UST Inspector Training Webinar Series

Automatic Tank Gauges

8/6/2019

Moderated by Drew Youngs

UST/LUST Program Manager, NEIWPCC

dyoungs@neiwpcc.org

Today's Speakers

Marcel Moreau

Principal, Marcel Moreau Associates

Ben Thomas

President, UST Training

Jon Kelly

Founder & CEO, Canary Compliance

Justin Whitfield

Business Analyst, Canary Compliance

Why ATGs?


TS-1001 TANK SENTINEL®
INCON
INTELLIGENT CONTROLS
POWER
WARNING
ALARM
SPACE

Why ATGs?

Parts of a Tank Gauge

Console

Parts of a Tank Gauge

Probe

Console

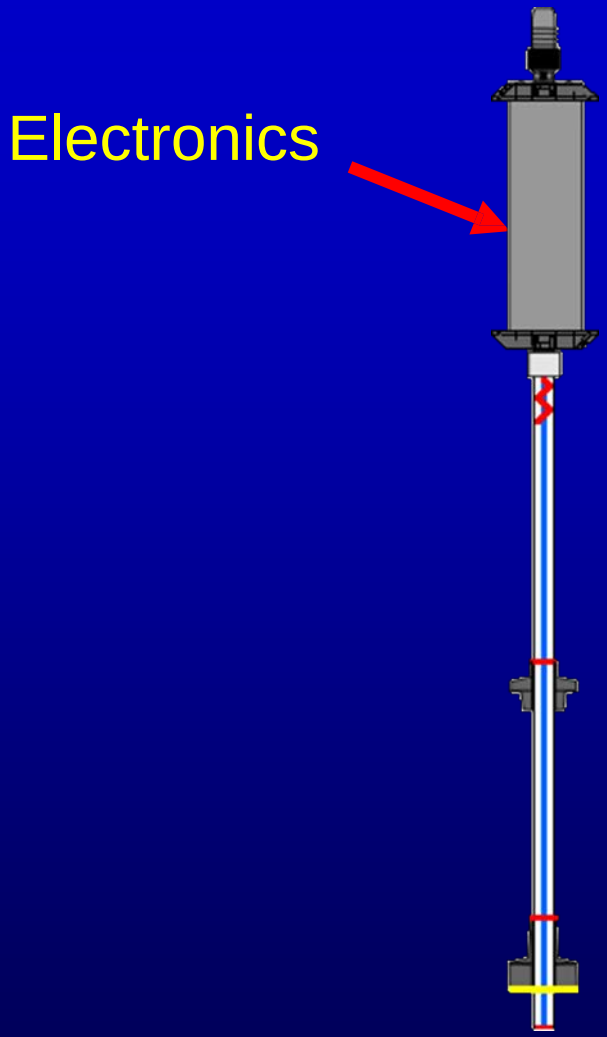
Mag Probe – How it Works

"Mag"

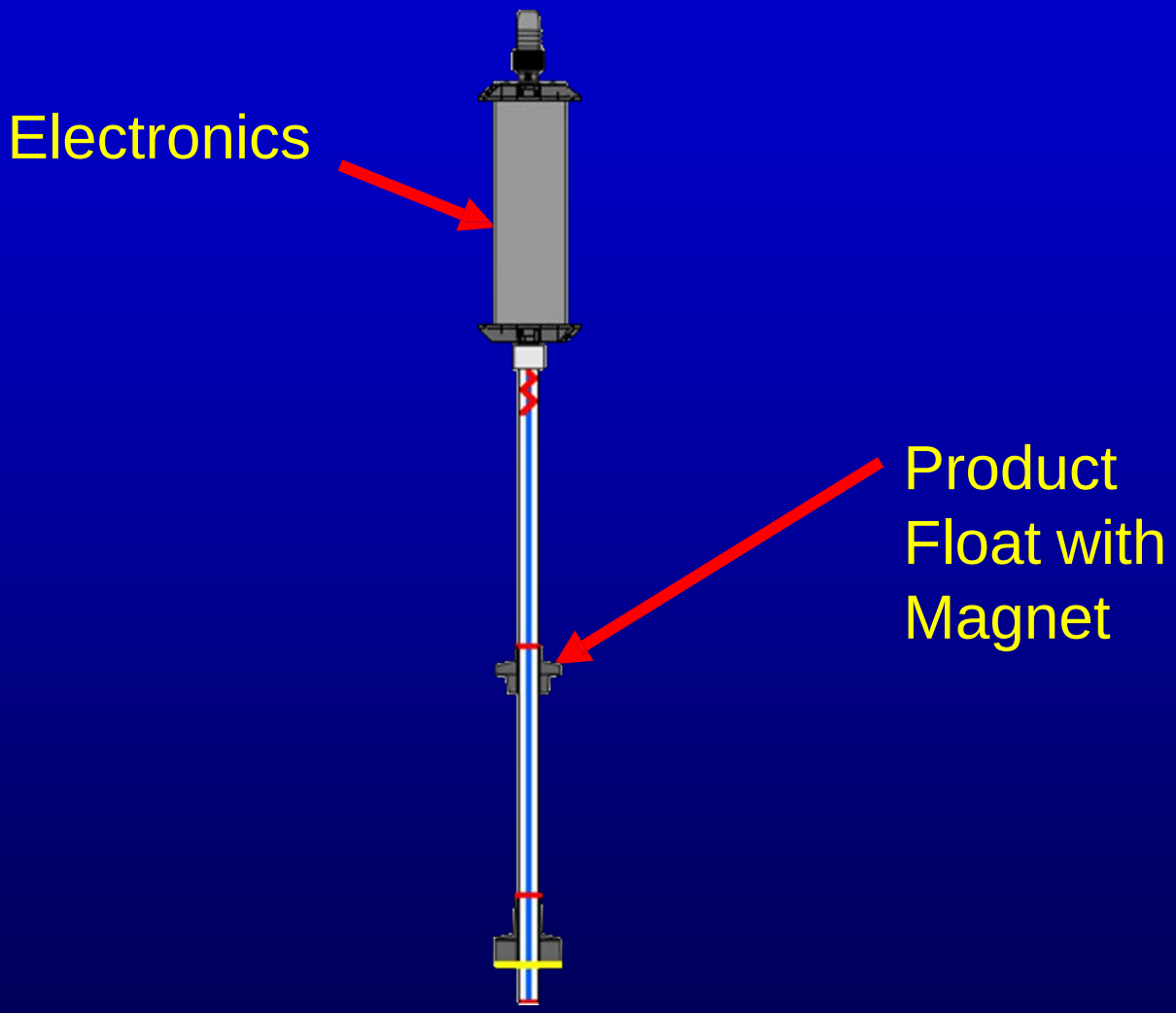
Short for

"Magnetostrictive"

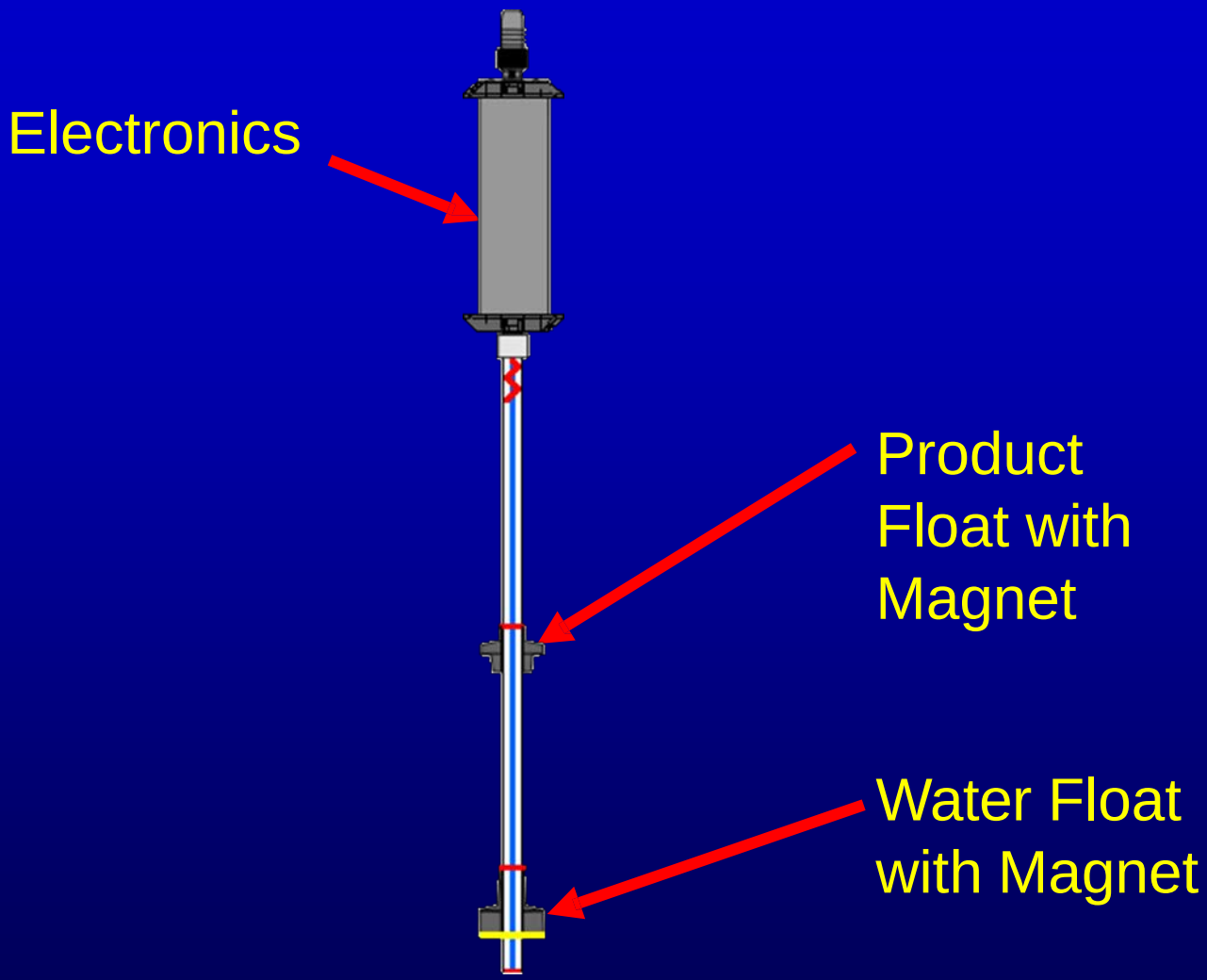
Mag Probe – How it Works



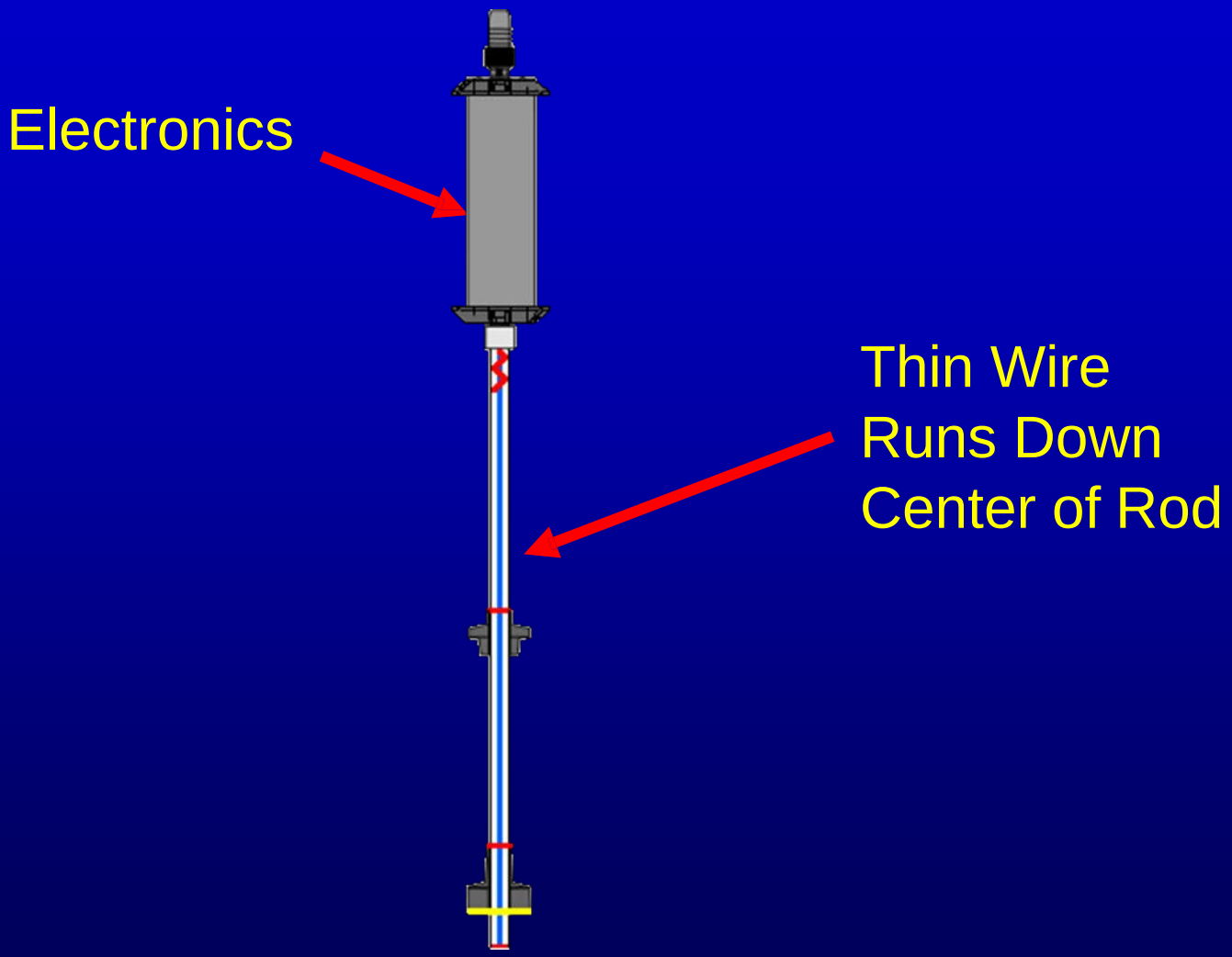
Mag Probe – How it Works



Mag Probe – How it Works

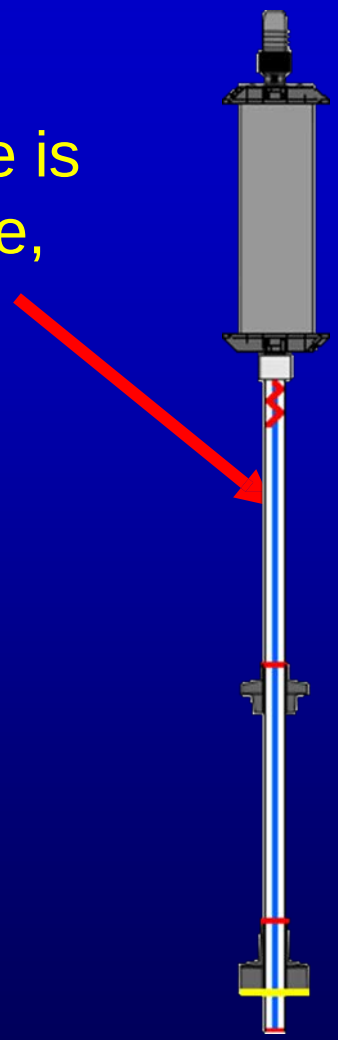


Mag Probe – How it Works



Mag Probe – How it Works

Short Electric Pulse is Sent Down the Wire, Creating Magnetic Field Around Wire



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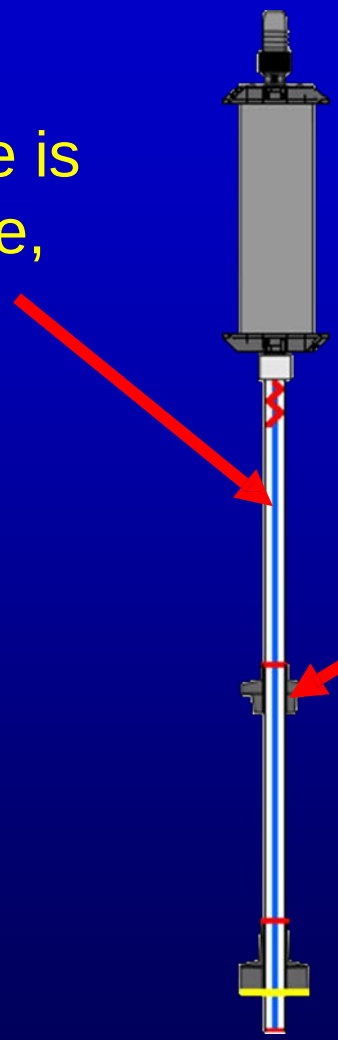
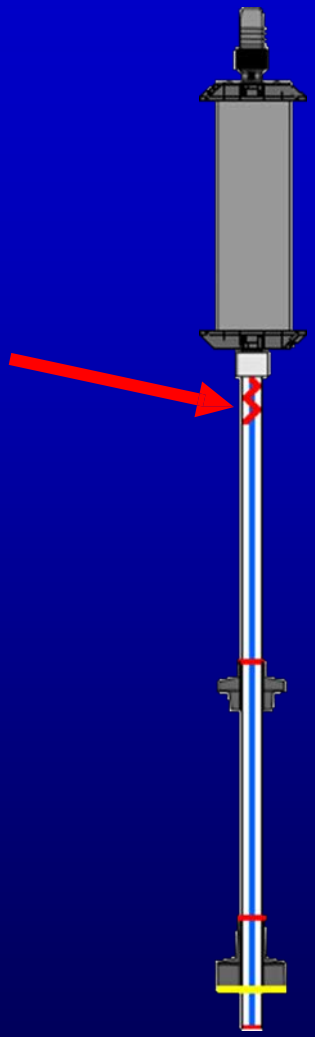


Magnetic Field Around Wire Interacts with Magnet in Float, Causing the Wire to Twist Slightly

Mag Probe – How it Works

This Twist Travels up the Wire and is Sensed by the Electronics



Mag Probe – How it Works

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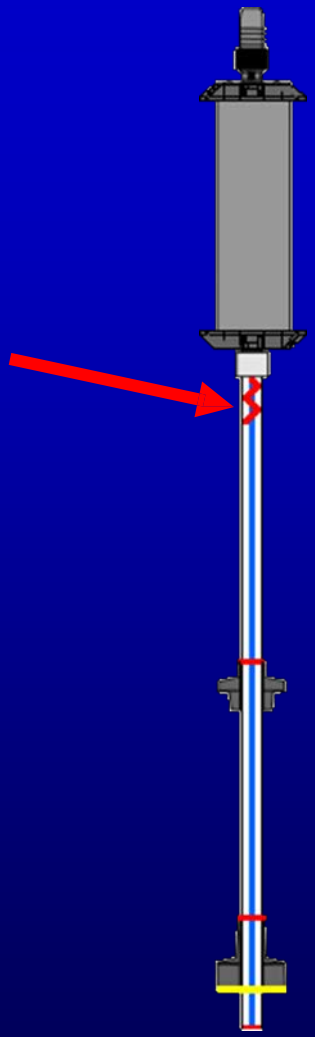
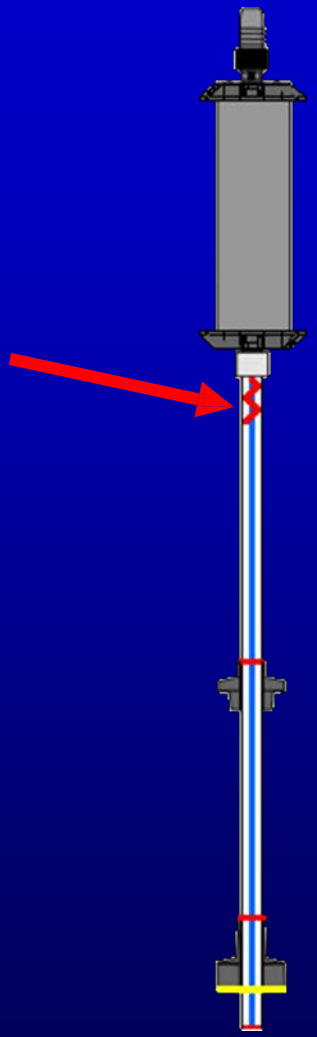


How Fast the Twist Travels Along the Wire was Measured at the Factory when the Probe was Made, and is Accurately Known

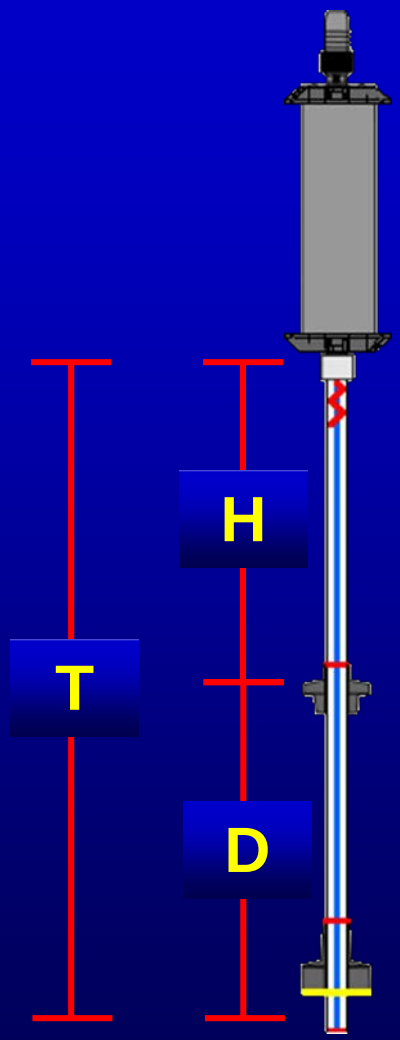
Mag Probe – How it Works

This Twist Travels up the Wire and is Sensed by the Electronics



The Time from when the Electric Pulse was Sent Down the Wire to the Arrival of the Twist at the Electronics is Measured and Converted to Distance

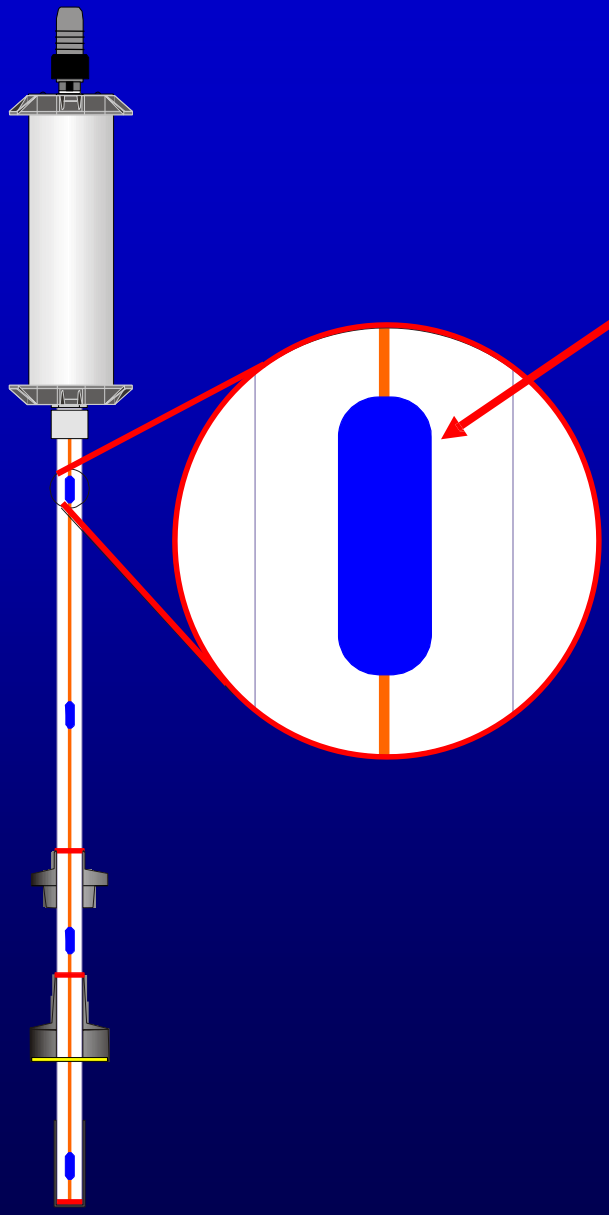
Mag Probe – How it Works



D = T - H

The Distance from the Float to the Electronics (**H**) is Subtracted from the Total Length of the Probe (**T**) to Give the Depth of Liquid (**D**)

Thermistors



Thermistors are placed at different positions along the probe to measure the temperature at specific depths.


GILBARCO
VEEDER-ROOT
09-14-05 2:36:34 PM
ALL FUNCTIONS NORMAL
ALARM
WARNING
POWER
EMC

Common ATG Abilities

Common ATG Abilities

- ✓ Product level, gross volume, net volume

Common ATG Abilities

- ✓ Product level, gross volume, net volume
- ✓ Water level, water volume

Common ATG Abilities

- ✓ Product level, gross volume, net volume
- ✓ Water level, water volume
- ✓ Ullage Volume, 90% ullage

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- ✓ Product level, gross volume, net volume
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- ✓ High water alarm
- ✓ Delivery needed, delivery volume

Common ATG Abilities

- ✓ Product level, gross volume, net volume
- ✓ Water level, water volume
- ✓ Ullage Volume, 90% ullage
- ✓ High/low product alarm,
- ✓ High water alarm
- ✓ Delivery needed, delivery volume
- ✓ Monthly leak detection (0.2 gph)

Common ATG Abilities

- ✓ Product level, gross volume, net volume
- ✓ Water level, water volume
- ✓ Ullage Volume, 90% ullage
- ✓ High/low product alarm,
- ✓ High water alarm
- ✓ Delivery needed, delivery volume
- ✓ Monthly leak detection (0.2 gph)
- ✓ Tightness test (0.1 gph)

ATG Leak Tests

Periodic

ATG Leak Tests

Periodic

No product dispensed during test period of several hours. Test data gathered while facility is closed – typically overnight.

ATG Leak Tests

Continuous

ATG Leak Tests

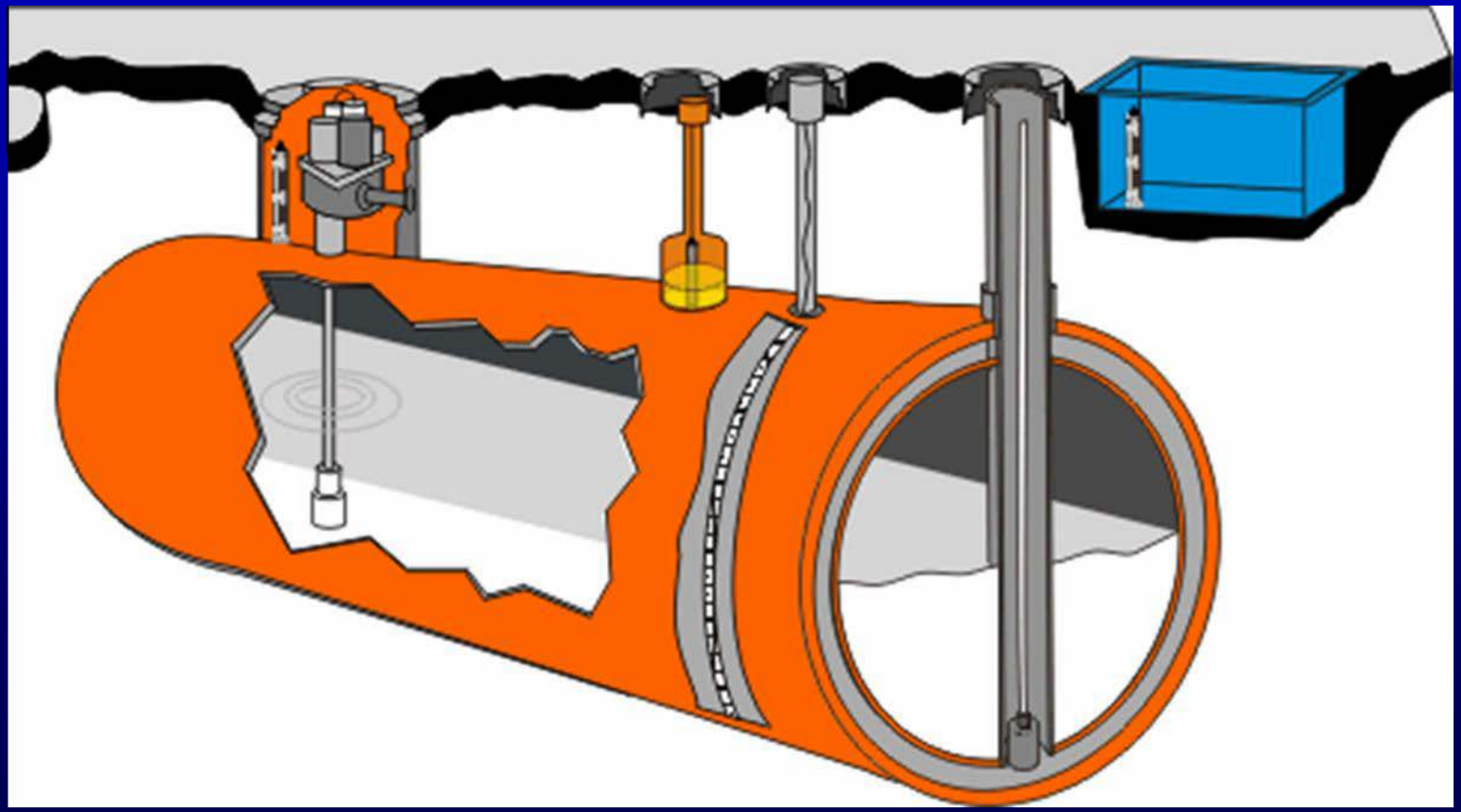
Continuous

No interruption of product dispensing. Test data gathered automatically during quiet intervals between dispensing events.

ATG Peripherals

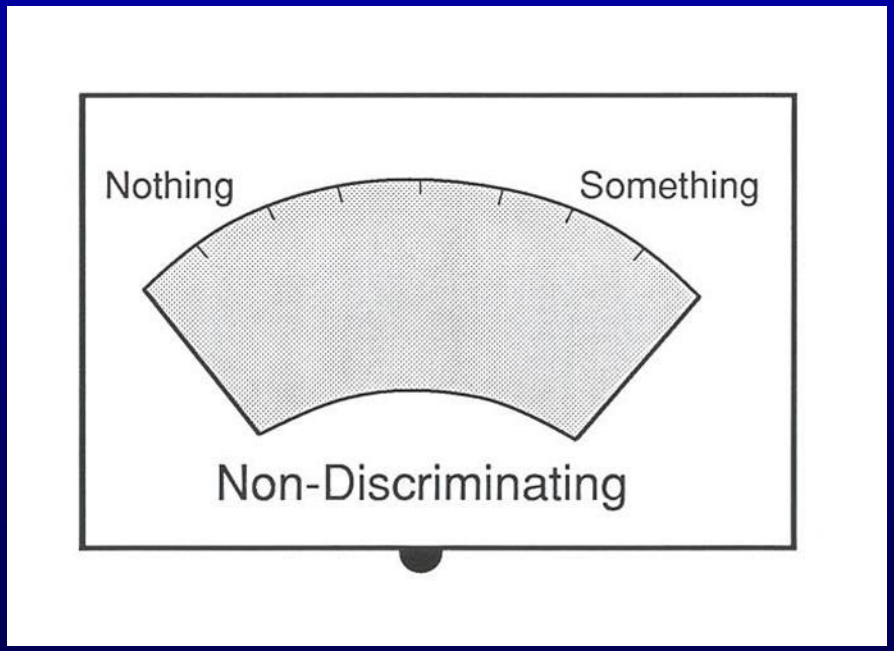
ATG Peripherals

- ✓ Sensors



ATG Peripherals

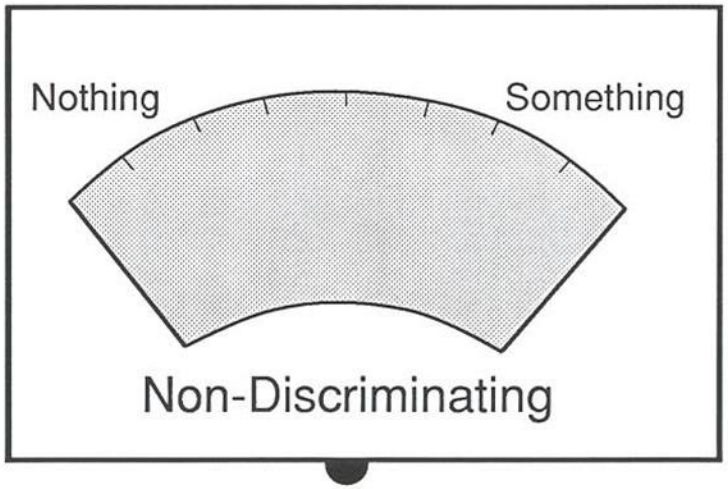
- ✓ Sensors
  - Non-Discriminating

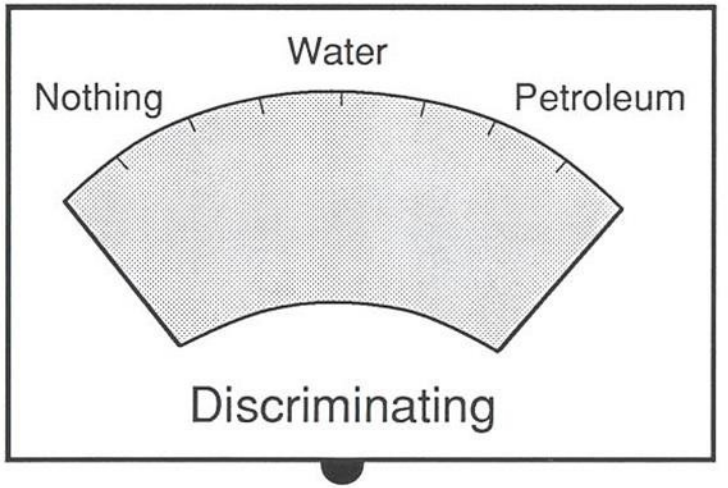


ATG Peripherals

✓ Sensors

- Non-Discriminating
- Discriminating



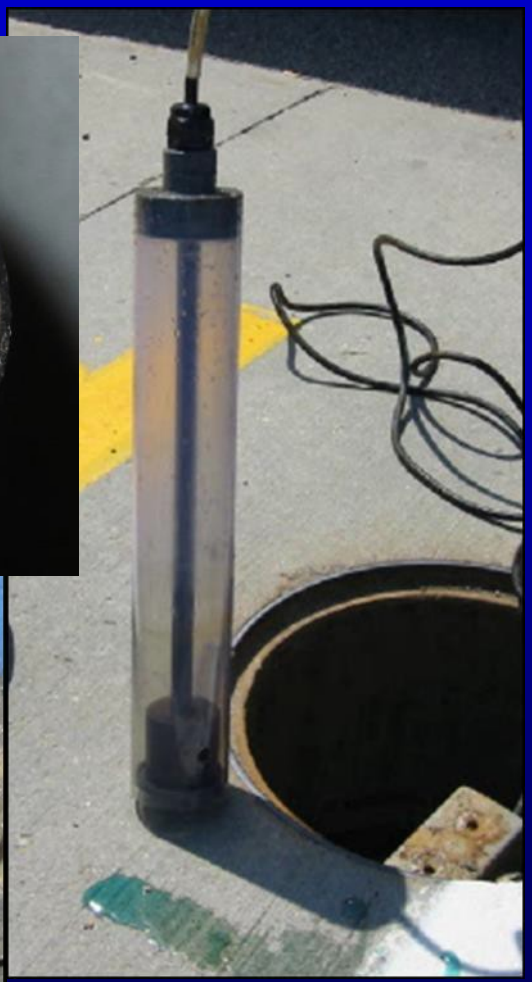


ATG Peripherals

- ✓ Sensors
  - Non-Discriminating
  - Discriminating
  - Ineffective

ATG Peripherals

- ✓ Sensors



ATG Peripherals

- ✓ Sensors

LUSTLine Bulletin 58 • September 2008

Tank-nically Speaking

by Marcel Moreau

Marcel Moreau is a nationally recognized petroleum storage specialist whose column, *Tank-nically Speaking*, is a regular feature of LUSTLine. As always, we welcome your comments and questions. If there are technical issues that you would like to have Marcel discuss, let him know at marcel.moreau@juno.com

MAKING SENSE OF SENSORS

Sensors are old hat to regulators in states where secondary containment has been required for a while, but implementation of the secondary-containment provisions of the 2005 Energy Act will introduce sensors in greater numbers to many more regulators, tank owners, and operators. So this seems like a good time to provide a primer on how the most common kinds of sensors used in UST systems today work. Along the way, I'll also touch on some the reasons why they may not work as well as they should.

In the late 1980s and early 1990s, there were many different types of UST sensors—dissolving strings, proximity switches, wires with dissolving insulation, vapor-sensing adsistors, and metal-oxide semiconductors. Most of these have gone the way of the dodo, although some still survive in isolated pockets of the country. In the interests of brevity and relevance, I'm going to limit this discussion to the technologies that I believe are most commonly used today.

What Is a Sensor?

In the UST world, sensors are devices that act as remote eyes to alert us to conditions of interest in the interstitial spaces of UST systems. These interstitial spaces include those between the walls of double-walled tanks and the insides of tank-top and under-dispenser sumps. Sensors are basically switches that are designed to automatically complete, interrupt, or modify an electrical circuit when certain conditions are present. In the UST world, these conditions prey is most often liquid—rainwater, groundwater, gasoline, diesel, or some related petroleum product. There are also a handful of vapor sensors and vacuum sensors out there, but they are not included in this article.

A Word About Compatibility

In these days where ethanol in fuel has become almost as pervasive as ethanol in taverns, compatibility of sensors with ethanol fuels is a factor that must be considered. A brief and unscientific survey I conducted of manufacturers' literature indi- that most sensors are compat- only a few

presence of a liquid, without indicating whether the liquid is product or water. Most discriminating sensors combine two separate sensor technologies, one that indicates that a liquid is present and a second technology that either responds only to product or can tell the difference between product and water.

It is important that facility operators know whether the sensors present at their facility are discriminating or nondiscriminating, because the alarm messages associated with non-discriminating sensors often err on the side of caution and indicate a "fuel alarm" even when only water is present. The all-too-frequent intru- tank-top sumps

location that could be … head office, a dedicated 24/7 moni- …ring center, or even a distant land … the planet. Most

The two main … sensors are discriminating and non-discriminating. Discriminating sen- … tell the difference

… that each "fuel alarm" requi… diate investigation to determine the … of the liquid that is pres- … willing to

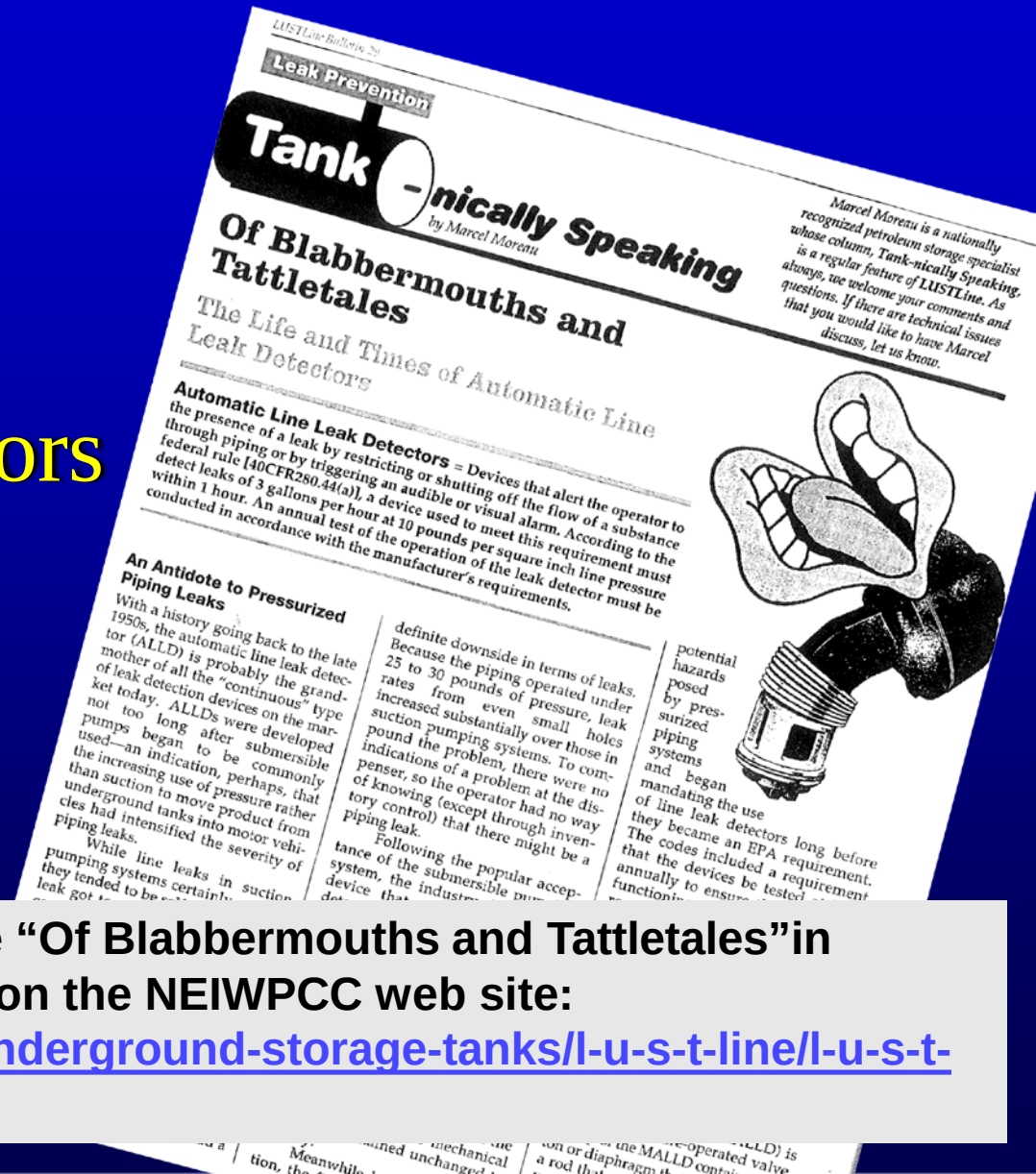
For more information on sensors, see "Making Sense of Sensors"in LUSTline #58, September 2008 available on the NEIWPCC web site: http://neiwpcc.org/our-programs/underground-storage-tanks/l-u-s-t-line/l-u-s-t-line-archive/

ATG Peripherals

- ✓ Sensors
- ✓ Line leak detectors

ATG Peripherals

- ✓ Sensors
- ✓ Line leak detectors



Leak Prevention

Tank-nically Speaking

by Marcel Moreau

Of Blabbermouths and Tattletales

The Life and Times of Automatic Line Leak Detectors

Marcel Moreau is a nationally recognized petroleum storage specialist whose column, Tank-nically Speaking, is a regular feature of LUSTLine. As always, we welcome your comments and questions. If there are technical issues that you would like to have Marcel discuss, let us know.

Automatic Line Leak Detectors = Devices that alert the operator to the presence of a leak by restricting or shutting off the flow of a substance through piping or by triggering an audible or visual alarm. According to the federal rule [40CFR280.44(a)], a device used to meet this requirement must detect leaks of 3 gallons per hour at 10 pounds per square inch line pressure within 1 hour. An annual test of the operation of the leak detector must be conducted in accordance with the manufacturer's requirements.

An Antidote to Pressurized Piping Leaks

With a history going back to the late 1950s, the automatic line leak detector (ALLD) is probably the grandmother of all the "continuous" type of leak detection devices on the market today. ALLDs were developed not too long after submersible pumps began to be commonly used—an indication, perhaps, that the increasing use of pressure rather than suction to move product from underground tanks into motor vehicles had intensified the severity of piping leaks.

While line leaks in suction pumping systems certainly ... they tended to be ... leak got ...

definite downside in terms of leaks. Because the piping operated under 25 to 30 pounds of pressure, leak rates from even small holes increased substantially over those in suction pumping systems. To compound the problem, there were no indications of a problem at the dispenser, so the operator had no way of knowing (except through inventory control) that there might be a piping leak.

Following the popular acceptance of the submersible pump system, the industry ... device that ...

potential hazards posed by pressurized piping systems and began mandating the use of line leak detectors long before they became an EPA requirement. The codes included a requirement that the devices be tested annually to ensure ...

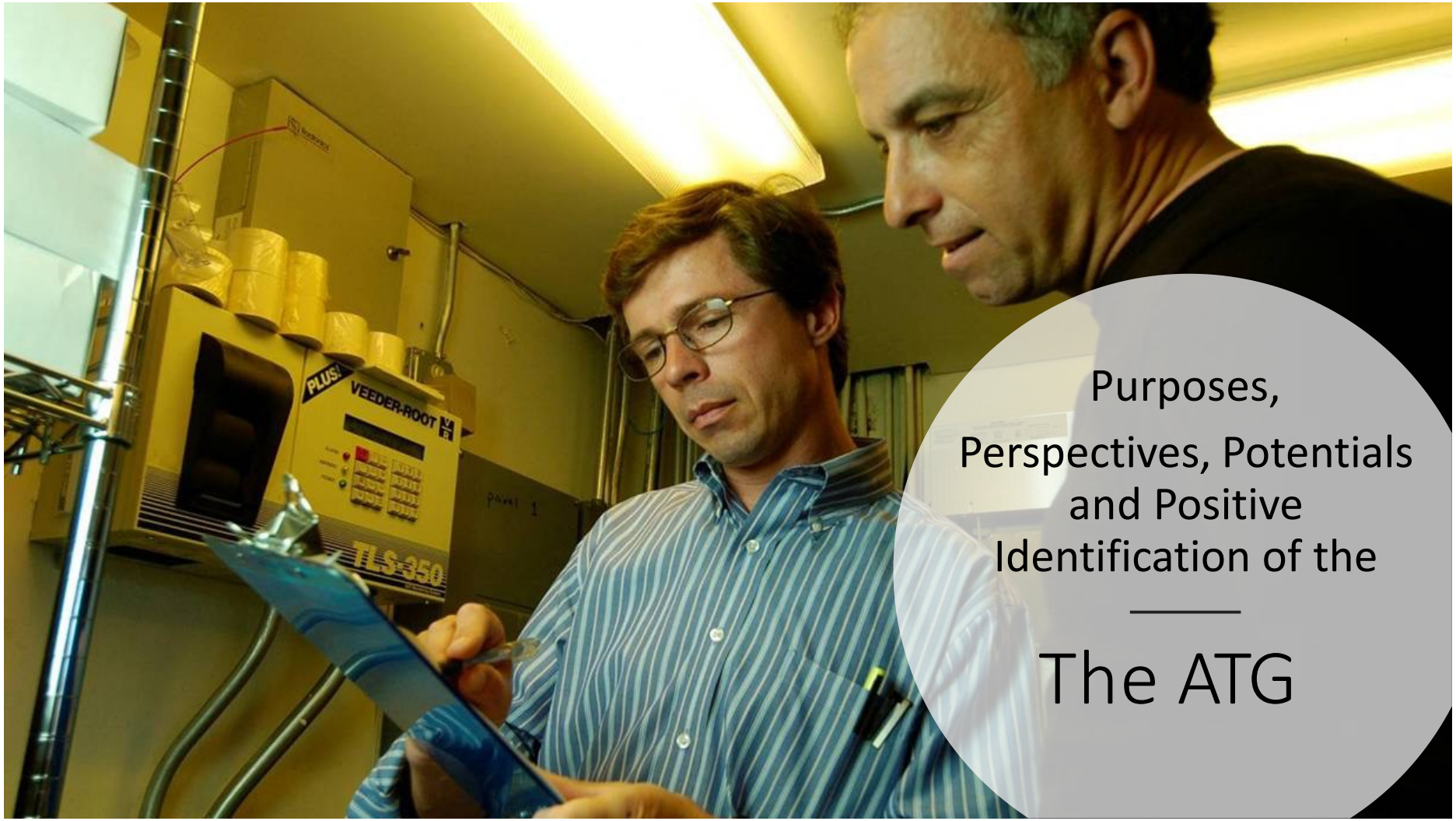
Meanwhile, ... mechanical ... unchanged ... tion, ... ALLD) is ... a rod ...

For more information on LLDs, see "Of Blabbermouths and Tattletales"in LUSTline #29, June 1998 available on the NEIWPCC web site:
http://neiwpcc.org/our-programs/underground-storage-tanks/l-u-s-t-line/l-u-s-t-line-archive/

ATG Peripherals

- ✓ Sensors
- ✓ Line leak detectors
- ✓ Remote communications

ATGs Come in Many Flavors



Purposes,

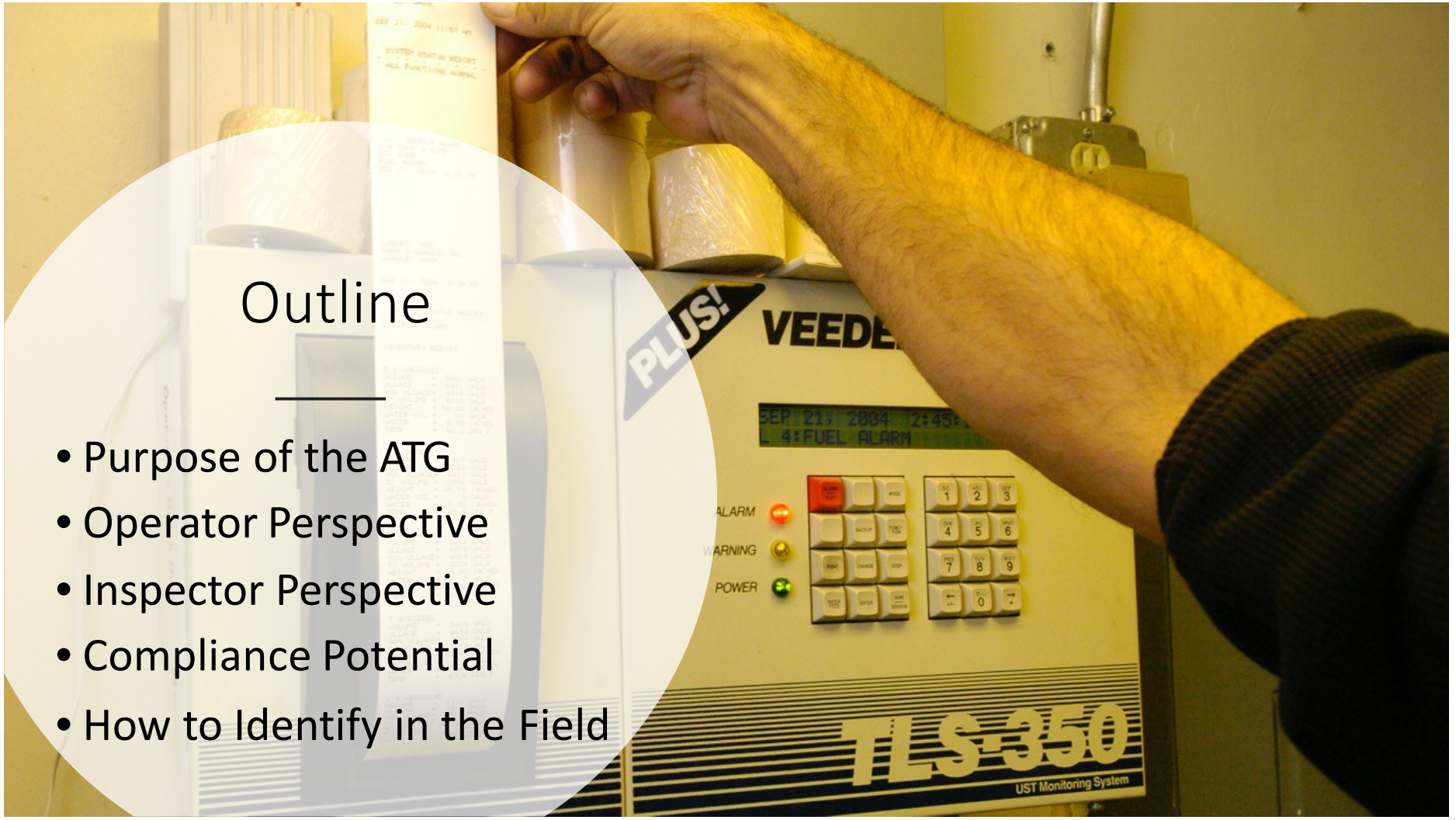
Perspectives, Potentials and Positive Identification of the

The ATG

Ben Thomas
UST Training
Clinton, WA

Outline

- Purpose of the ATG
- Operator Perspective
- Inspector Perspective
- Compliance Potential
- How to Identify in the Field



PURPOSE: The Automatic Tank Gauge is

A multi-purpose tool that can do many things

The brain of the UST system

The “box” that consolidates important information

Something the operator uses to manage their UST system

Something the inspector uses to confirm compliance

A device that comes in many shapes, sizes, colors and versions

Common names

- “The Veeder, The Incon, The Evo….”
- “That loud thing in the back”
- “The ATG”
- “Tank monitor”

PERSPECTIVE: What the Operator *probably knows* it does

- Checks fuel levels
- Checks water levels
- Checks sales activity
- Checks for ordering/ receiving fuel
- Checks to do inventory reconciliation
- Checks for alarms (maybe)
- Checks for leaks (hopefully)

PERSPECTIVE: What the Inspector *should know* it does

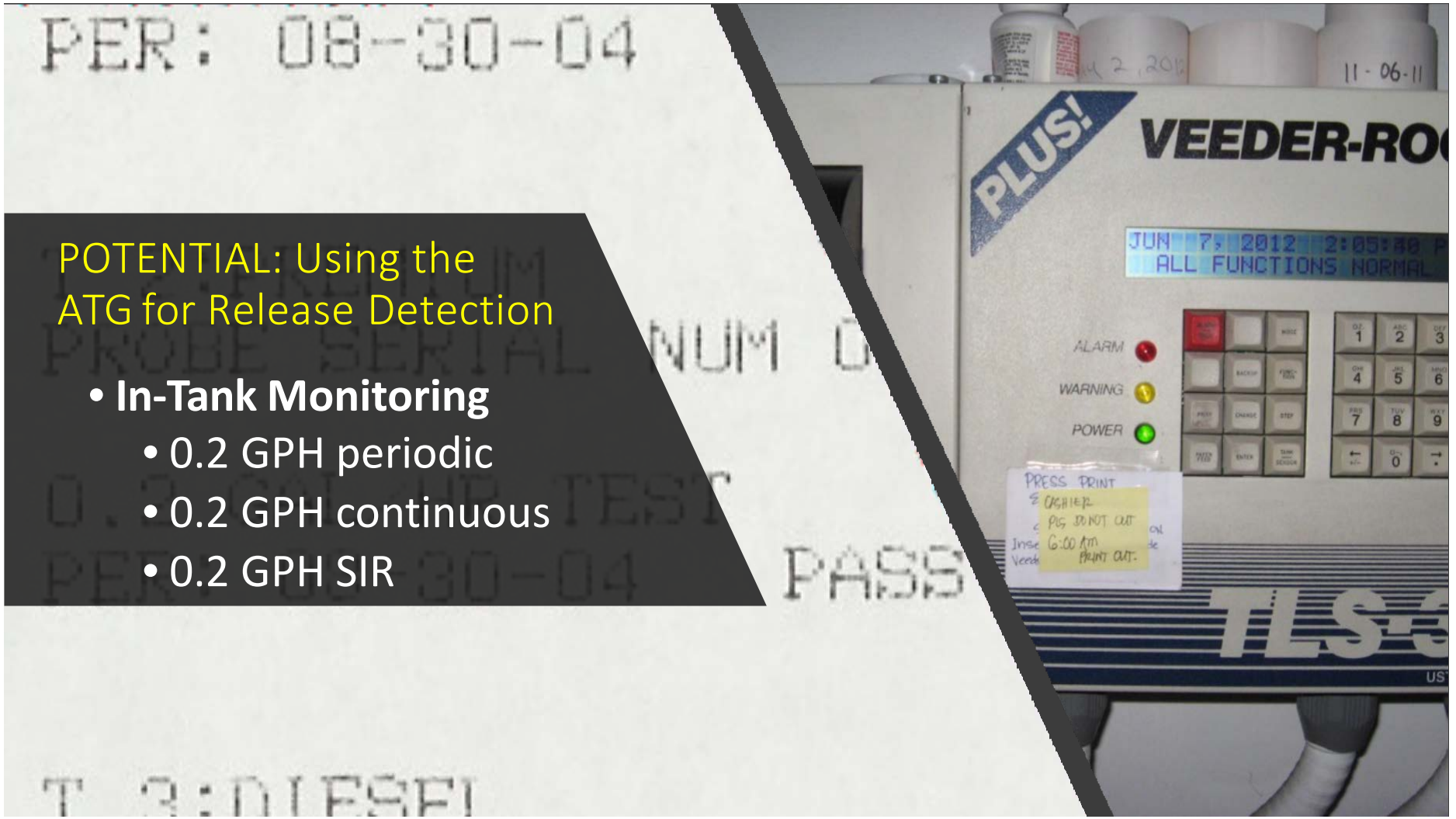
- Verifies interstitial monitoring compliance
- Verifies leak test compliance
- Verifies electronic line leak detection compliance
- Searches alarm history
- Verifies setup (third party certification)
- Verifies overfill alarm settings
- Verifies sensor set up

POTENTIAL: Using the ATG for Release Detection

- In-Tank Monitoring
- Interstitial Monitoring
- Line Pressure Testing

POTENTIAL: Using the ATG for Release Detection

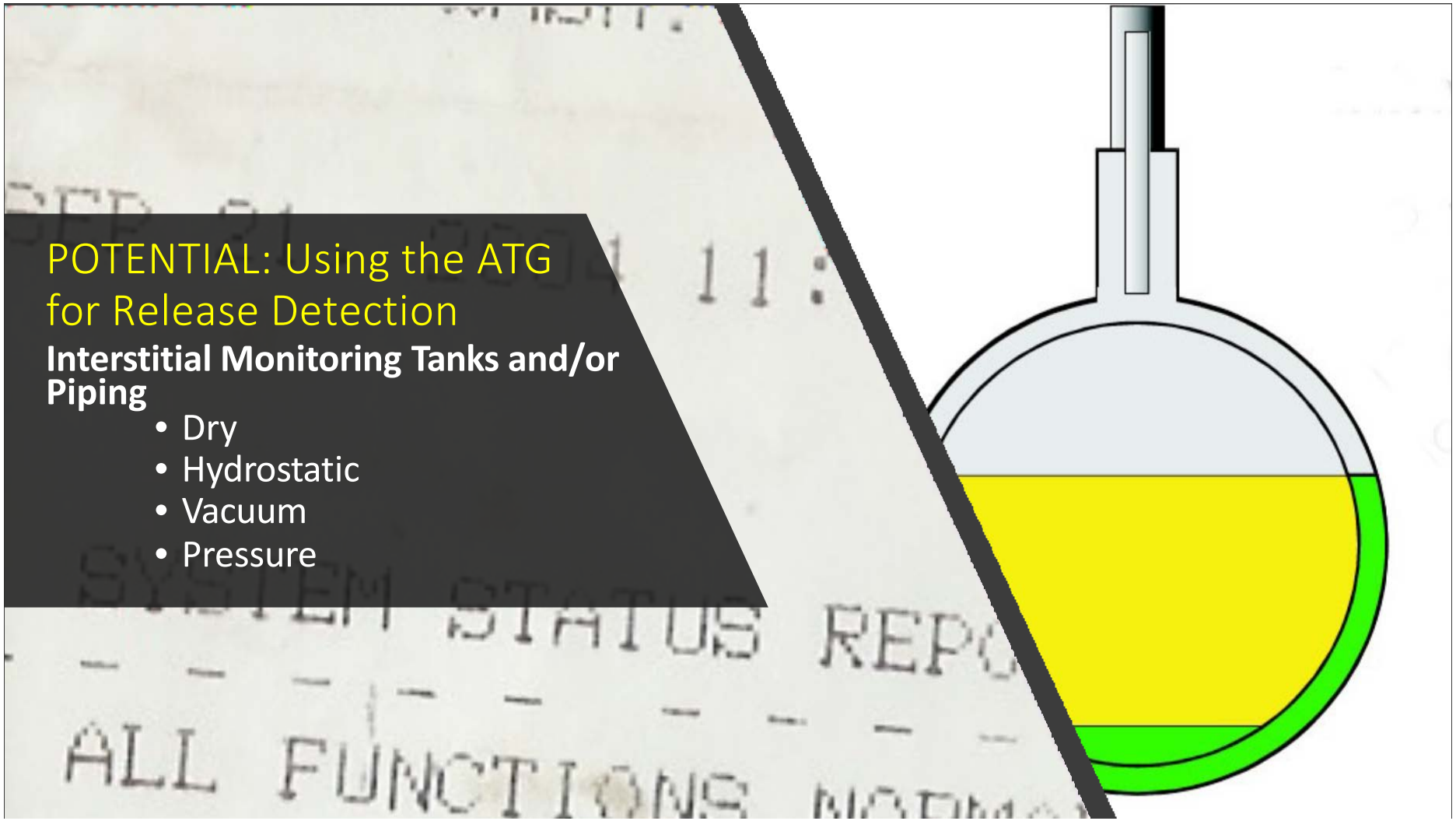
- **In-Tank Monitoring**
  - 0.2 GPH periodic
  - 0.2 GPH continuous
  - 0.2 GPH SIR

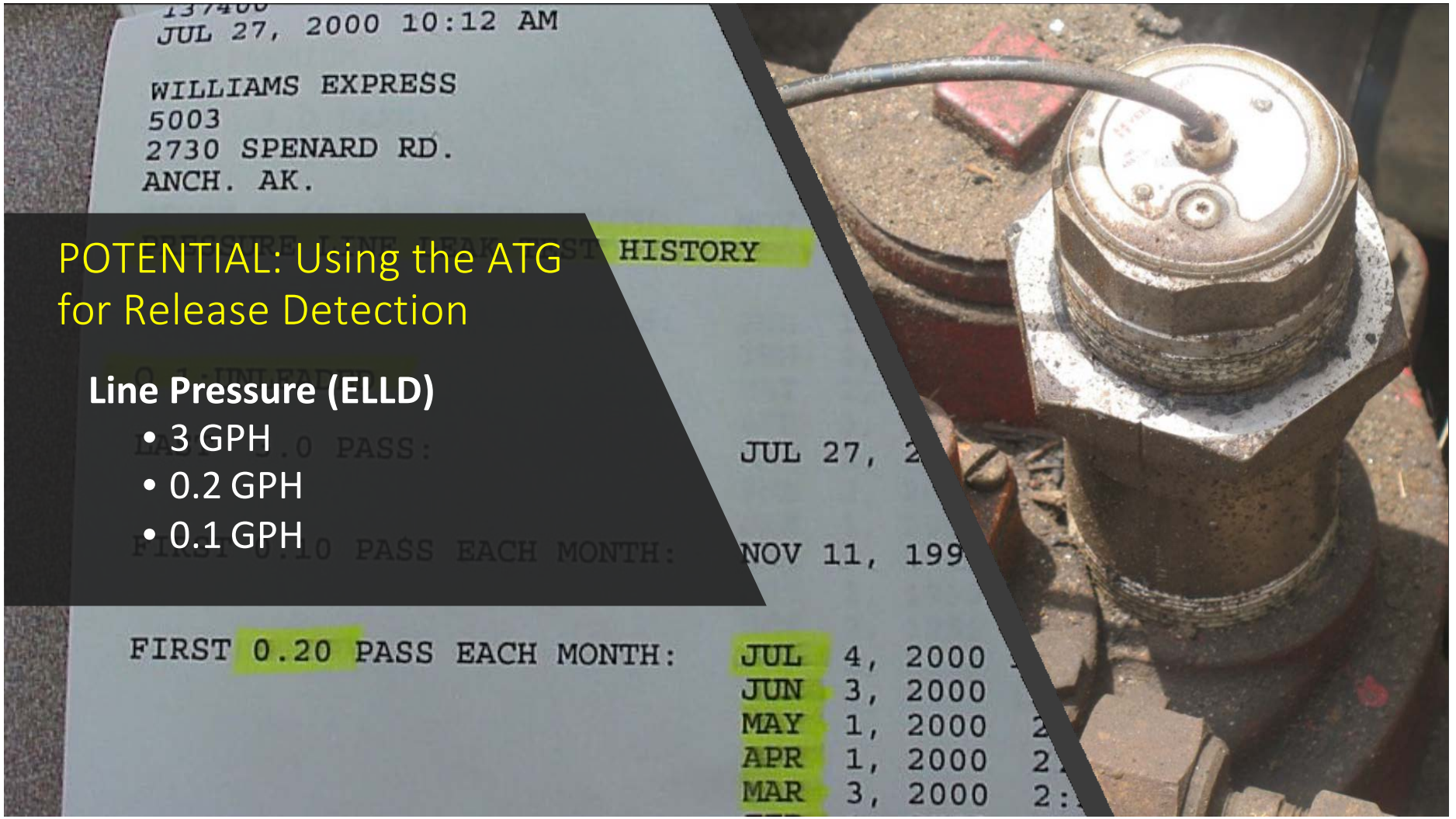


POTENTIAL: Using the ATG for Release Detection

Interstitial Monitoring Tanks and/or Piping

- Dry
- Hydrostatic
- Vacuum
- Pressure





POTENTIAL: Using the ATG for Release Detection

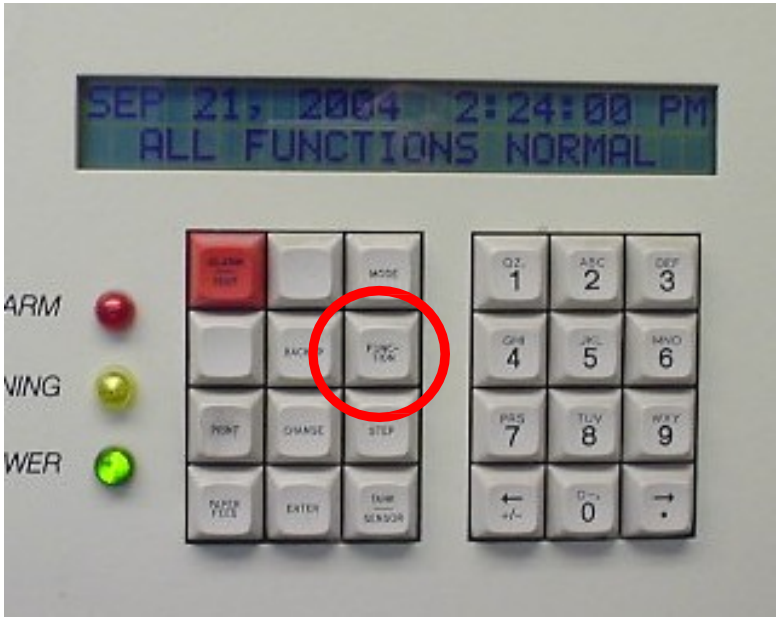
Line Pressure (ELLD)

- 3 GPH
- 0.2 GPH
- 0.1 GPH

More POTENTIAL:

- High and low level fuel alarms
- Probe and sensor identification and functionality
- Alarm and test result histories

Pro Tip: Hit the Veeder Root <Function> button to see what the ATG is programmed to do



- Hit Function a number of times
- Will tell if the UST system has
  - 0.2 GPH
  - CSLD
  - Interstitial
  - PLLDs
- Make sure you go back to All Functions Normal

ATG can tell us

Past: Alarm history *(what happened)*

Present: Functions and conditions *(what's happening)*

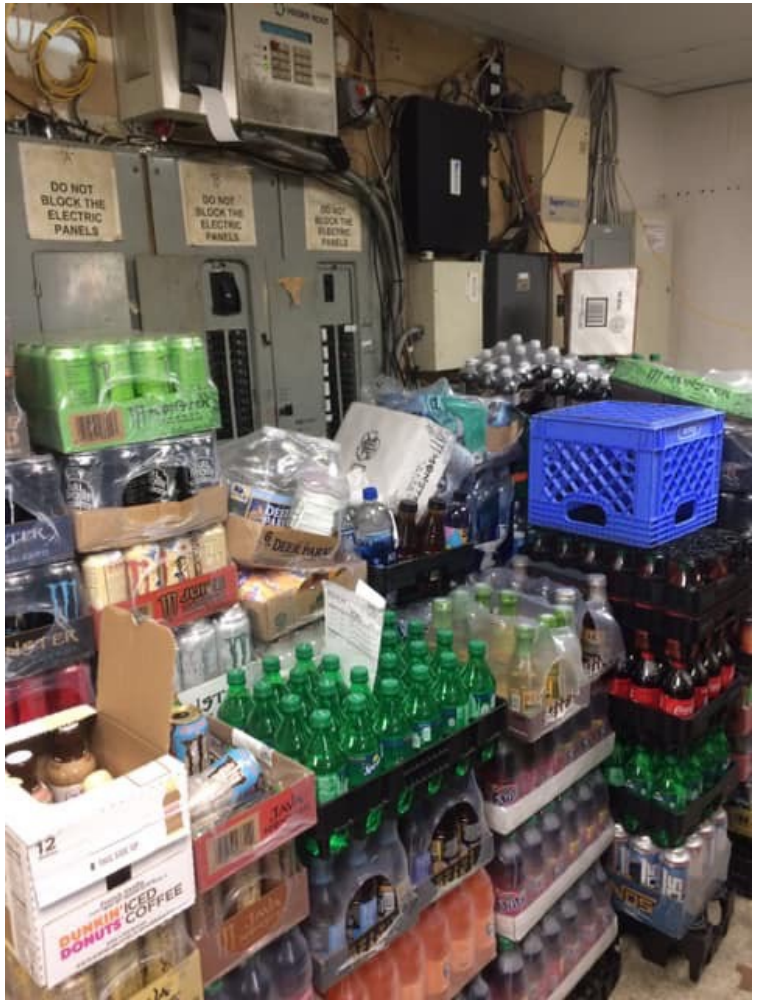
Future: Program settings *(what can happen)*

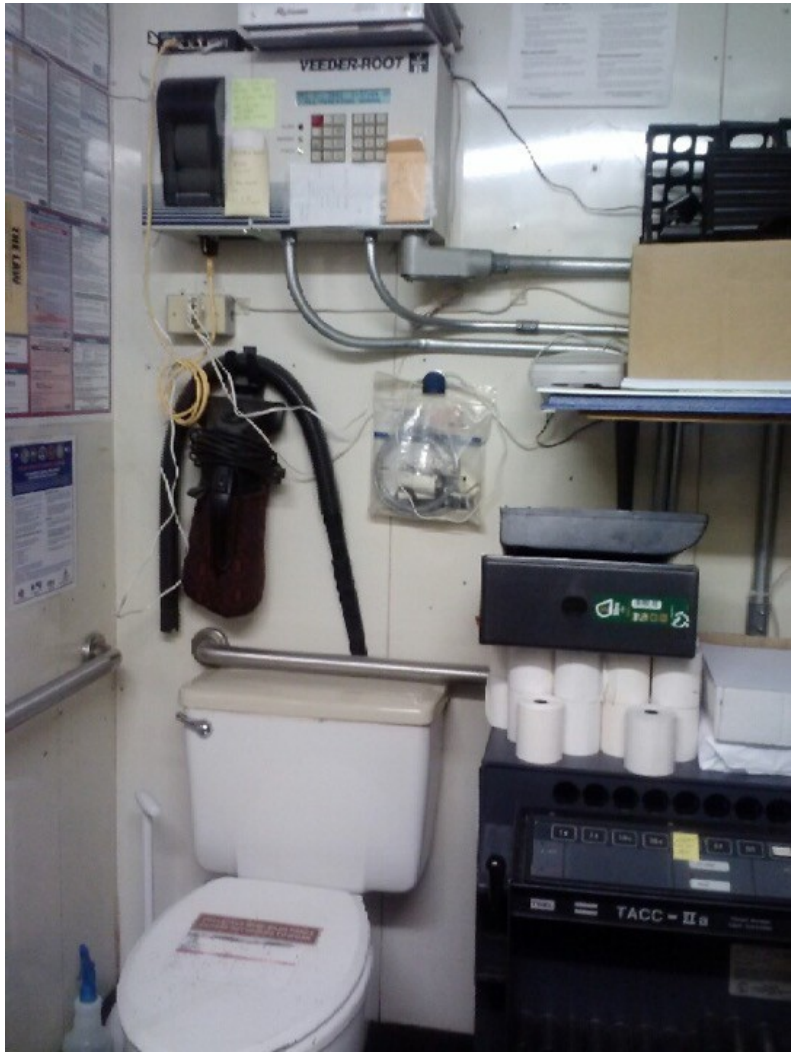
First Look for

- Brand name
- Model number
- Overall condition
- Internet connection
- Power
- Any alarms

Also look for

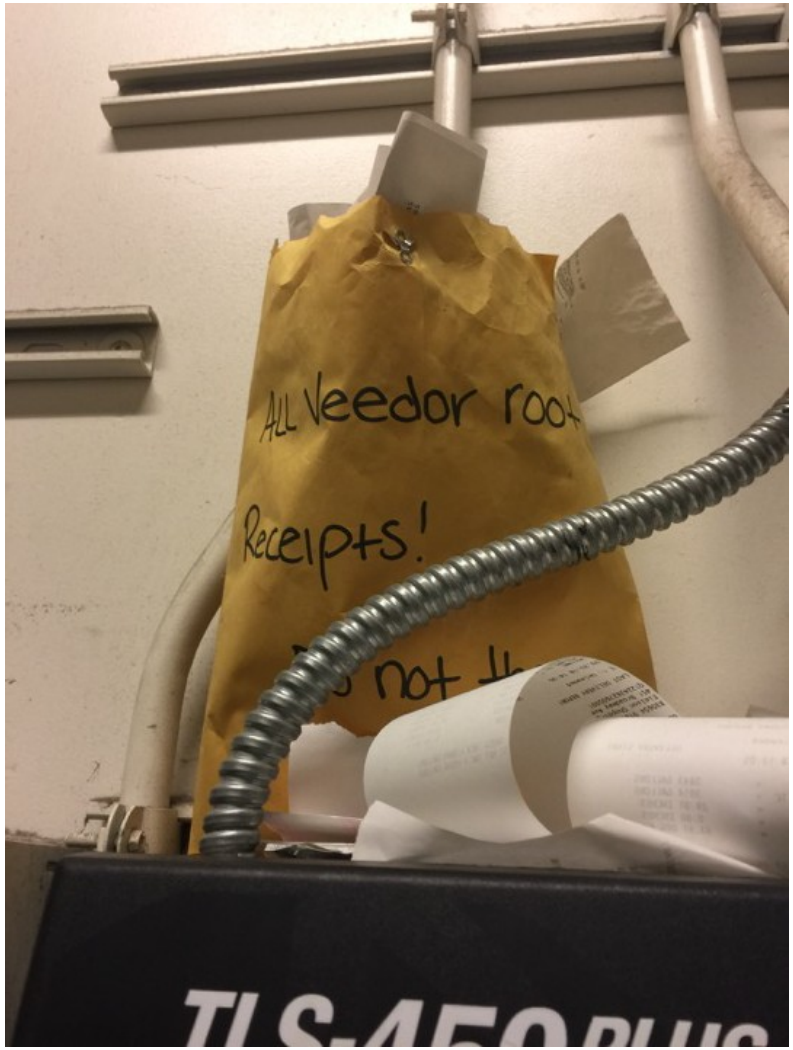
- Lights working
- Paper/printer
- Special “notes”
- User guide
- Blockage/access/ security

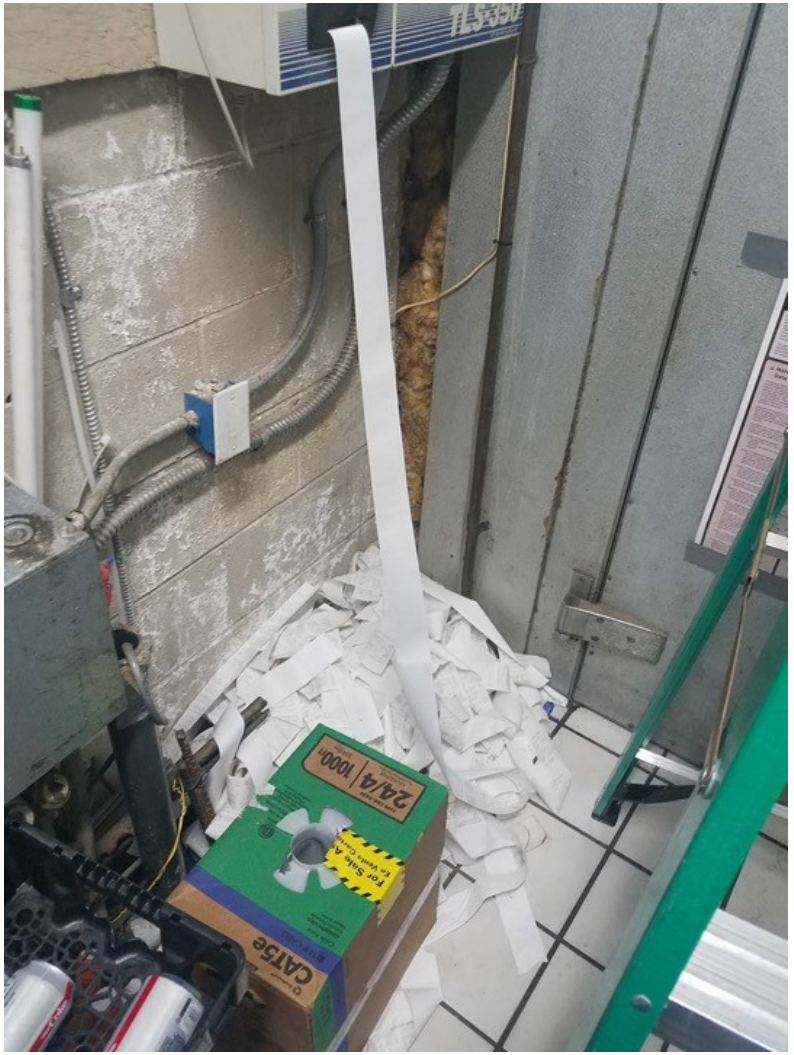



VEEDER-ROOT
TACC - II a


ATM
ATM
Prepaid
Phone Cards


VEEDER-ROOT
GLASS
mike's
hard
lemonade


ALL Veedor root
Receipts!


CAT5e
24/4 | 1000'

POSITIVE IDENTIFICATION: Name that ATG

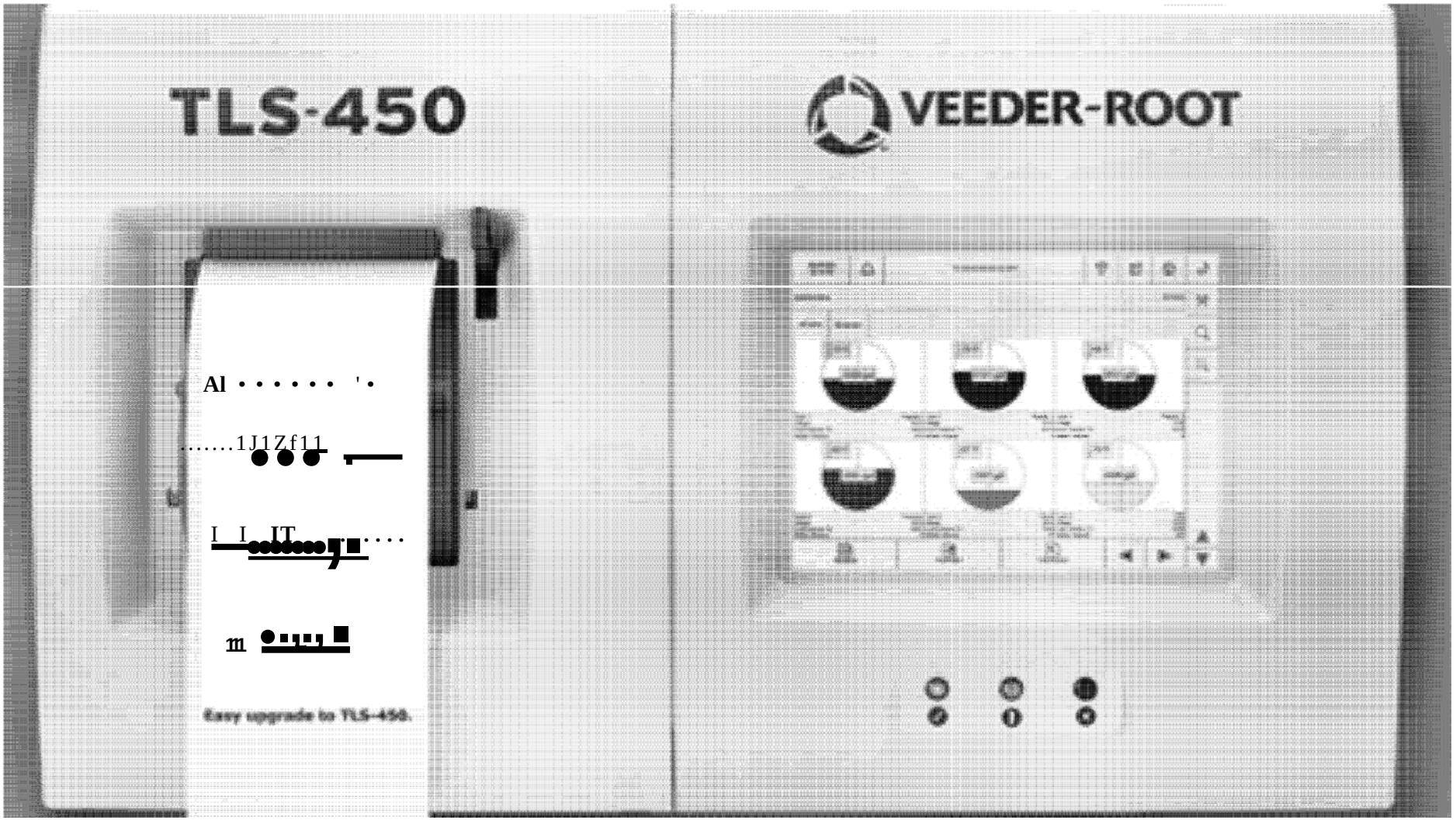

VEEDER-ROOT
ALARM
WARNING
POWER
TLS


Gilbarco
AUG 10, 2007 9:32:44 AM
ALL FUNCTIONS NORMAL
ALARM
WARNING
POWER
EMC
ENVIRONMENTAL MANAGEMENT CONSOLE


TLS-450PLUS
VEEDER-ROOT

TLS-450

VEEDER-ROOT




PLUS!
VEEDER-ROOT
TLS-350
RONAN
SERIES X76CTSI-N4
CONTINUOUS TANK MONITOR
2016/08/24


TS-550
Home
12/07/17
Print Inventory Report
Print Delivery Report
Regulator Report
Regulator Email


[FMS]/Reports
Inventory
Delivery
Tank T :J
Generator
Lmes
Regulatory
14:55
05/01/19
ALARM
WARNING
POWER
TS-550

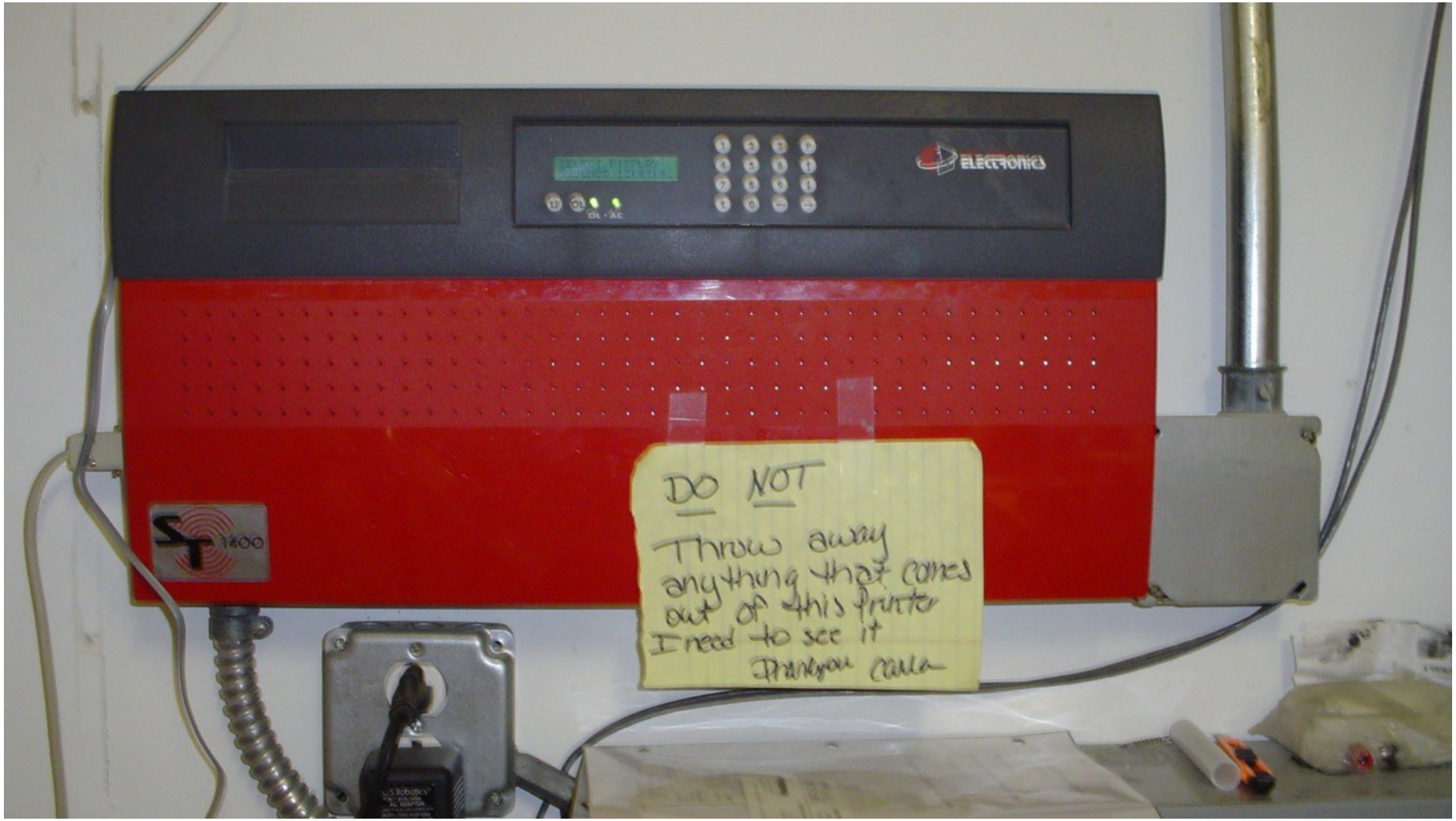

KEYBOARD MODE
COM
A1 PASSWORD?
LEAK TEST MODE
INCON
ENVIRONMENTAL CONTROLS DIVISION
TS-1000 EFI
524-8444
TANK SENTINEL®
INTERSTATE PUMP & TANK
IPT
1-800-323-8265 • 262-524-8494
• Full-line petroleum equipment distributor/building GC
• Design, Sales, Service, and Installation of aboveground and underground fuel systems
• Parts distribution (repair/maintenance)
GROSS
NET
LEVEL
CANCEL
ULLGE
WATER
TEMP
UP
CLOCK
ALARM
REPORT
DOWN
ACK
SHIFT
TEST
SETUP
ENTER
PAPER FEED

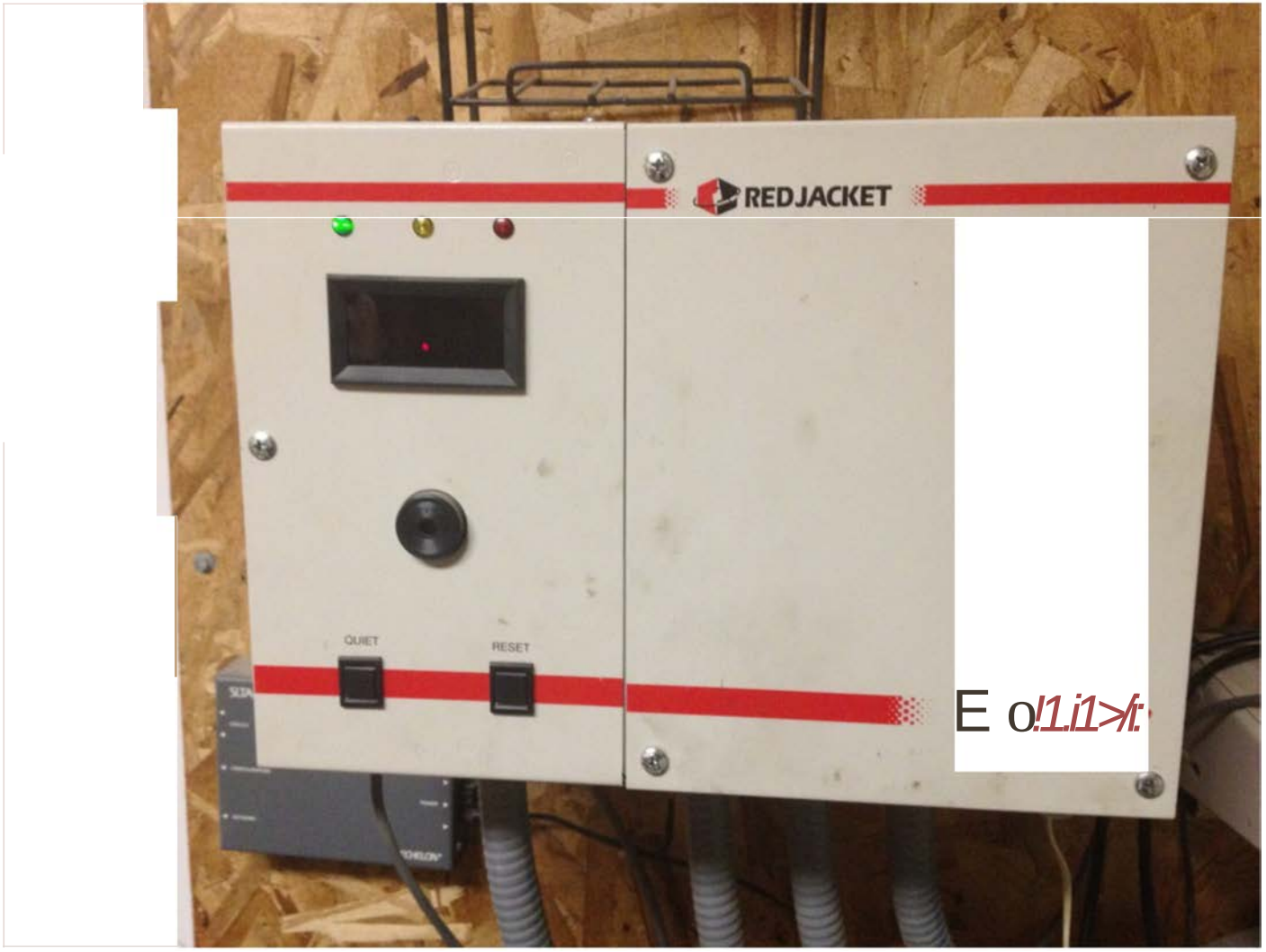

TS-1001 TANK SENTINEL
INCON


TS-LS300
Auto-Learn
Line Leak Detector
INCON
INTELLIGENT CONTROLS
POWER
REGULAR
PRODUCT
DIESEL
PRODUCT
PREMIUM
PRODUCT
Not In Use
PRODUCT
TEST / RESET
PRESSURE
HI
LO
PUMP ON
TEST
PASSED
ALARM
FAILED
Annunciator States / Conditions
If Alarm Sounds Call:
Annunciator Legend:
OFF (lamp is not illuminated)
ON (lamp is on-steady)
BLINK (lamp is on 1 sec. + off 1 second)
FLASH (lamp on 1/2 sec. + off for 4 sec.'s)
HORN (audible alarm sounds) *
N/A (lamp state is not applicable — ignore)


BX-TC-1
Temperature Sensor
Are your products protected?
REMOTE HIGH LEVEL ALARM
HORN SILENCE
The DataCheck Receiver and Portal
are located in an Igloo Trailer
OMNTEC
OEL8000 II TANK MONITORING SYSTEM
OK
FAULT
ALARM
PRINT
MENU
TEST
ACK
CURSOR LEFT
CURSOR RIGHT


PRINT MENU
1 Status
2 Tk Tests
3 Week Inv
4 Month Inv
Push num key
7 8 9
4 5 6
1 2 3
0 • ENTR
ALARM
POWER
CITIZ


DO NOT
Throw away
anything that comes
out of this printer
I need to see it
Thankyou Carla


REDJACKET
QUIET
RESET

FUEL OIL TANK MONITOR SYSTEM

EMC DSL TNK 01 (South)
EMC DSL TNK 02 (North)


PRINT REPORTS
LEAK TEST
PRINTER CONTROL
RUN PROG
CLR/SIL ALM
AUTOSTIK JR-4

More Resources

EPA manual, August 2000, EPA 510-B-00-009, Reference manual for UST inspectors, has detailed instructions on how to obtain reports

Tank Savvy Minute videos on YouTube for the Veeder Root TLS 350 and the Franklin EVO 550

Today's speakers

Jon Kelly Founder | CEO

Formerly with ExxonMobil

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Justin Whitfield Business Analyst

Former regulator (TX) and environmental analyst (7-11)

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Canary COMPLIANCE

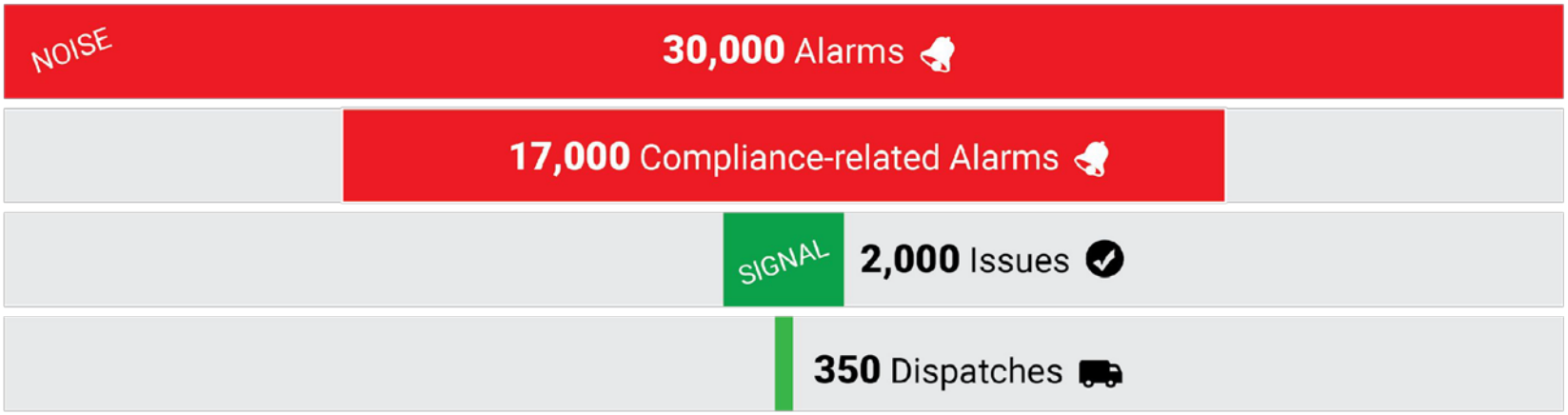
On average, how many ATG alarms occur per month at a retail facility?

- Less than 1
- Between 1 and 5
- Between 5 and 10
- Above 10

What impacts a site's risk profile?
Alarm volume

2018 study data

Over a 2 month period at 700 sites,
30,000 total unique ATG alarms occurred



Canary COMPLIANCE

On average, how long do ATG alarms remain active?

- Less than 1 day
- 1-2 days
- 2-7 days
- More than a week

What impacts a site's risk profile?
Alarm response time

2018-2019 study data

100 sites over six months

Excludes all alarms that were active for <24 hours

Alarm	How many times did this type of alarm occur?	On average, how many days was alarm active?
Tank CSLD Rate Increase Warning	12	17
Tank High Water Warning	13	6
PLLD Periodic Test Fail Alarm	13	5
Tank High Product Alarm	27	3
Sensor Fuel Alarm	26	3
PLLD Gross Test Fail Alarm	14	3
PLLD Shutdown Alarm	14	3
Tank No CSLD Idle Time Warning	22	2

Canary COMPLIANCE

True or False?

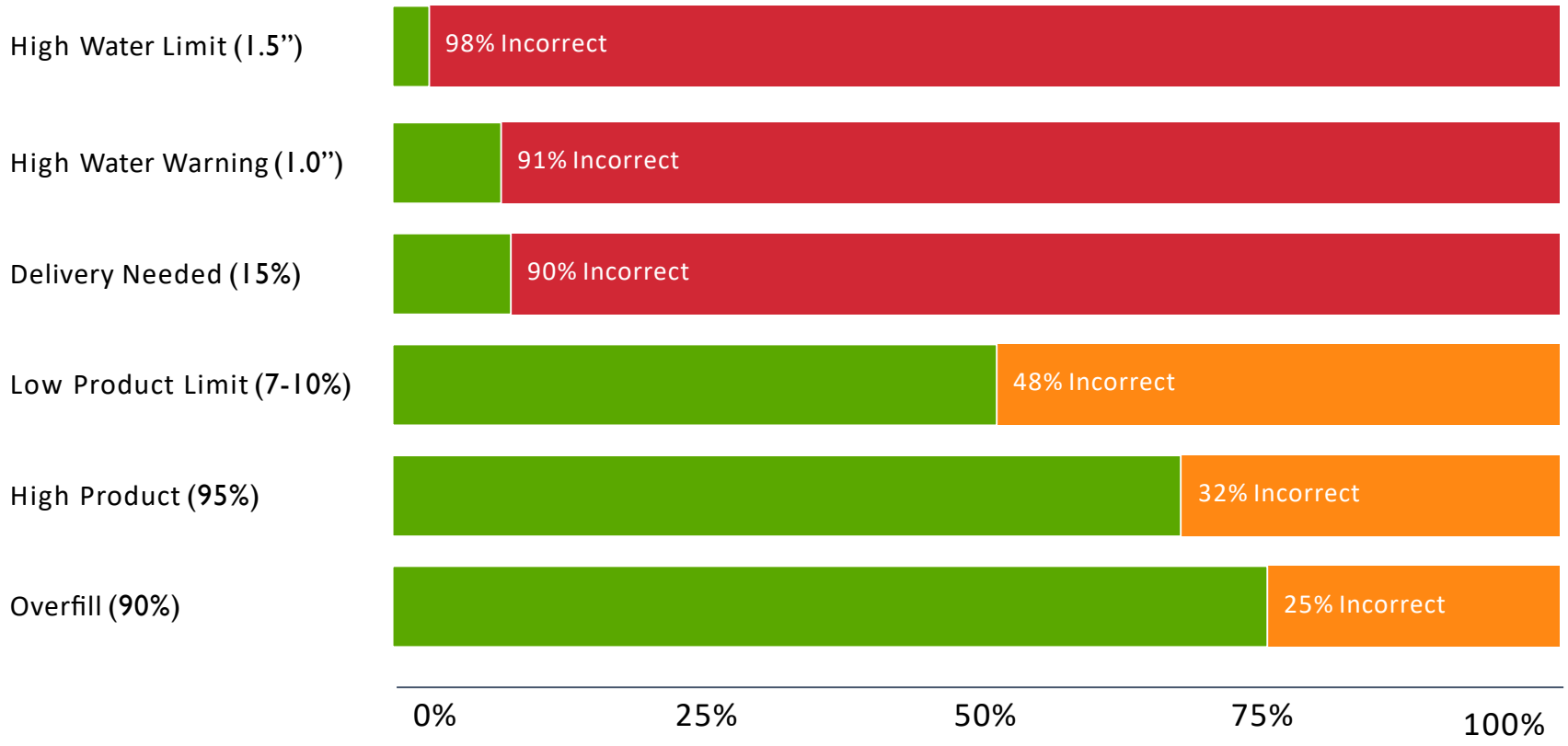
ATG alarms always accurately represent what is occurring at the site

- True
- False

What impacts a site's risk profile?
Alarm data integrity

Canary COMPLIANCE

Settings Audit Results
Percentage of Tanks with Correct Settings



Data anonymized and aggregated from 49 sites, 165 tanks

What is valid reporting?

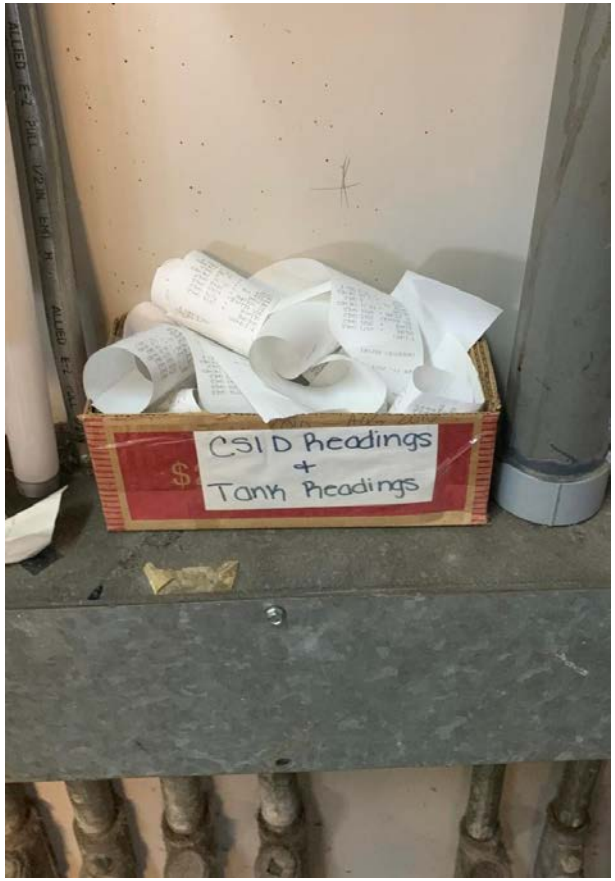
```
TANK LEAK TEST HISTORY
T 2: REGULAR
LAST TEST PASSED:
OCT 20, 2015  3:49 AM
STARTING VOLUME: 5732
PERCENT VOLUME: 57.2

FULLEST TEST PASSED
EACH MONTH:
JAN 30, 2015 4:39 AM
STARTING VOLUME: 6318
PERCENT VOLUME: 63.0

FEB 23, 2015 3:34 AM
STARTING VOLUME: 7308
PERCENT VOLUME: 72.9

MAR 1, 2015 10:44 PM
STARTING VOLUME: 7183
PERCENT VOLUME: 71.6

APR 4, 2015 11:42 PM
STARTING VOLUME: 6941
PERCENT VOLUME: 69.2

MAY 29, 2015 5:30 AM
STARTING VOLUME: 7841
PERCENT VOLUME: 78.2
```

```
JUN 2, 2015 5:31 AM
STARTING VOLUME: 7895
PERCENT VOLUME: 78.7

JUL 6, 2015  11:27 PM
STARTING VOLUME: 7305
PERCENT VOLUME: 72.9

AUG 1, 2015 3:49 AM
STARTING VOLUME: 6960
PERCENT VOLUME: 69.4

SEP 8, 2015 11:48 PM
STARTING VOLUME: 6679
PERCENT VOLUME: 66.6

OCT 14, 2015 12:26 AM
STARTING VOLUME: 6726
PERCENT VOLUME: 67.1

NOV 10, 2014 10:28 PM
STARTING VOLUME: 6955
PERCENT VOLUME: 69.4

DEC 4, 2014 5:04 AM
STARTING VOLUME: 5999
PERCENT VOLUME: 59.8
```

Is this site passing?

- Yes
- No
- It depends
- Beats me

Source: "Whack-A-Leak: The Holes in Our Leak Detection" by Marcel Moreau; published in LUSTLine 80 (June 2016)



Is this site passing?

- Yes
- No
- It depends
- Beats me

What is the industry doing to tackle data integrity challenges?

Canary COMPLIANCE

PEI™

CONEXXUS
solve forward

Thank You, Speakers!

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