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A MIDAMERICAN ENERGY HOLDINGS COMPANY

Pipeline Operator Perspective on Risk Assessments

Improving Pipeline Risk Assessments and Recordkeeping
PHMSA Workshop
July 21, 2011

Presented by:
Von McAllister, Manager, Pipeline Safety

System Overview

- Kern River is a 1,380-mile interstate natural gas transmission system
- Extends from southwest Wyoming through Utah and Nevada to Bakersfield, Calif.
- In operation since 1992
- Current design capacity of 1.9 billion cubic feet per day
- Owned by MidAmerican Energy Holdings Company – Berkshire Hathaway

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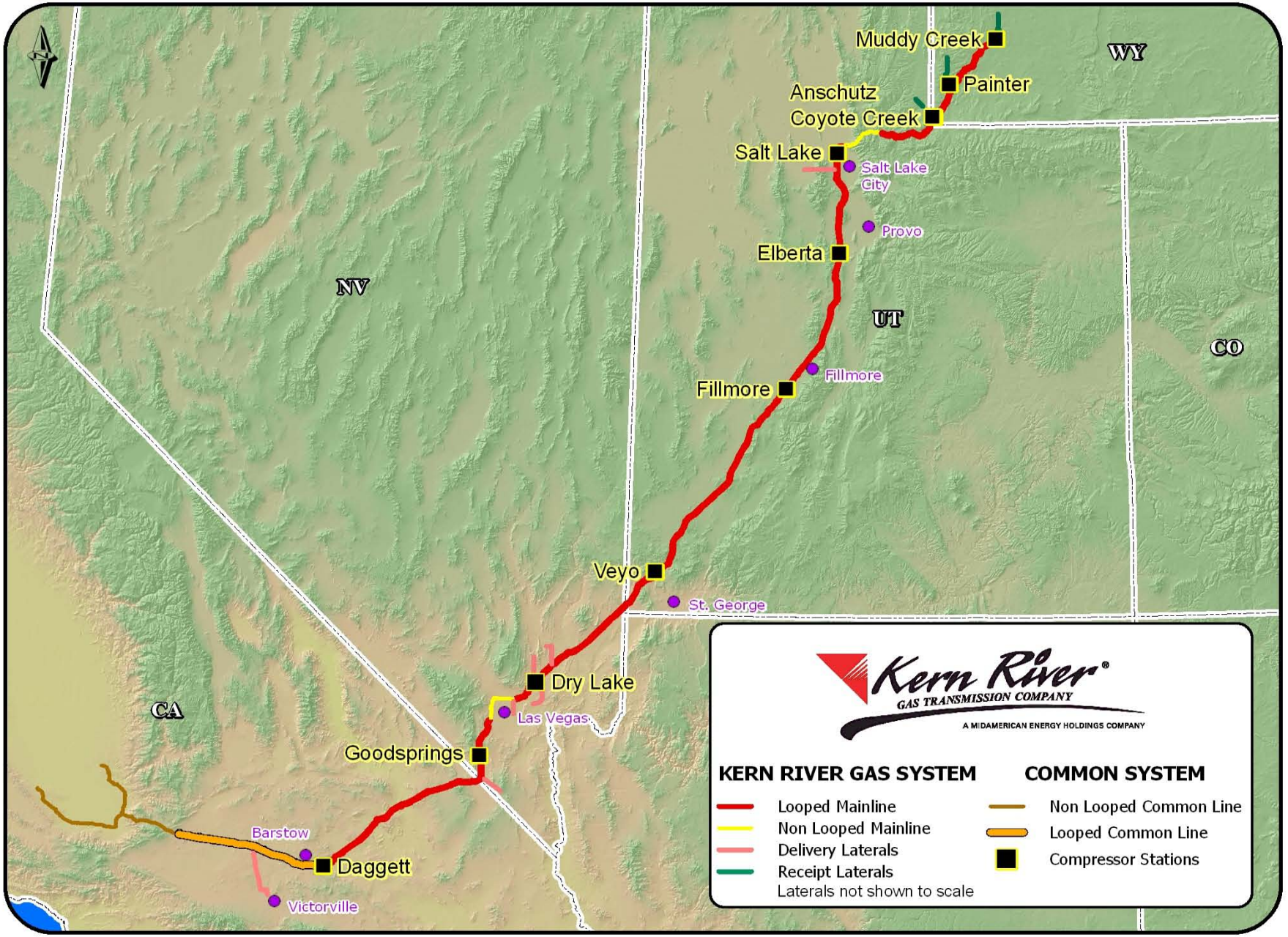
Muddy Creek
Painter
Anschutz
Coyote Creek
Salt Lake
Salt Lake City
Provo
Elberta
Fillmore
Fillmore
Veyo
St. George
Dry Lake
Las Vegas
Goodsprings
Barstow
Daggett
Victorville
WY
NV
UT
CO
CA
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KERN RIVER GAS SYSTEM
Looped Mainline
Non Looped Mainline
Delivery Laterals
Receipt Laterals
Laterals not shown to scale
COMMON SYSTEM
Non Looped Common Line
Looped Common Line
Compressor Stations

2010 Expansion Summary

- 145 MMcf/d forward-haul expansion
  - Compression addition at Muddy Creek
  - Compression restages at Painter
  - Meter station expansions at Opal and Kramer Junction
  - Implemented MAOP special permit to operate at 80% design factor. MAOP increased from 1,200 psig to 1,333 psig.
- Placed into service April 2010

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Apex Expansion Summary

- 266 MMcf/d expansion
  - Compression additions at Coyote Creek, Elberta and Dry Lake – 48,000 horsepower
  - Grass-roots compressor station near Milford, Utah – 30,000 horsepower
  - Compression restages at Coyote Creek, Elberta and Dry Lake
  - Compressor replacement at Fillmore
  - Wasatch Loop closure – 28 miles
- In-service November 2011

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Purpose of Risk Assessment

- Prioritize baseline assessment
- Identify potential problem areas
- Design preventive and mitigative measures
- Justify preventive and mitigative measures

Data Integration

- Geographical information system
- Pipeline open data system database
- Relative risk model
- Integrity alignment sheet generator

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Important Data

- Pipeline attributes
- Topography
- Encroachments
- Structures
- In-line inspection
- Close interval survey
- Coating survey
- Depth of cover
- Pipe examinations

Annual Process

- Update structures
- Identify threats
- Run risk analysis
- Quality-check results
- Evaluate preventive and mitigative measures – “what if” scenarios

KRGT Risk Assessment History

- 2005 – moved to new risk model
- 2005 – data quality check performed
- 2006 – revised process to use only population consequences for high consequence area ranking
- 2007-08 – realign and re-station data
- 2008 – algorithm to differentiate HCAs by population density and proximity

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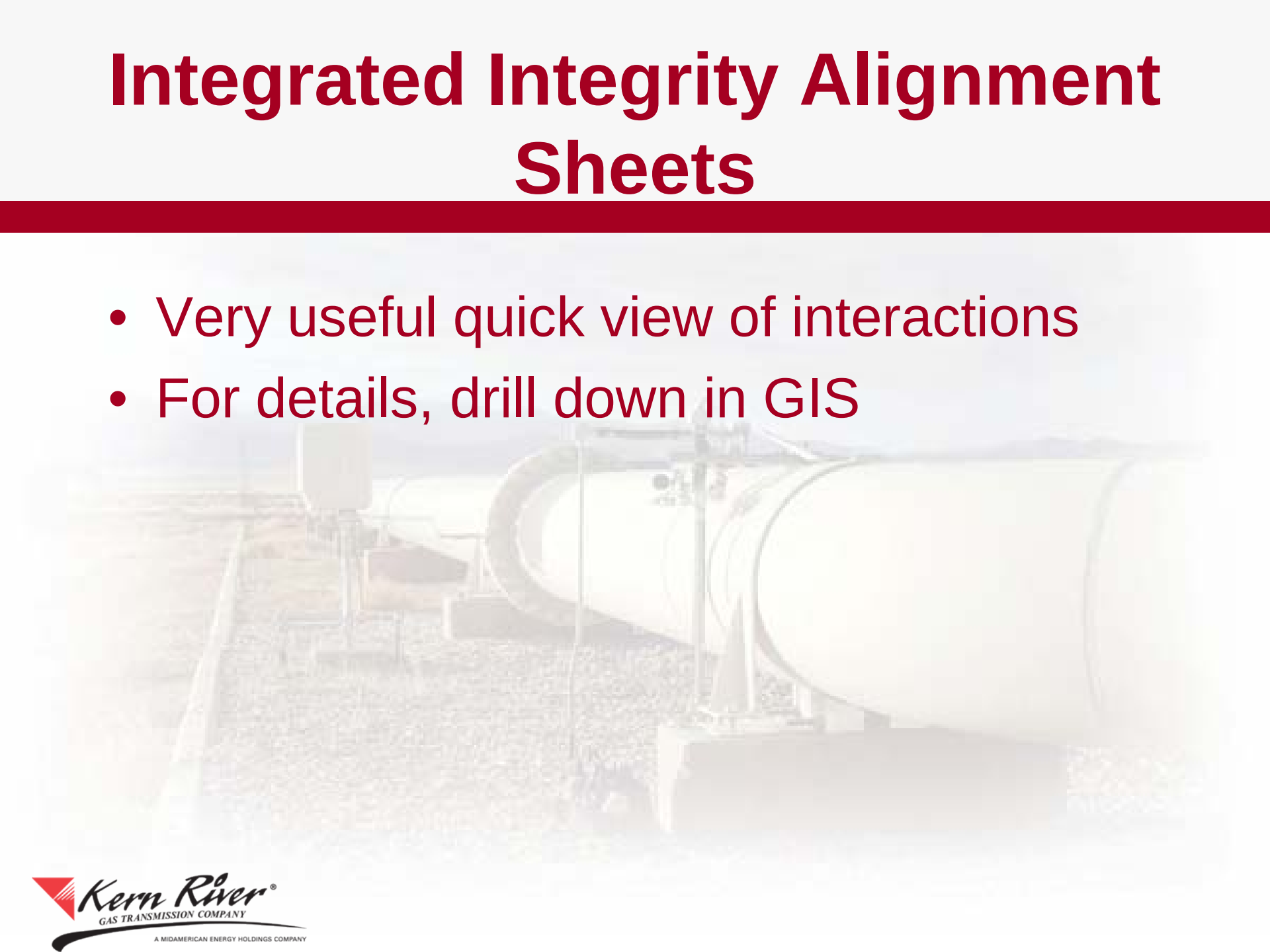
KRGT Risk Assessment History (cont.)

- 2009 – moved to new, customizable risk modeler
- 2009 – developed integrated integrity alignment sheets
- 2010 – added ILI, CP and other integrity data and substantially improved algorithm
- 2011 – “pre-processing” to handle large data sets

Integrated Integrity Alignment Sheets

- Very useful quick view of interactions
- For details, drill down in GIS



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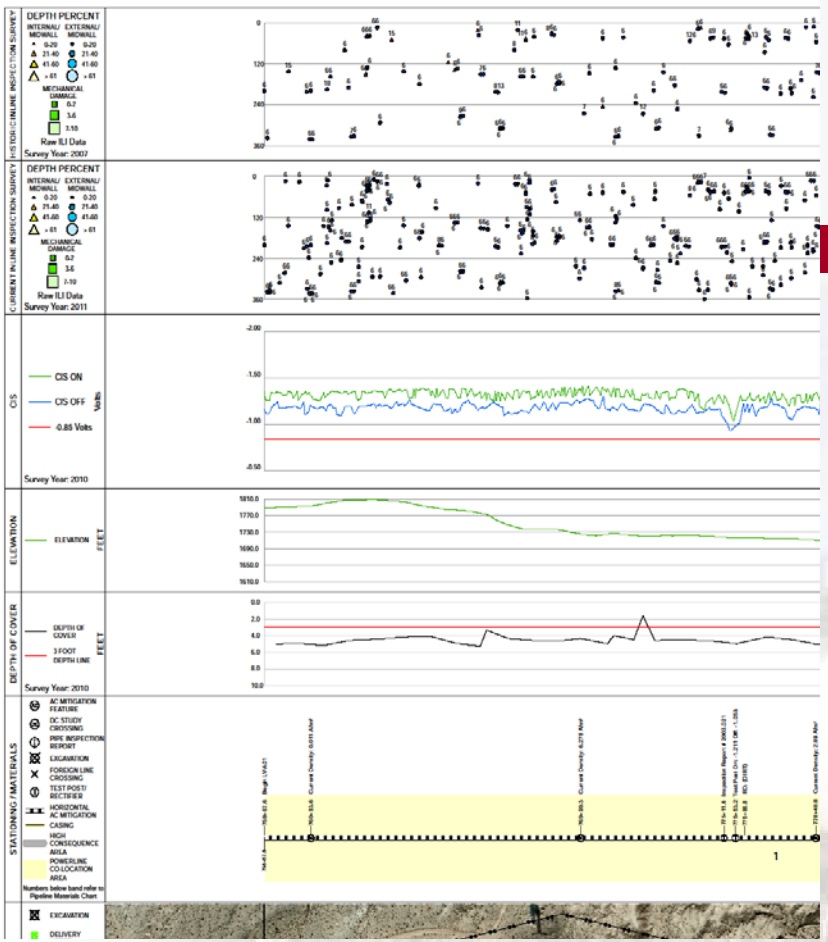

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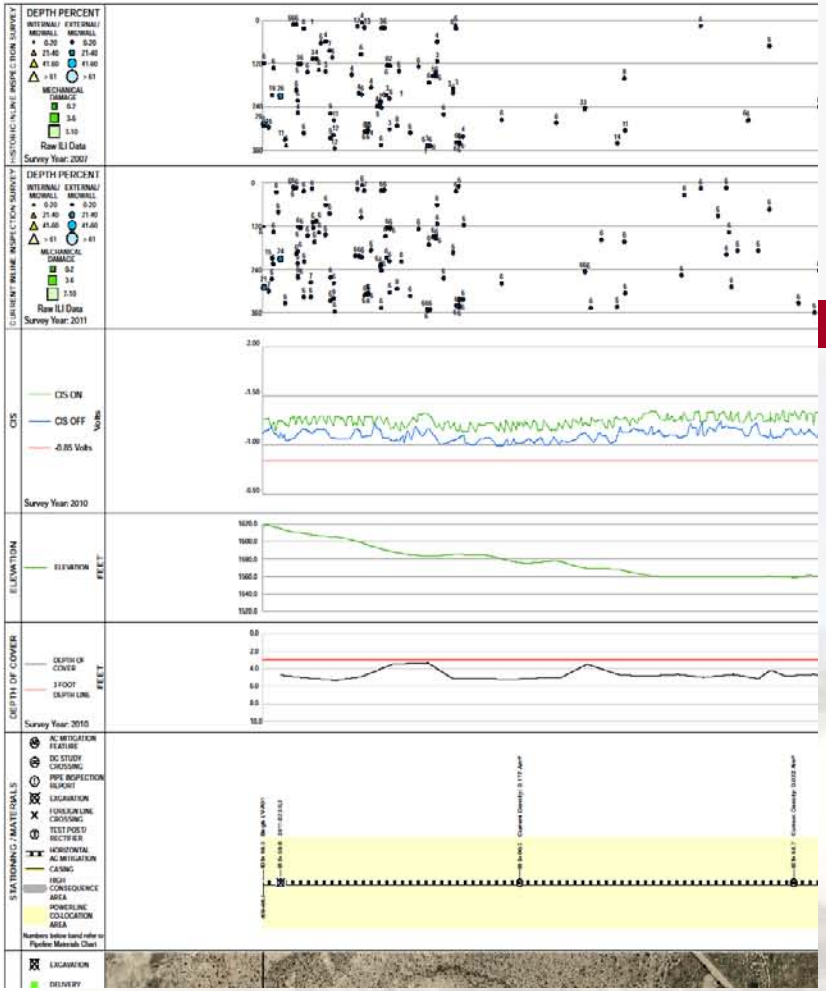

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Continuous Improvement

- Linear referencing
- Alignment and positioning
- Data – quality and new types
- Database
- Algorithms – detailed and quantitative
- Credit for mitigation performed
- Viewing
- New threats