

# **PHMSA Pipeline R&D Forum**

## **Track Session 4: Defect Detection / Characterization**

**Garrett Wilkie, Pipeline Integrity Manager  
BJ Pipeline Inspection Services**

**February 7-8, 2007  
Doubletree Hotel – New Orleans**

# ILI Service Providers Viewpoint on Detection & Characterization

- ◆ **What is Defect Detection and Characterization?**
  - The ability to identify an anomaly as a feature that is not normal and then the ability to provide additional detail regarding the qualities or peculiarities of this feature.
- ◆ **ILI Capabilities**
  - Technology and application, they are specific to your pipeline (UT tools in thin wall liquid lines with internal corrosion and a lot of dents, what are you missing?)
- ◆ **Field Excavation**
  - Are you in the right place? If nothing is found you need to ask why. ILI tools do not make things up, if there is a signature in the data there is an accompanying feature or explanation in the field.



# Accuracy and Reliability of ILI

- ◆ **Detection**
  - Entire data set collection versus data threshold limits
- ◆ **Discrimination**
  - Metal loss versus Mill / Manufacturing Defect
  - Long seam crack versus edge of an ERW or Flash Weld
- ◆ **Sizing**
  - There are sizing errors. Some defects are more difficult to size than others, this translates to larger sizing errors.
- ◆ **R&D to improve these items. New technology development and improvements to existing technologies.**



# Accuracy of Severity Assessment

- ◆ Various FFS methods
- ◆ Can MFL use Effective Area Calculations?
  - Conservative in how it is conducted, deepest point to deepest point does not simulate a true failure path.
- ◆ Depth Trending
  - Know your tool errors as well as the field errors.
  - Individual defect tolerances.
- ◆ RPR Trending
  - Length assessments play a factor, therefore FFS effective lengths can help normalize.

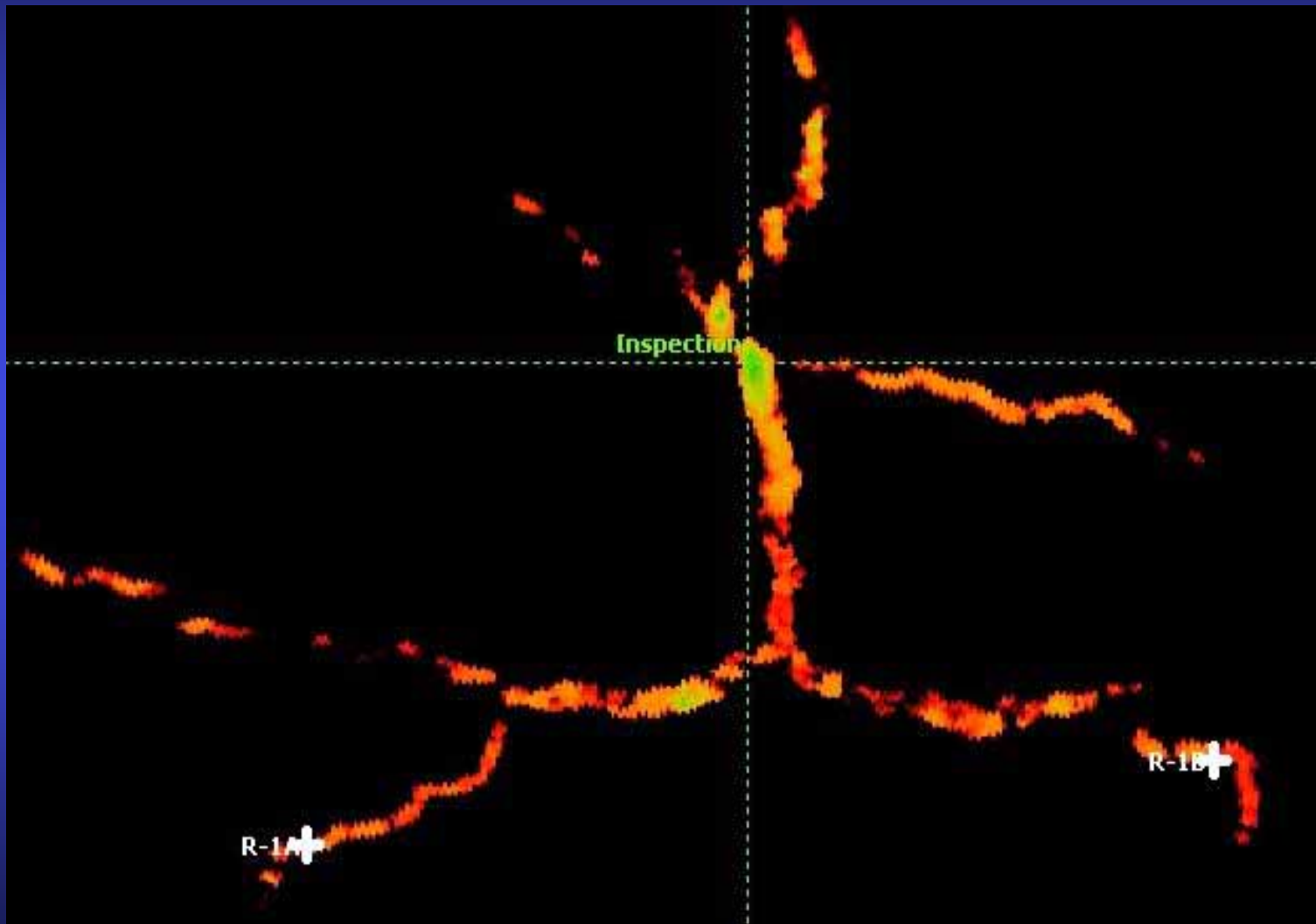


# Fitness for Services Calculations

- ◆ R&D Activities and Improvements required for FFS equations:
  - Combined Damage
  - SCC
- ◆ Tool Tolerances
  - There is a great deal of pressure to include tool sizing tolerances into defect mitigation. This depends on your IMP, what about pipe mill wall thickness tolerances and FFS equation conservatisms. Lets remember that there are many conservatisms throughout the process so keep things in perspective.

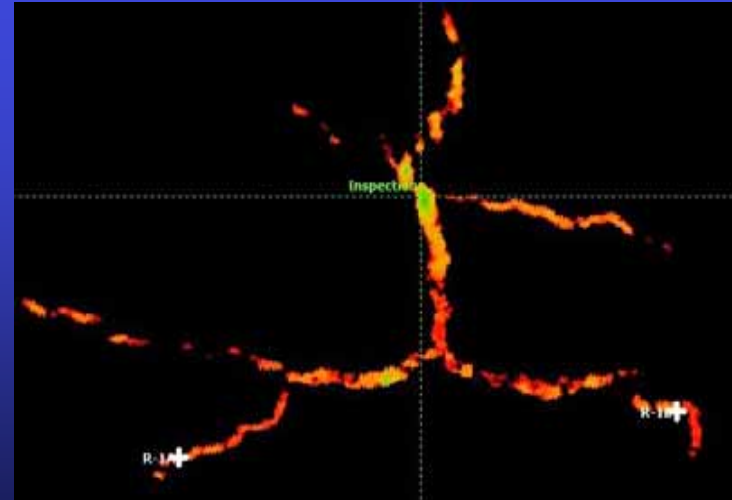
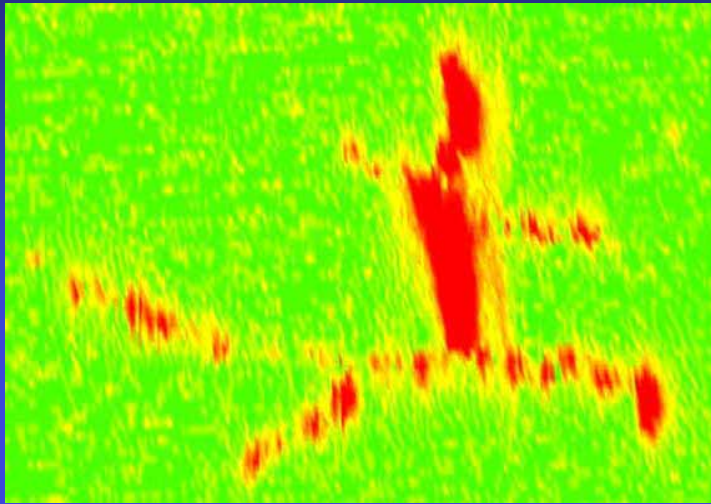


# “Running Man” – MFL Data



BJ Pipeline  
Inspection Services

# “Running Man” Corrosion



BJ Pipeline  
Inspection Services



# “Unpiggable” Pipelines

- ◆ **ILI for Solutions for “Unpiggable”**
  - Continue to develop technologies to navigate these pipelines. Tool design is always a balancing act, the more compliance you need to give a tool the more technical capabilities you have to give up. This is the continual challenge.
- ◆ **Direct Assessment**
  - The term is relatively new, but the concept has been around for as long as pipelines have been utilized.
  - The most comprehensive IMP utilizes both ILI and DA techniques.

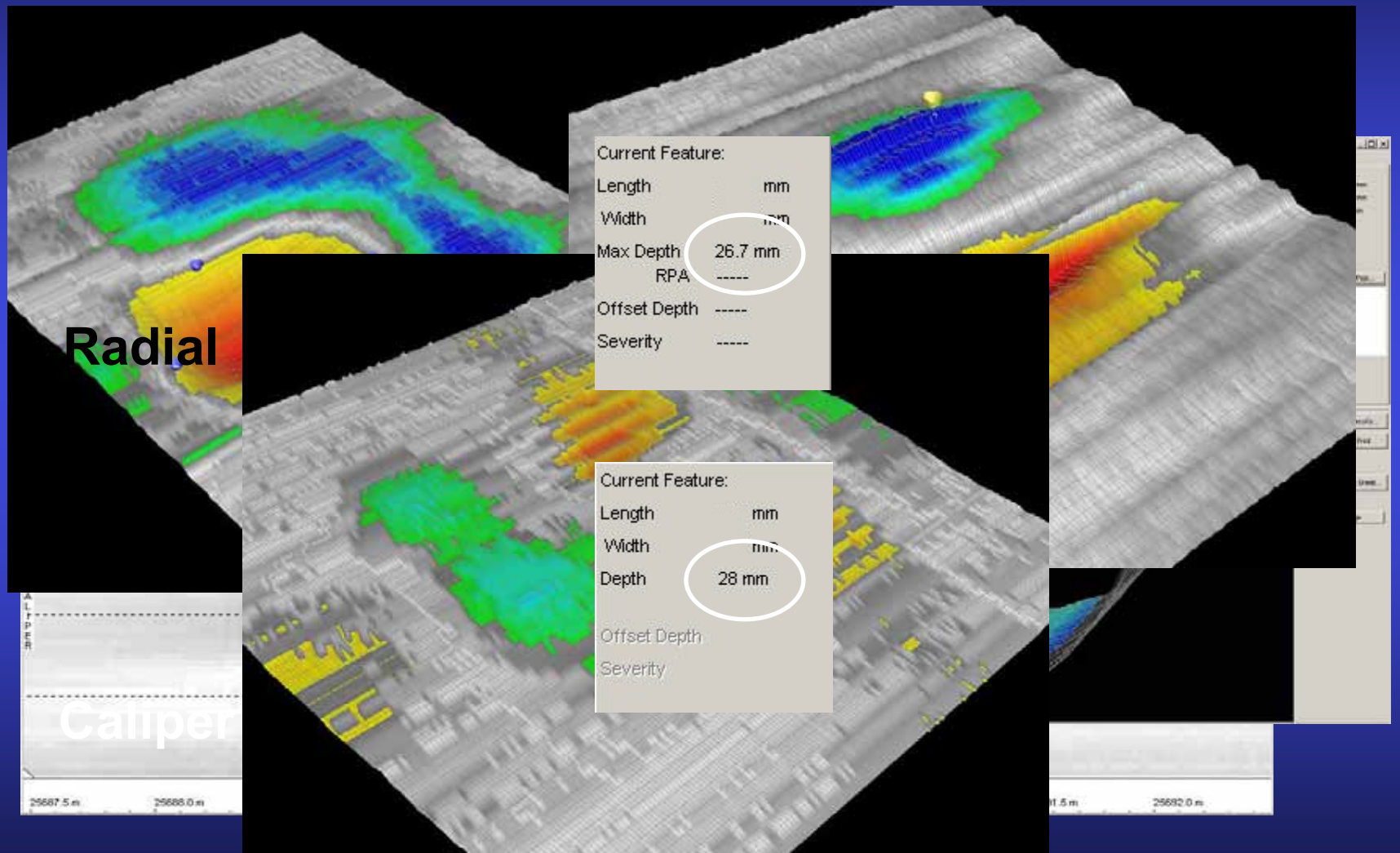


# ILI R&D Activities

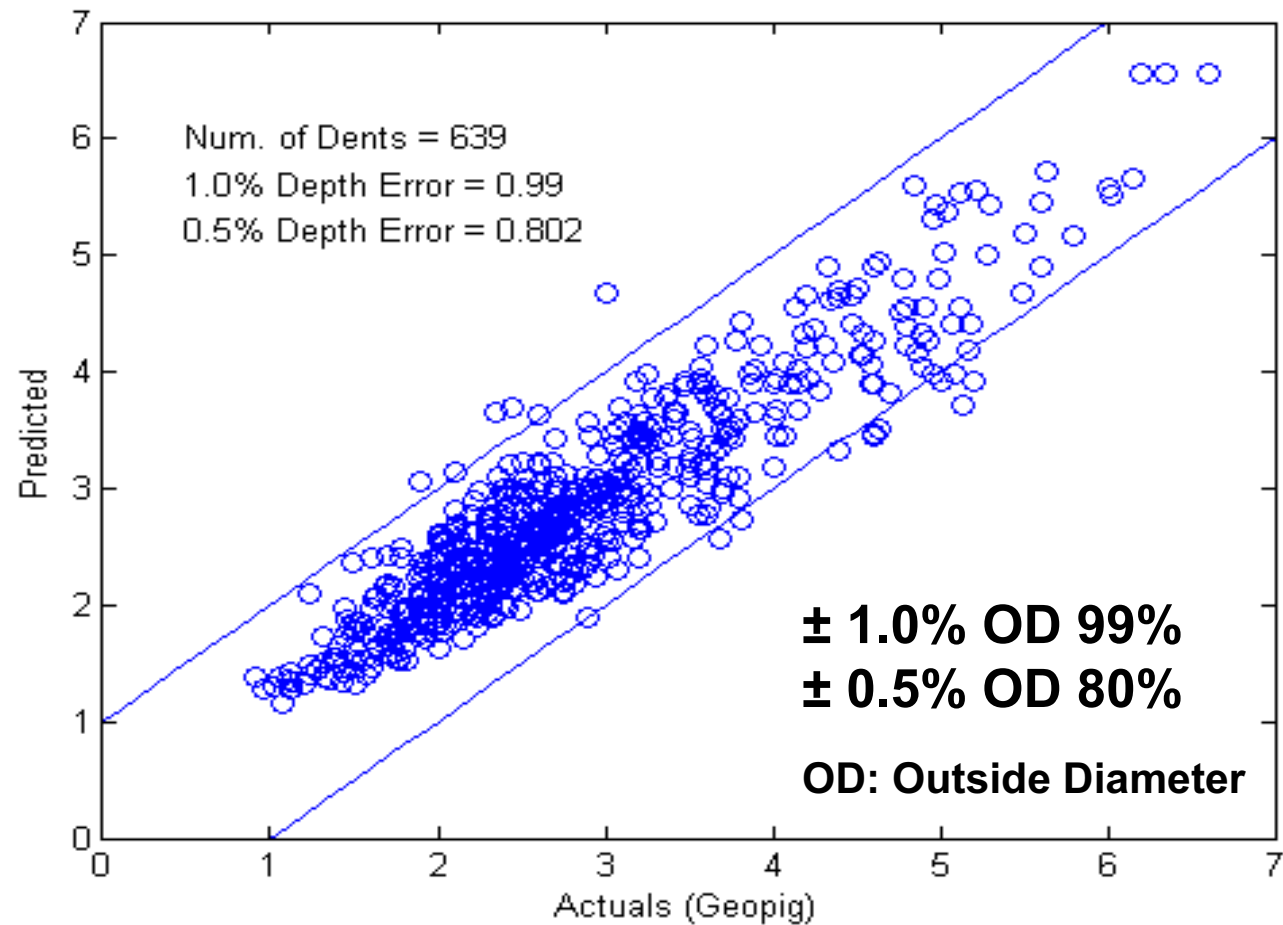
- ◆ **Mechanical Damage**
  - Capabilities of Existing Technologies
  - New Application of Technology – Dual Field Tool
- ◆ **SCC tools for Gas Lines**
- ◆ **Existing Technology Continual Improvements:**
  - Analysis Software, Analysis Techniques
  - Memory, Battery, Electronics (Data Acquisition)
- ◆ **Individual Service Provider as well as industry participation.**



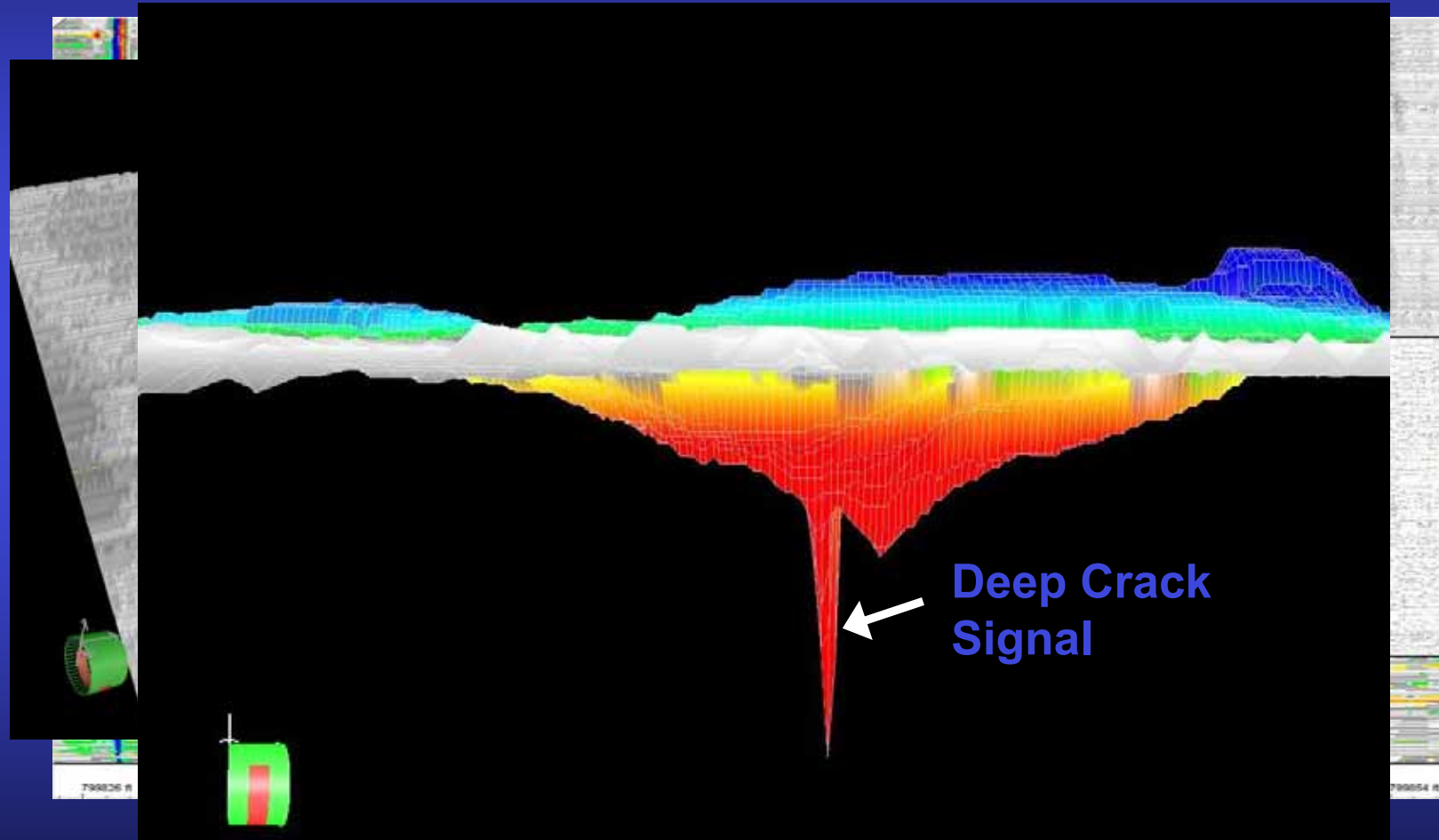
# MFL Dent Sizing



# MFL Dent Sizing Accuracy

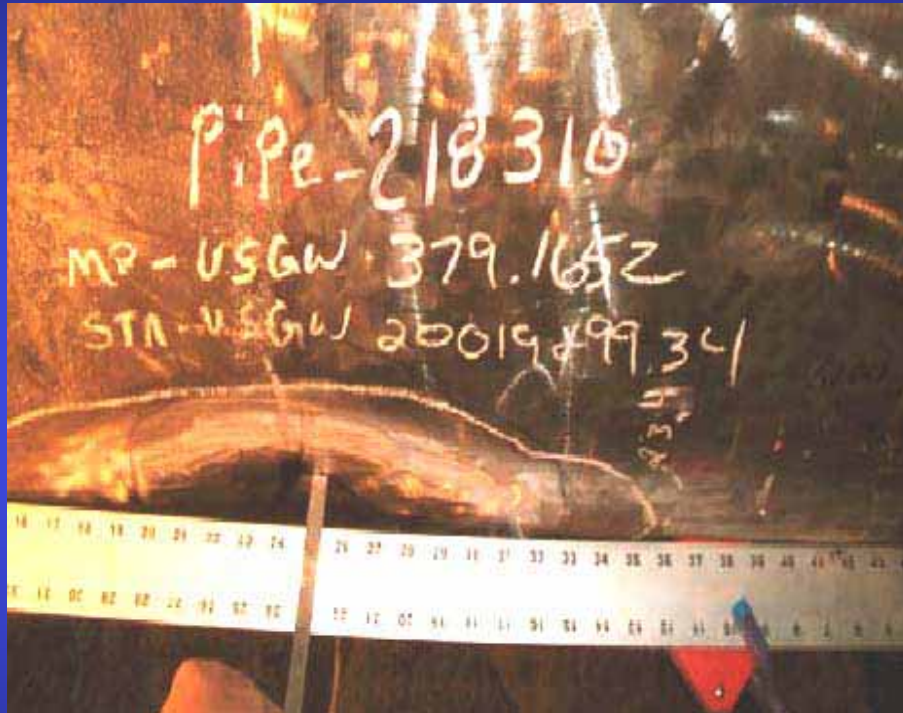


# Benefits of MFL Dent Analysis

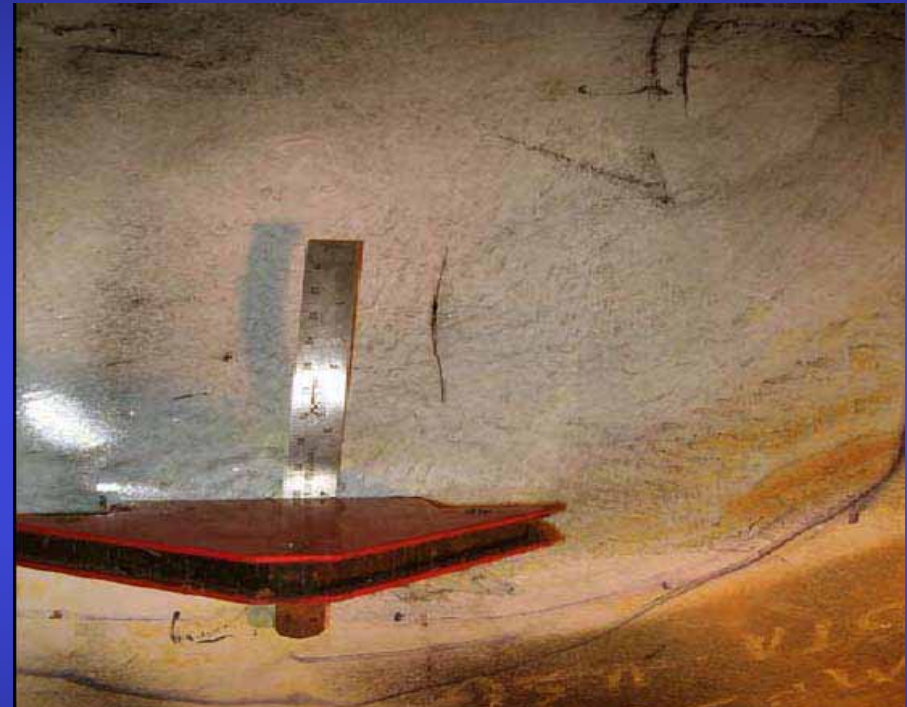


BJ Pipeline  
Inspection Services

# Circumferential Crack Inside Dent



**3.7% OD Dent**



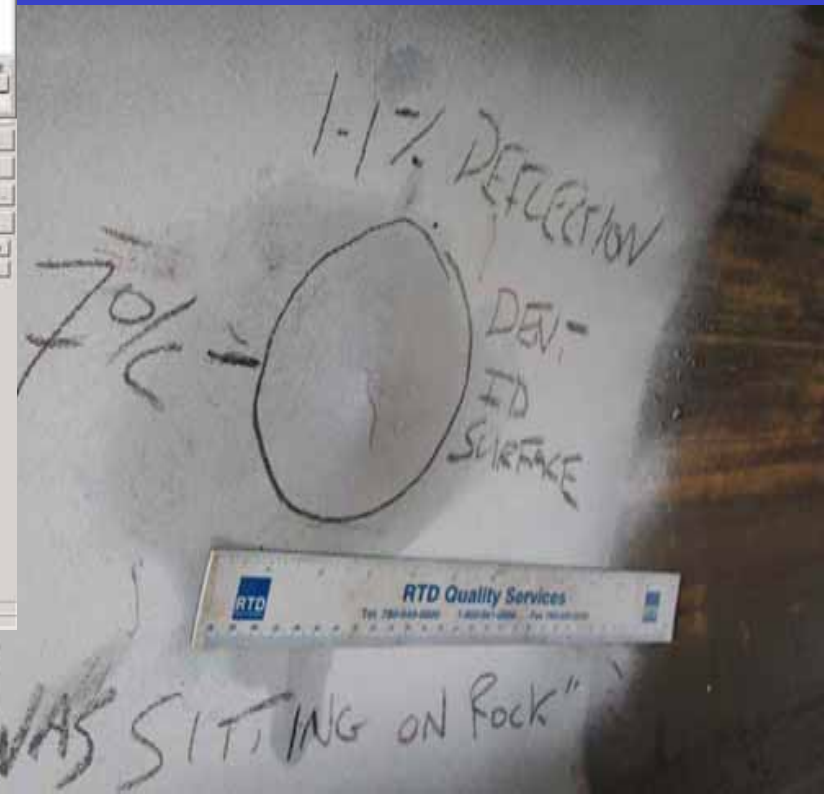
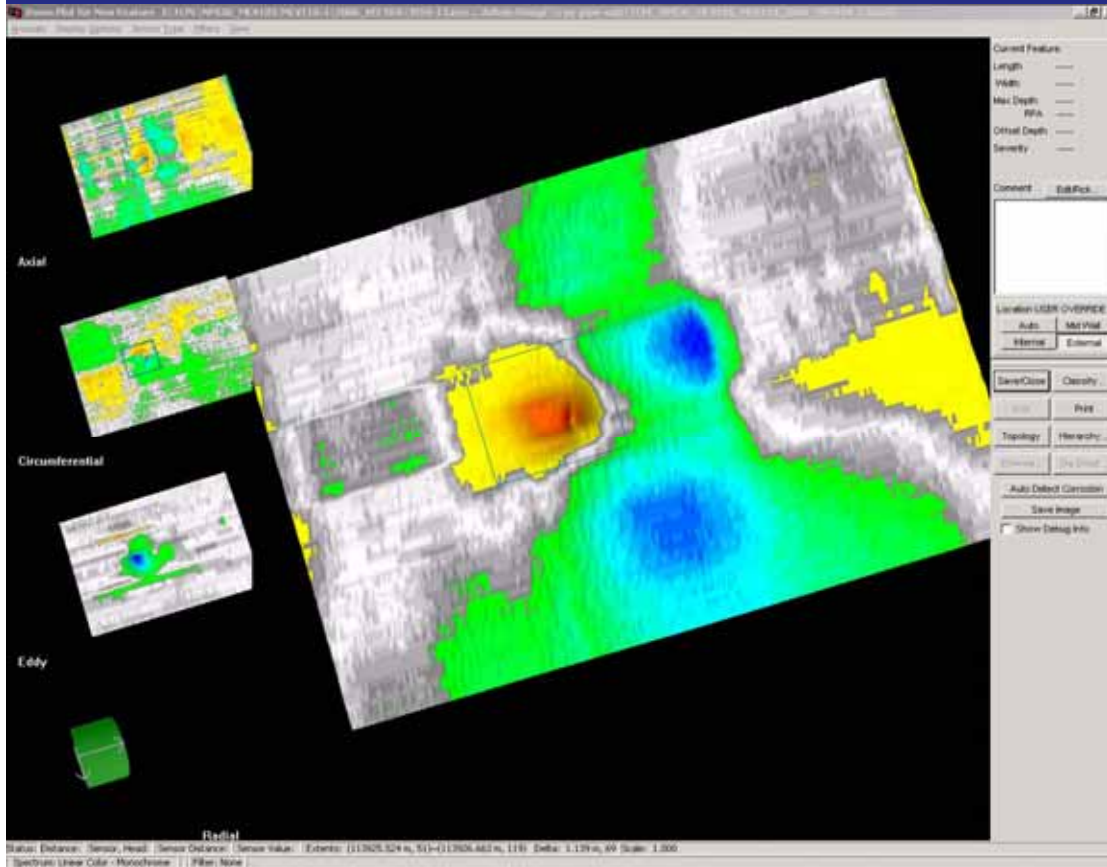
**Through Wall Circumferential Crack**



BJ Pipeline  
Inspection Services



# Crack in a Dent



BJ Pipeline  
Inspection Services

# Field Considerations with ILI data

- ◆ **Safe Working Pressures**
  - What do you know about the defect
  - Are there adequate FFS equations to assess the defect?
- ◆ **Excavation Planning**
- ◆ **Urgency of Response**
- ◆ **HCA considerations**
  - Dents, yes they are an issue but more information is required about them and how to analyze them. There currently are a large number of dents that are being excavated that are not an integrity threat is this the best way for industry to be spending its money?





# Conclusion

- ◆ **ILI Service Providers are very active in completing their own R&D initiatives as well as participating in industry forums (i.e PRCI)**
- ◆ **FFS equations need to be developed for more complex features (i.e. Combined Damage)**
- ◆ **Along with R&D activities are we utilizing current technology capabilities to their full extent?**

