UMN Distribution Piping Assessment Utilizing Advanced Guided Wave Technology
• University of Minnesota Twin Cities Campus
  ◦ 392 acres with 22 million ft\(^2\) building floor space
Steam Distribution – 11 miles of distribution system piping

- Minneapolis Campus
  - ~10% Buried Piping
- St. Paul Campus
  - ~20% Buried Piping

Problem – How to determine remaining pipe life for the buried piping?
- Cost per 100 ft of buried piping replacement
  - ~$100k
- Cost to find and repair a buried pipe leak - ~$35k to $50k
Potential Solutions

- **Excavate and inspect**
  - High cost
  - Positive/Actionable results

- **Thermal Imaging**
  - Good once a leak has developed, but doesn’t provide a material condition assessment of the piping.

- **Use inspection pig (similar to oil/gas pipe line inspection technique)**
  - Problems dealing with expansion loops and smaller pipe diameters
  - Need to construct entrance/exit stations

- **Use Ultrasonic NDE techniques**
  - Most promising and potentially cost effective approach
Structural Integrity Associates – Guided Wave NDE Technology

- Use a collar containing several ultrasonic devices to send a signal down the pipe to find discontinuities within the detector range.
What is Needed to be Effective?

- **Good documentation** of buried piping ‘As-Built’ configuration
- **Sufficient space** attach the collar
  - Nominal 12” of straight pipe with no pipe attachments immediately adjacent to the collar (e.g., pipe anchor, expansion joint, pipe elbow, etc.).
  - Clean pipe surface
- **Pipe/process temperature** <~180F
What Can Be Identified?
- The **specific location** of any pipe discontinuity
  - How far from the test collar
  - What position around the pipe
  - The significance of the indication (amount of wall loss)
- Given the pipe age when inspected and the evaluated condition, can **estimate remaining pipe life**.

What Impacts Results?
- **Each attachment**, pipe weld, degraded portion reduces the length of piping that can be inspected from a single point.
  - Best case – upwards of 350 ft of pipe can be inspected.
- Requires a **trained technician** to take and evaluate the data.
Additional Comments and Questions

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