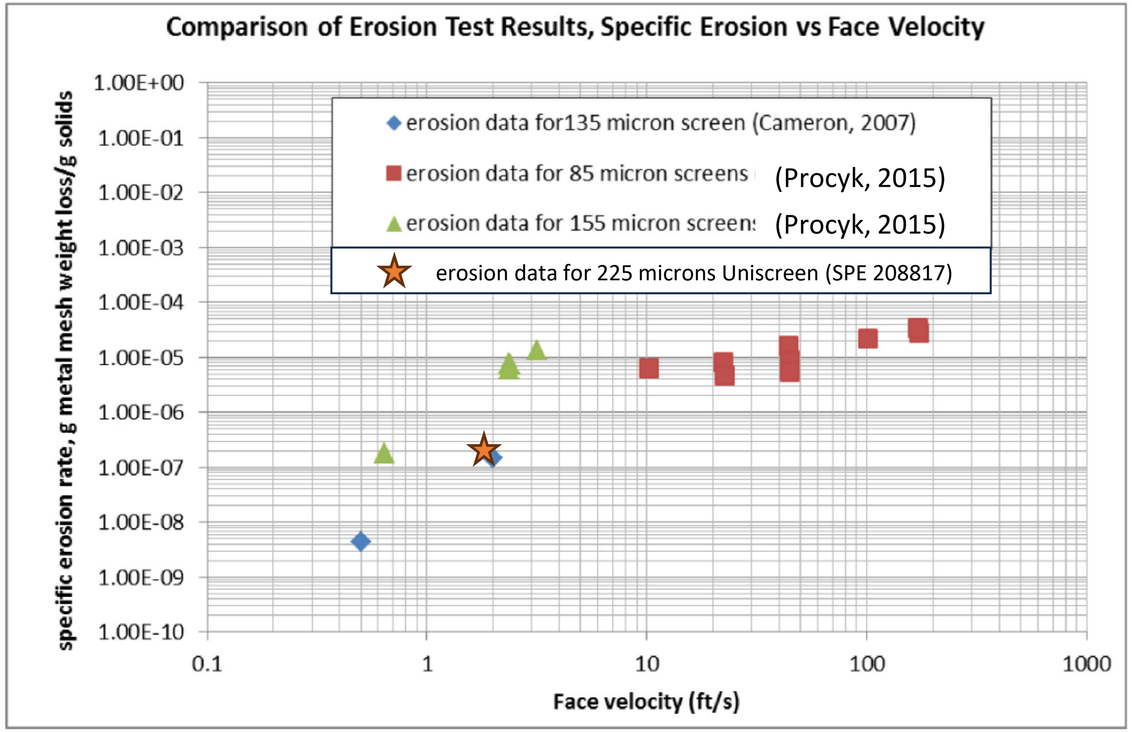
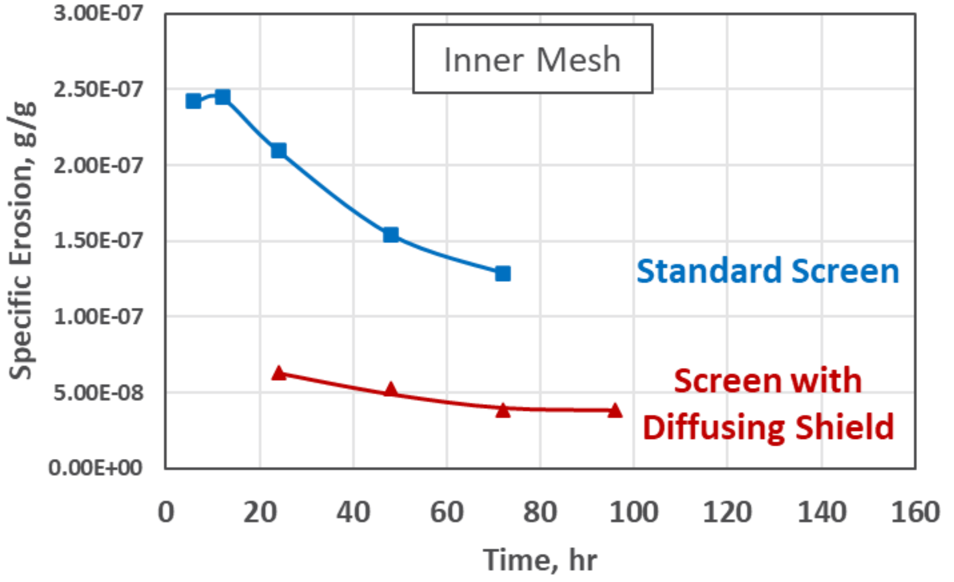


Figure 7—Specific Erosion Test Results

After SPE 174837

Stand Alone Velocity Limit = 0.13ft/sec

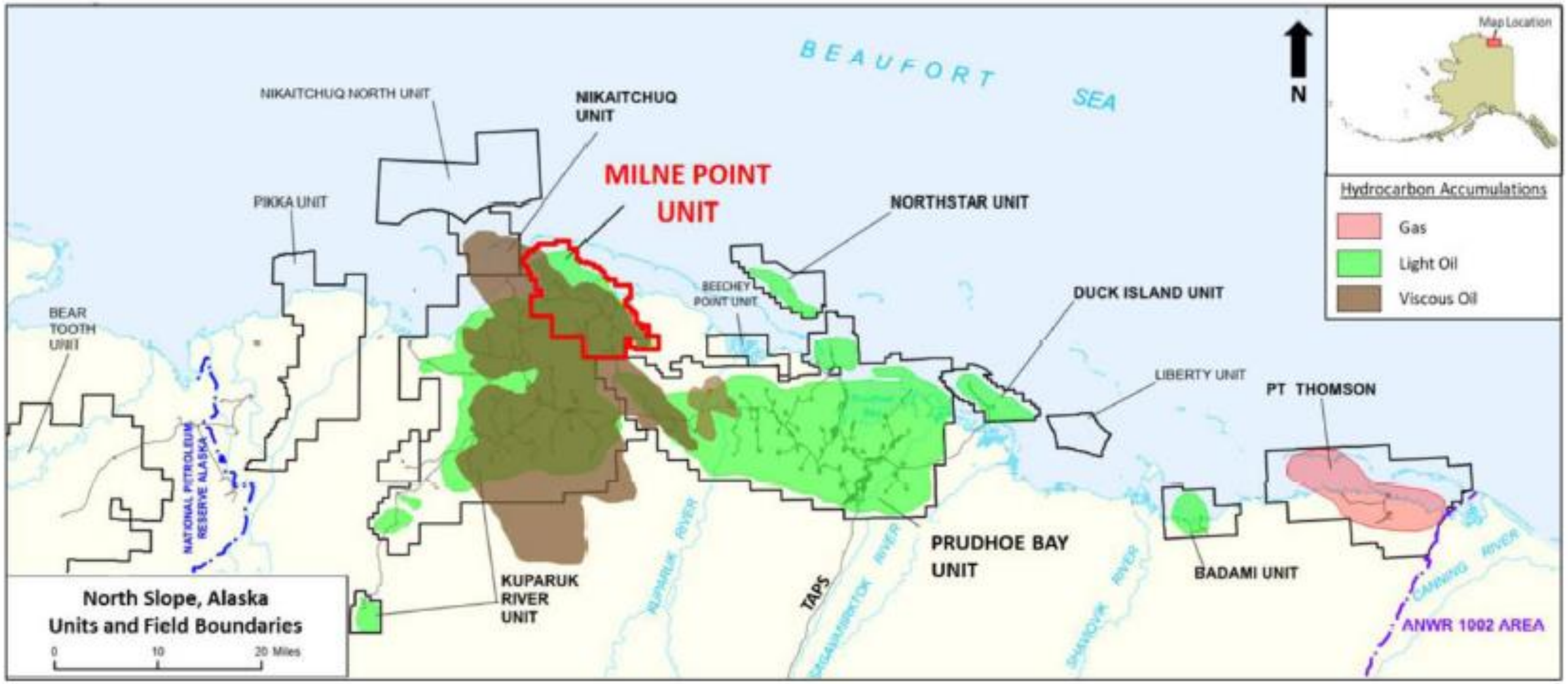
From SPE 208817



Erosion Resistant Screen Velocity Limit = 0.20ft/sec

+50% Production

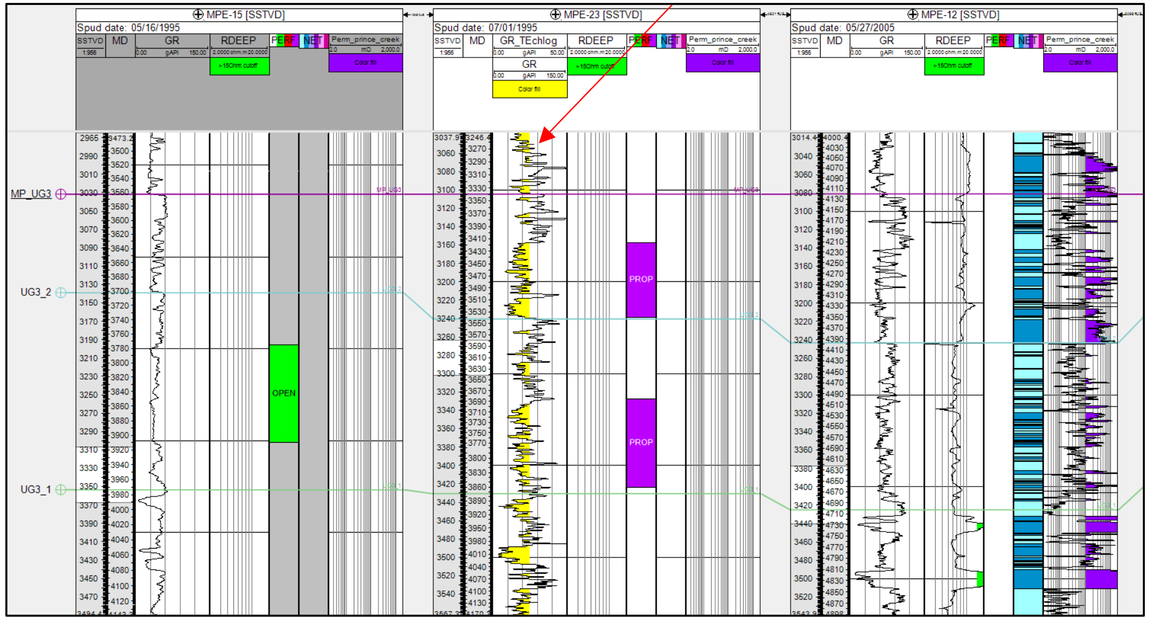
Milne Point Polymer Flood – North Slope Alaska



Ref: SPE 218269

Selection of New Water Source Well

Cased hole GR acquired June 2023 (tied in to openhole logs)



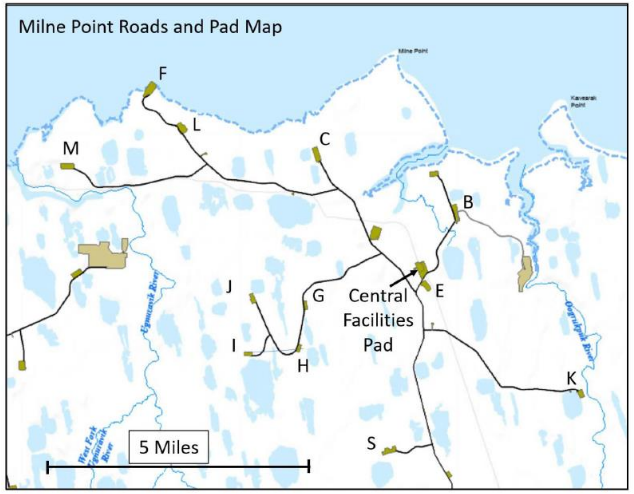
Avg net perm ~ 540mD, 89'TVD netsand thickness

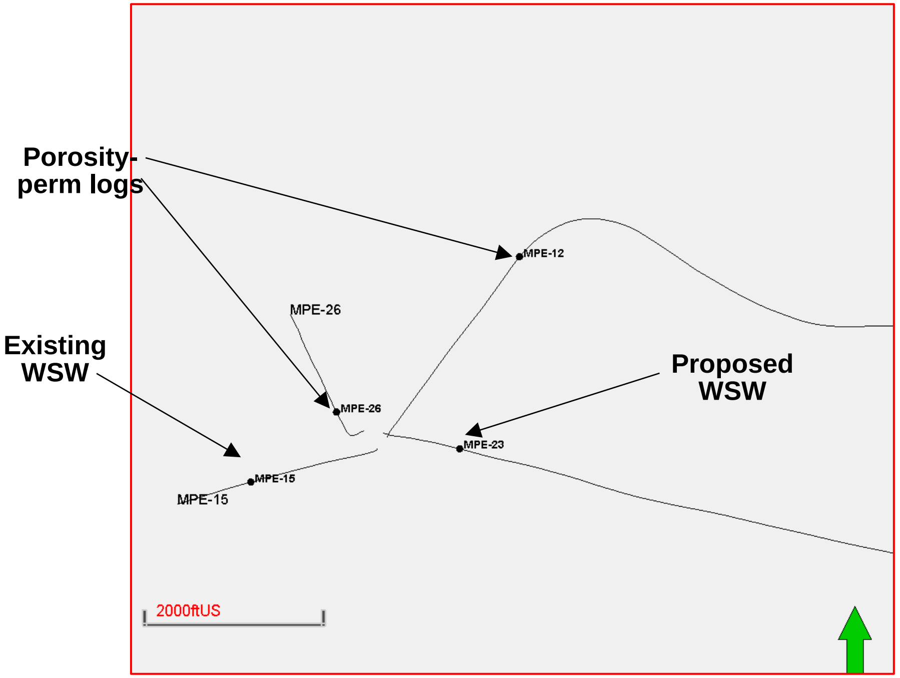
Avg net perm ~ 350mD, 63' TVD netsand thickness

Existing perfs (E-15)- able to deliver 4-6kbwpd, acceptable salinity for polymer

Proposed perf depths with Ugnu 'UG3' sands. 3415-3540 AND 3685-3860'md

E-12. Shown as it has porosity logs.

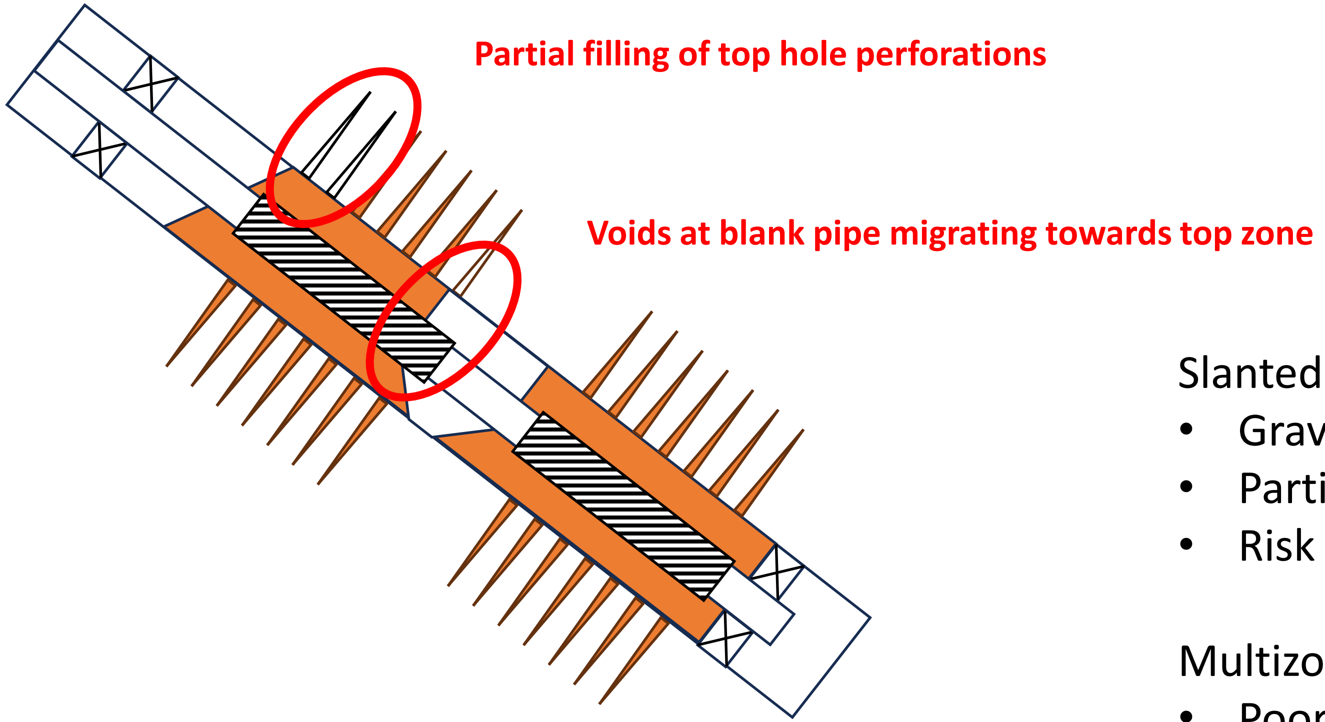




Challenge:

- Gravel pack needed
- Slanted well (50 deg deviation)
- Dual zone
- Perforation exit velocity > 0.1ft/sec

Gravel Pack Challenges in Slanted Wells



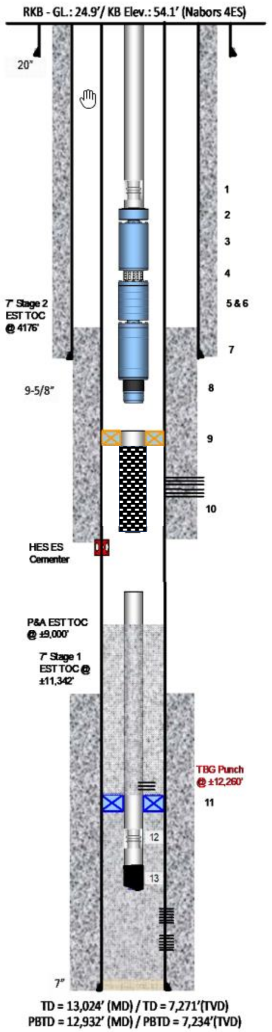
Slanted Well: 30-70 deg deviation

- Gravel settles on low side of the well
- Partial filling of top hole perforations
- Risk of voids in annular pack

Multizone with large blank sections

- Poor slurry dehydration creates voids
- Voids migrate tophole across screen sections

Field Installation



July 2023:

- Installation Procedure:
  - P&A Lower Section
    - Perforate tubing
    - Circulate Cement
    - Cut and pull tubing
  - Perforated overbalance 0.4" x 6 spf - 300ft uphole section
  - Run 300ft of 4 ½" 150 micron Shielded screen on 7" x 4 ½" permanent packer
  - Install ESP pump
- No reported incident during installation
- High rate water producer (5000bpd)
- Significant cost saving compared to prior gravel packed completions

August 2024 Update:

- No issue on the well – steady production/low skin
- Operator reordered 30 joints of Shielded screens to complete new well at higher deviation (70 deg) and increase water production

Conclusions

High erosion screen has been used in a high rate cased hole completion as a replacement for gravel pack with one year production with no sign of plugging or loss of integrity.

High erosion resistance screen provides a viable sand control alternative when gravel packing is not possible or not cost effective.

It is recommended whenever inflow modeling suggests high localized fluid velocity:

- In cased hole completion where gravel pack is not possible (slanted wells: 30-70^{o} deviation) or to improve the performance envelop of stand-alone completion (more production)
- In open hole completion when only partial wellbore collapse is suspected that would otherwise yield to hot spotting