*Interstate Natural Gas Association of America*

# Improving Pipeline Risk Assessments and Recordkeeping

Panel 4: Identifying Interactive Threats and Understanding Options

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# Risk Assessment

- Risk assessments are the foundation of an integrity management program

- Goals of assessing risks
  - Identify the most significant risks
  - To organize data and information to help prioritize and plan activities
  - Determine effective and prioritized prevention, detection, and mitigation plans for how and when to address the risks

- Assessing risks to pipeline integrity is a continuous process

# Threat Interactions - Background

- Threat interactions are not new.  They have been present on pipelines since the beginning.
- Many safety factors are added to pipeline design, construction and operations through company practices, standards, and regulations
- Most threat interactions are not recognized until they exceed these existing safety factors
- Historically, we have tried to classify incidents under a particular primary cause, even though there were factors present from other threats
- Efforts now are focused upon trying to clarify when these conditions exist and focus upon the interactions which have the potential of raising the overall risk profile beyond these existing safety factors to achieve the goal of zero incidents

# Threat Interactions - Clarifications

- There is significant confusion in the industry on the subject of threat interactions. Part of this is caused by lack of definition and clarity on the terminology being used:
  - Interacting Defects
    - Two or more defects in the pipe existing at the same location in a way that they reduce the strength of the pipe more than if considered individually
    - We have a very good understanding of how defects interact and most operators have incorporated this into their standard practices and evaluations
  - Interacting Threats
    - Multiple failure mechanisms acting upon the pipe such that the total threat is greater than the sum of the individual threats
    - This has been accounted for in many operators risk programs, but is not as well understood or consistently applied as defect interactions
  - Interacting Conditions
    - The inter-relationship of defects, threats, and the environment that the pipeline is installed and operating
    - This is the most complex and least understood of the three potential interactions

# Threat Interactions

- There is little guidance concerning threat interactions in the Standards, Regulations, FAQs, or Industry Documents
  - "The interactive nature of threats (i.e., more than one threat occurring on a section of pipeline at the same time) shall also be considered."
  - 192.917; ADB 11-01
  - FAQ-219: "An operator is expected to conduct its threat identification analysis in sufficient detail to identify if other interacting threats could adversely affect the stability of residual manufacturing and construction defects, as required by ASME B31.8S, Section 2.2, and establish its assessment plans accordingly."
  - Topical research projects have identified and discussed possible threat interactions, but only in context of the specific issue being addressed (Mechanical Damage, Manufacturing & Construction, etc.). This has led to a much better understanding of defect and some threat interactions.
- Focus has been on addressing the 20+ individual threats identified in ASME B31.8S Section 2.2
- There is currently no single body of literature or research which provides operators or regulators guidance on threat interactions or interacting conditions

# Threat Interactions

- This lack of guidance and terminology has led to ambiguity and inconsistent approaches to risk assessment of potential threat interactions
  - What threats (failure mechanisms/weaknesses) and conditions should be considered to interact?
  - How should interacting threats and conditions be incorporated into risk assessments?
  - What is the likelihood and consequence of specific threat interactions to occur on a pipeline segment?
  - What is the magnitude of increased risk due to threat interactions?
  - Do the existing interactions (threat and conditions) result in a condition which exceeds the strength of the pipe including safety factors?

# Threat Interactions – Next Steps

- IMCI Task Group formed to review Risk Management
  - Achieve a better understanding of threat interactions
    - Review of historical industry incident data and research literature
    - Compile the findings and summarize the current state related to threat interactions
    - Update of ASME B31.8S to provide more specific guidance on potential threat interactions that should be considered
  - Improve risk assessment modeling techniques to better evaluate potential threat interactions
    - Movement toward more data-intensive risk assessments incorporating improved and updated information about the condition of the pipeline system or segment
    - Provide opportunities for engaging stakeholders and sharing of “best-in-class” modeling techniques for threat interactions

# Threat Interactions – Next Steps

- Incorporation into individual Integrity Management Programs
  - Identify the impacts of threat and condition interactions on decision-making
    - What is the magnitude of the interaction
    - How does it impact the overall risk profile of the system or segment
    - Determine if the combination of failure mechanisms or potential weaknesses exceeds the individual threat mitigation systems being utilized or if additional actions are required
  - Focus on the risks to the pipeline system that are most likely to impact public safety

# Challenges

- Interacting threats and conditions are the most immature of the issues in risk assessment and can be very complex

- Ensuring that individual failure mechanism evaluations are not diluted in the risk assessment process through the incorporation of interactive evaluations

- Research is needed to better understand these issues and improve the knowledge of the risks to the pipeline and incorporating these findings into integrity management programs

# Summary

- Interacting threats are not new and are being accounted for and addressed.
- There are opportunities for improvement through research and updating Standards
- Interacting threats and conditions become an issue when the total stresses on the pipe exceed the strength of the pipe
- Our goal is zero incidents. Better understanding of the threats and conditions that exist on the pipeline and how they are inter-related is a key element in our work toward this goal.

***Thank You!***