



## OVERFILL DIAGNOSTIC INSTRUMENT



### World LP Gas Association GLOTEC

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# Today's Objectives

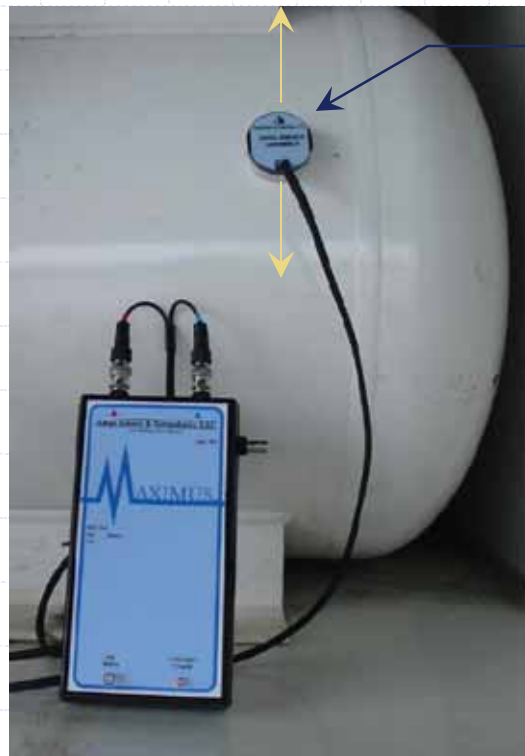
- Introduce Maximus™ Overfill Diagnostic Instruments
- Recap PERC-funded project (Docket 11653) at VIA Metropolitan Transit (VIA) in San Antonio, TX
- Show how the Maximus™ instrument fits with the Railroad Commission of Texas' LP Gas Safety Rule 8.2.3 (1)

# Maximus™ Overfill Diagnostic Instruments

- Non-invasively detect liquid presence
- Eliminate need to open outage gauge while refueling
- Diagnose defective Overfill Protection/Prevention Devices (OPDs)
- Verify OPD performance/functionality
- Operator friendly (designed with end-user input)

# Maximus™ Overfill Diagnostic Instruments

Single Channel Device



Magnetic sensor slides up and down to find liquid level

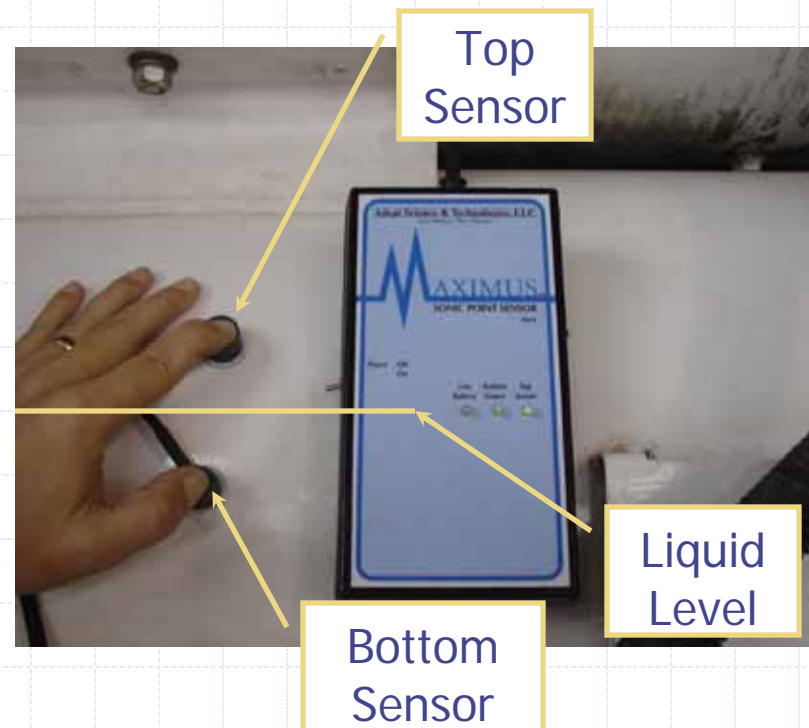
Permanently attached sensors straddle 80% volume level

Dual Channel Device

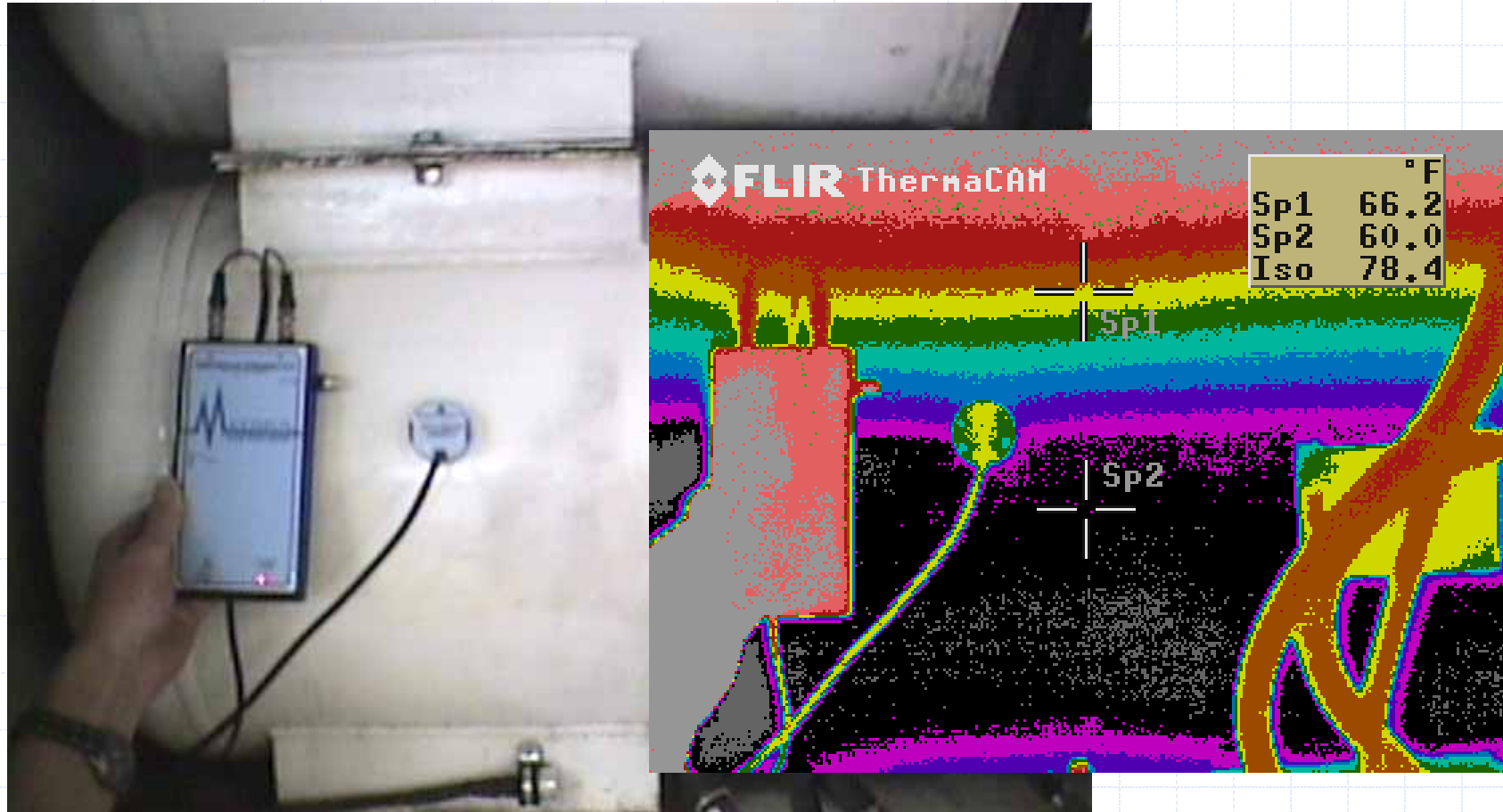


# Dual Channel Function

- Transducers are placed above and below 80% fill level
- Reading taken immediately after fill
- Two green LEDs = OPD worked
- Top sensor LED is red = OPD failed

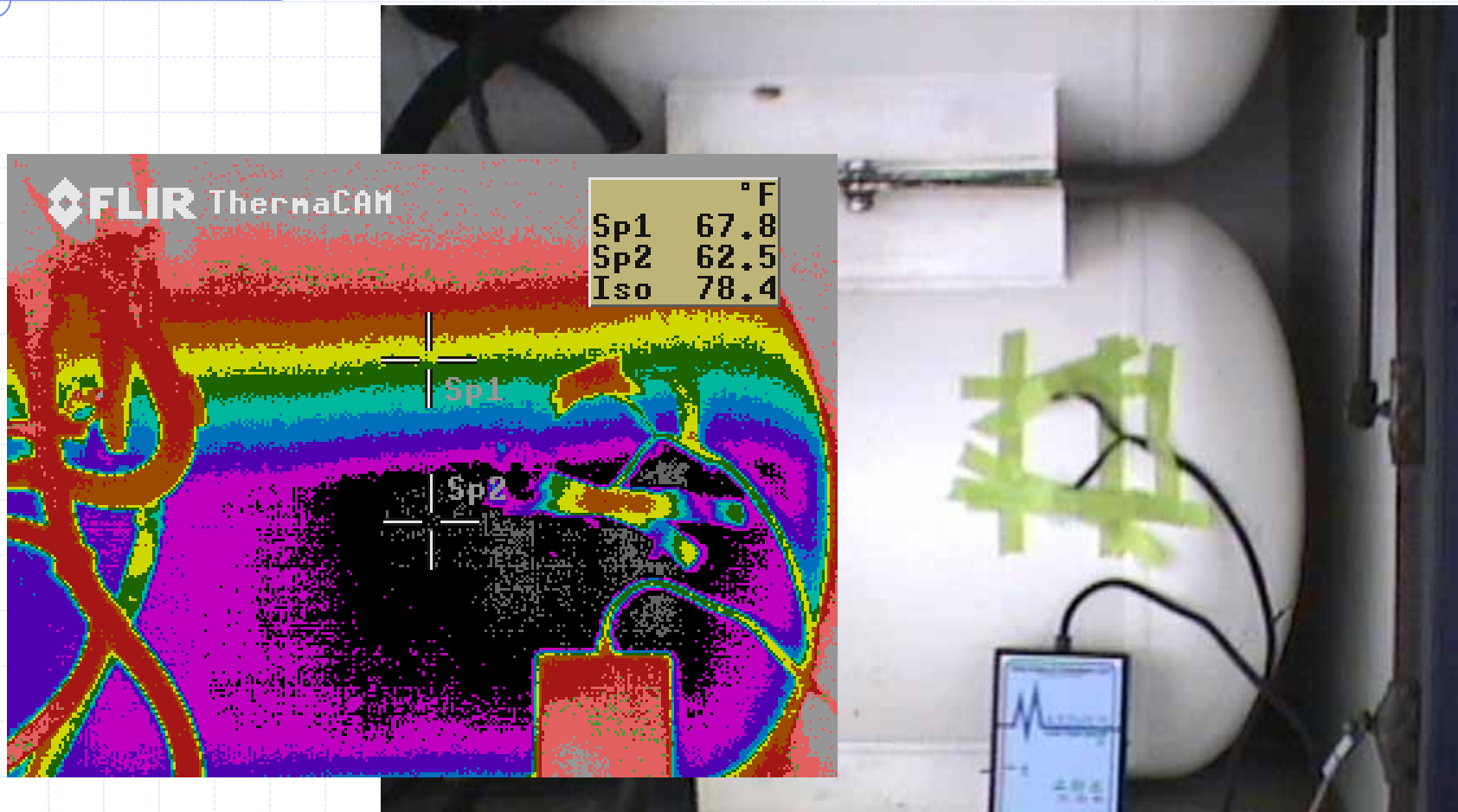


# Single Channel Test with IR Camera on Bus' Rear Tank





# Dual Channel Test with IR Camera on Bus' Rear Tank



# PERC Funded Project at VIA

- Project Duration: July 2005 - Oct. 2006
- PERC Grant: \$117,515
- ☑ Improve Design (electronics and sensor)
  - Scope Change (at end user request): verification rather than stop-fill function
- ☑ Permanently install transducer subassemblies on 20 VIA buses
- ☑ Deliver six Maximus™ Instruments
- ☑ Test fully integrated solution



# Additional Work

- In July 2006, single channel instrument received UL 913 certification – Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations
- Dual channel UL 913 certification - pending
- Report project results to Texas Railroad Commission (RRC) on October 26, 2006

## RRC's 8.2.3 (1) Rule (as of September 1, 2005)

“Where an overfilling prevention device is installed on an engine fuel container, **venting of gas** through a fixed maximum liquid level gauge **shall not be required** provided: 1. The **OPD is verified** by the owner of the vehicle **to be working properly**; 2. The **verification** of the valve is documented yearly and **clearly marked** on the container in a visible location; and 3. The OPD is replaced every two years...”

# Fleets Use of Maximus™ Instrument

- Permanently installed sensors on the tanks are triggered after each refill. Thus, OPD's functionality is verified.
- Defective OPDs are flagged
- Use of the Maximus™ instrument can be readily documented by technician
- Document replacement of failed OPDs

# Texas RRC Use of Maximus™ Instrument

- Keep outage gauge open during filling
- Keep track of gallons delivered past liquid indication
- Sensor is moved up and down to find liquid level post-fill
- Measure arc length from top of tank to liquid level
- Compare findings with manufacturer tolerances (e.g. Slegers Engineering)

Measuring Arc Length from Top Weld to Liquid Level



Liquid Level Detected by Maximus™

Magnetic Sensor

# Data Collected June 2006

<b>Test Results Summary</b>	
# of Buses Investigated	28
# of Tanks Filled	69
OPD Failures	7% (5/69)
OPD Function post outage*	12% (8/69)

\* OPD triggered past 78% full, but within manufacturer tolerance



# Thank You



Q & A