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Harrisburg, PA

PEI/RP1200-12

Recommended Practices for the Testing and Verification of Spill, Overfill, Leak Detection and Secondary Containment Equipment at UST Facilities

PEI

PEI/RP1200-12 ----------

1. **Introduction**
2. Definitions
3. Safety
4. Tank Secondary Containment Integrity Testing
5. Piping Secondary Containment Integrity Testing
6. Spill Bucket and Containment Sump Testing
7. UST Overfill Equipment Verification, Inspection and Testing
8. Electronic Monitoring System Inspection and Testing
9. Automatic Line Leak Detectors
10. Shear Valve Inspection and Testing
11. Emergency Stop
12. Documentation

Appendices

1. INTRODUCTION

Origin

- Produced as an industry service
- Prepared in response to requests from UST regulators, testers and operators
- Represents a single authoritative source of information

1. INTRODUCTION

Origin

- Represents a synthesis of industry procedures and manufacturers' recommendations and consensus of the PEI RP/1200 committee

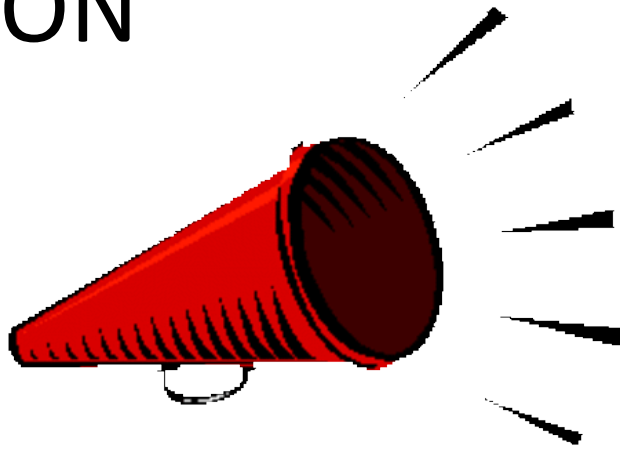
- Information assembled from published and unpublished sources provided by equipment suppliers, UST owners, testing contractors , industry related associations and authorities having jurisdiction

1. INTRODUCTION

Origin

- Committee is made up of representatives from:
  - Equipment suppliers
  - Tank owners
  - Testing companies
  - Industry associations
  - Regulatory community

1. INTRODUCTION



Origin

- In addition, the committee had the benefit of comments submitted by interested parties
  - Public comment period January 24 – March 26, 2012
  - 251 comments received from various parties
  - RP/1200 committee considered all comments

1. INTRODUCTION

Public Comments

- Comments can be made by anyone at any time via the world wide web
  - www.pei.org
    - Publications & Resources
      - Recommended Practices

1. INTRODUCTION

Origin

- In instances where there were differences or omissions in material available from existing sources, the committee included its own consensus recommendations based on the practical experience of committee members

1. INTRODUCTION

Background

- Spill, overfill, leak detection and secondary containment equipment required by regulations

- In order to operate effectively and safely, this equipment must be maintained, inspected and tested for proper operation on an ongoing basis

1. INTRODUCTION

Purpose

- Provide a concise summary of general guidelines for inspection and testing of _____ at UST facilities:

  - Spill prevention
  - Overfill equipment
  - Leak detection
  - Secondary containment
  - Shear valves
  - Emergency stops

1. INTRODUCTION

Purpose

- Intended to provide recommended practices that:

  - Protect human health and the environment
  - Promote safe and reliable operation of UST systems
  - Prevent spills and overfills associated with deliveries
  - Prevent damage to property and equipment

1. INTRODUCTION

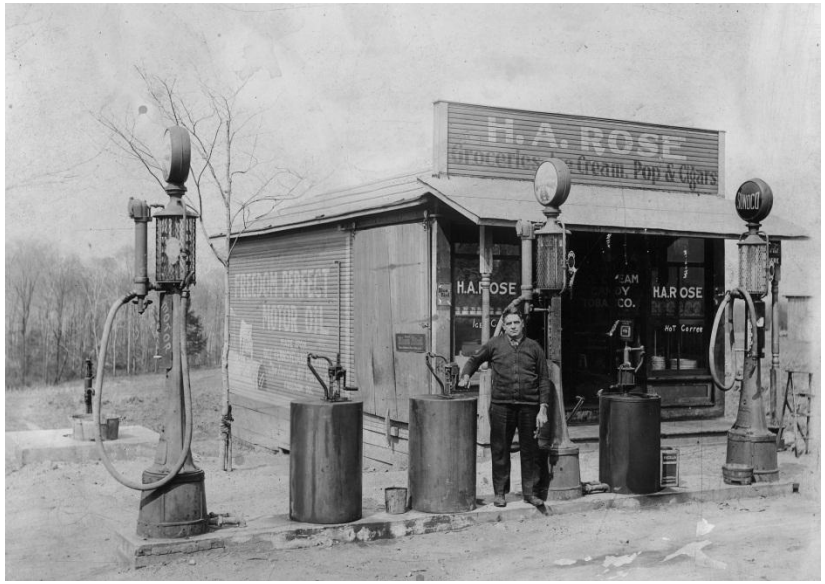
Purpose

- Not intended to:
  - Endorse or recommend particular materials, equipment, suppliers or manufacturers
  - Discourage the development or installation of new equipment
  - Discourage the development of new or improved testing procedures and equipment

1. INTRODUCTION

Scope

- RP/1200 applies to UST facilities that store_____
  - Motor fuels
  - Jet fuels
  - Distillate fuel oils
  - Residual fuel oils
  - Lubricants
  - Petroleum solvents
  - Oils
  - Other petroleum products



1. INTRODUCTION

Scope

- Recommended Practices apply to:

  - Underground storage tanks
  - Connected underground piping
  - Underground ancillary equipment
  - Secondary containment systems

1. INTRODUCTION

Scope

- Recommended Practices do not apply to:
  - Aboveground storage tanks
  - Mobile tanks (truck mounted refuelers)
  - Dispensing equipment above grade level
  - Tanks containing refrigerated liquids, liquefied petroleum gases, liquefied natural gases or compressed natural gases

1. INTRODUCTION

Scope

- Test methods based on current industry practices
- Intended to demonstrate that a leak from the primary containment will be detected before it reaches the environment
- If AHJ requires testing to meet specific leak detection standards – follow the regulatory requirements

1. INTRODUCTION

Scope

- RP/1200 is not meant to provide interpretation of regulatory or legislative requirements related to UST systems

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2. DEFINITIONS

- Tight Wrap Tank – A type of tank construction that consists of a primary tank wrapped by a secondary containment that is structurally supported by the primary tank.
  - Interstitial space is very small

- 110% Containment Tank – A tank with secondary containment where the interstitial space volume is 10% of the total primary containment volume.
  - Interstitial space is large

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3. SAFETY

- “Only properly trained individuals should inspect or test overfill, leak detection and release prevention equipment.”

- “These individuals are responsible for their own safety, and should take reasonable precautions to ensure the safety of facility employees, customers, and any other personnel in the work area.”

- “Refer to Appendix D for related safety publications.”

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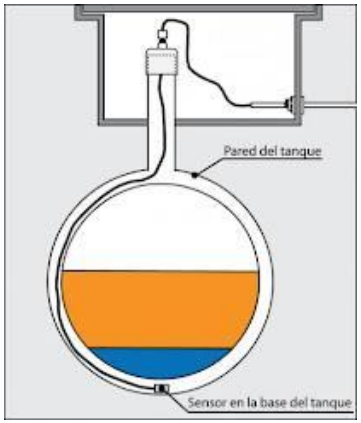
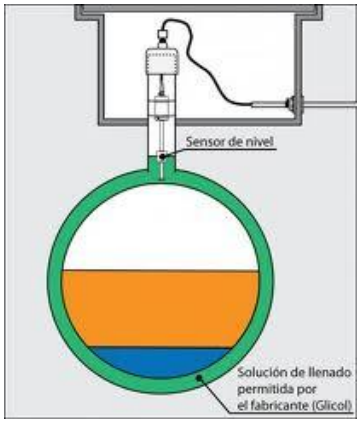
4. TANK SECONDARY CONTAINMENT INTEGRITY TESTING

4.1 General - Interstice may be dry or liquid filled

Dry = Vacuum Test



Wet = Hydrostatic Test



4. TANK SECONDARY CONTAINMENT INTEGRITY TESTING

4.2 Dry Test Method

- Test procedure is general in nature
  - Represents the consensus view of the committee
- Vacuum is pulled and monitored for a period of time
  - Test duration depends on size of tank
  - Amount of vacuum depends on type of tank

4. TANK SECONDARY CONTAINMENT INTEGRITY TESTING

4.2.5 Dry Test Method – Steel Tanks

- Must determine if tank is a “tight wrap” or 110% containment design
  - If tank is tight wrap – RP/1200 test procedure may be followed
  - If tank is 110% - Follow Steel Tank Institute R012 “Recommended Practice for Interstitial Tightness Testing of Existing Underground Double Wall Steel Tanks”

4. TANK SECONDARY CONTAINMENT INTEGRITY TESTING

4.2.6 Dry Test Method – Fiberglass Tanks

- May use RP/1200 test procedure

OR

- Fiberglass Tank & Pipe Institute “Field Test Protocol for Testing the Annular Space of Installed Underground Fiberglass Double and Triple-wall Tanks with Dry Annular Space”

4. TANK SECONDARY CONTAINMENT INTEGRITY TESTING

4.2.6 Dry Test Method

Table 4.1 Test Parameters			
Tank Type	Vacuum, inches Hg	Capacity, gallons	Duration, hours
Fiberglass	10	<20.000	1
		20,000+	2
Steel	6	<20.000	1
		20,000+	2

4. TANK SECONDARY CONTAINMENT INTEGRITY TESTING

4.2.6 Dry Test Method

Pass = No loss of vacuum and
no ingress of fluids

Fail = Any loss of vacuum or
any ingress of fluids

4. TANK SECONDARY CONTAINMENT INTEGRITY TESTING

4.3 Hydrostatic testing

- RP defers to the manufacturers' test procedure
  - Variables must be considered
  - Too many differences between manufacturers procedures
- These tests, when conducted according to the manufacturers' protocol, are "precision" tightness tests (0.1 gph)
- Manufacturers' checklist/data log included as appendix

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5. PIPING SECONDARY CONTAINMENT INTEGRITY TESTING

- Only tests the outer wall of double-walled pipe
  - Containment sumps are tested separately
- RP/1200 test procedure is general in nature (no established leak rate)

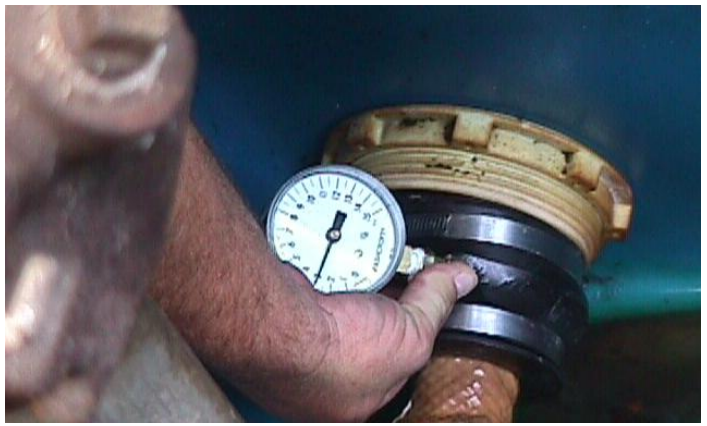
5. PIPING SECONDARY CONTAINMENT INTEGRITY TESTING

- Piping interstice is pressurized with an inert gas to 5 psi and monitored for 1 hour
  - Piping tested as one continuous system or in sections
  - "Sealing" interstitial space of some piping systems (particularly older ones) can be problematic

5. PIPING SECONDARY CONTAINMENT INTEGRITY TESTING

- Pass = No pressure change
- Fail = Any pressure change
  - If pressure increases – repeat the test

Note: Piping secondary containment testing is conducted only after the primary pipe has been precision tightness tested



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6. SPILL BUCKET & CONTAINMENT SUMP TESTING

6.1 General

- Spill bucket and sump testing is grouped together since the test procedure is the same
- Spill buckets and containment sumps can be single-walled or double-walled

6. SPILL BUCKET & CONTAINMENT SUMP TESTING

6.1 General

- Spill Buckets - Test procedures for both single and double-walled spill buckets
  - Single-walled = Hydrostatic OR Vacuum test
  - Double-walled = Vacuum test of interstice
- Containment Sumps – Test procedure for single-walled containment sumps only
  - Single-walled = Hydrostatic test

6. SPILL BUCKET & CONTAINMENT SUMP TESTING

6.2 Single-Walled Spill Bucket – Hydrostatic Test

- Clean and examine the spill bucket
- Fill with water to within 1 ½ inches of top
- Measure water depth to nearest 1/16 inch
- Monitor for 1 hour

Pass = Difference < 1/8 inch

Fail = Difference ≥ 1/8th inch

6. SPILL BUCKET & CONTAINMENT SUMP TESTING

6.2 Single-Walled Spill Bucket – Hydrostatic Test

- Be sure tank fill cap seals properly
- Be sure drain valve seals properly

If these components don't seal properly - water may enter tank

Alternatively, you may temporarily install a plumber's plug in the fill riser and remove/plug the drain valve

6. SPILL BUCKET & CONTAINMENT SUMP TESTING

6.3 Single-Walled Spill Bucket – Vacuum Test

- Clean and examine the spill bucket
- Install special test cover
- Pull a vacuum of 30” H_2O column
- Monitor vacuum for 1 minute

Pass = Ending vacuum level ≥ 26” H_2O column

Fail = Ending vacuum level < 26” H_2O column

6. SPILL BUCKET & CONTAINMENT SUMP TESTING

6.4 Double-Walled Spill Bucket - Vacuum Test

- Clean and examine the spill bucket
- Pull a vacuum of 15” H_2O column on interstice
- Monitor vacuum for 1 minute

Pass = Ending vacuum ≥ 12” H_2O column

Fail = Ending vacuum < 12” H_2O column

6. SPILL BUCKET & CONTAINMENT SUMP TESTING

6.4 Double-Walled Spill Bucket - Vacuum Test

Testing the interstice of a double-walled spill bucket simultaneously tests both the primary and secondary

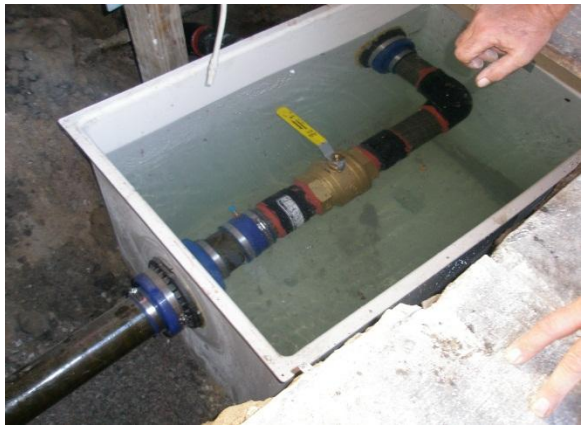
6. SPILL BUCKET & CONTAINMENT SUMP TESTING

6.5 Single-Walled Containment Sump – Hydrostatic Test

- Clean, examine and prepare the containment sump
- Fill with water to 4” above the highest sump penetration or sidewall seam – whichever is higher
- Measure water level to the nearest 1/16 inch
- Monitor water level for 1 hour

Pass = Difference < 1/8 inch

Fail = Difference ≥ 1/8th inch



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7. OVERFILL PREVENTION INSPECTION

Federal Rule (40 CFR 280) Overfill Prevention Options:

- Shutoff flow at:
  a. 95% tank capacity OR
  b. before tank top fittings are wetted
- Restrict flow at:
  a. 90% tank capacity OR
  b. 30 minutes prior to overfilling
- Alert the operator at:
  a. 90% tank capacity OR
  b. 1 minute prior to overfilling

7. OVERFILL PREVENTION INSPECTION

Shutoff

Restrict

Alarm

7. OVERFILL PREVENTION INSPECTION

Committee decided to develop protocols reflective of the more conservative application of the rules

- Overfill prevention devices must be set to:
  - Shutoff at 95% tank capacity
  - Restrict flow at 90% tank capacity
  - Alert the operator at 90% tank capacity

7. OVERFILL PREVENTION INSPECTION

7.1 Automatic Shutoff Devices (Flapper Valves)

- Remove from the tank
- Visually inspect
- Manually operate valve to ensure it is functional
- Measure length to ensure complete shutoff occurs when the tank is no more than 95% full

Note: Ensure that <u>complete</u> shutoff point occurs at 95%

7. OVERFILL PREVENTION INSPECTION

7.2 Restriction Devices (Ball Float Valves)

- Remove from the tank
- Visually inspect
- Measure length to ensure flow restriction occurs when the tank is no more than 90% full

Note: All tank top fittings must be tight in order for the ball float valve to effectively restrict the flow

7. OVERFILL PREVENTION INSPECTION

7.3 Alert Devices (Electronic Alarms)

- Electronic alarms typically part of ATG system
  - Remove from the tank
  - Visually inspect
  - Measure length to ensure that alarm occurs when the tank is no more than 90% full

Note: Overfill alarms must provide an audible and/or visible warning to the fuel delivery driver

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8. ELECTRONIC MONITORING SYSTEM INSPECTION

- Test/Inspection of ATG system:
  - Console
  - In-tank probes
  - Interstitial sensors (tanks & piping)

- Test is general in nature – Not intended as calibration of ATG system

8. ELECTRONIC MONITORING SYSTEM INSPECTION

8.1 ATG Console

- Verify system is properly configured (setup)
- Verify all site specific parameters are correct
- Verify that indicator lamps function
- Verify that printer functions
- Verify that LCD display functions

Component Testing & Verification

8.2 ATG Probes

- Remove probe from tank
- Visually inspect probe tank cap assembly
- Visually inspect probe and floats
- Verify that floats move freely
- Verify all floats indicate the correct fluid levels and indicated fluid levels correspond with programming

8. ELECTRONIC MONITORING SYSTEM INSPECTION

8.3 Interstitial Sensors

- RP only considers sensors that function by detecting the presence of liquids (both discriminating and non-discriminating)
- RP only considers float switch type sensors as these are the most common
  - For other types of sensors – consult manufacturer

8. ELECTRONIC MONITORING SYSTEM INSPECTION

8.3 Interstitial Sensors

- Verify that sensor is properly installed
- Remove sensor from tank interstice or piping sump
- Visually inspect
- Submerge sensor in appropriate test fluid (water for non-discriminating type)
- Verify proper alarm condition and/or STP shutdown
- Verify sensor is properly labeled in ATG console setup

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9. AUTOMATIC LINE LEAK DETECTORS

General

- Two types of automatic line leak detectors

Mechanical

Electronic

9. AUTOMATIC LINE LEAK DETECTORS

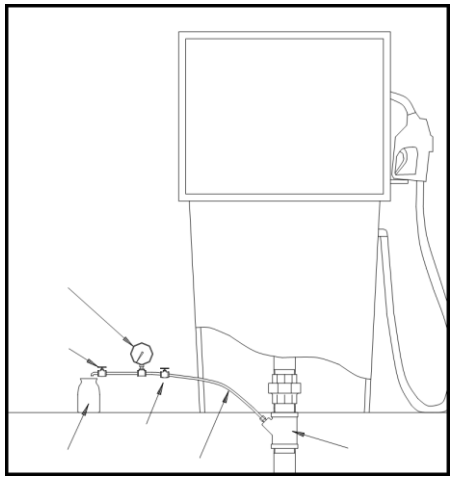
General

- Test procedures verify that the ALLD is capable of detecting a leak equivalent to 3 gph @ 10 psi
- Test apparatus must have an adjustable orifice to properly simulate a leak equivalent to 3 gph @ 10 psi
- Calibration of the adjustable orifice may be accomplished with or without the use of a pressure regulator – Both procedures are described

9. AUTOMATIC LINE LEAK DETECTORS

General

- Test must confirm that the STP properly cycles on/off (verifies STP relays are functioning)
- Simulated leak must occur at the dispenser that is at the highest elevation above the STP
- If piping system has master/satellite configuration, simulated leak must occur at the farthest satellite dispenser



9. AUTOMATIC LINE LEAK DETECTORS

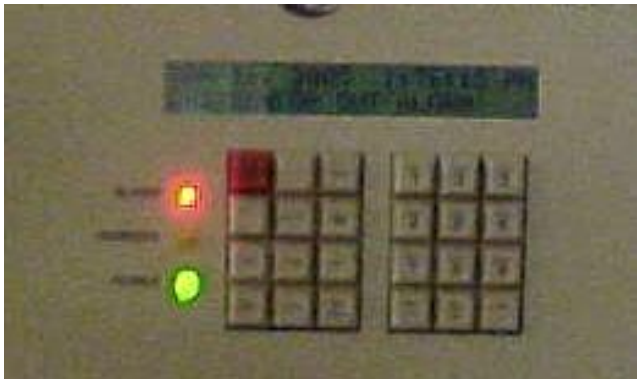
9.1 Mechanical Leak Detectors

- Visual inspection
- Verify leak detector “trips” when line pressure nears zero
- Verify leak detector sees a simulated leak equivalent to 3 gph @ 10 psi
  - “Slow flow” condition exists

9. AUTOMATIC LINE LEAK DETECTORS

9.2 Electronic Line Leak Detectors

- Visual inspection
- Verify system setup parameters are correct
- Verify leak detector searches for leak
- Verify leak detector sees simulated leak equivalent to 3 gph @ 10 psi
  - Causes alarm condition
  - Causes STP shutdown if required by AHJ



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10. SHEAR VALVE INSPECTION & TESTING

- Two types of shear valves

Product Shear Valve

Vapor Shear Valve

10. SHEAR VALVE INSPECTION & TESTING

10.2 Product Shear Valves

- Visual inspection
- Verify anchored securely and at correct height
- Confirm trip mechanism is functional
- Manually close the valve poppet
- Verify that no product flow occurs

10. SHEAR VALVE INSPECTION & TESTING

10.3 Vapor Shear Valves

- Visual inspection
- Verify anchored securely and at correct height

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11. EMERGENCY STOPS

General

- May be more than one e-stop switch at the facility
- Must test every e-stop switch individually
- Verify e-stop is clearly labeled
- Verify easily accessible

11. EMERGENCY STOPS

- Manually activate switch to confirm power has been disconnected to:
  - All dispensers
  - All STPs
  - All power, control and signal circuits associated with dispensers and STPs
  - All other non-intrinsically safe electrical equipment in the classified areas of the UST system and dispensers

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12. DOCUMENTATION

- Sample forms are provided for every test
- Proper documentation of testing is essential

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APPENDIX A – FRP Tank Manufacturer's Test Checklists/Data Logs

- Appendix A-1 & A-2

  - Fiberglass tank manufacturers' precision tank tightness testing procedure for brine filled double-walled tanks

APPENDIX A-1

CONTAINMENT SOLUTIONS

HYDROSTATIC PRECISION TANK TEST CHECKLIST

NWGLDE Category: INTERSTITIAL TANK TIGHTNESS TEST METHOD

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APPENDIX A-2

TRUCHEK DATA LOG

SITE LOCATION AND TANK INFORMATION

4-FOOT-, 6-FOOT-, AND 8-FOOT-DIAMETER DOUBLE-WALL TANKS

10-FOOT-DIAMETER DOUBLE-WALL TANKS

XERXES

APPENDIX B – Pressure & Vacuum Conversion Tables

- Convert Units for Measuring Pressure

  PSIG - Inches HG – Mbar – Bar

- Convert Units for Measuring Vacuum

  Inches H_2O – Inches HG – PSIG – Mbar - Bar

APPENDIX C – SAMPLE TEST DATA SHEETS

C-1 Tank Secondary Containment Integrity Testing Dry Test Method

C-2 Piping Secondary Containment Integrity Testing

C-3 Spill Bucket Integrity Testing Hydrostatic Test Method Single and Double-Walled Vacuum Method

C-4 Containment Sump Integrity Testing Hydrostatic Testing Method

C-5 UST Overfill Equipment Inspection Automatic Shutoff Device and Ball Float Valve

C-6 Overfill Alarm Operation Inspection

C-7 Automatic Tank Gauge Operation Inspection

C-8 Liquid Sensor Functionality Testing

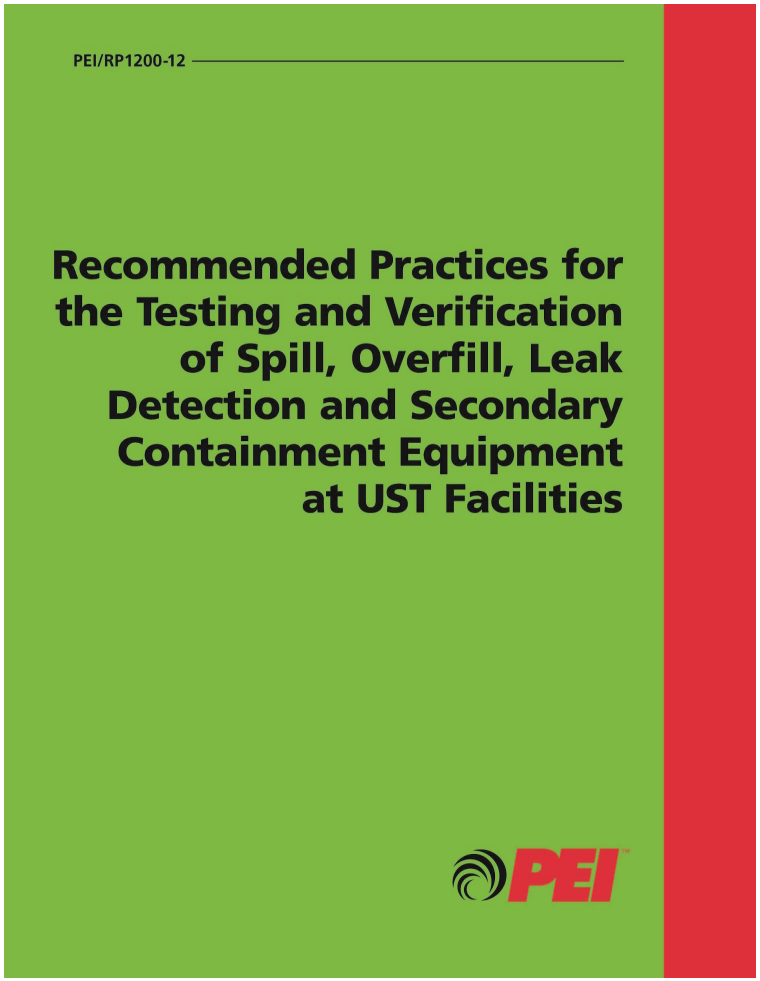
C-9 Mechanical and Electronic Line Leak Detectors Performance Test

C-10 Shear Valve Operation Inspection

C-11 Emergency Stop Switch Operation Inspection

APPENDIX D – PUBLICATION REFERENCE

- API
- FT&PI
- ICC
- NFPA
- PEI
- STI
- UL
- OSHA
- EPA



PEI RP/1200

Doing what we can to protect service stations