Leak Detection.....Today and the Future

Clean and Safe Drinking Water Workshop

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Leak Detection.....Today and the Future
Introduction

- Founded in 1956
- Wholly owned Canadian corporation
- 50 employees
- Offices across Canada
- Products & Services provider
- Use and sell the best products available
- Projects completed in Canada, USA, UK, Morocco, Trinidad, Barbados, Brazil
Why Leak Detection?

- Limited Water Resources
- Increasing population / demand
- Expense of establishing new resource
- Health issues
- Economics - Water is expensive
- Leakage worldwide 10% - 70%
What Have We Done So Far

- Passive leak detection ... when we see water, we’ll dig.
- All leaks come to the surface ... don’t they?
- Listening on hydrants and valves.
- Increased flows to the treatment plant.
- Some leak noise correlation.
- Leak noise recorders.
- DMA (District Metering Areas).
Localization of Leakage

- Sonic detection – sounding
- Step testing
- Noise logging
- Correlation
- Permalog advanced leak detection
Sonic Detection – Sounding

For listening directly at pipes and fittings, for simple localization.

- Simple operation
- Low cost
- Lightweight
- Robust, compact design for field use

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Step Testing

Step testing is the process of localizing leakage into a particular sector of the distribution system for subsequent pinpointing and repair

• System divided into “tight zones”

• Water supplied through one meter

• Working from the farthest valve, any leakage isolated in that sector is shown on the meter as a drop in consumption
Zoning an Area

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Step Testing

Figure 8.3  Diagram to Illustrate the Principle of ‘Step Testing’ for Leakage Control

- Valves closed at intervals during step test.
- Meter & Chart / Electronic Recorder.
- Closed boundary valves.
- Disproportionate drop in flow when valves 'C' & 'E' are closed, indicating suspected leakage for further investigation.

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Step Testing

Problems with Step Testing

- Requires detailed planning
- Area must be “tight” before the step test can begin
- Is normally carried out at night
- Can also be labour intensive

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Noise Logging

Power in from charger
Rechargeable Battery Pack

Sensor

Signal in from Leak

Data out to PC
Input/Output
Data Processing & Storage
ADC
Preamplifier

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Noise Logging

Leak position
Noise Logging

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Graph Interpretation

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Acoustic Loggers

Potential areas for improvement

- Still require manpower (deployment and downloading)
- Need to re-deploy periodically to ensure leakage has not risen again
Leak Noise Correlation

MicroCorr (3/Super)

MicroCorr 4

MicroCorr 5

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Leak Noise Correlation

The correlation formula:

\[ L = D - \frac{(V \times Td)}{2} \]

The Process

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Leak Noise Correlation

Information required to do a correlation

- Length of pipe between sensors
- Type of pipe – Cast Iron, Plastic
- Diameter of the pipe
- Any changes of materiel, pipe type
Leak Noise Correlation

Factors producing good quality leak noise

- High water pressure
- Hard backfill
- Small rupture
- Clean pipes
- Metallic pipes
- Small diameter pipes
Leak Noise Correlation

Factors producing poor quality leak noise

- Low water pressure
- Soft backfill
- Split mains
- Encrusted pipes
- Soft/Lined pipes
- Large diameter pipes
Criteria for a Permanent System

- Procedure for rapid leak localization
- No specialist labour required
- Low cost to enable widespread deployment
- Long operating lifetime
- Intelligent leak identification

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Permalog®

Intelligent noise logger designed for permanent deployment or tactical deployment to survey large areas of network quickly and effectively

- Fully automatic intelligent logger
- Adaptable to all network situations
- Compact size
- Low unit cost
- Long operating life
- Patent protected

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Permalog
an alternative approach

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Permalog® Patroller

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Operational Methodology

- Assessment
- Deployment
- Patrol
- Follow-up
- Repair

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Water Savings

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Benefits

- 100% of distribution system monitored
- More leaks found, more quickly
- Faster response to mains bursts
- Automates and de-skills surveying
- Independent of metering/balancing
- No opening/closing of valves
- Improves overall detection efficiency and motivation
- Operates continuously over a 10 year period
- Potential to comprehensively cover a network without small flow zones
- Permanent monitoring of “sensitive” pipelines

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Pressure Management

Why manage pressure?

- Simple and immediate method of reducing leakage
- Reduced volumetric flow into a zone
- Lower pressure-related consumption
- Fewer burst pipes
- More consistent service to the consumer
Electronic Pressure Controllers

- Regulate the operation of the PRV according to demand (flow rate) or time of day
- Optimize pressure in the network
- Get the most out of the investment in PRV
- Need to be reliable and safe

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Without PRV controller

- Fluctuating demand
- Constant pressure
- Total week’s

Lowest demand. Pressure much too high

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Leak Detection…..Today and the Future

With PRV Controller

- Fluctuating demand
- Pressure adjusted accordingly
- 12.8ml in the week

Immediate water saving of 6%

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Conclusions

- Sophisticated equipment is available for each aspect of leakage control.
- Performance and reliability is key.
- Deployment of the correct techniques and technology can produce significant water saving, and effectively control the network.

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End Result Less ...

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Thank You for Your Time