

Utility
Service
Group

Utility Service Group Helium Leak Detection

Redefining Leak Detection

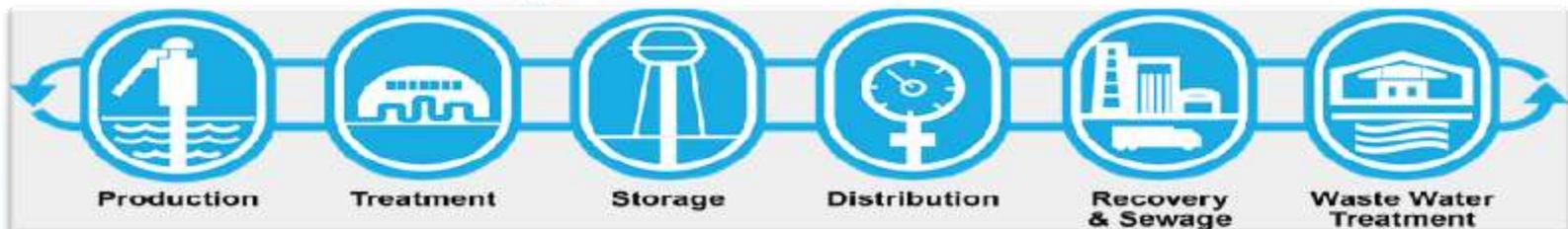


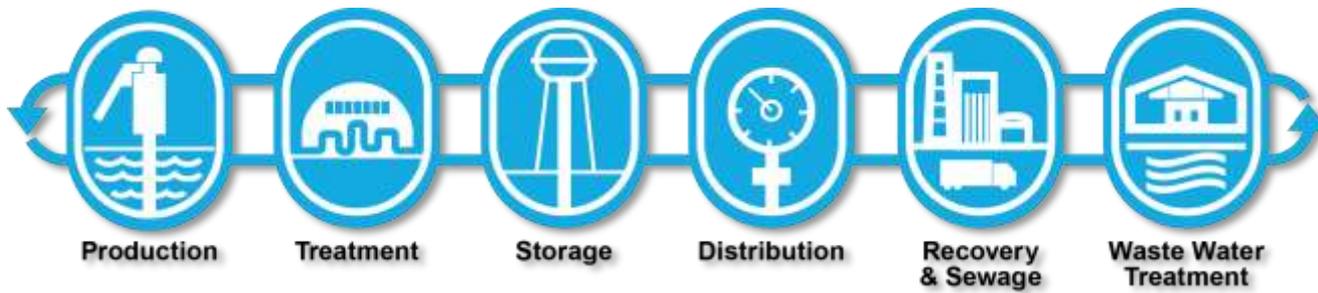


Utility Service Group



- ▶ Municipal Water Experts
- ▶ Celebrated our 50th Anniversary
- ▶ National Service Capability
- ▶ Part of a Global Group of Suez Companies
- ▶ Focused on Asset Management and Preserving Water and Wastewater System Assets
- ▶ Unique business approach which combines AM principles, technology, funding and fixed payments





Innovative Solutions Since 1963

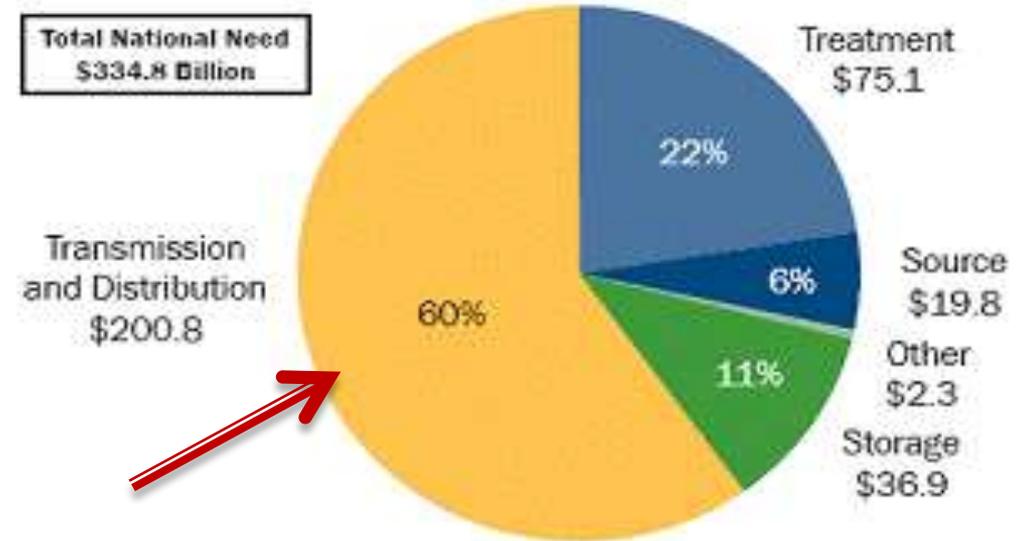
- ▶ *Water Storage Tank Asset Management*
- ▶ *Water Quality*
- ▶ *Water Well Services*
- ▶ *Distribution Asset Management*
- ▶ *Non Revenue Water Programs*
- ▶ *Sewer Asset Management*
- ▶ *Sludge Drying*
- ▶ *Communications Site Management*



Market Drivers – Pipeline Investment

- ▶ AWWA - No Longer Confronting Americas Infrastructure Challenge - \$1 Trillion Need (repair, replace or new pipe expansion)
- ▶ American Society of Civil Engineers gives drinking water systems a D Grade
- ▶ America's drinking water systems face an annual shortfall of at least \$11 billion to replace aging facilities

Total 20-Year Need by Project Type (in billions of January 2007 dollars)



Note: Numbers may not total due to rounding.

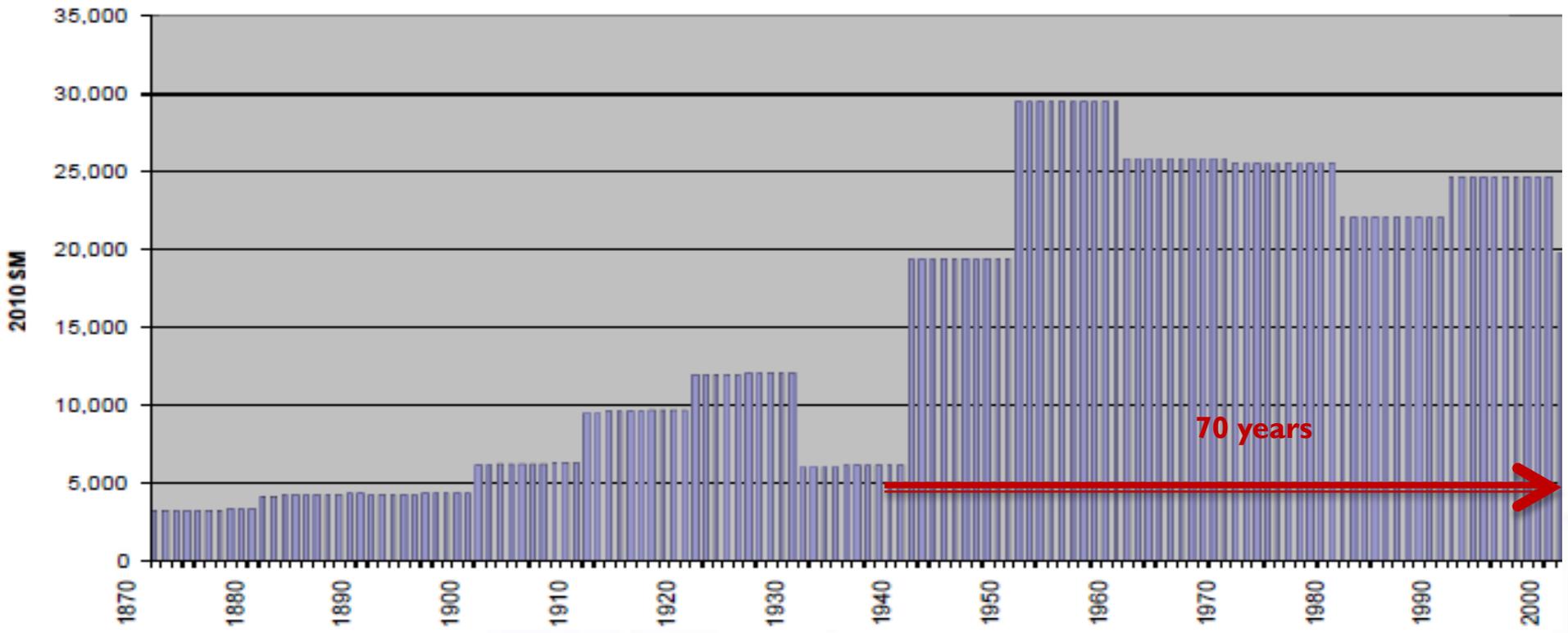
USEPA Drinking Water Needs Survey





Pipe Age

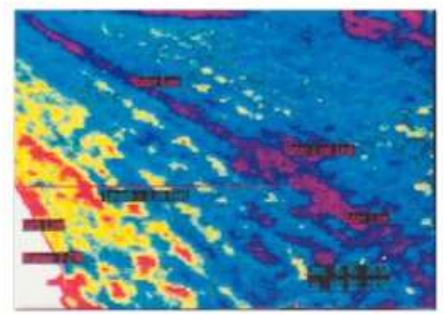
Estimated Aggregate Investment in US Water Mains (in millions of 2010 \$s)





Other Leak Detection Technologies

- ▶ Smart pigs
- ▶ Acoustic sensors
- ▶ Aerial thermography
- ▶ Disadvantages
 - Cost
 - Availability
 - Application constraints
 - Pipe diameter
 - Velocity
 - Pressure
 - Geometry
 - Launch site construction



Helium Leak Detection Features

- ▶ In use since 2007.
- ▶ The system is Protected by International Patents
- ▶ Helium injected into live water main – no need to depressurize the system.
- ▶ Particularly suited for (**non-metallic, plastic, clay & large diameter pipes**), although suited for any material
- ▶ Can be used in challenging conditions:
 - Long runs with limited listening points / access (hydrants, services, valves)
 - Intermittent pressures
 - Difficult to locate leaks
- ▶ Injection can be used to pinpoint leaks for up to 5 days





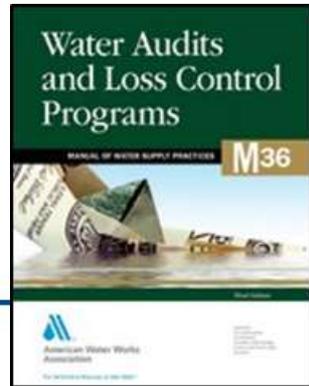
Helium Leak Detection Benefits

- ▶ Reliable and highly accurate – reduction in unavoidable losses
- ▶ Superior performance to acoustic technologies
- ▶ Works in areas with few or very distant access points (e.g. transmission mains)
- ▶ Minimally intrusive into the pipe network
- ▶ Not limited to water network geometry or configuration
- ▶ No need to construct a launch pit or device to inject the helium
- ▶ Quick to deploy

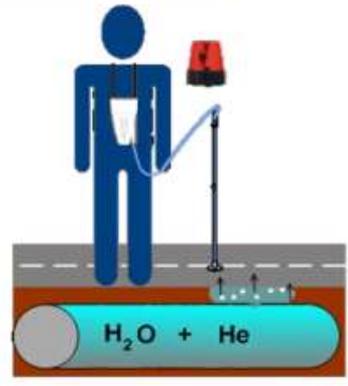
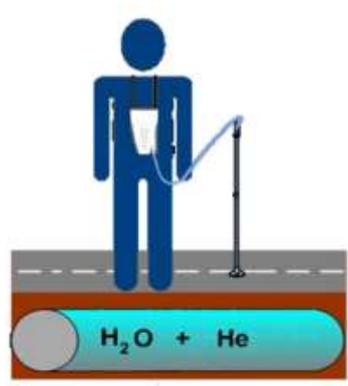
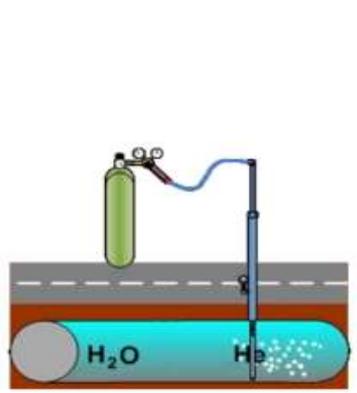
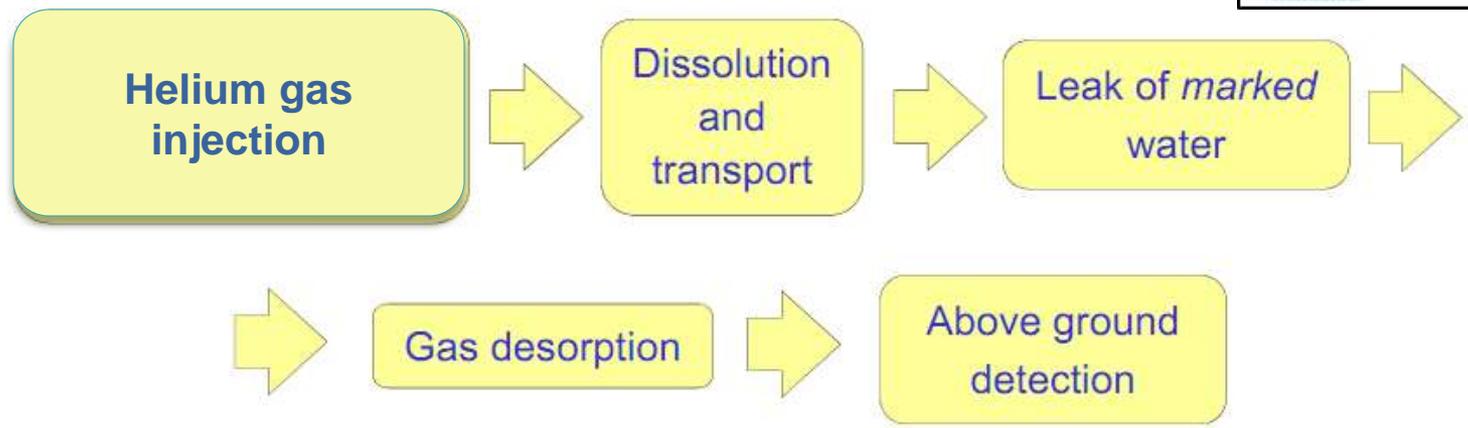




Principles of Helium LD

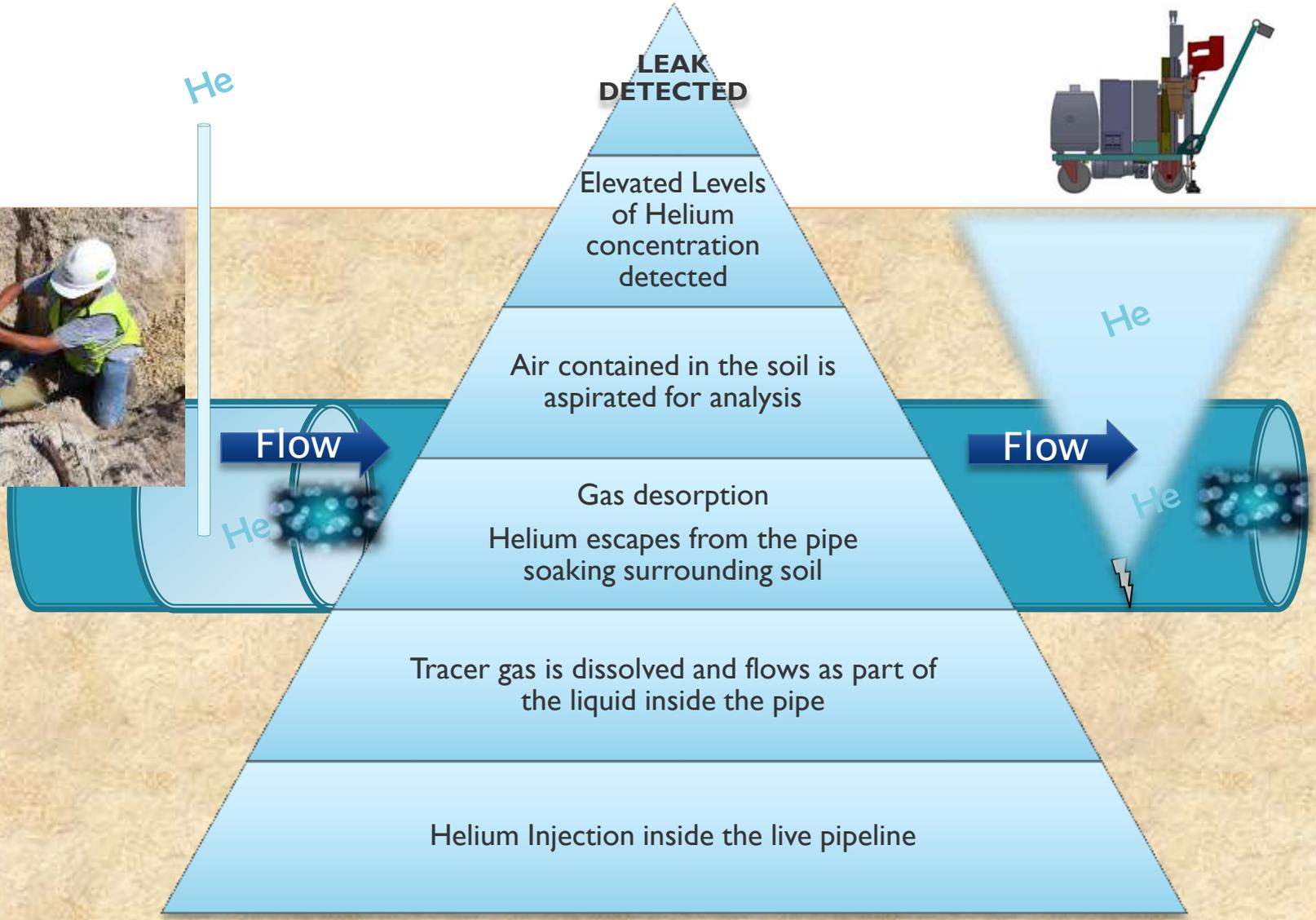


Tracer Gas method for pipes in operation





IDENTIFYING & PINPOINTING LEAKS – HELIUM LD





Helium - NSF Standard 60 Drinking Water Treatment Chemicals Certification

- ▶ Helium certified to 99.999% pure

Utility Service Company, Inc.
1230 Peachtree Street Northeast
Suite 1100
Atlanta, GA 30309
United States
678-235-0281
Facility : Madison, NC

Helium

Trade Designation	Product Function
Utility Service Company - Helium Series A	
Utility Service Company - Helium Series B	



<http://info.nsf.org/Certified/PwsChemicals/Listings.asp?Company=C0146209&Standard=060>



Insertion / Injection of Helium

Patented Injection Process



Injection through a standard 3/4 inch tap

Standard Injection Point





Helium Injection

DIRECT INJECTION INTO LINE



INJECTION VIA FIRE HYDRANT





Distributing the Helium Throughout the Desired Network Area

Sampling at a hydrant to insure helium distribution





Flowing Hydrants if Necessary



Helium Distribution Considerations

- Helium Injection Location
- Drawing Helium into the Network
- Dechlorination & Environmental Protection
- Traffic Control & Safety

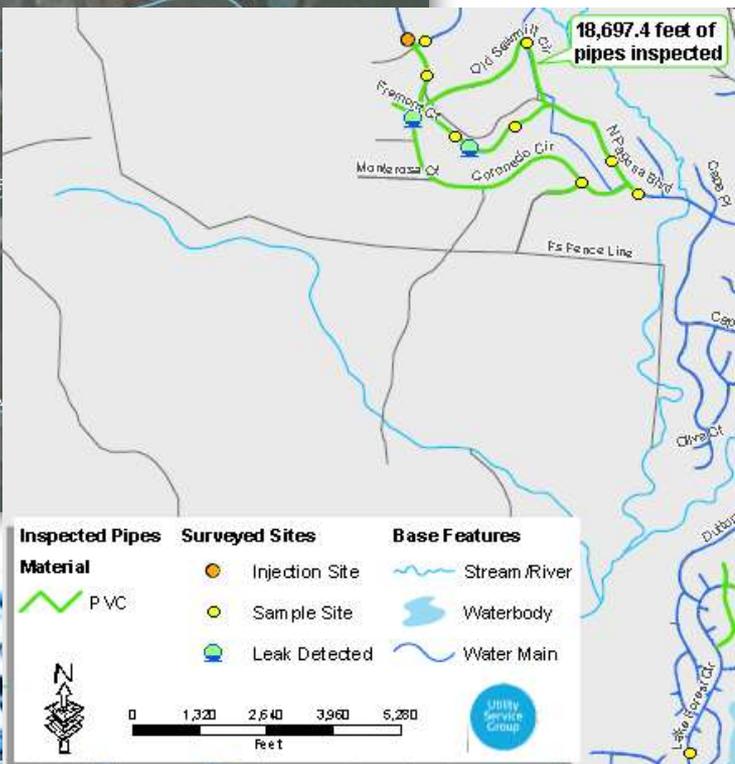
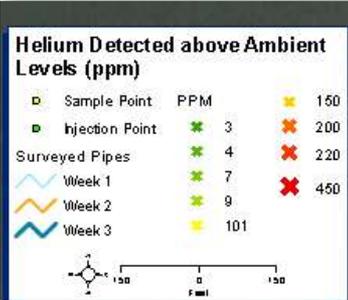
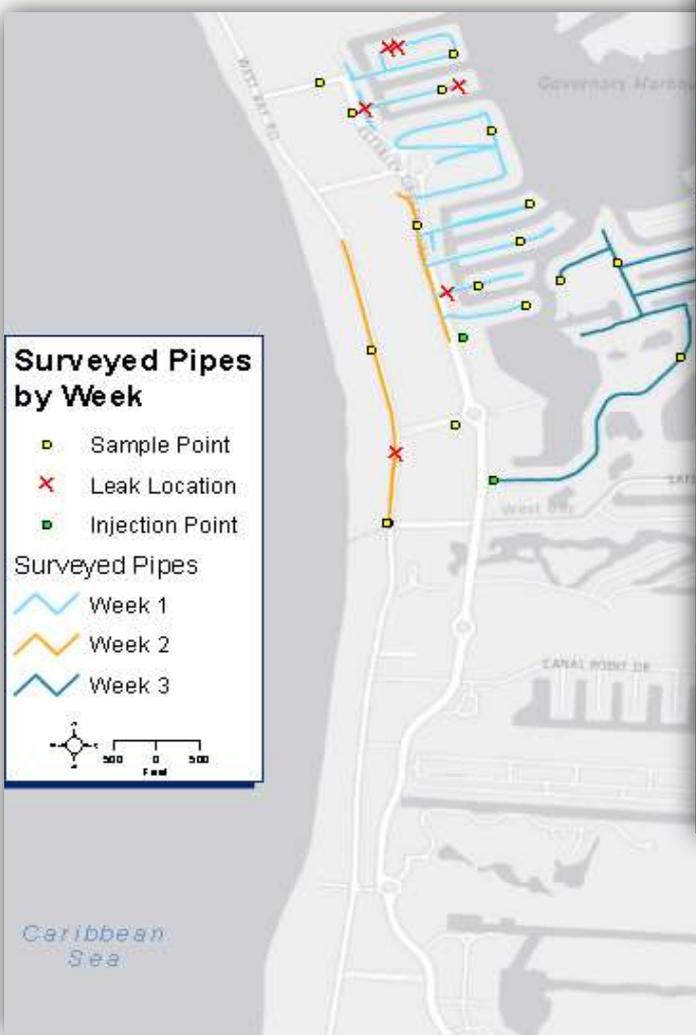
Detection Process

- ▶ Drilling / hand probe of small holes needed in non-porous surfaces to allow He gas into atmosphere. $\frac{1}{2}$ " diameter or less; $\frac{1}{2}$ depth of pipe or less.
 - Fully automated cart
 - Hand Drilling
 - Leak detection / pinpointing
- ▶ Looking for levels above ambient conditions.
- ▶ GPS location of "leaks" for mapping





Leak Survey Mapping



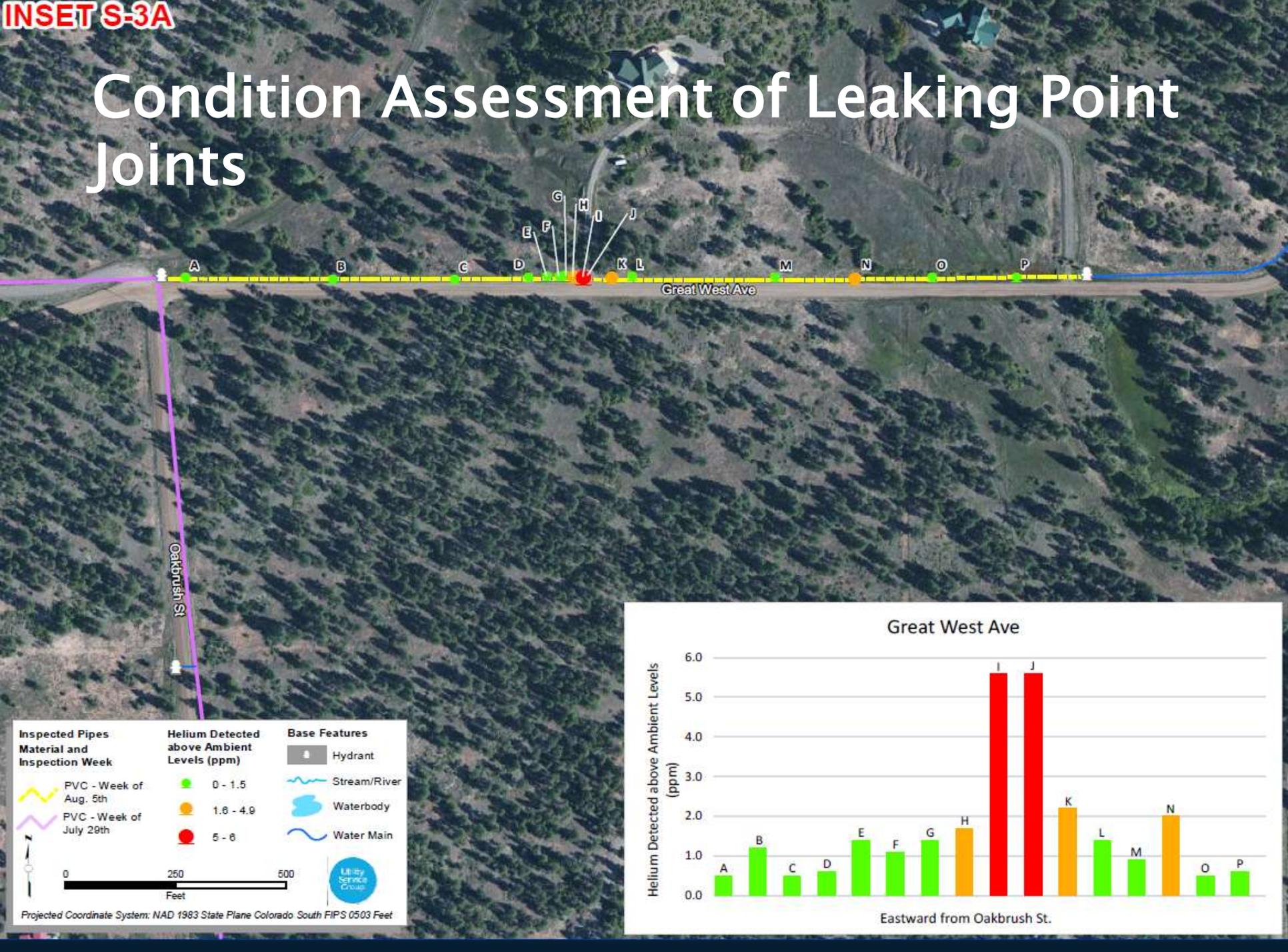
Surveyed Pipes

Date	Week/Day	Length (ft)
3/17/2014	day 2	975
3/17/2014	day 2	1,061
3/17/2014	day 2	1,590
3/17/2014	day 3	2,610
3/17/2014	day 4	4,700
3/17/2014	day 3	1,447
3/17/2014	day 3	232
3/17/2014	day 4	214
3/17/2014	day 5	2,440
Subtotal		15,214

Caribbean Sea



Condition Assessment of Leaking Point Joints



Inspected Pipes Material and Inspection Week	Helium Detected above Ambient Levels (ppm)	Base Features
PVC - Week of Aug. 5th	0 - 1.5	Hydrant
PVC - Week of July 29th	1.6 - 4.9	Stream/River
	5 - 6	Waterbody
		Water Main

0 250 500 Feet

Utility Service Group

Projected Coordinate System: NAD 1983 State Plane Colorado South FIPS 0503 Feet





Project Challenges

- Line locations – 100 yr. old system = old mapping (section plats) inaccurate. Concrete pipe.
- Drilling in paved roadways up to 36 inches in depth
 - Multiple layers of pavement including blacktop, cement concrete and brick
- Plumbing & connections – American / Canadian threads.
- Deep wet vaults with limited access.
- 30” transmission main flow direction – flow direction opposite of what was expected.
- Limited sampling points with no option to “create” demand. Dependent on system demand.
- Weather - Rain, sleet, cold conditions
- Traffic control



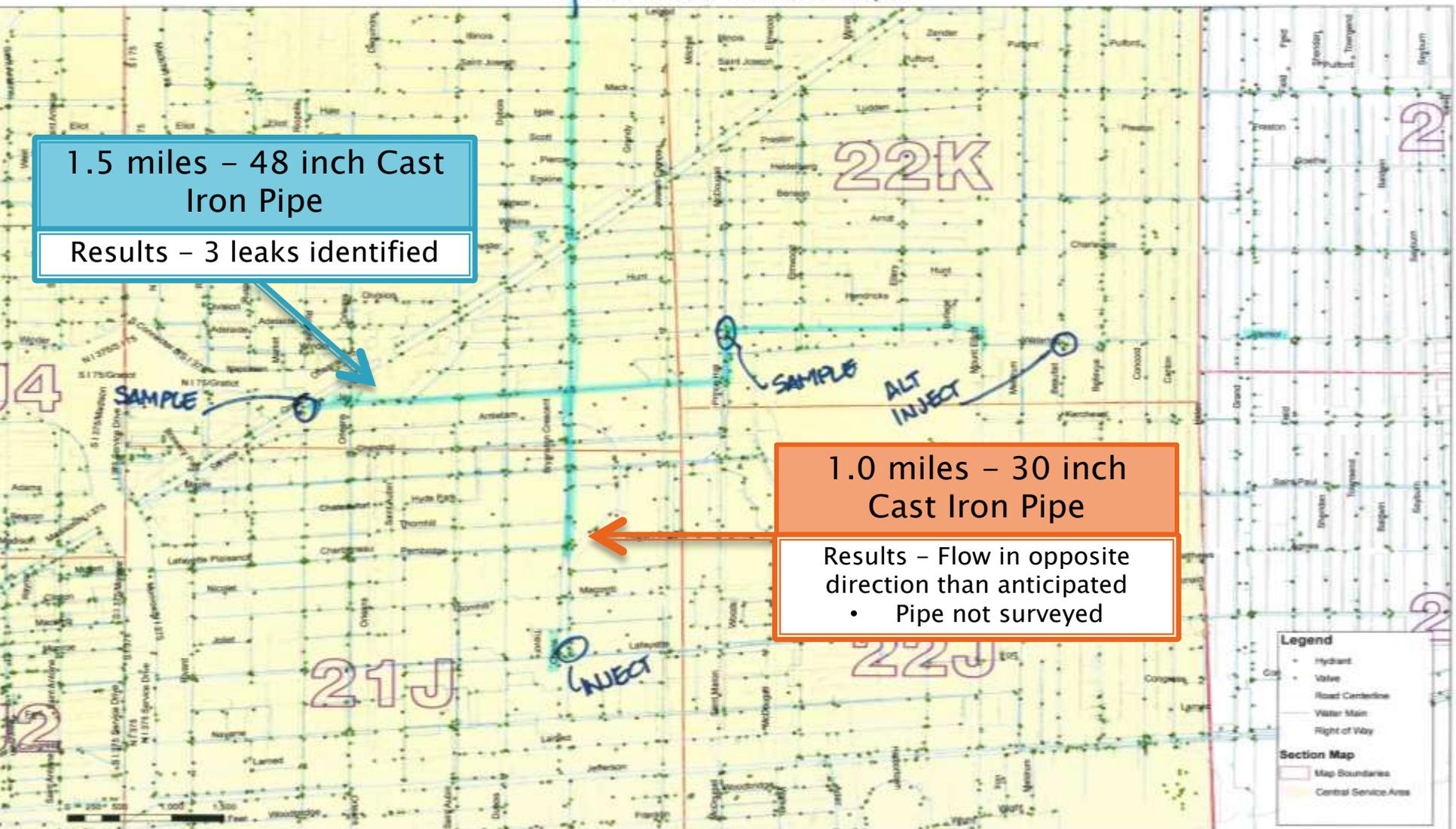


Detroit - 48" and 30" Cast Iron Transmission Mains – 100 Year Old Water System

CANFIELD SAMPLE
DWSD Water Section Maps

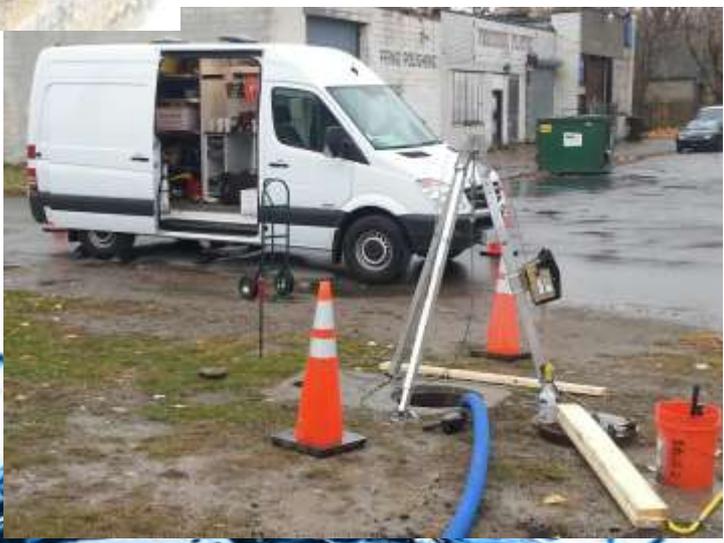
1.5 miles – 48 inch Cast Iron Pipe
Results – 3 leaks identified

1.0 miles – 30 inch Cast Iron Pipe
Results – Flow in opposite direction than anticipated
• Pipe not surveyed





Work Conditions



PROJECT RESULTS

- ▶ Recently completed leak detection for water company in Cayman Islands
- ▶ PVC is elastic – expand and contract with pressurization
- ▶ No leak when line was under pressurized.
- ▶ In a months time found \$1.2M worth of water loss.





Case Study – Harrisburg, PA

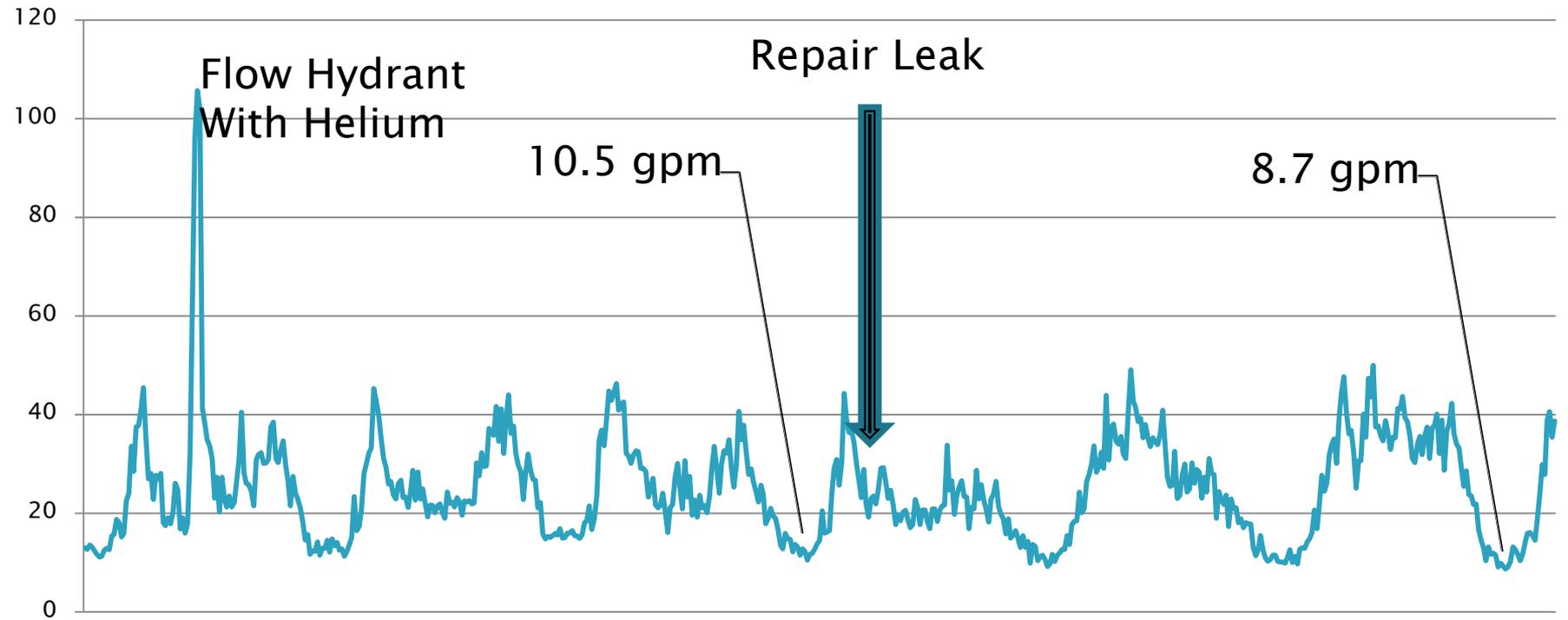


3/4" Service at 410 Pleasantview replaced on April 19, 2013



Repair & Results

President's Drive Flow (Gal/min)

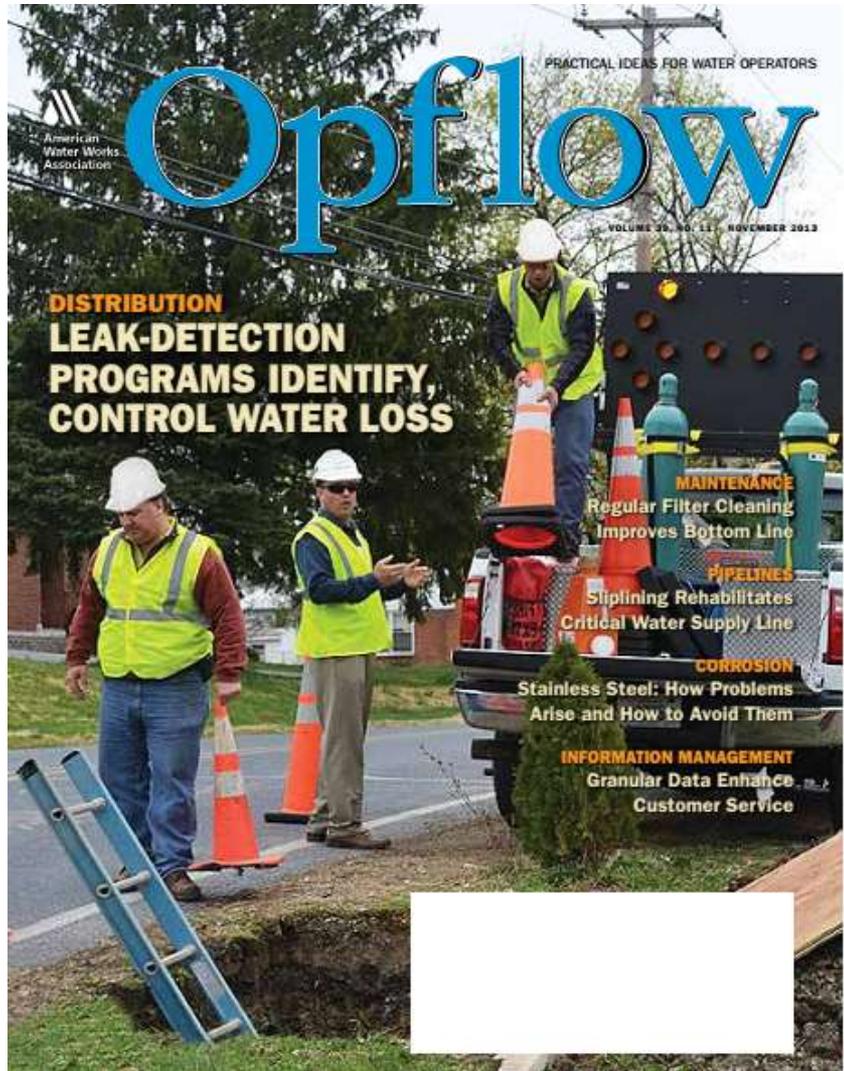


President's Drive DMA	4/13/13 - 4/19/13	4/19/13 - 4/22/13
Minimum Daily Flow	34,888 gpd	30,894 gpd





Helium Leak Detection



<http://dx.doi.org/10.5991/OPF.2013.20.0005>

Russell G. Titus is with New Jersey American Water (www.njwater.com), Hillsborough, N.J. Rob Meston is with Utility Service Associates (www.leakdetectionusa.com), Seattle. Jeff Johnson is with Spanaway Water (www.spanaway-water.org), Spanaway, Wash. Paul Meschino and Randy Moore are with Utility Service Group (www.utilityservice.com), Atlanta.

Distribution

An effective leak-management program is an important part of asset management. Numerous leak-detection technologies and approaches are available, but a customized program will deliver the best results.

BY RUSSELL G. TITUS, ROB MESTON, JEFF JOHNSON, PAUL MESCHINO, AND RANDY MOORE

LEAK-DETECTION PROGRAMS IDENTIFY AND CONTROL WATER LOSS

Editor's Note: This is the last of a three-part series of articles based on a series of AWWA webinars on distribution system issues. The first article, Biofilm Control: Develop an Effective Strategy to Preserve Quality, Ensure Compliance (September 2013 issue), described biofilm control strategies. The second article, Maintenance: Well Asset Management Increases Service Life (October 2013 issue), reviewed water well rehabilitation technologies. This article covers an array of available leak-detection strategies that can be incorporated into a leak-detection program. For more information, visit www.awwa.org/webinars.

LEAKAGE IS ALWAYS AN ISSUE with underground water conveyance systems. A water utility can control underground leakage only by conducting a painstaking survey of the entire system.

The earliest leak-location method was for an operator to place one end of a listening stick to the ground above a water main and the other end against his or her ear. Water under pressure is a form of potential energy. When the pressure is released to atmospheric pressure, it changes to kinetic energy. Some of the energy is in the form of audible sound. Different types of leaks and leaks in various kinds of pipe materials produce different sounds.

Summary

- ▶ Deployed in “live” fully operable water system with no impact on operations
- ▶ Effective on all pipe sizes and materials
- ▶ Not limited by “noise” or electrical interference, or to system geometry or length of pipe(s)
- ▶ Less intrusive than other technologies
 - Standard tap only needed for injection
 - Nothing to get stuck or lost traveling through pipe
- ▶ Fast to implement (especially in relation to other tests in large pipes)
- ▶ Works in areas with few or very distant access points (like transmission mains)



Contact Info:

Dawn Halpern
Water System Specialist
Utility Service Group
dhalpern@utilityservice.com
(619)818-3840(c)

