AUDIT TRAIL DEVICE SECURITY

PRESENTED BY SCOTT WAGNER
INTRODUCTION

• Audit trails accepted in 1989
• Audit trails provide more information than a lead-and wire seal
• Many benefits to users and weights and measures officials
• Weights and Measures officials and service personnel must understand
  • Audit trail format
  • Audit trail requirements
  • How to use the information from audit trails
TWO TYPES OF PARAMETERS TO BE SEALED

• Adjustment parameters:
  • Parameters whose values are expected to change as a result of accuracy adjustments

• Configuration parameters:
  • Parameters whose values are expected to be entered once only and not generally changed after all initial installation settings are made
PRINCIPLES FOR SEALING

• Need to seal depends on:
  • Ease of facilitation of fraud
  • Likelihood that fraud will not be detected

• Features/Functions used in routine operation do not need to be sealed (e.g., setting unit prices)
<table>
<thead>
<tr>
<th>Categories of Device</th>
<th>Methods of Sealing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Category 1:</strong> No remote configuration capability.</td>
<td>Seal by physical seal or two event counters: one for calibration parameters and one for configuration parameters.</td>
</tr>
<tr>
<td><strong>Category 2:</strong> Remote configuration capability, but access is controlled by physical hardware.</td>
<td>The hardware enabling access for remote communication must be on-site. The hardware must be sealed using a physical seal or an event counter for calibration parameters and an event counter for configuration parameters. The event counters may be located either at the individual measuring device or at the system controller; however, an adequate number of counters must be provided to monitor the calibration and configuration parameters of the individual devices at a location. If the counters are located in the system controller rather than at the individual device, means must be provided to generate a hard copy of the information through an on-site device.</td>
</tr>
<tr>
<td><strong>Category 3:</strong> Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password).</td>
<td>An event logger is required in the device; it must include an event counter (000 to 999), the parameter ID, the date and time of the change, and the new value of the parameter. A printed copy of the information must be available through the device or through another on-site device. The event logger shall have a capacity to retain records equal to 10 times the number of sealable parameters in the device, but not more than 1000 records are required. (Note: Does not require 1000 changes to be stored for each parameter.)</td>
</tr>
</tbody>
</table>
DEFINITION OF “REMOTE” DEVICE

• Not required for the measurements operation of the primary device or to compute the transaction information (in any mode)
• Not a permanent part of the primary device
• Able to adjust another device or chance a device’s sealable configuration parameters
Measuring Devices – Example Category 1

- No remote configuration capability
- Access to adjustments/configuration only at the device
- Sealing:
  - physical seal or
  - two event counters (minimum form of audit trail)

Example: ECR/Console may authorize sales, but can **NOT** Remotely Configure Dispenser
MEASURING DEVICES CATEGORY 2

- Remote configuration capability
- Access to remote configuration is controlled by physical hardware
- On site
  - Clear indication when in configuration mode
    - Including indication on any recorded representation
MEASURING DEVICES CATEGORY 2

• Sealing:
  • Hardware enabling access for remote communication sealed using a physical seal
  OR
  • Device receiving parameters sealed with two event counters (calibration and configuration)

• Event counters can be located at individual measuring device or at system controller
  • Adequate number of counters required to monitor individual devices at the location
  • Means to generate hard copy of audit trail info if counters are at system controller
MEASURING DEVICES CATEGORY 3

• Remote configuration capability

• Access to configuration parameters or adjustments unrestricted or controlled through software switch (e.g. password)

• Clear indication when in configuration mode
  • Including indication on any recorded representation

• Sealing:
  • Event logger (or centralized event logger)
    • Includes event counter, parameter ID, date, time, new value
    • Printed copy available through on site device
      • Electronic copy may also be provided in addition to hard copy
Example – Viewing Scale Event Counter
<table>
<thead>
<tr>
<th>Event Counter</th>
<th>Date</th>
<th>Time</th>
<th>Parameter Identification</th>
<th>New Values</th>
<th>Explanatory Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>323</td>
<td>3/12/02</td>
<td>09:00</td>
<td>span</td>
<td>46.838</td>
<td>Span adjustment</td>
</tr>
<tr>
<td>322</td>
<td>3/12/02</td>
<td>08:59</td>
<td>AZSM</td>
<td>1</td>
<td>Zero tracking range set to 1 division</td>
</tr>
<tr>
<td>321</td>
<td>12/22/01</td>
<td>13:31</td>
<td>samples avg</td>
<td>16</td>
<td>Samples per update set to 16</td>
</tr>
<tr>
<td>320</td>
<td>12/22/01</td>
<td>13:33</td>
<td>span</td>
<td>42.838</td>
<td>Span adjustment</td>
</tr>
<tr>
<td>319</td>
<td>12/22/01</td>
<td>13:32</td>
<td>AZSM</td>
<td>3</td>
<td>Change in the zero tracking range</td>
</tr>
<tr>
<td>318</td>
<td>8/17/01</td>
<td>14:14</td>
<td>AZSM</td>
<td>1</td>
<td>Zero tracking set to 1 division</td>
</tr>
<tr>
<td>317</td>
<td>8/17/01</td>
<td>14:03</td>
<td>span</td>
<td>46.838</td>
<td>Span adjustment</td>
</tr>
<tr>
<td>316</td>
<td>8/17/01</td>
<td>14:03</td>
<td>samples avg</td>
<td>4</td>
<td>Samples per update set to 4</td>
</tr>
<tr>
<td>315</td>
<td>8/17/01</td>
<td>13:55</td>
<td>zero</td>
<td>520</td>
<td>Coarse zero (dead load) is 520 lb</td>
</tr>
<tr>
<td>314</td>
<td>8/17/01</td>
<td>13:33</td>
<td>AZSM</td>
<td>0</td>
<td>Zero tracking turned off</td>
</tr>
<tr>
<td>313</td>
<td>3/15/01</td>
<td>10:25</td>
<td>span</td>
<td>46.231</td>
<td>Span adjustment</td>
</tr>
</tbody>
</table>
GENERAL REQUIREMENTS FOR AUDIT TRAILS

- Adjustment mode accesses only sealable parameters
- An event counter shall be able to count at least 1000 values (e.g., 000 to 999)
  - Increments only once while in the configuration mode regardless of the number of changes while in that mode
  - Counter increments only when parameter is changed
- Audit trail data shall be:
  - Stored in non-volatile memory
  - Retained for at least 30 days if power is removed
  - Protected from unauthorized erasure, substitution, or modification
- When the event logger storage capacity is full, any new events shall cause oldest event to be deleted
ACCESS TO AUDIT TRAIL INFORMATION GENERAL

• Described in the NTEP Certificate of Conformance
• Viewing or printing contents:
  • Must be “convenient”
  • Must be separate from calibration or set-up mode
  • Must not affect normal operation before or after access
  • Must require a key to access
PHYSICAL SEAL COMPARED TO AUDIT TRAIL

• Physical seal:
  • Broken seal indicates access to the sealed features or adjustments
  • Viewed as a deterrent
BENEFITS OF AUDIT TRAILS

• Provides industry with an alternative to physical security seals
• Provides more information than physical security seals
  • Record audit trail information on inspection report
• Device owner can use to detect employee tampering
• Evidence to weights and measures of the number, frequency, and types of changes
• Alerts inspector when investigation is necessary
• Deterrent to fraudulent manipulation of parameters
EXAMPLES OF AUDIT TRAILS

The Following Examples Provided Courtesy of

Gordon Johnson
Gilbarco Veeders-Root
Modular Keypad

1 2 3 F1
4 5 6 F2
7 8 9 $ TOTAL

PRESS "CLEAR" to EXIT
CLEAR 0 ENTER VEL. TOTAL

PRESS "ENTER" for AUDIT TRAILS

PRESS "Vol Total" for electronic totals
<table>
<thead>
<tr>
<th>Vol.</th>
<th>1</th>
<th>5</th>
<th>7</th>
<th>6</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPU $</td>
<td>1.111</td>
<td>1.222</td>
<td>1.333</td>
<td>1.444</td>
<td>1.555</td>
</tr>
</tbody>
</table>

Encore / Eclipse – Normal Display

$ 2 4 .5 2 2
Encore / Eclipse audit trail Display

press $P\text{ Vol.} 10 3$

- $P$ indicates audit trail mode
- Configuration changes: Gallon or liter
- $100 75 50 25 0$
Encore / Eclipse audit trail Display
press Enter 2nd time

"P" indicates audit trail mode
Counts blend change mode
Configuration changes Gallon or liter

$ P 1 0
Vol. 1 3

1 4 6 2

Number of days since last calibration
Encore / Eclipse audit trail Display
press Enter 3rd time

$ P \quad \quad 10$

Vol. $4 \quad 3$

Number of calibrations per meter
### Encore / Eclipse Electronic Totals

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$</td>
<td>4</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vol.</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

Read both lines for volume totals.

8.736

Read as 1,420,598.736 gallons
AN INSPECTOR’S MOST POWERFUL TOOL
SERIAL  JEEN394201
NUMBER
MODEL  NJ4
NUMBER
NTEP CC NO. 02-019

For use with equipment specified in installation instructions.

POWER OPERATED DISPENSING DEVICE FOR FLAMMABLE LIQUIDS
FOR USE IN CLASS I, DIVISION 2 GROUP D HAZARDOUS LOCATIONS 34GL
ADDITIONALLY RATED FOR EBS(E0-E8)

UNIT
Voltage: 115
Hertz: 50/60
Amps: 13.0

Options:
SPEAKER
PUSH TO START
CIN CENTER
EBS FUEL
INTERCOM

SERVICE STATION HOSE NOZZLE VALVE
FOR USE ONLY WITH UL LISTED INTERCHANGEABLE

CAUTION: Hazard of electrical shock. More than one disconnect switch may be required to de-energize the device for servicing.

WARNING: Do not disconnect connectors, fuseholders, lampholders, etc. while circuit is live.
Attention: Ne pas débrancher les connecteurs, fusibles, supports de lampes, etc. pendant que le circuit est sous tension.

M029888001: REV T

UL LISTED
NTEP Certificates of Conformance Database Search

Search Type:  Download Instruction Presentation

- To access the user password - Certificate of Conformance found, select one of the three options:
  - Download Certificate
  - Contact Manufacturer
  - Contact Distributor

- Enter the X (at least one character to begin search)
- Enter the Y (at least one letter to begin search)
- Enter the Z (at least one number to begin search)
- Discretionary notes: The results may be affected by your version of Internet Explorer.

Note: NTEP Certificates of Conformance are a result of third-party verification of equipment compliance with the NTEP's requirements. It is essential to consult the NTEP's database to ensure the equipment meets the necessary standards.

The website provides various options and resources for NTEP Certificates of Conformance.

For assistance with your search, contact NTEP at (800) 223-5497.
Database Search

Search Tips: Download Instructional Presentation

- To ensure the most current Certificate of Conformance is found, only enter the first five digits of the CC Number.
- Enter into at least one field to begin search.
- For an exact number search, enter the full number.
- CC Number or Manufacturer
- Enter part numbers, certificate or model numbers to expand your search.
- Dropdown menu functionality may be affected by older versions of Internet Explorer (IE).

Active Status: Devices are being manufactured or remanufactured for commercial application under an NTEP Certificate of Conformance. This means that the Certificate is in force and all fees have been paid.

Inactive Status: An inactive Certificate of Conformance is a Certificate which was previously active, but the devices are no longer being manufactured for commercial applications subject to local regulations or laws; however, devices already manufactured, installed or in inventory, but not yet sold, may be used, sold, repaired and resold under inactive Certificates of Conformance.

The fields below provide various options for searching NTEP Certificates of Conformance.

For assistance with your search contact NCWM at (402) 396-1850 or info@ncwm.net

<table>
<thead>
<tr>
<th>CC Number</th>
<th>Status</th>
<th>Manufacturer</th>
<th>Model Number</th>
<th>Device Type</th>
<th>Application</th>
<th>Certificate Number</th>
<th>Status Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>02-136</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>02-136A17</td>
<td>04/03/2017</td>
</tr>
</tbody>
</table>

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Wayne Fueling Systems, LLC
Read/Write Fuel Dispenser - D58-0982-50 (09/08/97) (Gen. Name: Orion)

Wayne Fueling Systems, LLC
Read/Write Fuel Dispenser - D58-0982-50 (09/08/97) (Gen. Name: Orion)

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Read/Write Fuel Dispenser - D58-0982-50 (09/08/97) (Gen. Name: Orion)
AUDIT TRAILS:
LEARNING TO INTERPRET AND APPLY INFORMATION

• What is the device telling us?
• Making Jurisdictional policies
<table>
<thead>
<tr>
<th>Event Counter</th>
<th>Date</th>
<th>Time</th>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7/3/08, Thurs</td>
<td>5:10 p.m.</td>
<td>Meter Calibration</td>
<td>994 Pulses/gal</td>
</tr>
<tr>
<td>2</td>
<td>7/7/08, Mon</td>
<td>5:00 a.m.</td>
<td>Meter Calibration</td>
<td>1040 Pulses/gal</td>
</tr>
<tr>
<td>3</td>
<td>8/8/08, Fri</td>
<td>5:15 p.m.</td>
<td>Meter Calibration</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>8/11/08, Mon</td>
<td>5:35 a.m.</td>
<td>Meter Calibration</td>
<td></td>
</tr>
</tbody>
</table>

**Additional Events:**

- **12/24/08, Wed** 5:15 p.m.
- **12/29/08, Mon** 5:35 a.m.
RISK BASED R.M.F.D. INSPECTIONS

Time well spent?
OTHER RESOURCES ON AUDIT TRAILS

• NIST Special Publication 1010, June 2004
  • Developed by Juana Williams, NIST WMD
  • Interactive, self-study CD ROM
  • Audit Trail Criteria
  • Interactive example
  • CD ROM and study guide

• For information about CD ROM, contact:
  • Juana Williams, NIST WMD
    • Tel: (301) 975-3989
    • Email: juana.Williams@nist.gov
Scott Wagner, Petroleum Inspector
Colorado Dept. of Labor and Employment
Division of Oil and Public Safety
Scotta.wagner@state.co.us