IPS 2024

IPS 24-8.3

Value of Oriented Perforating in Unconventional Wells- A Case Study

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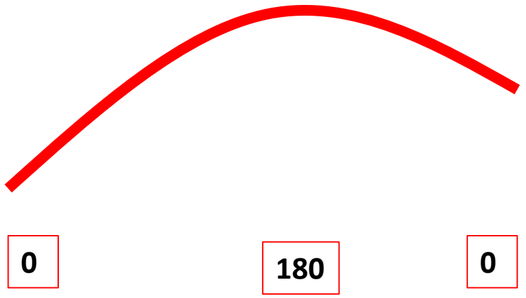
Agenda

- What started all this within ConocoPhillips L48 ?
- Unconventional Case Study background
- Data Analysis/Observations

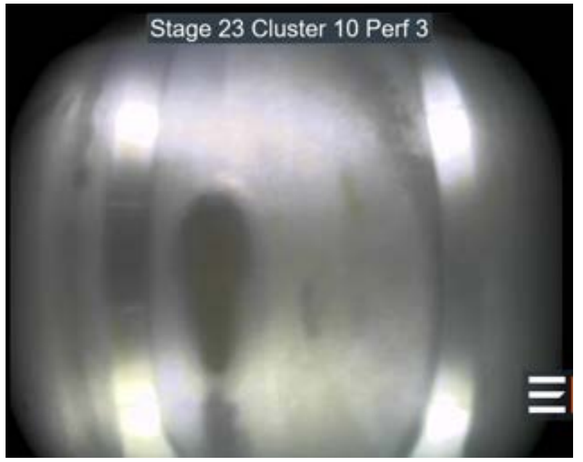
2019

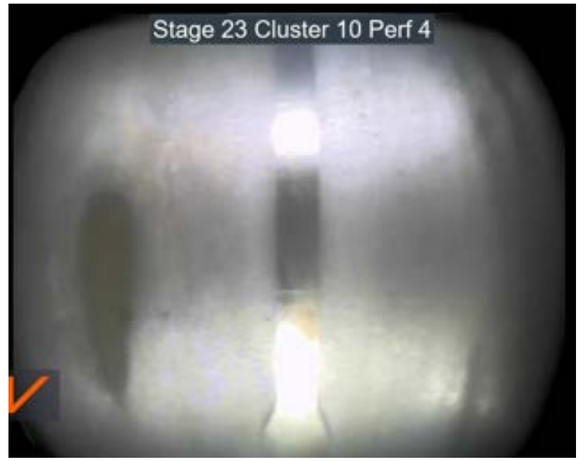


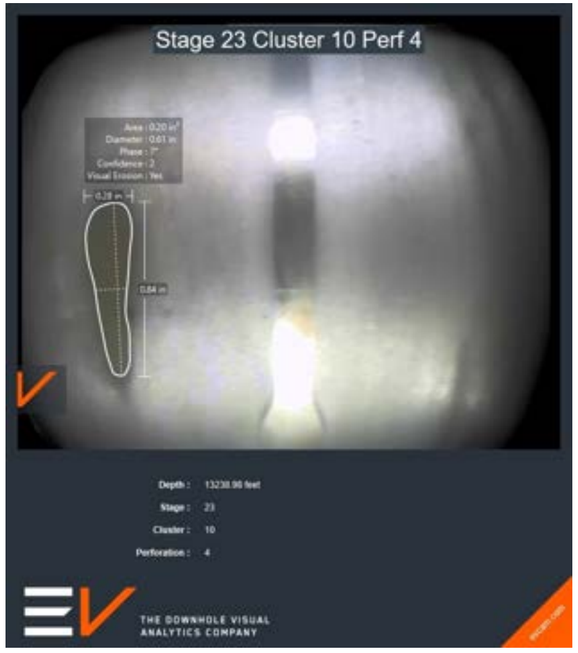
- Plan was to test extreme limited entry in certain stages and verify with camera (*10 clusters/stage @ 4-5 spf, 60 degree phasing, 0.33” EHD)*
- *Observation of uneven erosion*
- *Low side EHD >> High Side*

Example acquired and measured image

Stage 23, Cluster 10

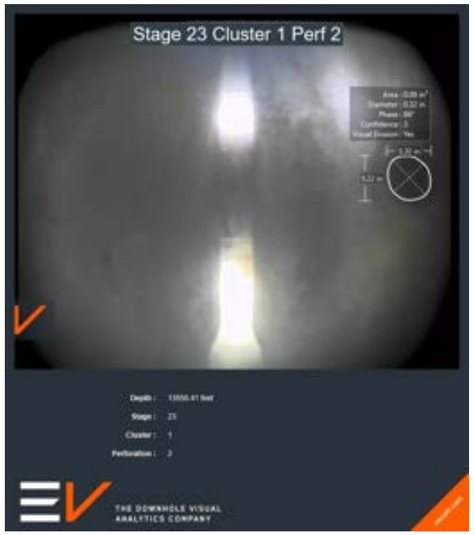






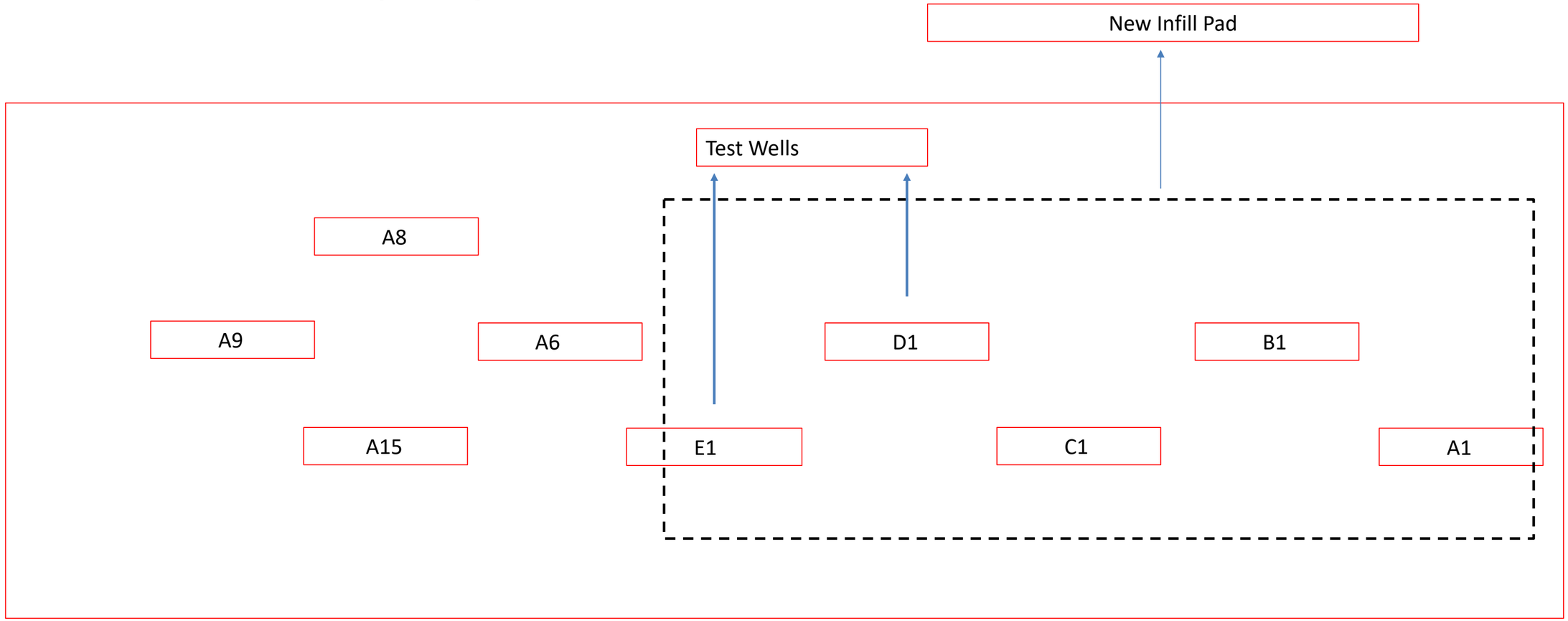
Example acquired and measured image

Stage 23, Cluster 1



2023

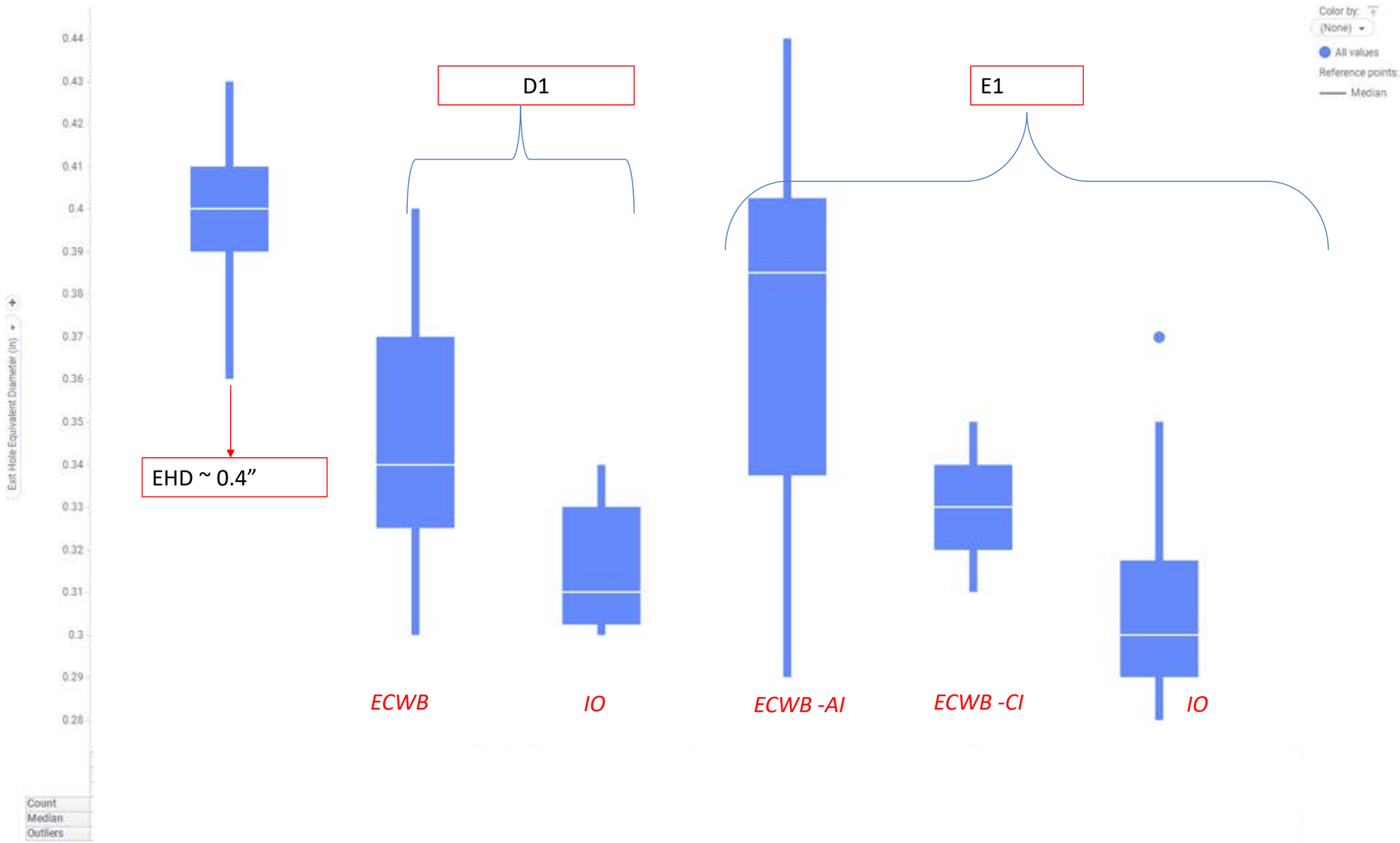
- Industry now looking at internal orienting options
- Unconventional Case Study background



Infill Pad

- Historically COP focused on eccentric weight bar (ECWB) oriented to high side
- Infill wells provided an opportunity to test ECWB vs. Internal Orientation
- Subject wells D1 & E1 chosen to test orientation (10k ft laterals)
  - Toe half - Standard ECWB guns
  - Heel half –Internal Orientated guns
- Infill wells perforation design
  - D1/E1 – 10 clusters x 2 spf (0.42″)
- A1/B1/C1 – All 3 wells had standard ECWB orientation
  - 10 clusters x 3 spf (0.42″)

Base hole variance

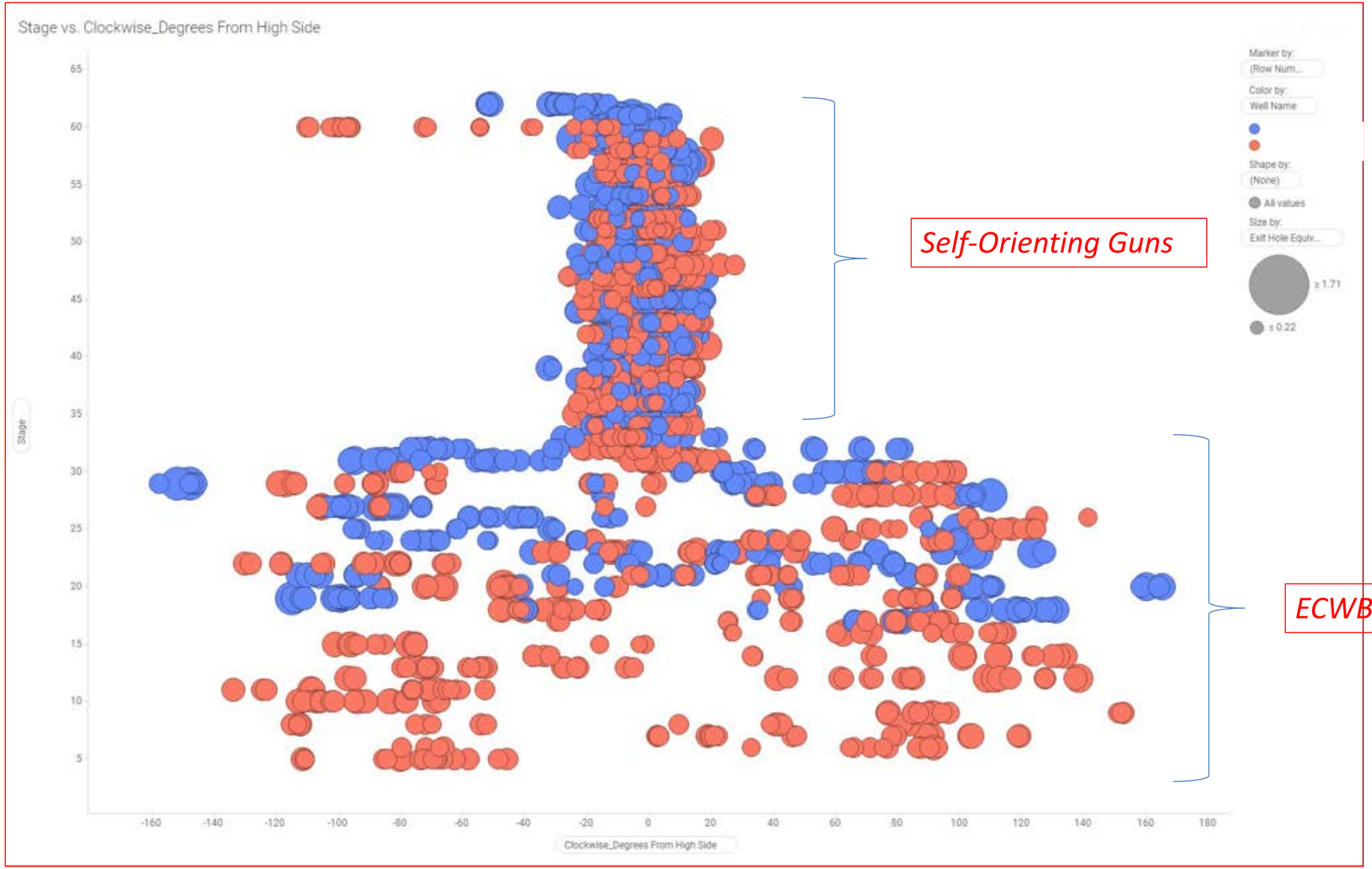


Surface QC EHD ~0.4 “

Acoustic Imaging downhole ~0.31”

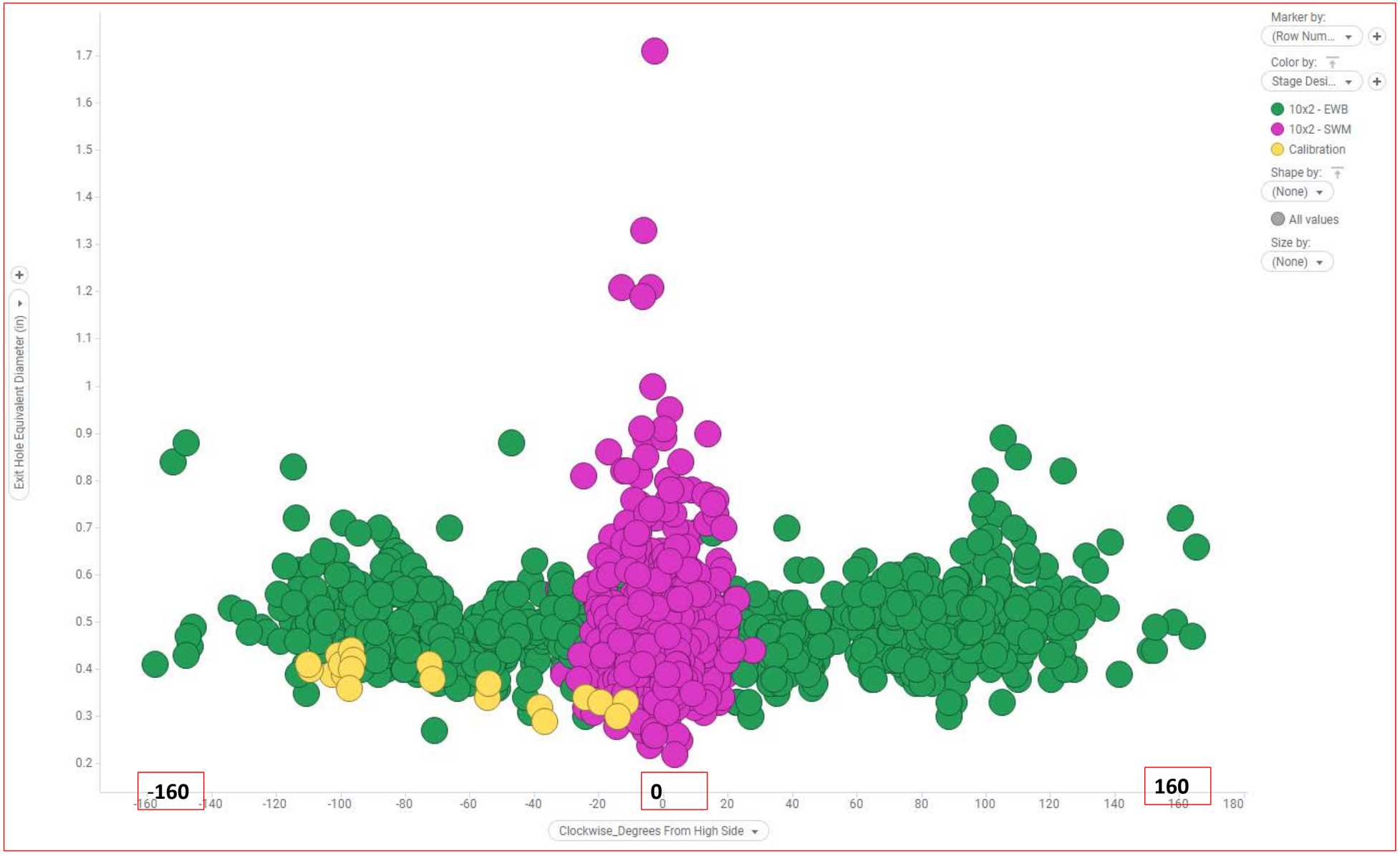
Camera Imaging downhole ~ 0.33”

IO vs. ECWB



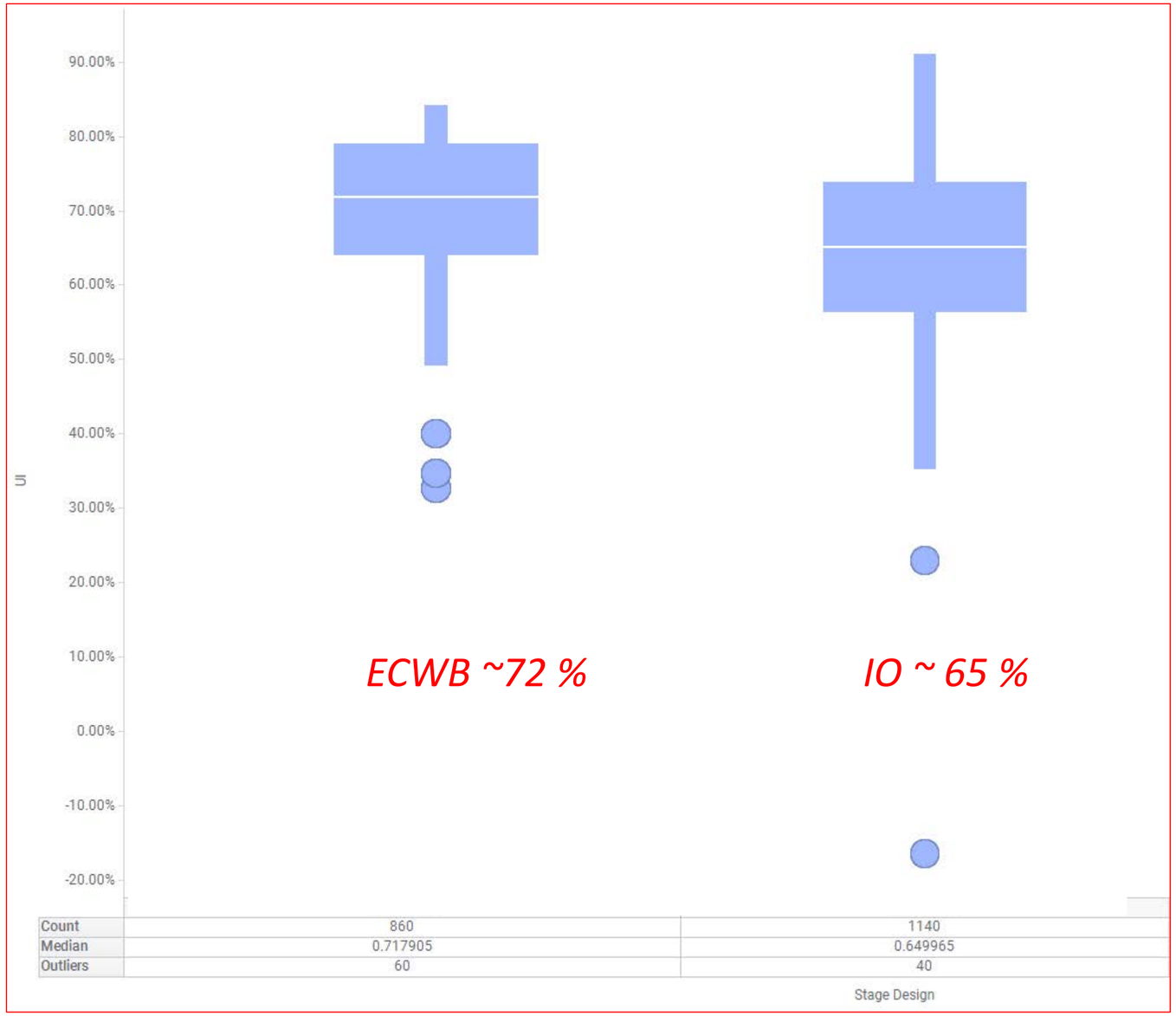
Self-orienting guns get their $ worth

EHD vs. Orientation

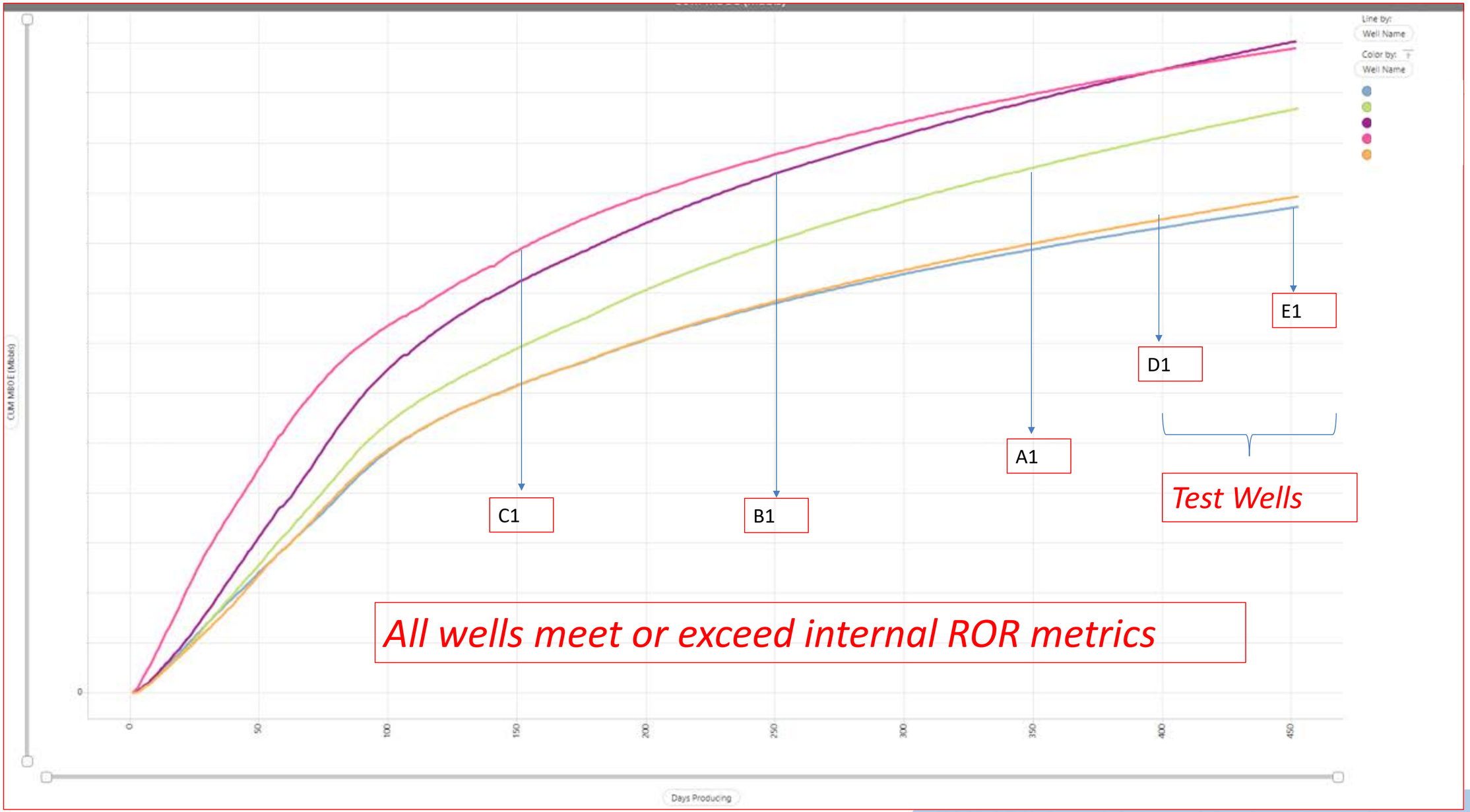


Few oddities noticed on high side run away clusters

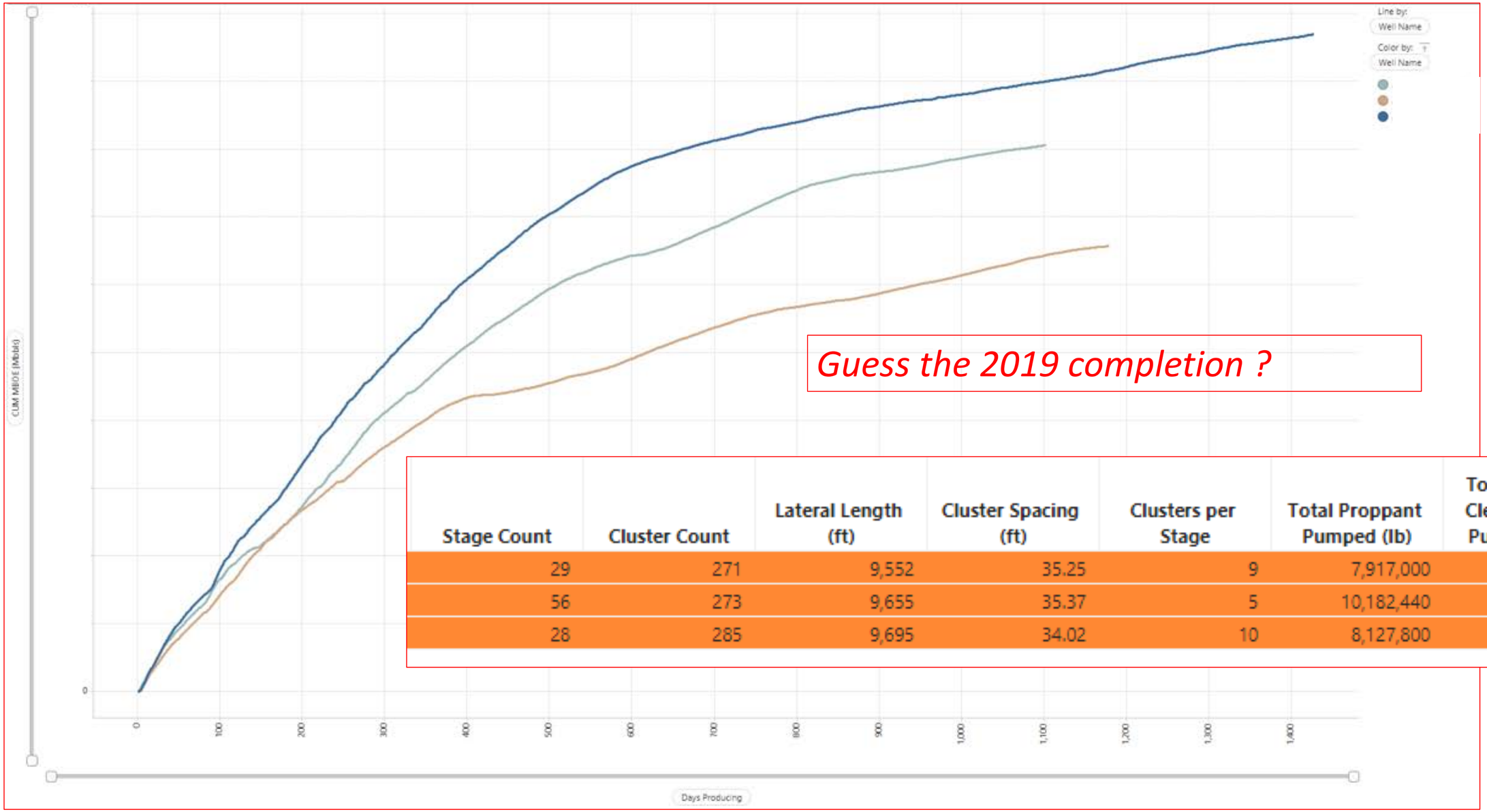
Uniformity Index (based on exit area)



Production Tales



2019 Well Review



Guess the 2019 completion ?

Stage Count	Cluster Count	Lateral Length (ft)	Cluster Spacing (ft)	Clusters per Stage	Total Proppant Pumped (lb)	Total Stim Int Clean Volume Pumped (bbl)
29	271	9,552	35.25	9	7,917,000	166,893
56	273	9,655	35.37	5	10,182,440	217,256
28	285	9,695	34.02	10	8,127,800	185,345

Results

- High side orientation has shown benefits in attempting to maintain consistent entry hole size
- Does orientation matter when it comes to production analysis ?
- Why pay top $$ when one cannot attribute production uplift solely to perforation criteria ?

QUESTIONS?

MAY 13-15 IPS 2024

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