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ACOUSTIC LOGGERS: LEAK DETECTION IN NEW MEXICO



Today's Presentation

- Why Leak Detection?
- Theory of Acoustic Logging
- NMOSE Project
- Findings
- Next Steps
- Conclusions

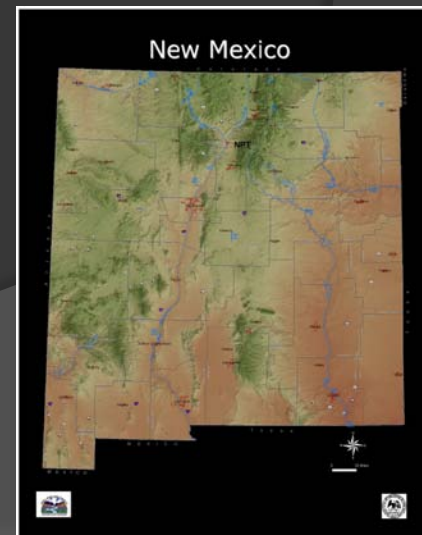
WHY LEAK DETECTION?

Why Leak Detection

- Estimated 6 billion gallons lost in US prior to reaching end user (AWWA)
- Operational costs & the price of developing new water supplies are increasing
- Loss of water = lost revenue
- NM is an arid environment with limited water supplies

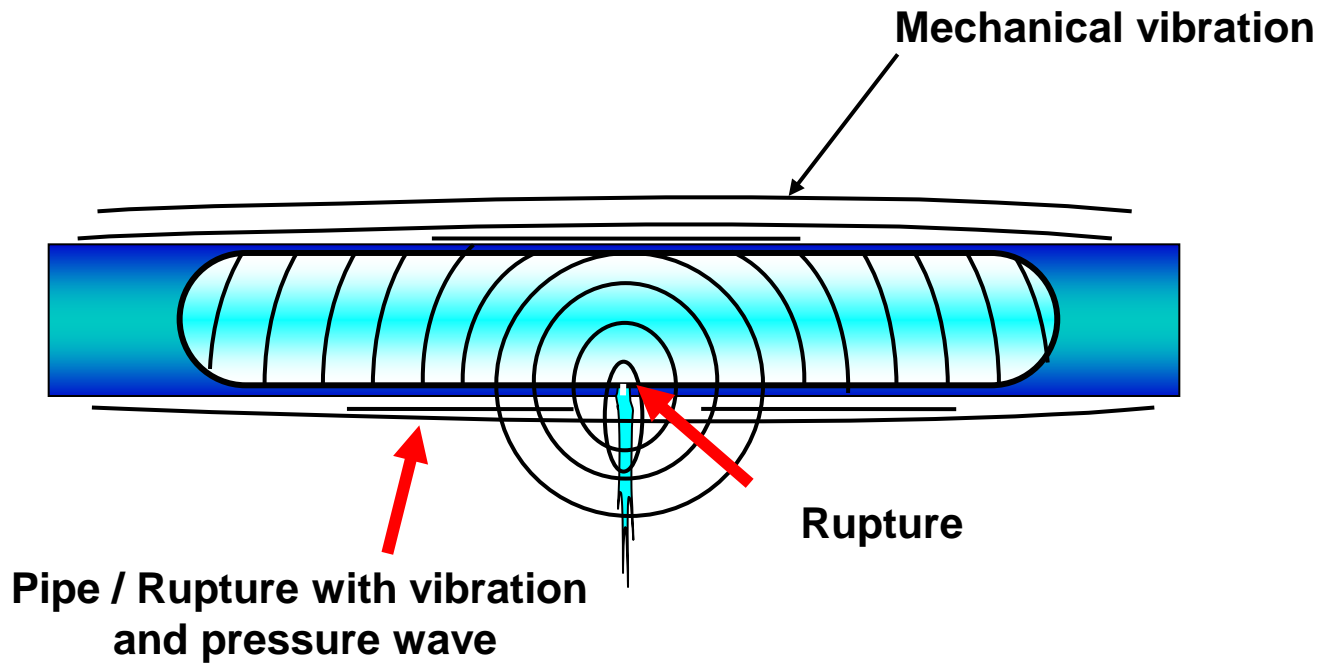
NMOSE

- Water Rights permit conditions mandate “Best Technology”
- Previous study recommended pairing AWWA water audit with leak detection efforts
- Governor’s Water Innovation Fund



THEORY OF ACOUSTIC LOGGING

Leak Detection

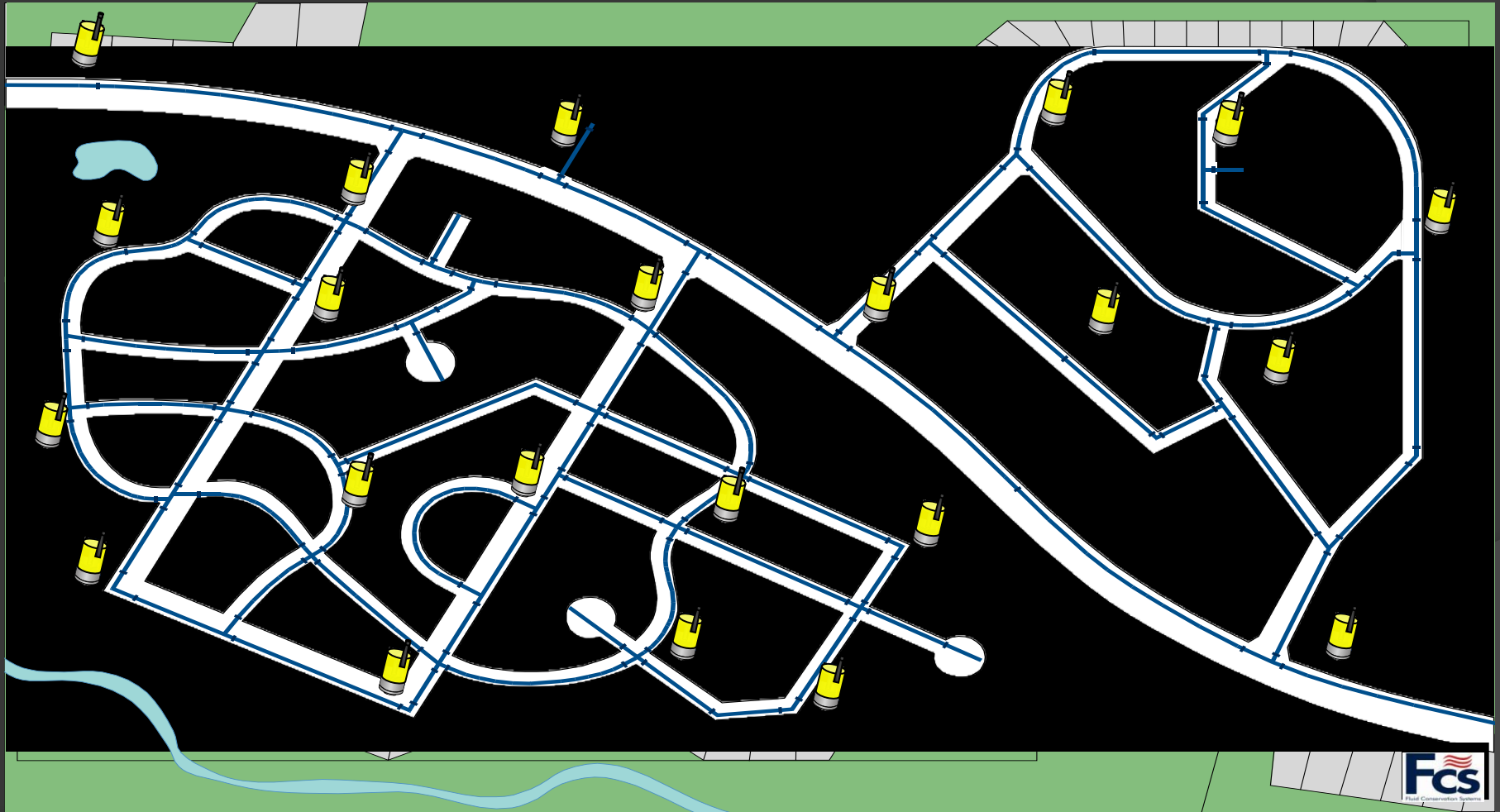


Leak Detection

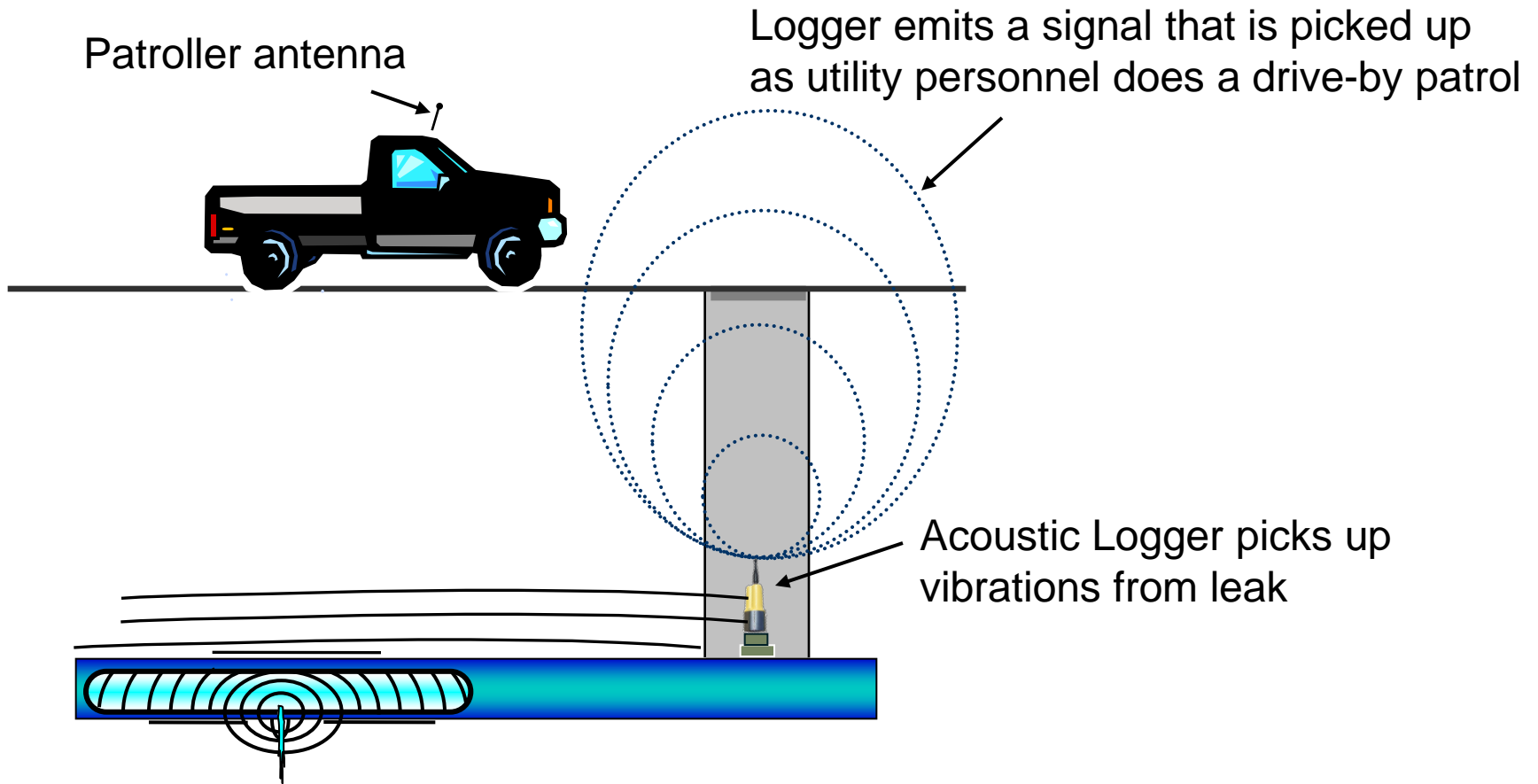
- ⦿ Placement on valves
- ⦿ Spacing depends on pipe material
 - Metals: 500 – 1,000 ft
 - Concrete: 250 – 500 ft
 - PVC: 50 – 250 ft
- ⦿ Also available in meter/logger combo



Leak Detection



Leak Detection



Leak Detection

As loggers are detected they will appear in the list

The information given is:-

- Logger Serial Number
- Leak Status
- Level & Spread
- Time logger signal received

Patrol 11:27 ok

Serial	Lk	Lv	Sp	Time
07041029	N	3	5	11:2...
02032292	L	19	2	11:2...
07070147	N	3	3	11:2...
07070146	N	5	2	11:2...
07070151	N	6	2	11:2...

Connected: patroller 2 . 08071271
7070147
"NEW PERMALOG"
"

Clear Logs Stop

Leak Detection

Download to Excel spreadsheet

Serial	Comment	Deployed	Read	Status	Level	Spread
0000111	100 3 rd St	10/1/2009	10/14/2009	N	4	2
0000112	108 3 rd St	10/1/2009	10/14/2009	L	36	7
0000113	112 3 rd St	10/1/2009	10/14/2009	N	10	3

Keep history

- by location or
- by logger serial number

NMPOSE Project

Project Details

- Partner with three cities with suspected real loss problems
- Provide equipment -100 loggers per city
- Provide training for utility staff
- Assist with installation and follow up
- Provide pre and post AWWA water audits



Partners

⦿ Cities

- Ruidoso
- Las Vegas
- Rio Rancho

⦿ Contractors

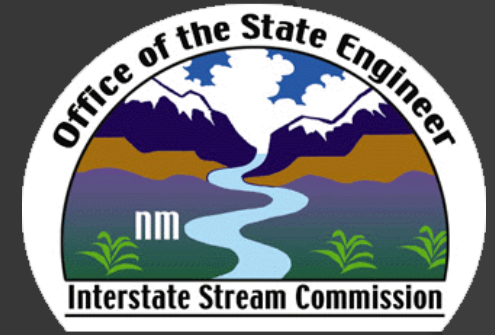
- AMEC
- Miya Water

⦿ Equipment

- Fluid Conservation Services (FCS)
- Gutermann



NMOSE Project



- ◎ Agreement with Cities (MOU)
 - NMOSE to provide:
 - Equipment
 - Training
 - Audits

 - Cities to provide:
 - Staff
 - Data
 - 3 year commitment on the use and maintenance of the equipment

The Audits 2008-2009

City	Non-Revenue Water Percent	Real Losses Percent	Real Losses Volume MG/yr	Real Losses in gallons/con/day	Real Losses Cost
Ruidoso	29.7	↓ 17	101.9	37.81	\$41,276
Las Vegas	35.8	↑ 26	209.6	87.40	\$53,455
Rio Rancho	15.3	→ 11	486.2	44.86	\$227,520 ↑ est



Arrows indicate direction of change from previous audit 2005-2006

Implementation

- Meeting/presentation to utility management and staff
- First field visit – two days of training and installation with field staff
- Start data collection for audit



Implementation

- Second field visit – trouble shooting, ground microphone work and data management
- Presentation of draft audit
- Multiple follow ups (depending on need)



The Findings

The Findings

- ◎ The Audits
- ◎ The Process
- ◎ The Equipment
- ◎ The Leaks



The Audits

- ⦿ Complete audit before you start
- ⦿ Be sure of real loss numbers prior to investment in leak equipment
- ⦿ Evaluate the cost of real losses and the cost of obtaining the next unit of water
- ⦿ Understand that you are only going to find a percentage of the leaks (60%)
- ⦿ Set resources to maximize cost/benefit

The Process

- ⦿ Provide adequate training
 - Different cities had different needs
 - Don't forget about training on database
- ⦿ Secure "Buy in" at all levels
 - Management enthusiasm does not always trickle down
 - Lack of management support does not overcome field teams enthusiasm

The Process

- ◎ Picking the right staff
 - Technologically savvy
 - Ability to problem solve
 - Field and office staff (GIS and database management)
- ◎ Follow up plan in place
 - Finding the leaks
 - Fixing the leaks



The Equipment

- ⦿ Limited by:
 - Pipe material
 - Valve placement
 - Interference (electrical, traffic)
 - Pinpointing leak
 - Number of available loggers



The Equipment

- ⦿ PDA
- ⦿ Bluetooth issues
- ⦿ Antennas
- ⦿ Reliability/ sensitivity
- ⦿ Weather issues
- ⦿ Ground microphone



The Leaks

- ⦿ All 3 cities found leaks with the loggers
- ⦿ Several identified leaks went to main break
- ⦿ Each city learned how to eliminated incorrectly identified leaks that were due to interference
- ⦿ Finding leaks does not equal fixing leaks

NM Next Steps

NMOSE Next Steps

- New Mexico Rural Water Association
- Rotate use through small systems in NM
- Used in 3 systems – all crises mode
- Benefits to correlator and software



NMOSE Next Steps

- Continuing to emphasize need for audits
- Published final report
- Scheduling post leak detection audits

Quantifying Leaks with Acoustic Loggers

2008-2010

Prepared for:

New Mexico Office of the State Engineer Water Use and
Conservation Bureau

May 21, 2010

Prepared by:

New Mexico Office of the State Engineer, Water Use and
Conservation Bureau
AMEC Earth and Environmental & Miya Arison Group



Conclusions

Conclusions

- ⦿ Loggers find leaks
- ⦿ Takes commitment to both finding and fixing leaks
- ⦿ Should be considered one tool in the tool box
- ⦿ Be sure it is real losses
- ⦿ Consider costs/benefits prior to determining level of commitment



Questions?

Final Report

http://www.ose.state.nm.us/wucp_pws.html

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