



# Preventing Mechanical Damage

---

How do pipeline operators prevent mechanical damage to their systems?



# Who damages pipelines?

---

- Homeowners
- Excavators
- Contractors working for Private or Government entities
- Agriculture
- Other underground operators



## How is damage occurring?

---

- Failing to contact pipeline operator to learn of location of pipeline
- Changing the scope, type, location or method of excavation conducted
- Excavating without having a representative present
- Failing to pass on vital information to machinery operator



# Preventing Mechanical Damage

---

How do pipeline operators prevent mechanical damage to their systems?

*By combining existing methods and technologies and using them in creative ways*



# Existing Methods and Technologies

---

- Public Education and Awareness Campaigns
- Mapping
- Surveillance
- One Call Systems
- Locating and Marking
- Excavation Monitoring



# Public Education and Awareness

---

- Public Education
  - Targeted mailings
  - Public Service Announcements
  - Advertising (radio, television and press)
  - Group meetings
- Pre-design and pre-construction contact and/or meetings
- Strategic relationships



# Public Education and Awareness

---

## API Recommended Practice 1162

- Baseline and Supplemental Programs
- More stakeholders
- More messages
- Various messages and frequencies
- Evaluation of effectiveness
- Continuous improvement to Programs



# Mapping

---

- National Pipeline Mapping System
- Geographic Information and Positioning Systems
- Satellite and Digital Orthographic Imagery
- Video Mapping System
- Alignment Sheets





# Surveillance Methods

---

- Visual Surveillance
  - Satellite
  - Aerial
  - Ground (Camera or walk-by)
- Acoustic
- Fiber Optic
- Impressed Alternating Cycle Current



# Visual Surveillance

---

- Satellite
  - Commercial satellites
  - High risk areas identified
  - Continuous monitoring required
  - Real time monitoring limited
  - Affected by weather conditions



# Visual Surveillance

---

- Aerial Patrol
  - GIS mapping overlay
  - Laser imagery with video
  - Satellite phones
  - Blue Sky
- Ground Patrol
  - Surface Video Survey
  - Walk by



# One Call Systems

---

- Grid to polygon
- Electronic applications
- Positive Response
- Automated communication with updates
  - Voice
  - E-mail
  - Fax
- Information transfer



# Locating and Marking

---

- Locating

- Magnetometer, used to detect a metallic mass or magnetic signature
- Radio Frequency, used to follow a metallic path which can carry a detectable radio signal
- Ground Penetration Radar, provides a visual image of below ground radar signal return
- Rods, used to detect facilities



# Locating and Marking

---

- Marking
  - Permanent
    - Tri-view Marking
    - Line of Sight Marking (GPS Distance and Message)
    - Curb, Soil and Pavement Marking
    - Warning Mesh
    - Maintenance
  - Temporary
    - Pre-Marking (geographic and environmental conditions)
    - Warning Fencing
    - Barriers
    - Photographs



# Excavation Monitoring

---

- API Recommend Practice 1166
  - Evaluation and determination of whether monitoring or observation is required
  - Monitoring
    - Within 25 feet of outside wall of pipeline
    - Conduct site visits on pre-determined frequency
  - Observation
    - Is less than or has potential to be less than 5 feet radially from outside wall of pipeline
    - Daily observation and reporting



# Enforcement

---

- State One Call Laws
  - Criminal
  - Civil
- Federal Law
  - Criminal law: failure to call which results in damage to pipeline
- Civil litigation