Exploring New Developments in Loss Prevention and Asset Management of Trunk Mains

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Current Assessment & Asset Management Tools

- Pipeline mapping.
- Long-range robotics.
- Leak detection.
- Monitoring.
Pipeline Mapping

- Laser gyroscope technology.
- Provides x-y-z coordinates of pipelines.
- Results integrated into web-based GIS portal.
Pipeline Mapping
Pipeline Mapping
Long-Range Robotics

- Up to 6 km from entry point.
- Up to 5-Bar operating pressure.
- Multiple sensing technologies available:
  - HD-CCTV
  - Sonar
  - Laser
  - Electromagnetic
  - Mapping
Long-Range Robotics
Long-Range Robotics

Leak Detection and Condition Assessment

- Smartball is compressed and inserted into the pipeline.
- Smartball detects leaks as it flows through the pipeline.
- A single deployment can range from less than 0.5 miles to more than 12 miles (20 Kilometers).
- Smartball detects air pockets as it flows through the pipeline.
- Smartball easily passes through curves and other obstacles.
- Smartball is retrieved with a special tool that compresses and extracts the ball.
SoundPrint® SmartBall

- Power Supply
- On-Board Memory
- Microprocessor
- Pinger
- Temperature Sensor
- Rotation Sensor
- Acoustic Sensor

patents pending
The rolling ball listens for leaks from *inside* the pipe...
Pipeline Monitoring

- Permanent acoustic fibre optic monitoring.
- Up to 40-km per system.
- Detects and locates structural events.
- Currently used primarily in prestressed concrete pipelines.
SoundPrint® AFO Pipeline Monitoring

- Electronically monitors acoustic activity in a pipeline
- “Hears” the sound of a prestressing wire failure as it occurs, and accurately locates source
- Performed successfully since mid 1990s, and used by GMRA since 2000
Prestressed Concrete Cylinder Pipe (PCCP)
SoundPrint® AFO Pipeline Monitoring

Optical-fibre cable installation
SoundPrint® AFO Pipeline Monitoring

AFO system and user interface
The Great Man-Made River Project

- More than 4000km of pipeline.
- Mainly 4m dia. PCCP (approx. 575,000 pipes).
- Water is extracted from underground aquifers
- Once complete, system will be capable of producing over six million m³/day
Pipe Failure History

Pipe Ruptures

1. Station No. 158+298
   T-B Line (19-08-99)

2. Station No. 325+290
   S-S Line (04-09-99)

3. Station No. 325+719
   T-B Line (22-01-00)

4. Station No. 169+594
   S-S Line (07-06-00)

5. Station No. 162+970
   T-B Line (29-04-01)
GMRP Acoustic Monitoring

Fibre Cable Deployment
Visual inspections done during repair confirmed:
- Accuracy of Acoustic Monitoring:
  - No. of wire breaks were as expected (104 recorded v. 148 observed)
- Validity of the model:
  - Cracks of outer core where expected.
GMRP Acoustic Monitoring

Case Study – Repair
GMRP Acoustic Monitoring

Current Monitoring (Dec 2009)
- 360 km

Future Expansion (2009 - 2011)
- 1120 km
GIS Interface
GIS Interface

Potomac Contract C - Pipe Chart Generated 7/30/2009
Displaying all recorded events and new events in the monitoring period from the beginning of Wednesday, January 03, 2009 to the end of Thursday, July 30, 2009
GIS Interface

Potomac Contract C – Pipe Chart Generated 7/30/2009
Displaying all recorded acoustic wave breaks in the monitoring period from the beginning of Wednesday, January 09, 2008 to the end of Thursday, July 30, 2009.

Upstream Events: 0
Future Developments

- Long-range fibre-optic camera for pressure pipe applications incorporating leak detection, pipeline mapping and pipe wall condition assessment capabilities.
Questions