



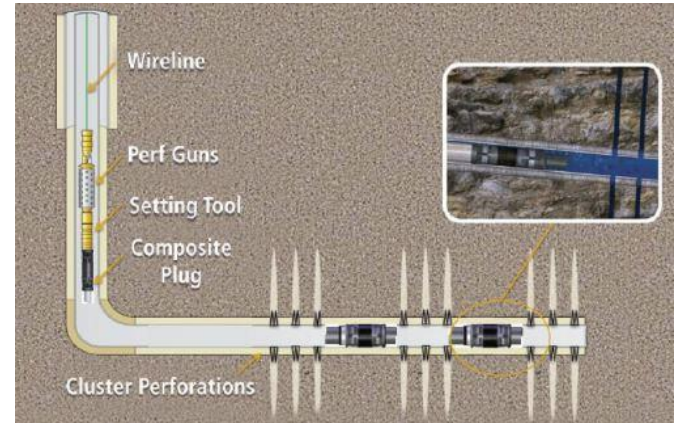
Bridge Plug Milling: where does the time go?

2018 ICoTA Canada Roundtable – October 24th 2018
Craig Fraser

Introduction

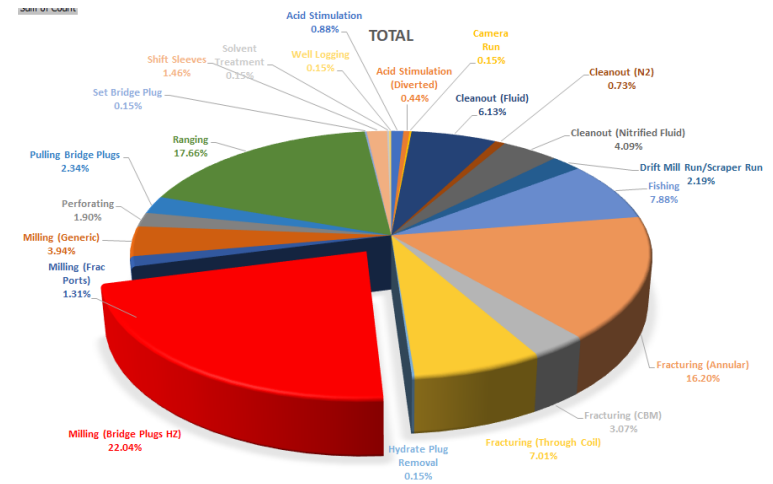
- Plug and Perf Operations
 - 10-15% of the completions in Canada
 - ~80% of the completions in U.S.

- Plug Design
 - Advancement in technologies
 - Several different offerings



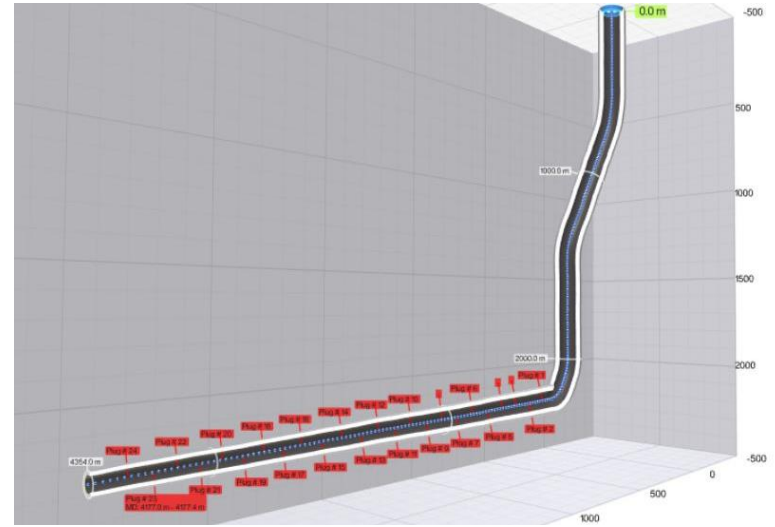
Background

- 2018 - Plug milling >20% of Trican Coil runs
- Single customer – 100 Wells milled
 - Montney Formation (AB + BC)
 - >2300 plugs
- Gathered large amounts of data
 - Mill Times, speed between plugs, wiper trips, rates, pressures etc.
- Evaluate efficiencies and deficiencies



Data Set

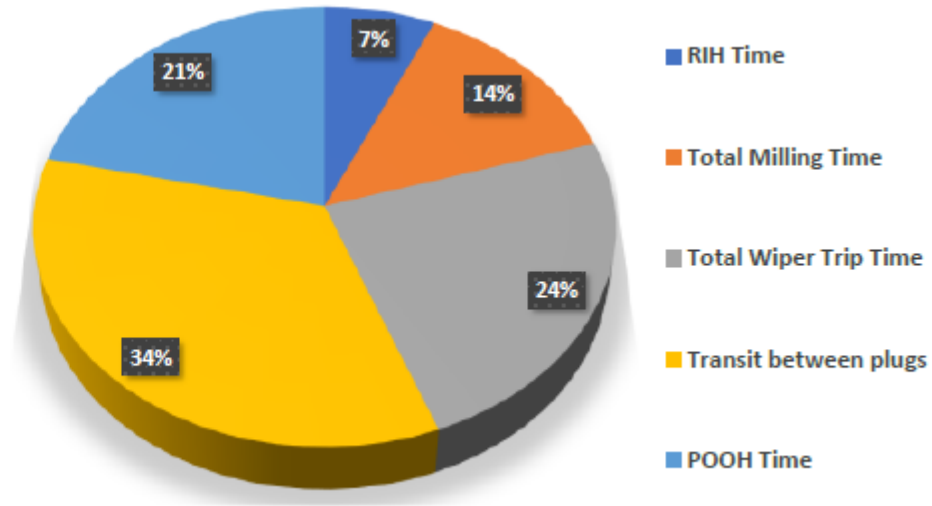
- 50 Well Data Set
 - North of Dawson Creek
- Well Design
 - 114.3mm 22.47kg.m Monobore
 - 4200-5000m MD / 2300m TVD
 - Avg 23 Plugs
- BHA
 - 73mm Motor
 - 73mm Friction Reduction Tool
 - 92mm Tricone Bit



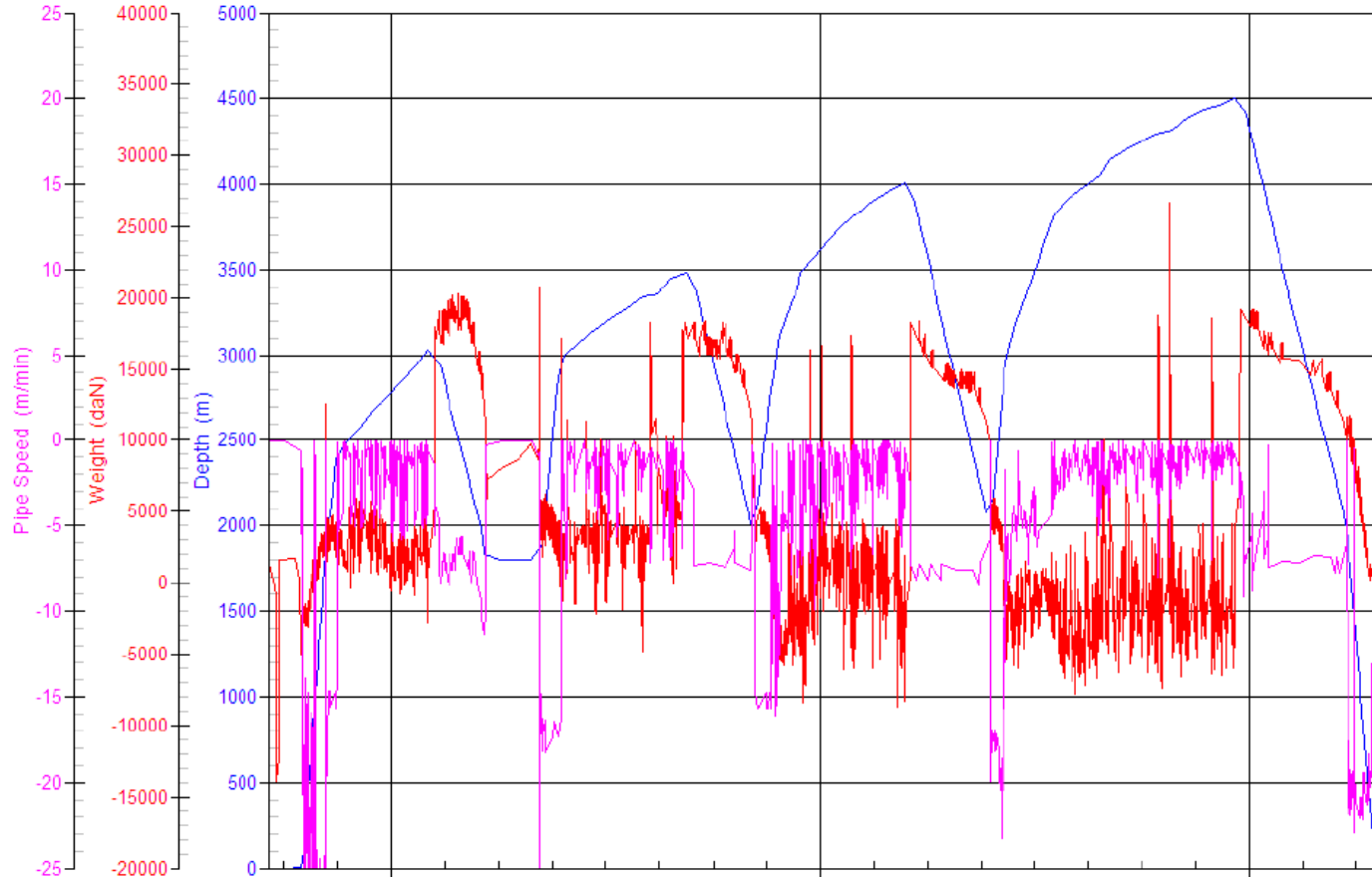
Average Data

- Same data gathered for each well
- Averages over the 50 Well Data Set

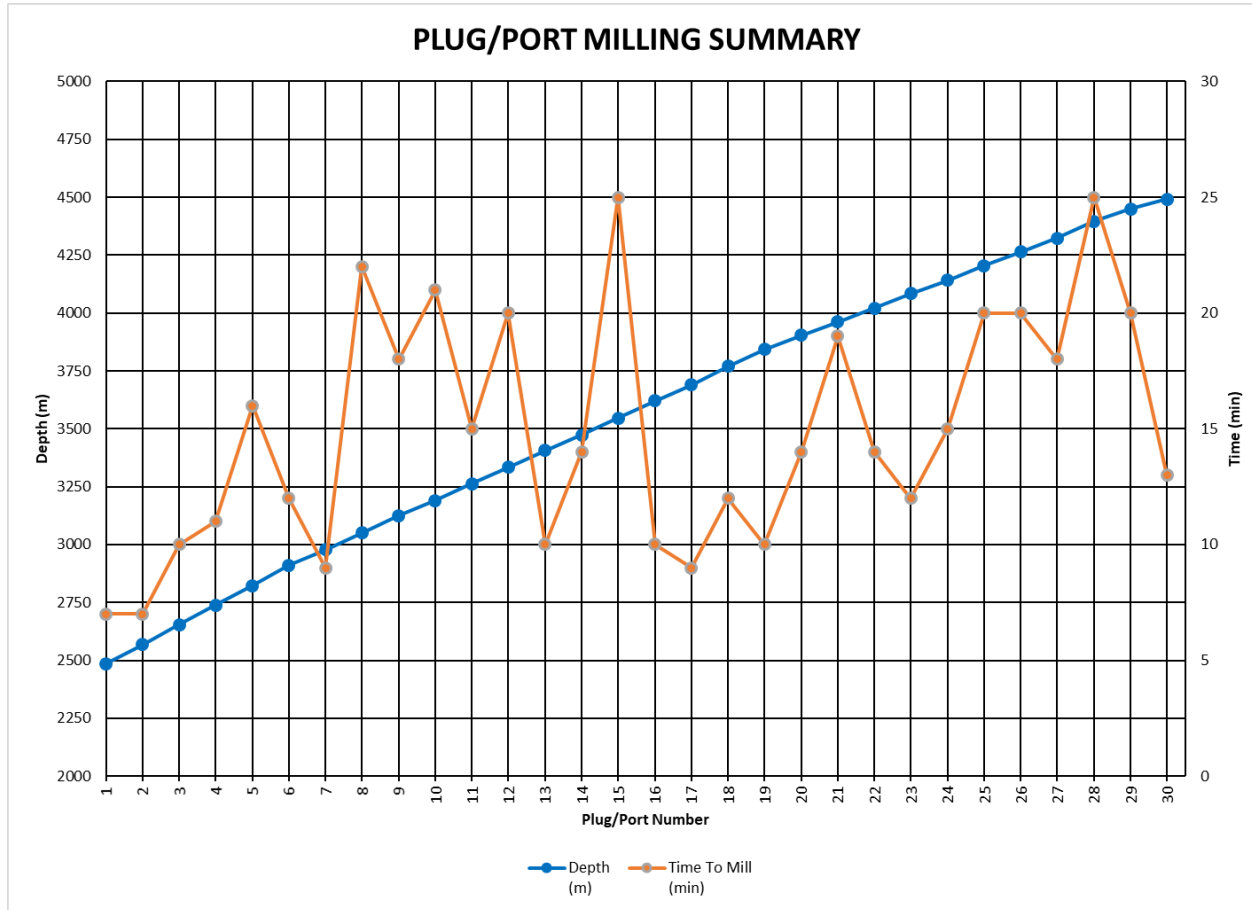
RIH Time	2.2 hrs
Total Milling Time	4.4 hrs
Total Wiper Trip Time	7.8 hrs
Transit between plugs	11.2 hrs
POOH Time	7.0 hrs
Total Time in Well	32.6 hrs
First Plug to Last Plug	23.4 hrs



Early Wells



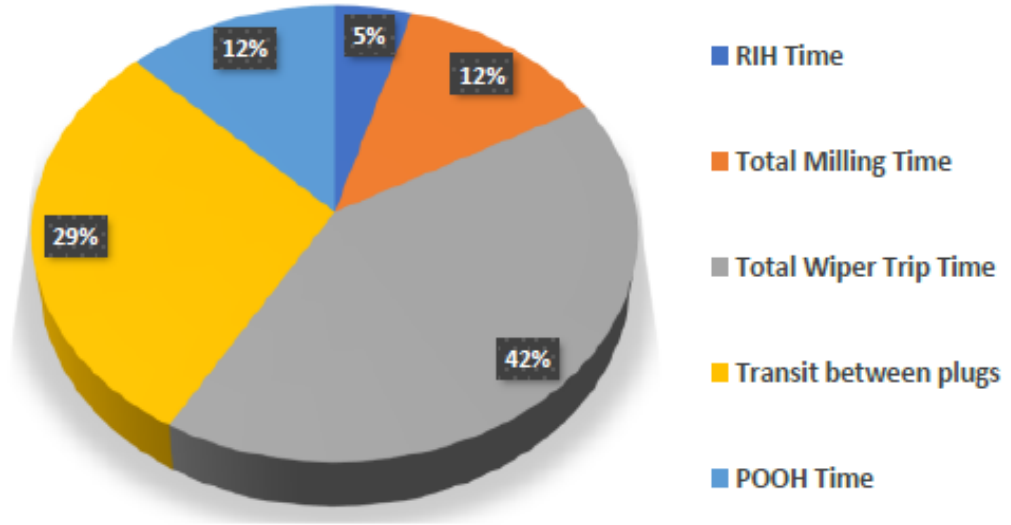
Early Wells



Early Wells

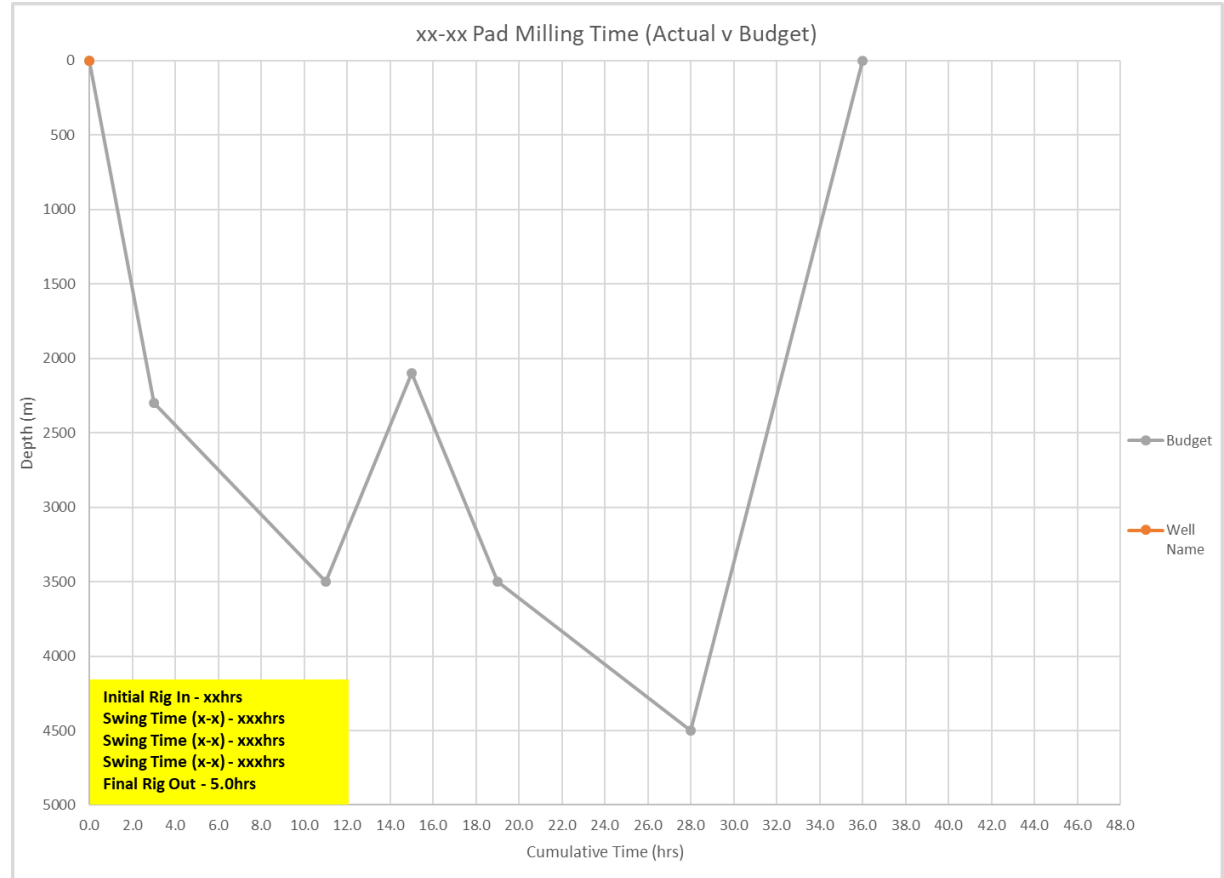
- Slow operation
- Wiper trips > 24hrs
- 2.5 days in well – milling time is a small part.

RIH Time	2.7 hrs
Total Milling Time	7.5 hrs
Total Wiper Trip Time	25.1 hrs
Transit between plugs	17.6 hrs
POOH Time	7.5 hrs
Total Time in Well	60.3 hrs
First Plug to Last Plug	50.1 hrs

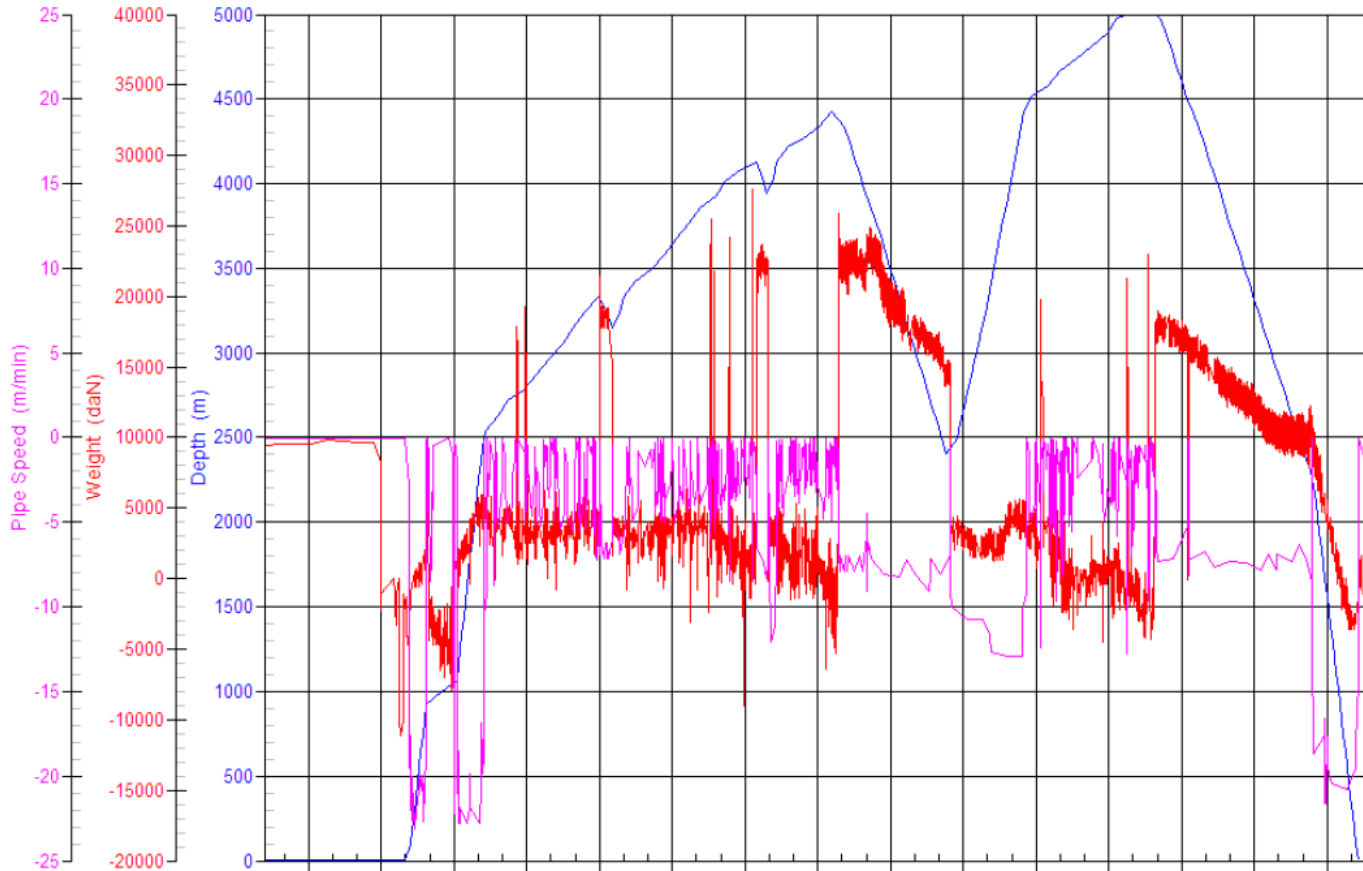


Budget Well

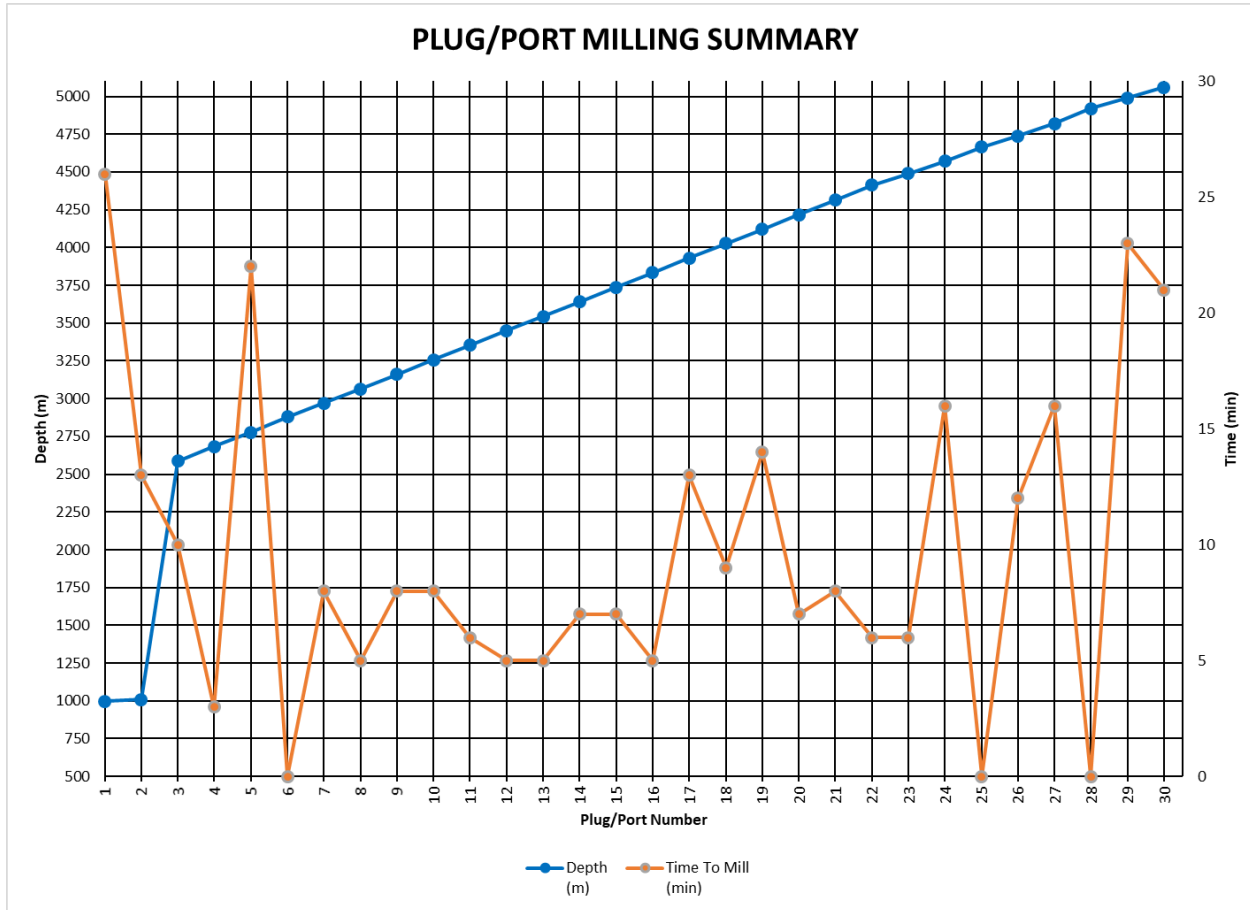
- Come up with an 'average' scenario.
- Quick reference to compare progress to budget.



Small Improvement



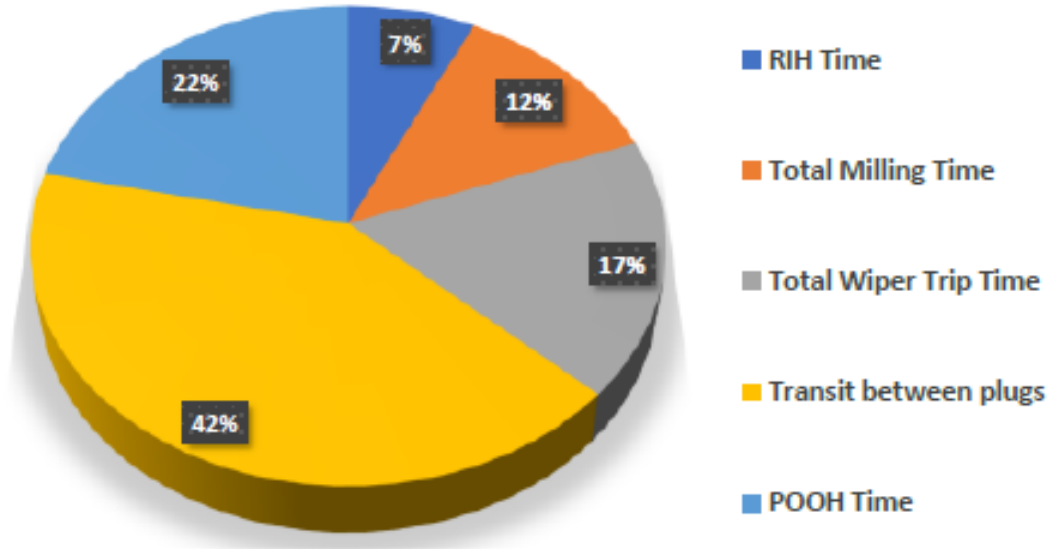
Small Improvement



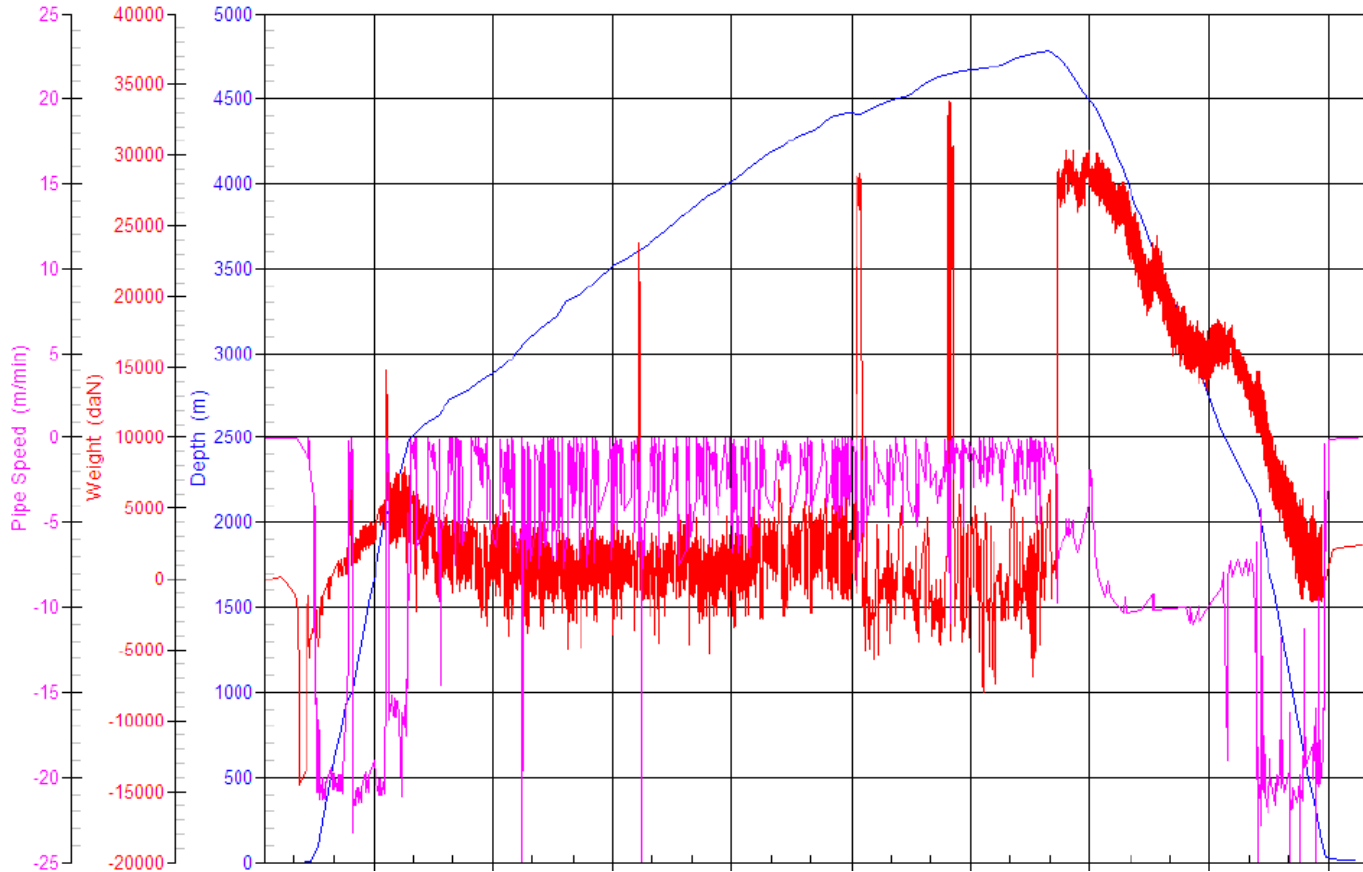
Small Improvement

- Less Time spent milling
- Wiper trips reduced
- Higher speed between plugs

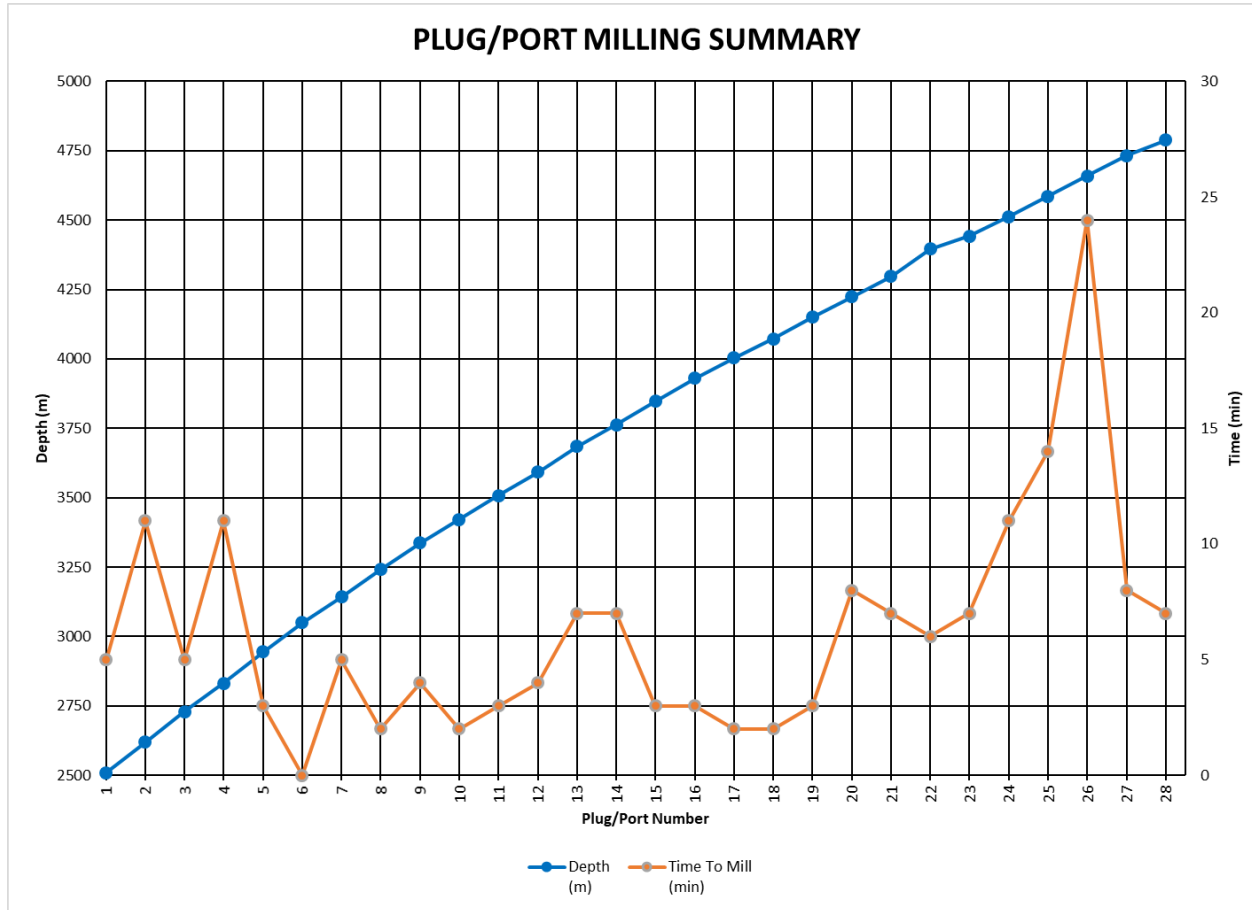
RIH Time	2.8 hrs
Total Milling Time	4.8 hrs
Total Wiper Trip Time	6.9 hrs
Transit between plugs	16.4 hrs
POOH Time	8.5 hrs
Total Time in Well	39.4 hrs
First Plug to Last Plug	29.8 hrs



Further Improvement



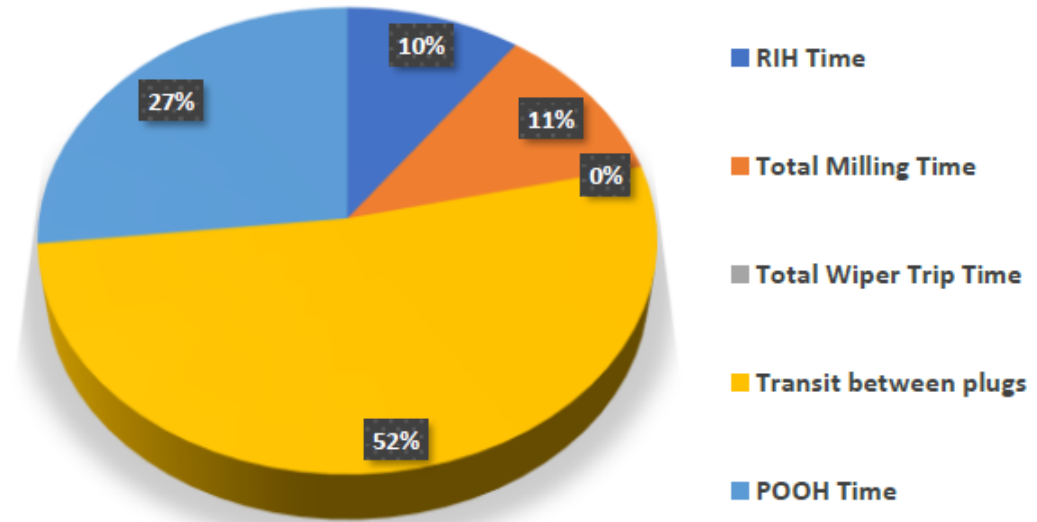
Further Improvement



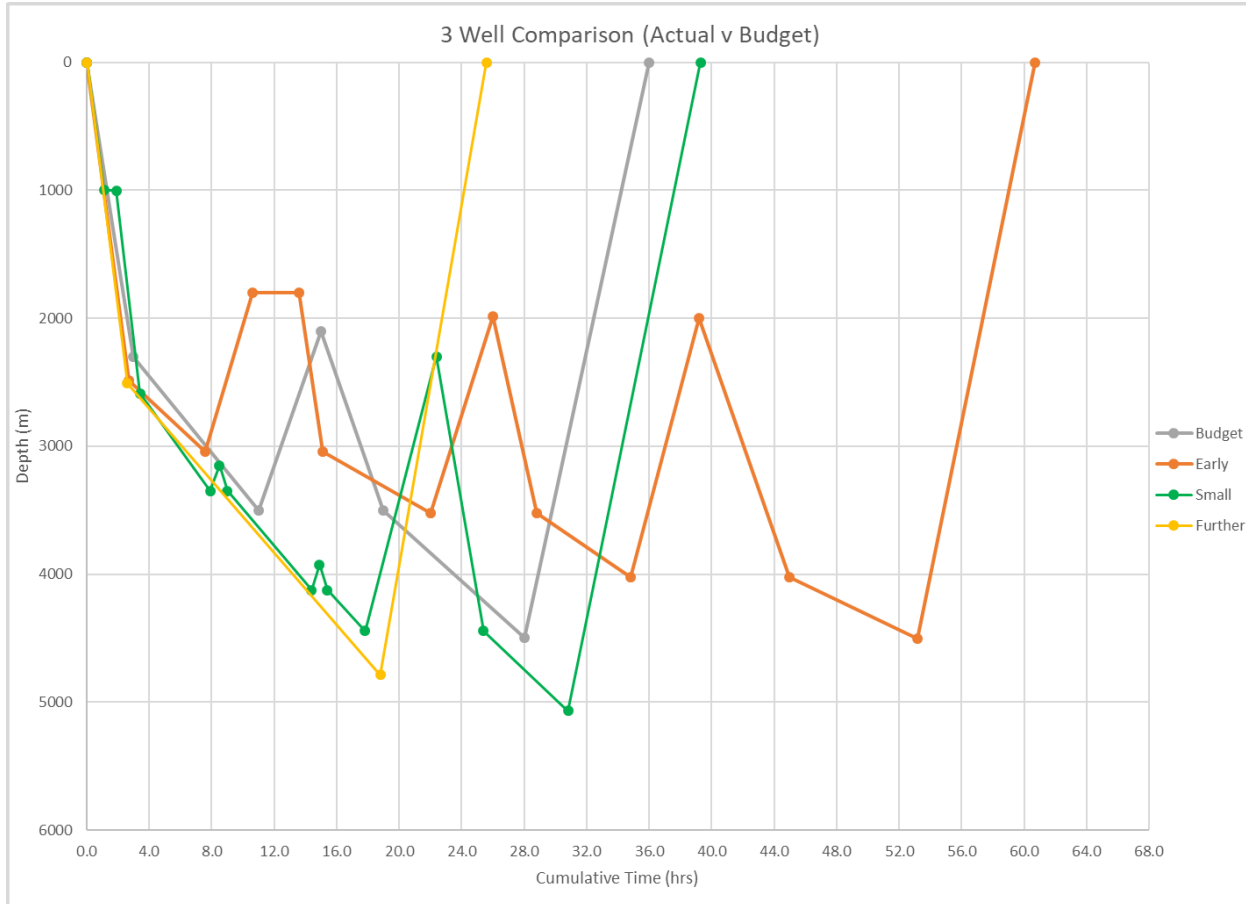
Further Improvement

- Milling time decreased even further
- No wiper trips
- Higher speed between plugs

RIH Time	2.6 hrs
Total Milling Time	2.9 hrs
Total Wiper Trip Time	0.0 hrs
Transit between plugs	13.3 hrs
POOH Time	6.8 hrs
Total Time in Well	25.6 hrs
First Plug to Last Plug	16.2 hrs



Comparison



Conclusions

- 'Milling' of the plugs is a small part
- Wellbore conditions will effect efficiencies
- Listen to the well!

