Safety and Environmental Risk Minimization

Automatic tank gauges
Why Do ATGs Miss Leaks?
Why Do ATGs Miss Leaks?

SYSTEMS

• Traditional wisdom viewed the Automatic Tank Gauge as nothing more than a bunch of components
  
  • You buy the system of components known as an ATG
  
  • You have it installed, then set it up, turn it on, and
  
  • SHAZAM! - It works!
  
  • The ATG does its job - Really???
Why Do ATGs Miss Leaks?

SYSTEMS

• Traditional wisdom was wrong!
  • UST systems continued to leak
    • Even when equipped with ATGs!
• ATGs and UST systems are sub-systems within a larger system - Retail Gasoline Outlet (RGO)
  • Inside C-Store sales (Twinkies, Coffee, Tobacco, Chips, Pizza, Coke, etc.)
  • Car Wash
  • Auto-repair
• RGOs are themselves part of a much larger system - Fuel Distribution Network (refinery, pipeline, terminal, carrier...)
  • End-of-the-Line: NO CONTROL over fuel quality
Why Do ATGs Miss Leaks?

CAUSES

- The root-causes behind leaks that have been missed by ATGs can be attributed to two general sources.
  - *People (92% - 98%) - A component of a system*
  - *Engineering / Design (2% - 8%) - (Material, Equipment, Environment, Process)/People*

- “Prophets of Doom” or “Prophets of Enlightenment”
  - *W Edwards Deming & Joseph M. Juran*
    - U.S. Navy
    - Motorola
    - Toyota
Why Do ATGs Miss Leaks?

CAUSES


- Supports industry findings from investigations of accidents & incidents
Why Do ATGs Miss Leaks?

People (92% - 98%)

- Categories
  - Poor Workmanship (Manufacturing / Installation)
  - Improper Programming & Setup
  - Improper Application
  - Improper Operation
  - Improper / Inadequate Maintenance / Repair
  - Inadequate Inspection and/or Testing
  - Tampering & Vandalism
  - Inadequate Response

The vast majority of missed leaks are due to inadequate, wrong, or no actions taken by people and not to the ATGs!
Why Do ATGs Miss Leaks?

PEOPLE

• Poor Workmanship
  • Assembly mistakes not caught during manufacturing
    • Cold solder joints
    • Wrong or Sub-grade materials
    • Improper cure times, tightening torques, etc.
    • Missing parts, components, etc.
  • Damaged wiring during installation
    • Cuts, nicks, abrasions
    • Wiring not per code
    • Wrong type conduit, improper seal offs, etc.
  • Improper grounding
    • More is NOT necessarily better
  • Intrinsically safe wiring compromised
Why Do ATGs Miss Leaks?

PEOPLE

• Poor Workmanship
  • Wiring not per manufacturer’s requirements
    • Wrong gauge
    • Wrong wire material & type
    • Wrong insulation type
    • Too long wiring runs
  • Incorrect piping materials
  • Piping not assembled per manufacturer’s requirements
    • Not enough adhesive / wrong cutback depths
    • Improper curing temperature & times
    • Micro-voids in materials
    • Cross-threading of fittings
Why Do ATGs Miss Leaks?

PEOPLE

• Improper Programming & Setup
  • STPs wired to stay on continuously
  • Sensors not mounted properly
  • Piping programmed too long or too short
  • Wrong piping material or diameter
  • Wrong product assigned to tanks
  • Sensors / Probes mislabeled
  • Alarm thresholds incorrect
  • Leak detection notifications disabled
  • Line leak tests disabled
  • Wrong programmed tank type or size
Why Do ATGs Miss Leaks?

PEOPLE

- Improper Application
  - Tank too large for ATG leak test certification limitations
  - Too many tanks manifolded together
  - Piping length exceeds ELLD leak test certification limitations
  - ELLD not certified for piping material, type or diameter
  - Multiple piping types / materials used in system
  - Multiple ELLDs used on manifolded piping system
Why Do ATGs Miss Leaks?

PEOPLE

- Improper Operation
  - Ignoring alarm and warning messages
  - Not conducting daily inspections to determine whether the ATG system is functioning normally
    - Power to the ATG console?
    - System or Function status - Normal?
    - Display on?
    - Audible alarm working?
    - Visual alarm indicators working?
    - Sensors properly mounted?
    - No nicked or cut sensor / probe / ELLD wiring?
  - Maintain a daily log of ATG inspection results and any actions taken to correct potential / real problems with ATG system

- NOV 21, 2005 10:49 PM
  Q2: GROSS LINE FAIL

- JUN 23, 2006 06:11 AM
  L7: SENSOR OUT ALARM

- MAR 22, 2003 10:21 AM
  AUTODIAL FAILURE

- FEB 01, 2007 10:15 PM
  T2: HIGH WATER ALARM
Why Do ATGs Miss Leaks?

PEOPLE

- Improper / Inadequate Maintenance and/or Repair
  - Technician repairs or replaces the wrong ATG component
  - Technician fails to resolve the problem with the ATG
  - Technician damages other ATG components during maintenance or repair activities either to the ATG or to other equipment
  - Owner does not follow the ATG manufacturer’s guidelines for periodic maintenance and inspection
  - Owner fails to have malfunctioning ATG components repaired or replaced
Why ATGs Miss Leaks?

PEOPLE

- Inadequate Inspection and/or Testing
  - Damaged or worn components of the ATG system are not identified during inspection
  - One or more components (e.g., sensors, probes, etc.) of the ATG system are missed during functional testing or inspection
  - Diagnostic reports are not pulled from the ATG console and analyzed to evaluate the functionality of various ATG sensors
  - Alarm history reports are not pulled and reviewed to assess whether there are potential problems with the UST or ATG systems
Why ATGs Miss Leaks?

PEOPLE

- Tampering and Vandalism
  - Deliberate disabling of leak detection functions
  - Deliberate disabling of audible / visual alarms
  - Unplugging or not connecting the ATG to power
  - Deliberate damage to the ATG console, components or sensors
Why ATGs Miss Leaks?

Engineering / Design (2% - 8%)

- Software
- Hardware
- Interference
- Will not cover in this presentation