CLOSING THE GAP
MAOP VALIDATION

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CONTENT

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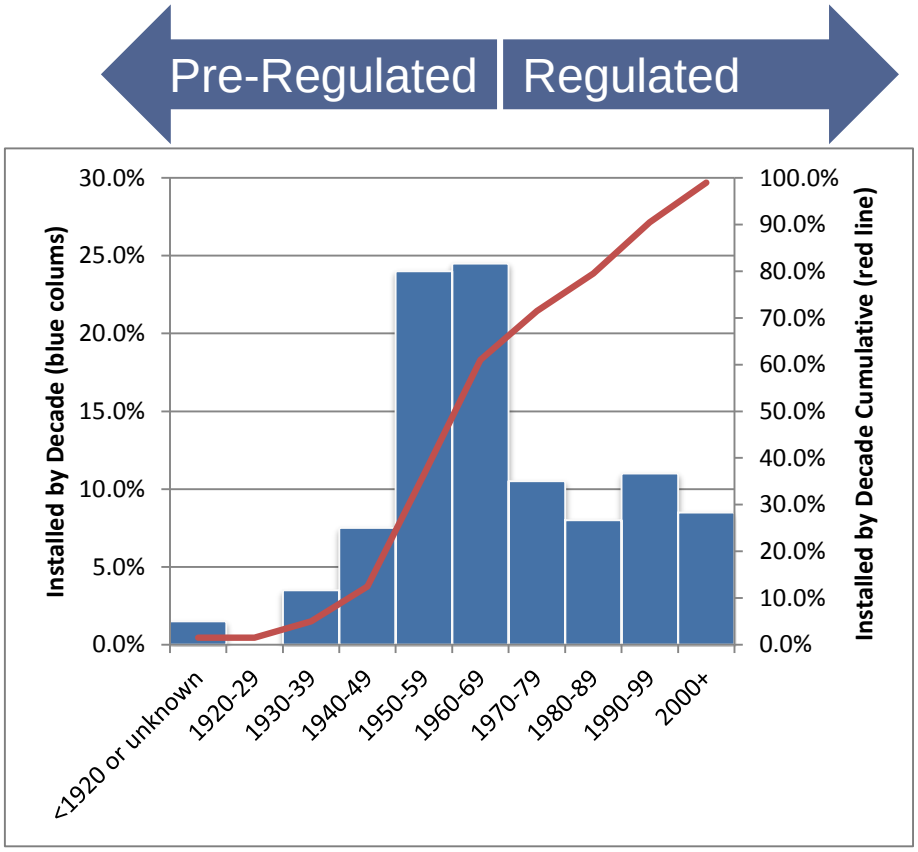
1. Regulatory Review
2. Case Study: Material Documentation using NDT

CONTENT

REGULATORY REQUIREMENTS



Percentage of gas transmission pipeline mileage installed in the USA [1]

1) J. F. Kiefner, M. J. Rosenfeld, The Role of Pipeline Age in Pipeline Safety, Final Report No. 2012.03, INGAA Foundation, October 2012

- 305,000 miles (490,850 km) of natural gas transmission pipelines in the USA
- Approx. 50% of all pipelines installed between 1950 and 1970
- Approx. 66% of all pipelines installed prior to 1970 (“pre-regulation pipelines”)

REGULATORY REQUIREMENTS

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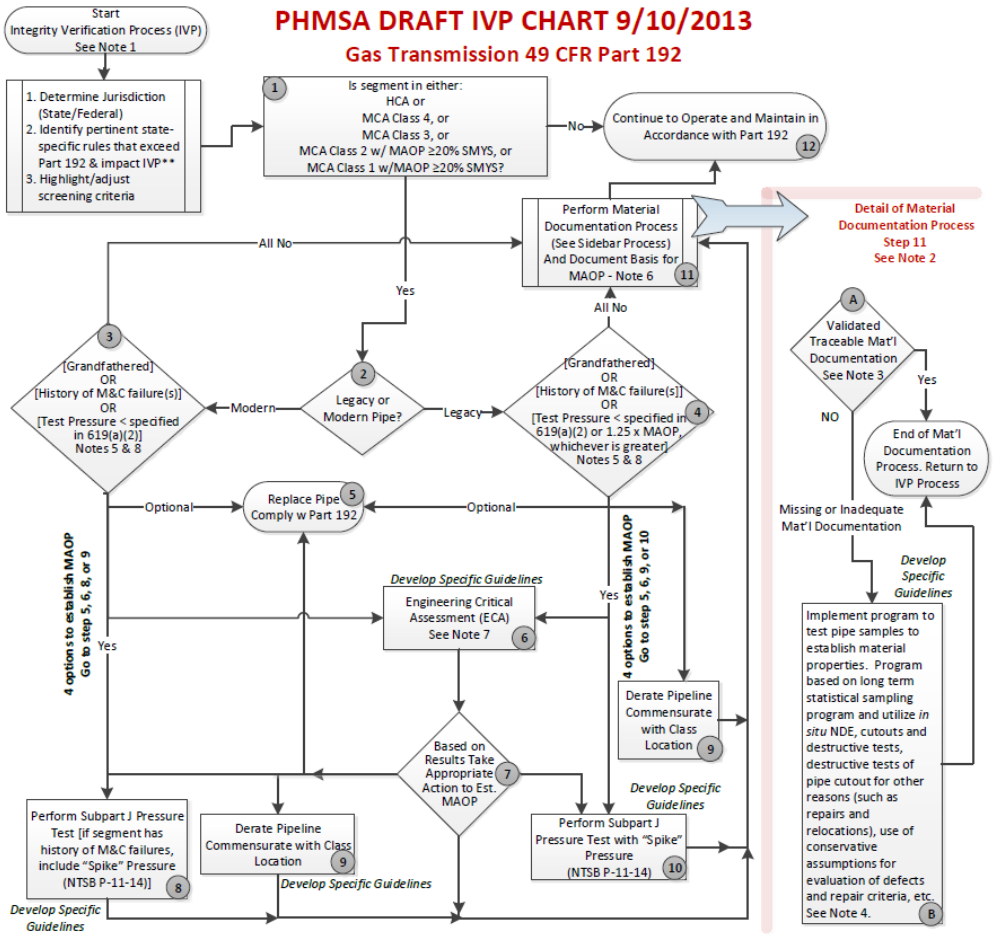
PSA § 23 Regulatory Demands:

- Operators are required to **identify pipeline sections** with insufficient records to substantiate MAOP/MOP for steel pipelines.
- MAOP/MOP must be reconfirmed for sections with insufficient records.
- Verification of Records and Reporting – requires operators to identify pipe segments for which they do not have records to substantiate MAOP for all Gas Transmission steel pipe (Class 3, 4 and all HCAs)
- PSA §23 – "Testing Regulations" – Requires conducting tests to confirm the material strength of previously untested gas transmission steel pipelines in high consequence areas (HCAs) and operating at a pressure greater than 30 % SMYS that were not previously pressure tested;

  – Tests can be either pressure testing or alternative equivalent means such as ILI programs.

OUTLOOK IN REGULATORY REQUIREMENTS

- The drafted and revised IVP gas transmission lines was published on 09/10/2013.
- The drafted IVP hazardous liquid lines was published on 09/17/2014
- Industry reviews and comments (ongoing).
- Release is expected shortly.



IVP PRINCIPLES
APPLY TO HIGHER RISK LOCATIONS

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- High Consequence Areas (HCAs)

- Moderate Consequence Areas (MCAs)
  - an onshore area that is within a potential impact circle, containing one or more buildings intended for human occupancy, an occupied site, or a designated Federal interstate, expressway, or 4-lane highway right-of-way, and does not meet the definition of high consequence area, as defined in § 192.903

IVP PRINCIPLES
SCREENING

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Screen segments for categories of concern

- Grandfathered Pipe
- Lack of Records to Substantiate MAOP
- Lack of Adequate Pressure Test
- Operating pressures over 72% SMYS (pre-Code)
- History of Failures Attributable to Manufacturing or Construction Defects
- Legacy materials and construction techniques

IVP PRINCIPLES
MATERIAL DOCUMENTATION AND VERIFICATION

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Validated Traceable and Complete Material Documentation for:

- Pipe and fittings
  - – Yield Strength and Manufacturing Seam Process
- Valves
  - – Pressure rating and weld end compatibility
- Components
  - – Pressure rating compatibility

Else Material Properties must be established via:

- Cut out and Test Pipe Samples
- Non-Destructive Testing (on-going industry projects)
- Manufacturing markings during Field verification for valves, flanges, etc
- Other

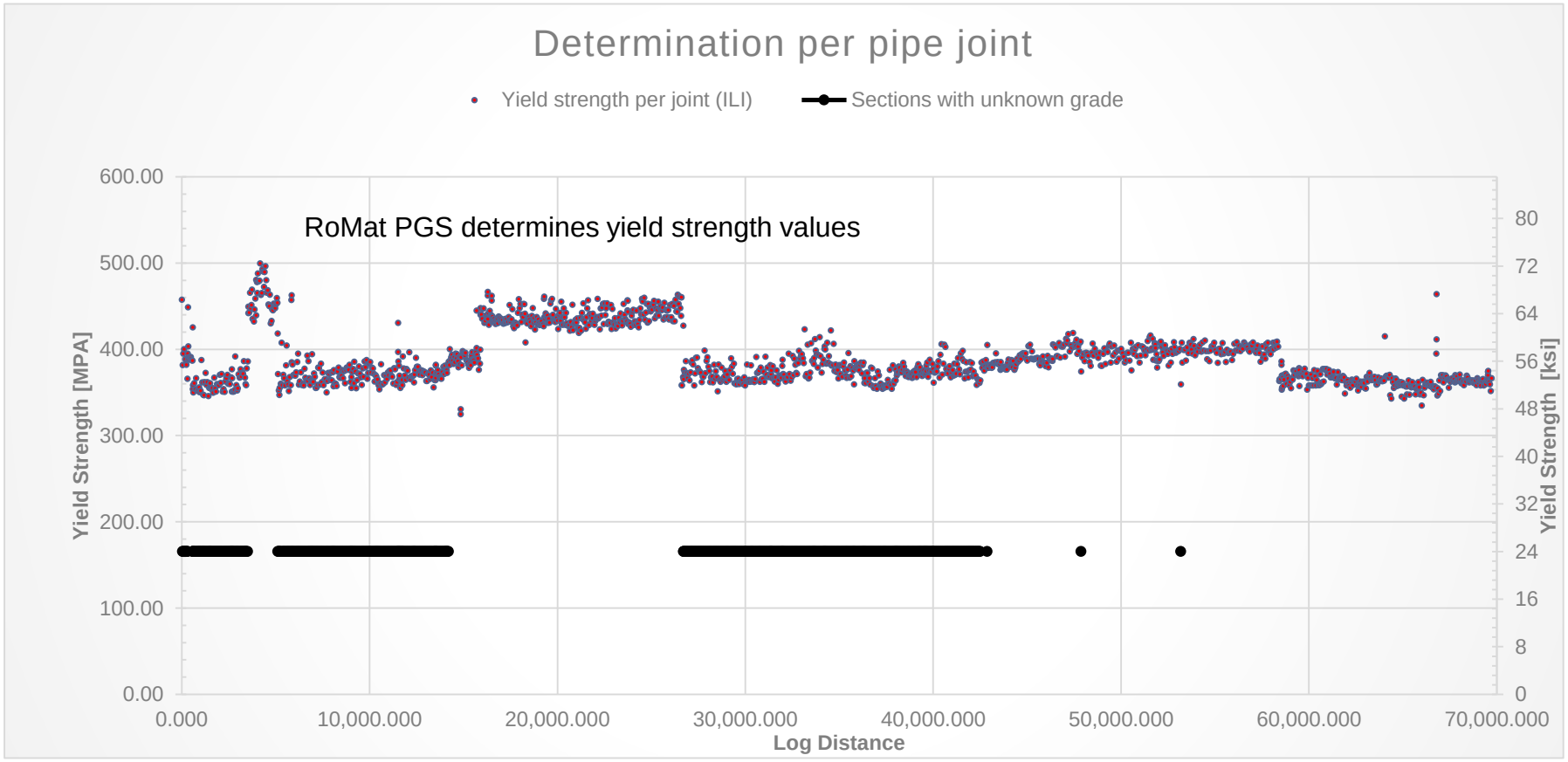
IVP PRINCIPLES
MAOP ASSESSMENT

Operator to choose between:

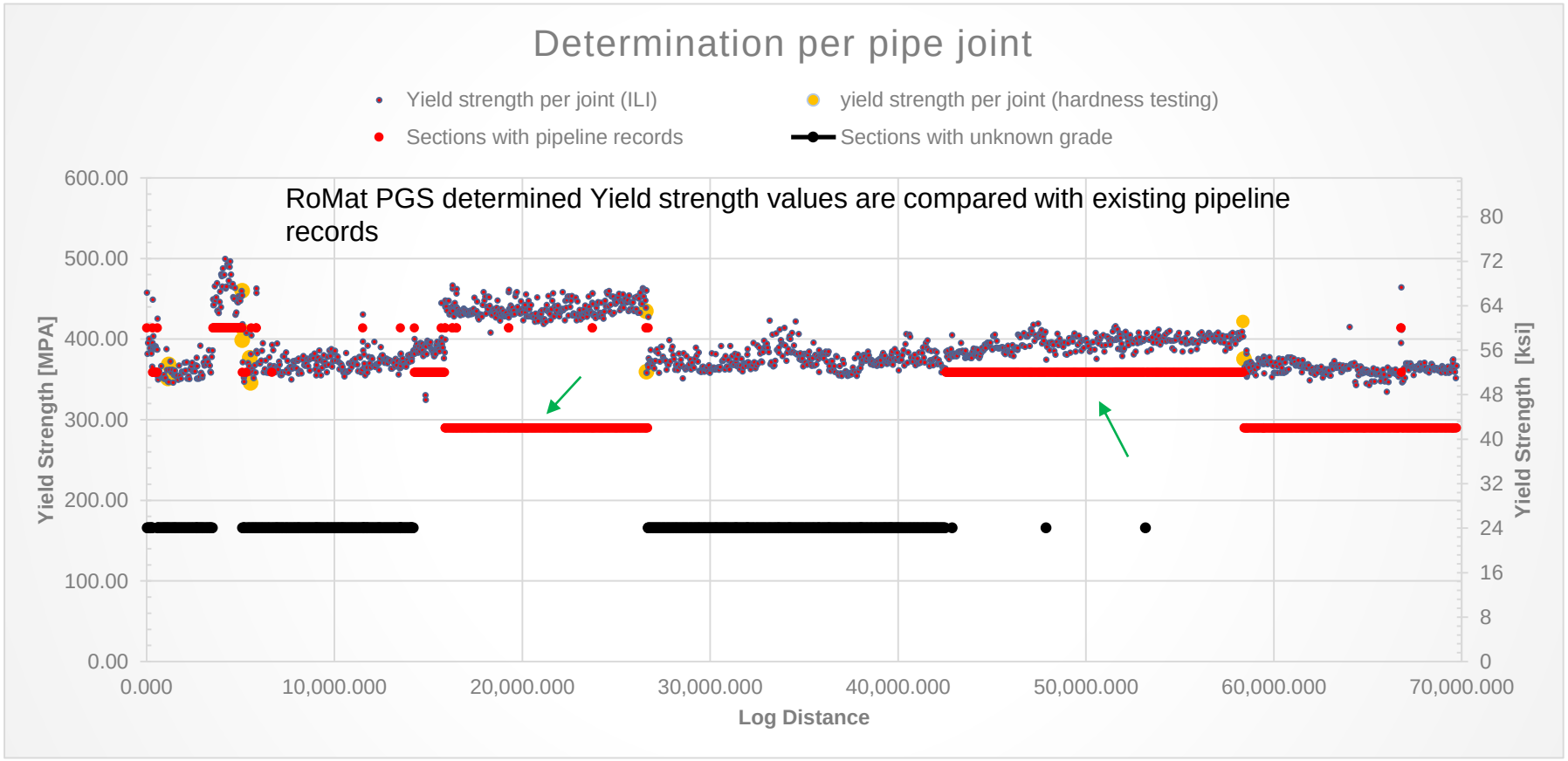
- Pressure Test
- Pressure Reduction
- ECA
- Pipe Replacement
- Alternative

CONTENT

ROMAT PGS – THE DATA EVALUATION PROCESS



ROMAT PGS – THE DATA EVALUATION PROCESS



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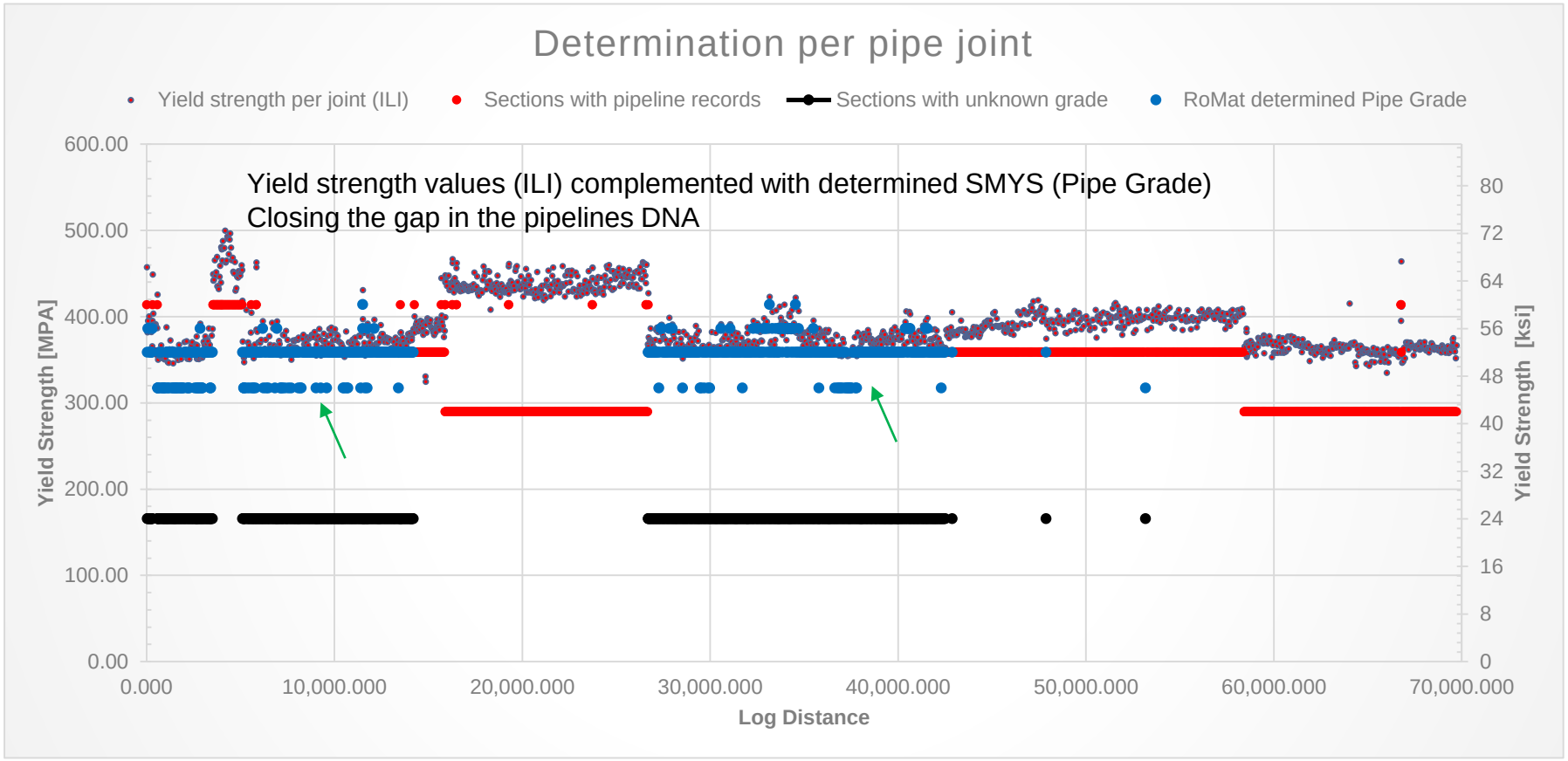
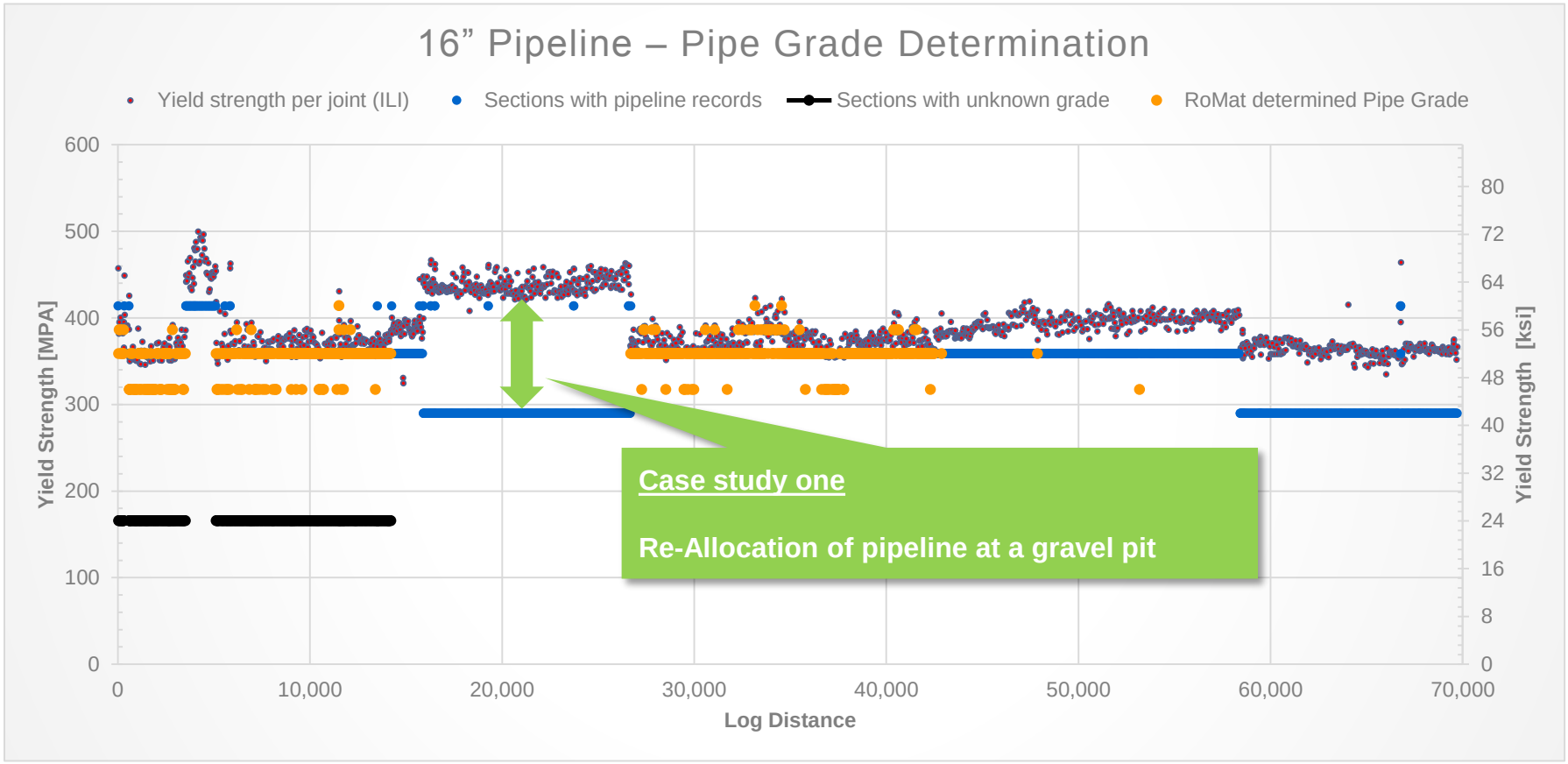


CASE STUDIES – PIPE GRADE RESULTS



CASE STUDY ONE

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Re-Allocation of pipe line at a gravel pit

Ordered pipe:	X 42; API 5 L		
Delivered pipe:	X42/ X52; API 5L		
	Requirement for yield strength		
	X 42	Min./Max. Yield	42 ksi/72ksi
	X 52	Min./Max. Yield	52 ksi/77ksi
Investigation on mill certs:		yield strength between	58 ksi and 62 ksi
Tool measurements:		yield strength between	60 ksi and 63 ksi
Inspection System Result Verification insitu:		verification joint	= 63.02 ksi

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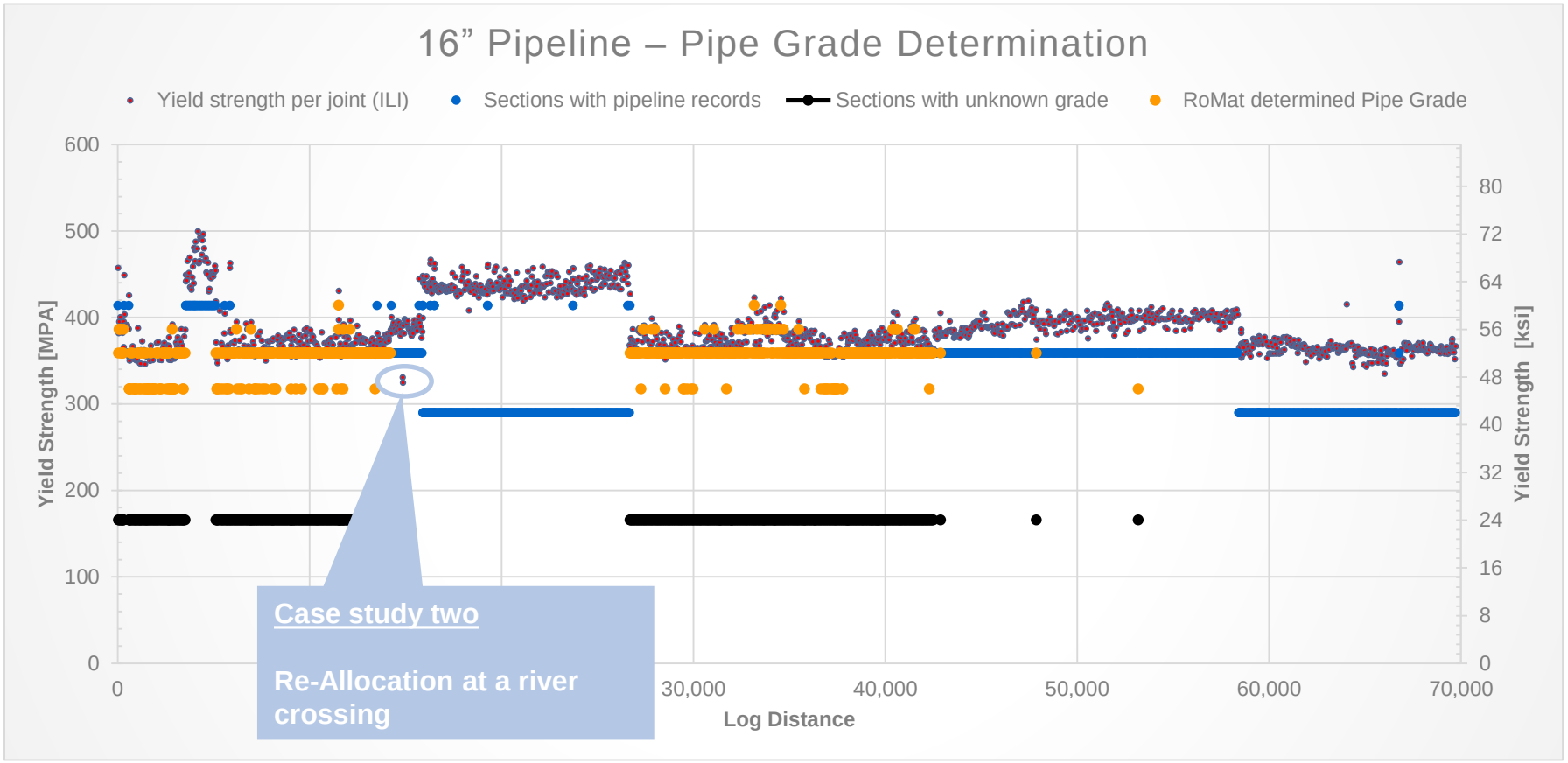

CASE STUDY TWO

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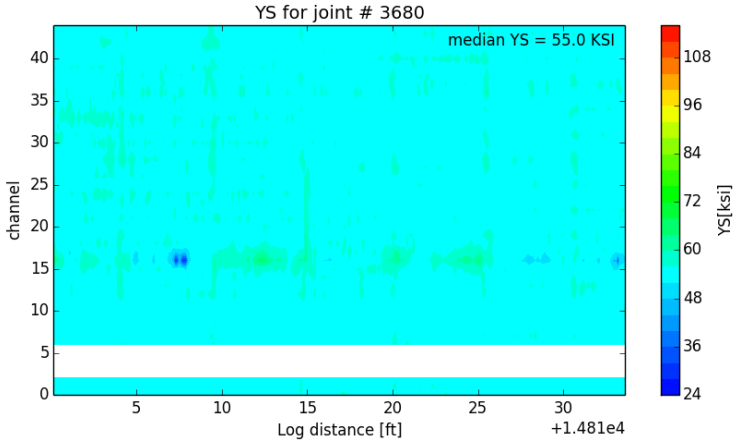
Re-Allocation of pipe line at a river crossing

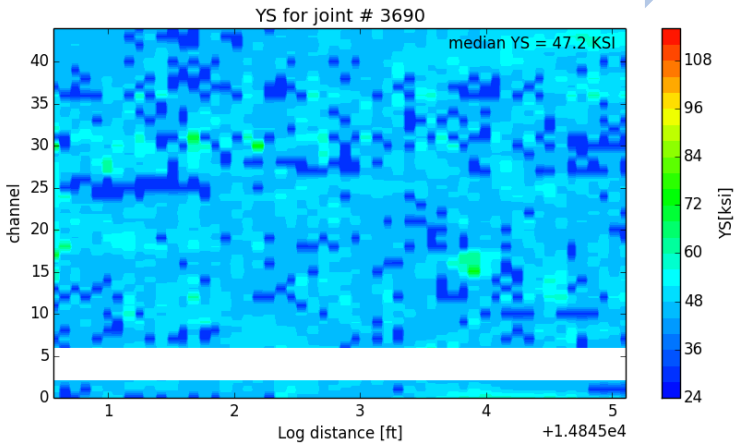
Ordered pipe:	X 52; API 5 L	
Delivered pipe:	X 52; API 5L	
	Requirement for yield strength	
	X 52 = Min./Max. Yield	52 ksi/77ksi

Tool measurements:	Section:	55 ksi until 58 ksi
	Outlier 1	yield strength 47.94 ksi
	Outlier 2	yield strength 47.09 ksi

CASE STUDY TWO – PIPE GRADE PLOTS

Flow





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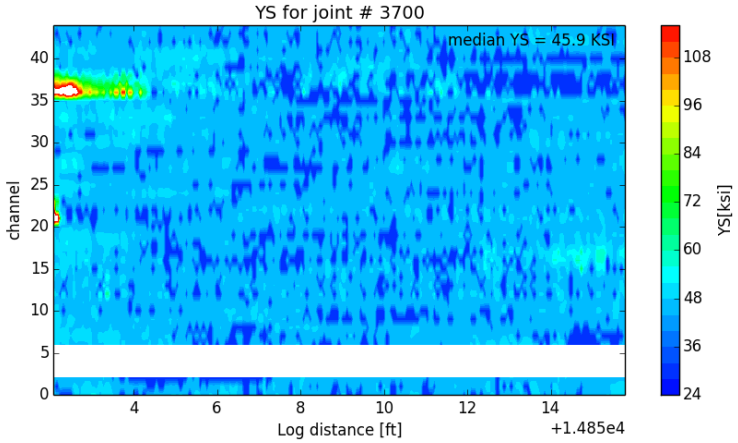

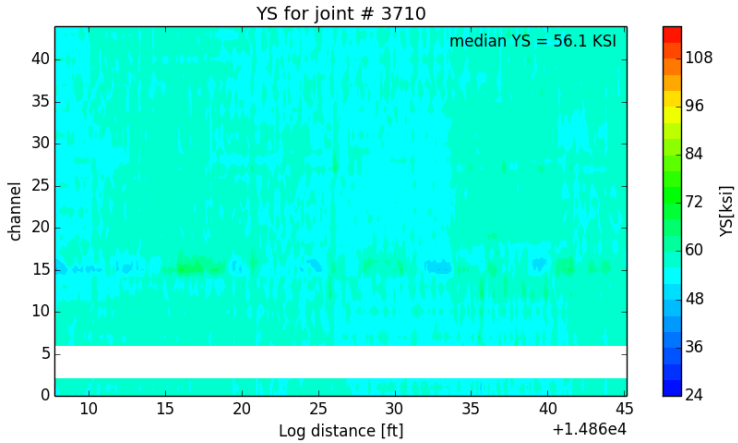

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Discrepancy was found between MAOP record and As-Built at the river crossing. As-Built indicated pups were installed but no material records were found. Joints established as X-46 per ILI.

PROCESS OF MAOP RECONFIRMATION
COMPLETION OF RECORDS

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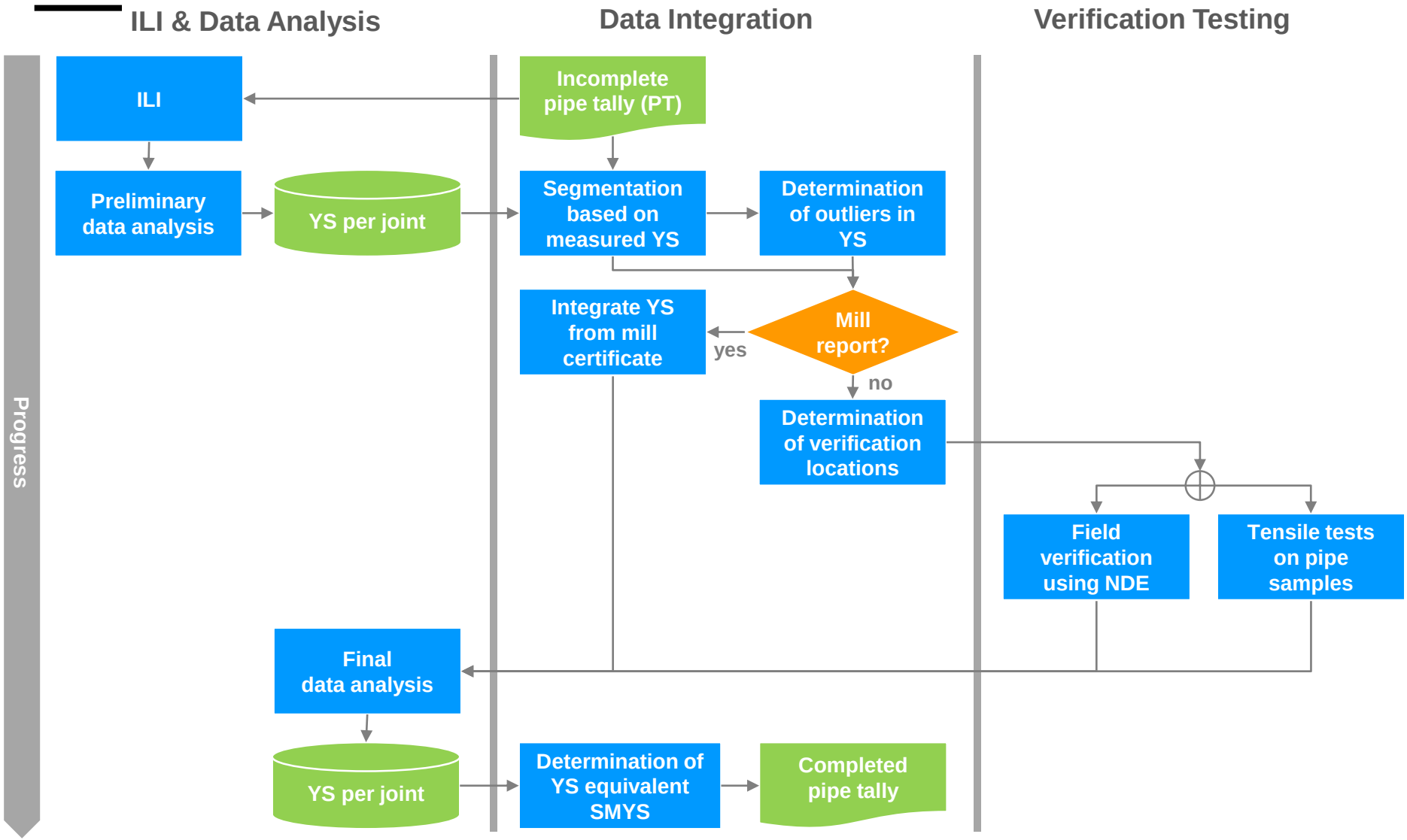

THANK YOU FOR JOINING THIS PRESENTATION.

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