PIPELINE MATERIAL PROPERTIES USING ILI

PHMSA R&D – Baltimore · Christopher De Leon · · 11-Sep-2018

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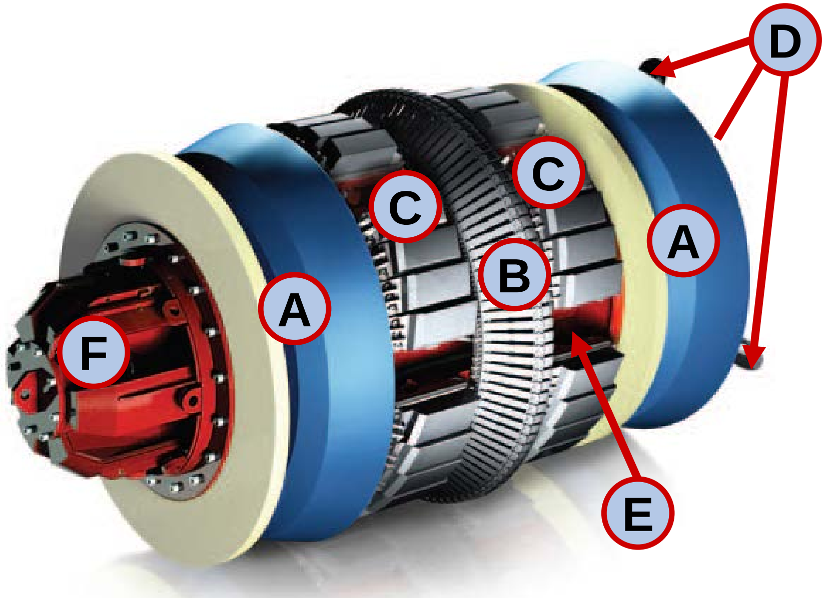
CONTENT

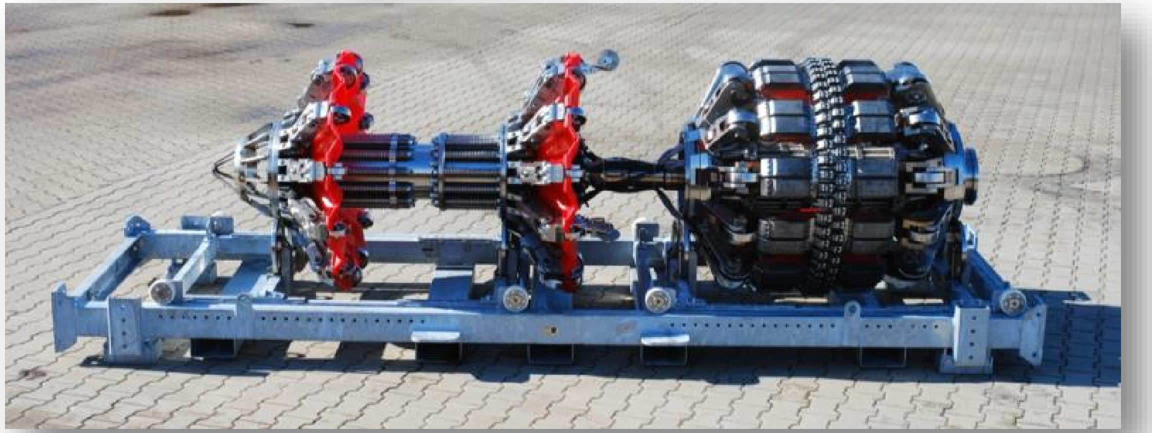
TECHNOLOGY INSIGHT
STANDARD

A	**Cups/Discs**	Sealing and/or guiding elements
B	**Sensor Carrier**	Measure magnetic flux leakage field and host coil systems for internal/external discrimination
C	**Magnets & Brushes**	Magnetize the pipe wall in axial direction to a saturation level between 10 to 30 kA/m
D	**Odometer wheels**	Measure overall distance of the survey. The odometer sensor information also controls the sampling rate via the system controller
E	**Battery and E-Box**	Powers electronics and performs data acquisition and storage. They are located inside the body of the tool, but the specific segment varies by configuration
F	**Speed Control Unit (SCU)**	Controls the speed of the tool during inspection surveys in gas lines (only for 20" and above)



Standard Specifications	
Tool Sizes	3" – 56"
Pipeline Product	Gas / Liquids
Product Temperature Range	0°C - 65°C (14°F – 49°F)
Max. Operating Pressure	150 bar (2175 psi)
Operating Speed Range	up to 5.0 m/s (11.2 mph)
Min. Bend Radius	1.5D

TECHNOLOGY INSIGHT
STANDARD



INDUSTRY GAP

Regulatory

Proposed 192.607 - Verification of Pipeline Material: Onshore steel transmission pipelines

The Challenge: System of Record / VTC

Pipeline operators may not have documentation for Pipe Grade or Yield Strength, driving proportionally spaced excavations (NPRM).

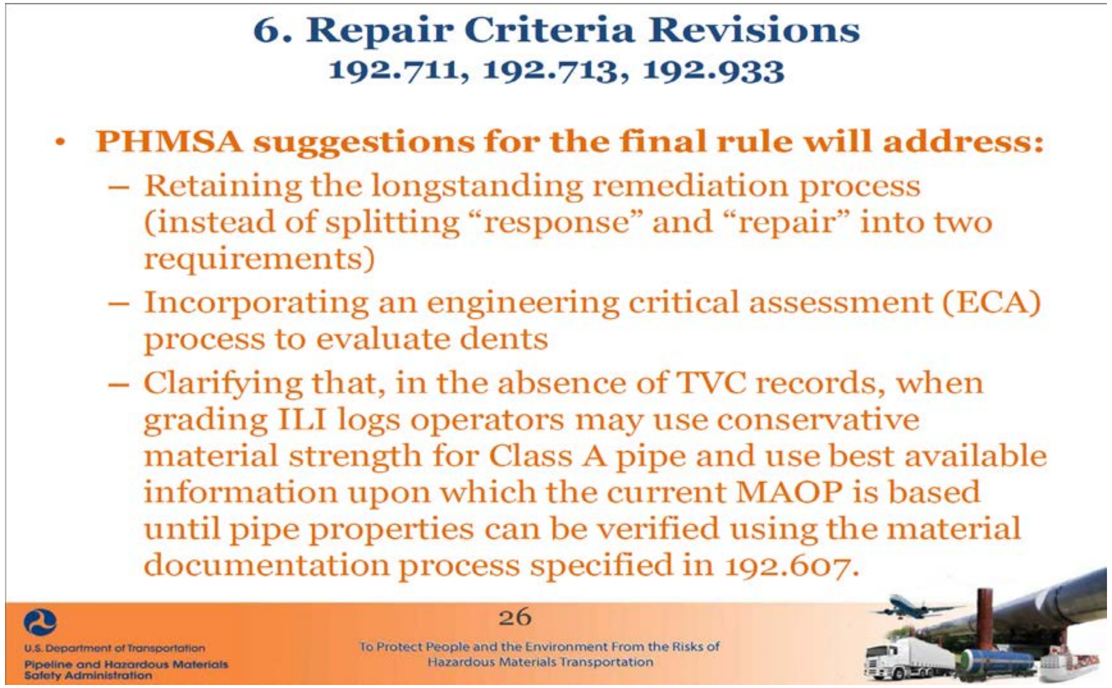
Gap

Uncertainty in Specified Minimum Yield Strength (SMYS) or Yield Strength (YS) values affects confidence in Maximum Allowable Operating Pressure (MAOP) and Fitness for Service activities. **Consensus guidance on the use of ILI technology can be improved.**

DEVELOPMENT

Consensus

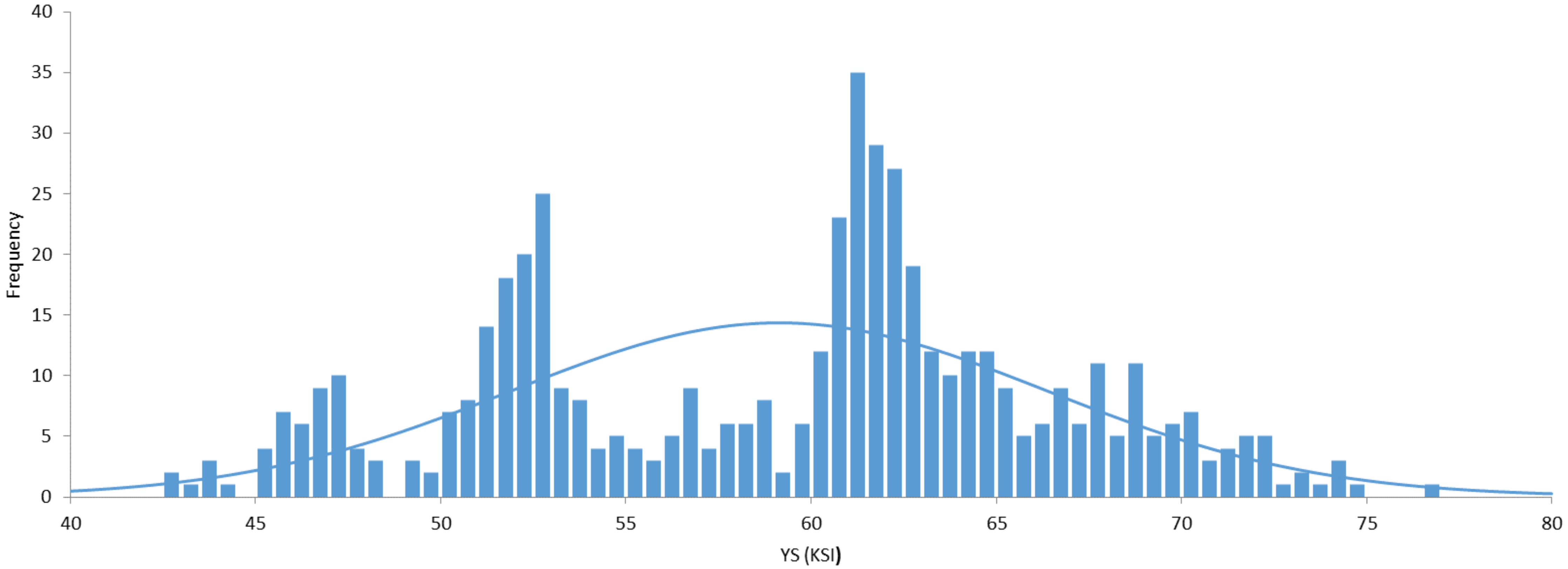
The ability to leverage ILI for characterizing material properties such as YS and Ultimate Tensile Strength (UTS) on a joint by joint basis enables **Consensus Recommended Practices/Standards and Regulation to better close gaps associated with Risk and Cost-Benefit**.



In many cases augmenting efforts involving:

- Confirmation of TVC efforts
- Identification of material property outliers
- Reduction of overall risk via data integration during feature assessment
- Accessible data for Engineering Judgment and Cost Benefit Analysis

MATERIAL PROPERTIES VIA ILI



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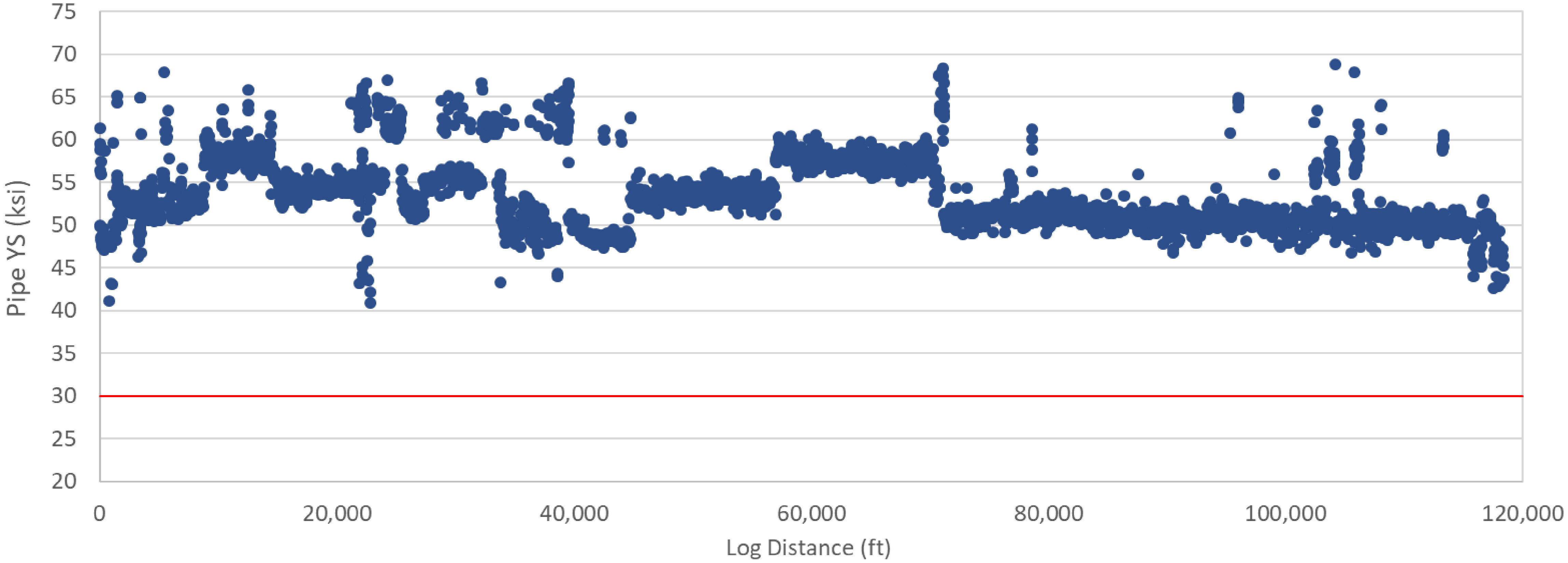
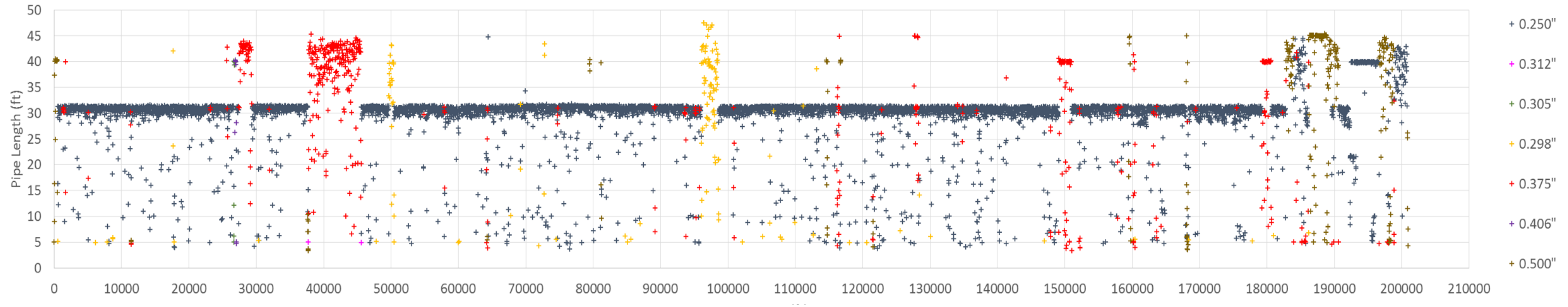
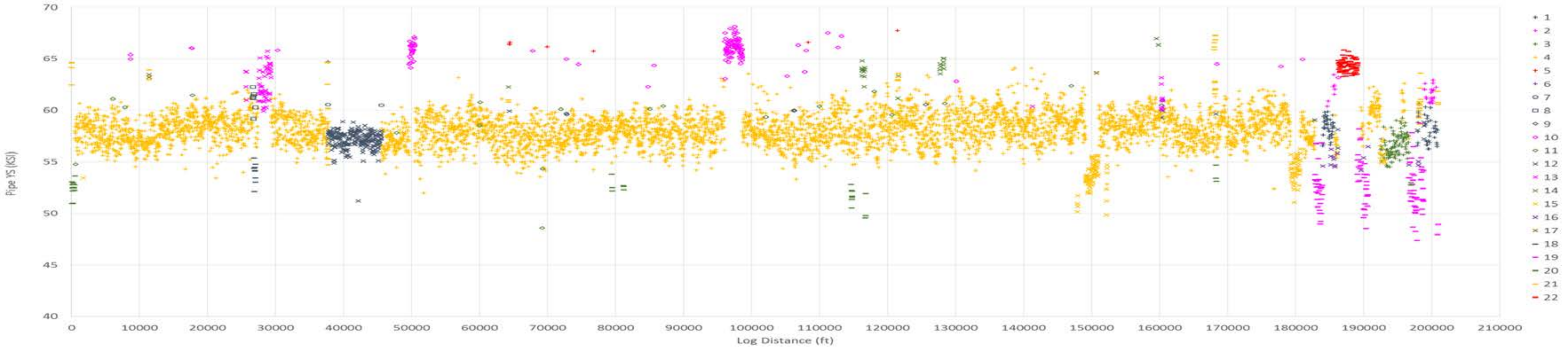


MATERIAL PROPERTIES VIA ILI





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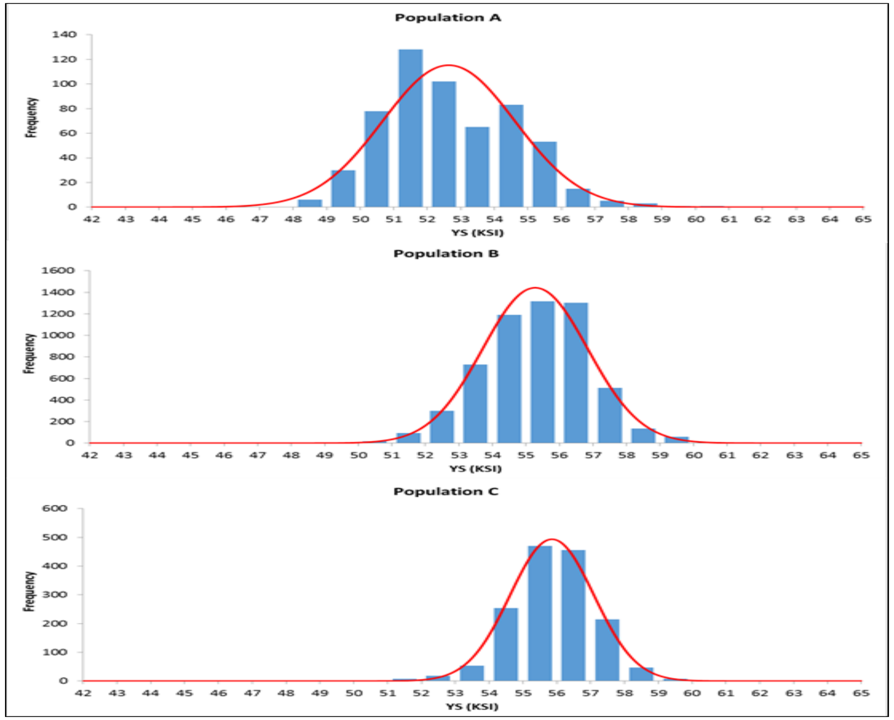

Example Feature: 40% depth x 6” long

Mod-B31G with X-42 = **962 PSI or 1.22 RPR = 1 yr response (NPRM)**

Mod-B31G with ILI_YS of 44,000 PSI = **999 PSI or 1.27 RPR = greater 6 years (Fig 4)**

CONCLUSION

Gap

Lack of clear guidance for all stakeholders on implementing **data integration best practice to leverage ILI advancements,** particularly surrounding material properties, MAOP Re-Confirmation and FFS activities.

Development Opportunities

Consensus practice document

Regulator supported Industry project