MULCARE
Pipeline Solutions

What smart meters can do for gas operations

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Delivering Natural Gas Innovation...

Agenda

- Meet your speaker
- Evolution of meter interaction
- What is a smart residential ultrasonic meter?
- How do you communicate with a smart meter?
- What can a smart meter tell me?
- How does a smart meter help my gas operations team?
- Scenarios
- Final thoughts

Meet your speaker

Scott Laplante

- Director of Product and Service Training/AMI Specialist (Mulcare/PERC)
- 37 years gas industry experience (31 years gas operations Eversource Energy)
- American Gas Association (Customer Field Service Measurement & Odorization Committees)
- ANSI B109 Metering & Regulator Standards Committee (Past Vice Chairperson)
- NGA Gas Operations School Committee
- Past President & Parliamentarian, Appalachian Gas Measurement Short Course
- 22 years United States Navy

THE EVOLUTION OF METER INTERACTION

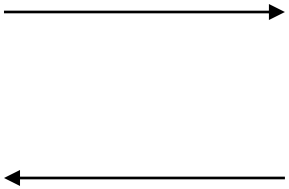
Manual Meter Reading

Meter reader reads meter

Automated Meter Reading (AMR)

Meter talks to AMR collection vehicle

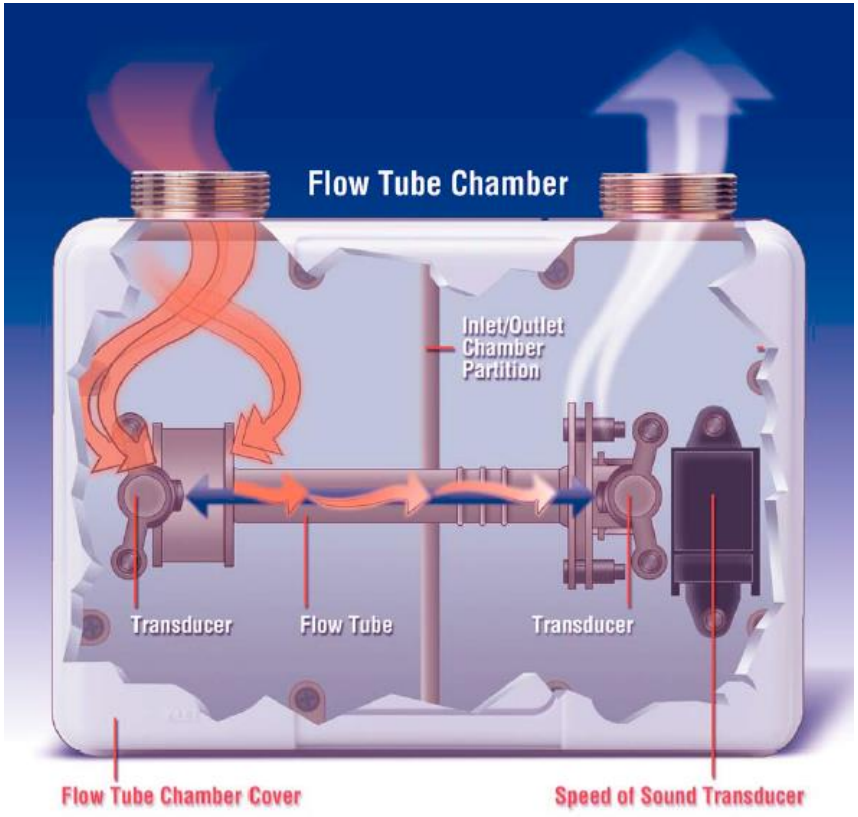
Advanced Metering Infrastructure (AMI)



Meter talks to tower and tower talks to meter

WHAT IS A RESIDENTIAL ULTRASONIC SMART METER?

- Gas meters that use measured speed of sound of gas passing through the meter to measure the volume used.
- Piezoelectric transducers generate and detect waves
- Waves travel at the speed of sound of the moving fluid
- Velocity of gas is determined from the transit time of generated sound waves
- Sampling system: Spot measurement repeated at intervals averaging two seconds
- Volume (ft^3) = **Velocity** (fps) **x** cross-sectional **Area** of flow tube (ft^2) **x** sample **Time** (s)



HOW DO YOU COMMUNICATE WITH A SMART METER?

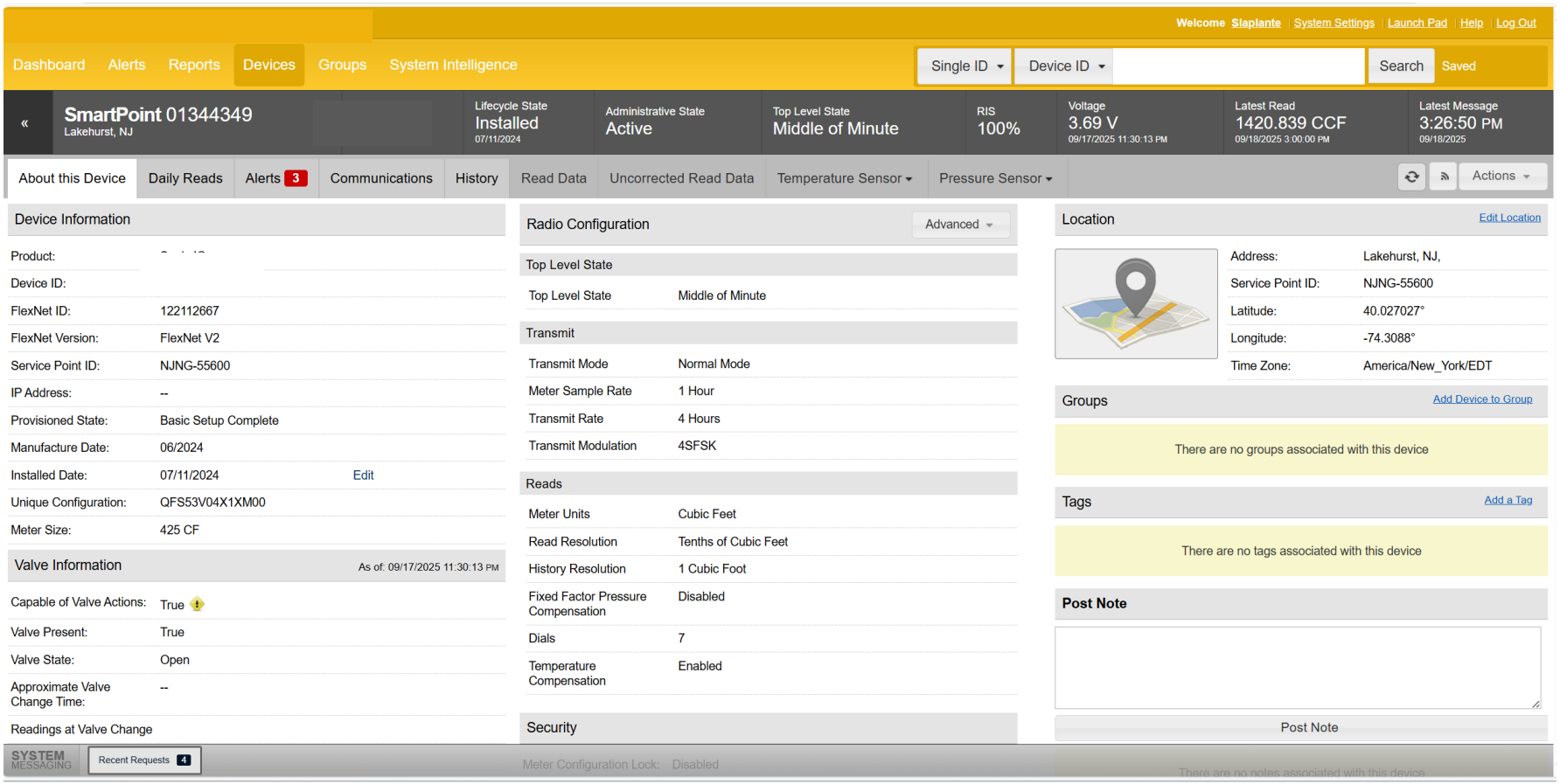
Visually

Handheld device

Bluetooth

Optical probe

Remotely (AMI)



WHAT CAN A SMART METER TELL ME?

- Corrected and uncorrected read
- Outlet pressure
- Flow
- Air in meter
- Reverse flow
- Valve position
- Temperature
- Diagnostic meter issues
- Numerous days of hourly data

HOW DOES A SMART METER HELP MY GAS OPERATIONS TEAM?

Smart meter shutoff capabilities

Scenario	Remote	Handheld**	Meter	Examples
Vacant account	X	X		Customer moves out and no new customer takes over account
Non-Payment Shut off	X	X		Billing department requests remote shut off due to non-payment on the account
System over pressurization	X	X	X	Regulator station failure or isolation on system
System under pressurization	X	X	X	Broken main, regulator station failure, peak flow on undersized system
Load curtailment	X	X		Loss of gas supply without shutting down entire system
Seismic event*	X	X	X*	Earthquake
Meter tampering			X	Customer pulls meter, reverses meter direction or tampers with electronics
High flow rate			X	Flow rate exceeds cubic foot an hour parameters
High temperature			X	Fire adjacent to the meter cause temperature sensor to reach its setting
Odor complaint	X	X		Customer calls to complain about odor of gas in the building
Gas leak migration*	X	X	X*	Broken main causing gas to seep into multiple buildings
Carbon Monoxide*	X	X	X*	Call from emergency service personnel.
Water infiltration	X	X	X	Water entering main due to crack. Meter will self shut due to pressure issues
Flooding conditions (Proactive)	X	X		Proactive shut off for flood prone areas
Fire department request	X	X		Emergency response

Methods used to Shut Off

Remote = shut off from Operations Center (AMI)

Handheld = Technician in field using handheld unit/smart device to shut off

Meter = Meter Shut off valve self shuts and reports back to head end system (AMI)

* Potential for future auto shut off capability

** Device can communicate with the meter via cable connected optical probe or blue tooth devices

Billing disputes

Standard meter

- Change meter and test.
- Extensive work by revenue department to settle dispute.

Smart meter

- Download hourly readings to show customer their usage.
- Change meter and monitor remotely.
- Significant drop in billing disputes.

Outlet pressure issues

Standard meter

- Install gauge or chart record on customer piping.
- Numerous visits to check pressure status.
- Safety and billing issues unknown.

Smart meter

- Download pressure data from meter to share with customer and equipment installer.
- Most issues solved with one visit.
- Meter alarms when pressure is outside of acceptable parameters.

Diversion

Standard meter

- Difficult to identify due lack of data.
- Extensive work for revenue protection/gas operations.

Smart meter

- Hourly read data.
- Alarms and automatic shut off for issues such as reverse flow or air in meter.
- Remote monitoring.

System emergencies

Standard meter

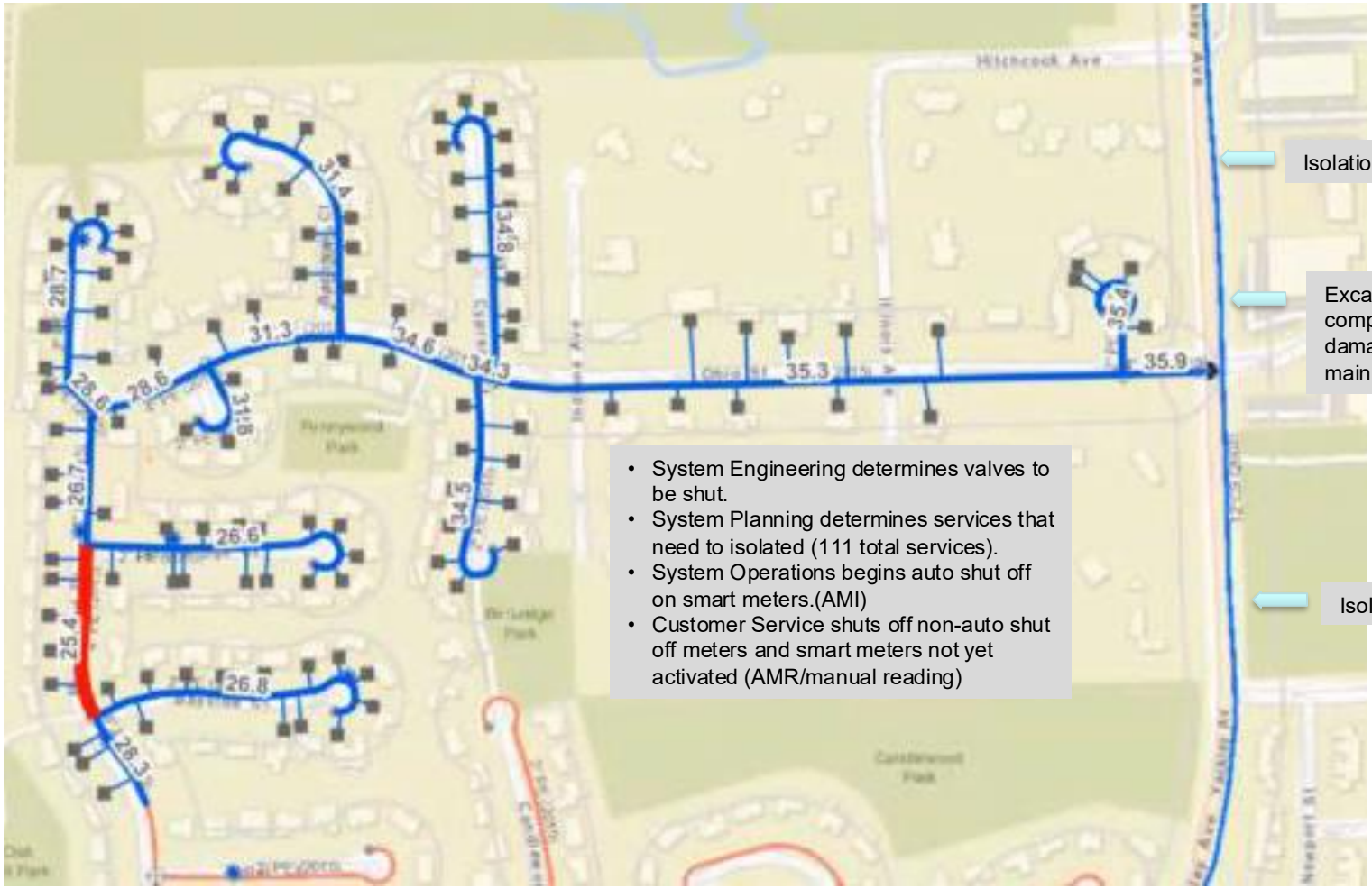
- Inability to communicate detected AOCs.
- No built-in protection for utilization pressure systems and other AOCs.

Smart meter

- Ability to communicate detected AOCs.
- Auto shutoff capabilities.
- Records data for investigation purposes.

SCENARIOS

Damaged main requiring shutdown



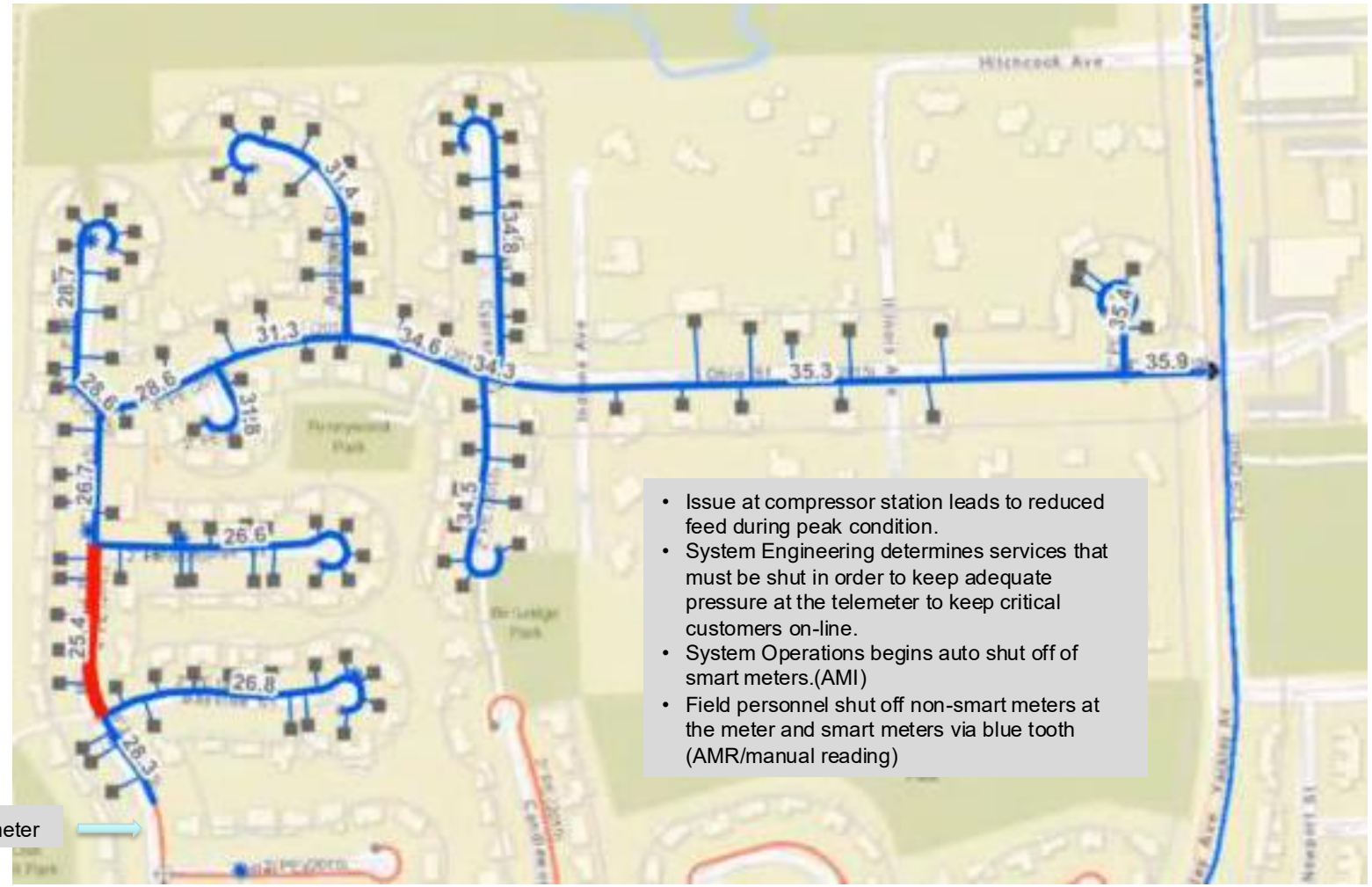
- System Engineering determines valves to be shut.
- System Planning determines services that need to isolated (111 total services).
- System Operations begins auto shut off on smart meters.(AMI)
- Customer Service shuts off non-auto shut off meters and smart meters not yet activated (AMR/manual reading)

Isolation valve

Excavating company damages gas main

Isolation valve

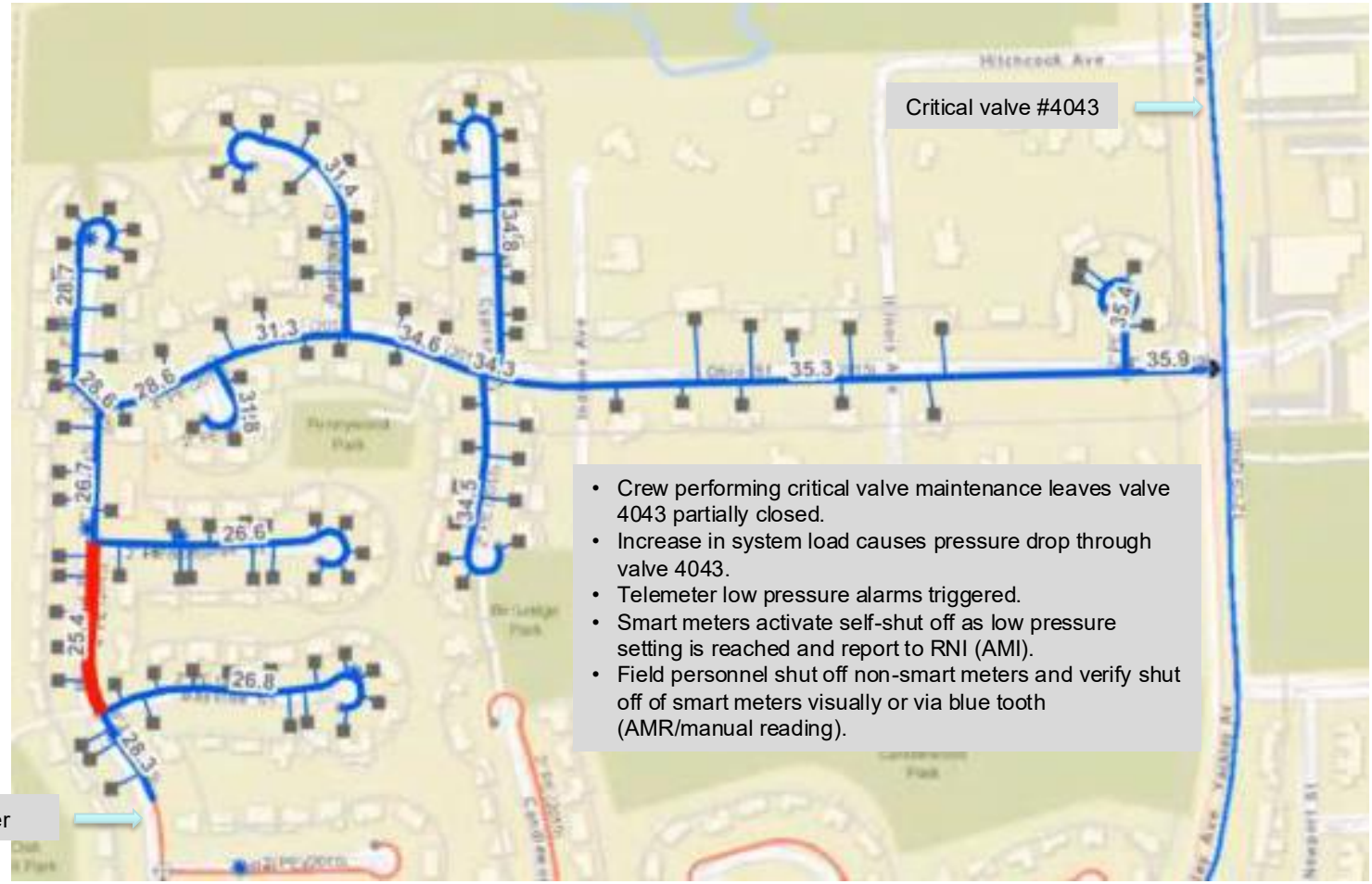
Load Curtailment



- Issue at compressor station leads to reduced feed during peak condition.
- System Engineering determines services that must be shut in order to keep adequate pressure at the telemeter to keep critical customers on-line.
- System Operations begins auto shut off of smart meters.(AMI)
- Field personnel shut off non-smart meters at the meter and smart meters via blue tooth (AMR/manual reading)

Telemeter

System under pressurization



- Crew performing critical valve maintenance leaves valve 4043 partially closed.
- Increase in system load causes pressure drop through valve 4043.
- Telemeter low pressure alarms triggered.
- Smart meters activate self-shut off as low pressure setting is reached and report to RNI (AMI).
- Field personnel shut off non-smart meters and verify shut off of smart meters visually or via blue tooth (AMR/manual reading).

FINAL THOUGHTS