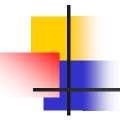


Preventing Mechanical Damage

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