Compliance Assistance: Evidence-Based Approach

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Background

1. Environmental Results Program (ERP) developed by MassDEP in 1997
   - Introduced through regional meetings
   - Statistical Performance Measures
   - Industry-wide Compliance Improvements
   - Large universe w/ small number of field inspections
2. In 2003, Rhode Island was the 1st state to adopt the MassDEP model (& expand its application to workplace hazards in the auto refinishing industry sector)
   - Academic partners from the outset
   - Started w/auto-body sector (N=367); traditional facility-by-facility approach; <5% of universe vs 49%; voluntary participation (multi-media coverage)

“Evidence-Based” Approach

- Relies heavily on statistics to identify, document, & measure industry-wide improvements in environmental compliance & performance
- Strong, focused industry compliance assistance component
- Reliable adjunct to targeted enforcement inspections

How It Works

1. Baseline agency "field inspections" of a statistically valid number of *randomly selected* facilities [to determine compliance rates across entire industry sector before program launch]
2. Industry intervention: focused compliance assistance—agency guidance, certification checklists, training [Facilities certify compliance w/regulatory requirements & best management practices (supported by written/plain English regulatory guidance)]
3. Post-intervention "on-site inspections" to verify recent industry compliance efforts

Note - Performance measurement based solely on statistical analysis of agency field inspection data

Case Study: USTs

USEPA HQ State Innovation Grants Program

Rhode Island's State Innovation Grant Project - 2006
Underground Storage Tanks (USTs) —
Alternative Inspection Programs & the Energy Policy Act of 2005
(*State Innovation Grant EI-97150001-0*)
Workplan (PDF) (13 pp, 108K)
Fact Sheet (PDF) (2 pp, 56K)
Final Report (PDF) (41 pp, 397K) December 29, 2009
Progress Reports

Risk Analysis, An International Journal
Peer-reviewed, Society for Risk Analysis
"Reducing Drinking Water Supply Chemical Contamination Risks from Underground Storage Tanks" 2011-12

http://www.epa.gov/NCEI/stategrants/rhodeisland2006.htm

Multidisciplinary 3-Yr Team Effort (Statistics, Sci. & Eng.)
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Study Objective

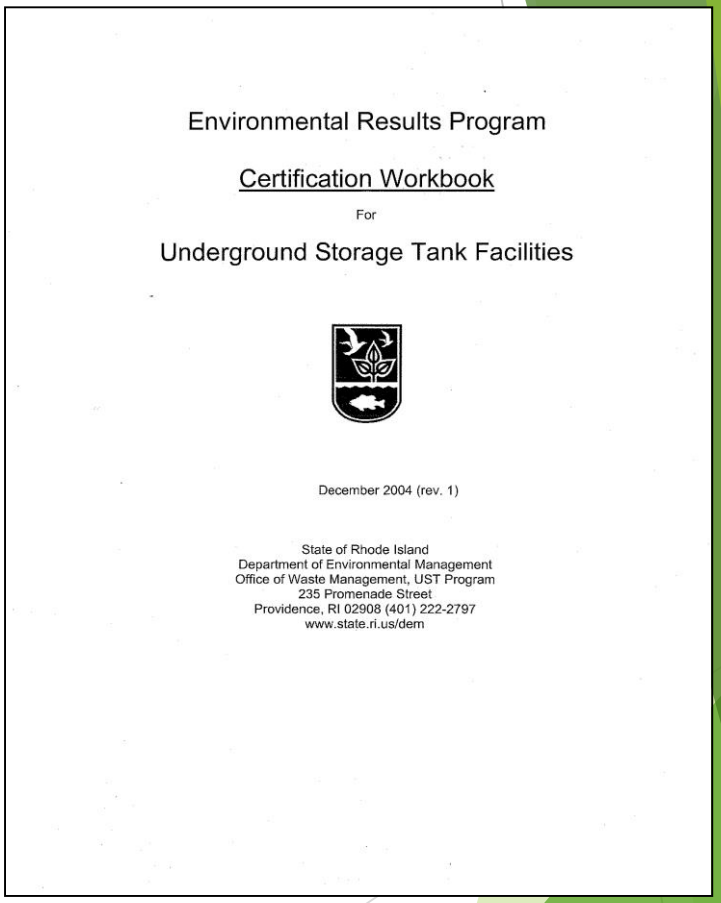
- To evaluate whether the ERP model can be used as a cost-effective alternative to traditional facility-by-facility inspection & enforcement programs for underground storage tanks
- 2005 U.S. Energy Policy Act-Sec. 1523 (b)

"Study of Alternative Inspection Programs – The Administrator of the Environmental Protection Agency, in coordination with a State, shall gather information on compliance assurance programs that could serve as an alternative to the inspection programs under section 9005(c) of the Solid Waste Disposal Act (42 U.S.C. 6991d(c)) and shall, within 4 years after the date of enactment of this Act, submit a report to the Congress containing the results of such study."

UST Certification Workbook

www.dem.ri.gov/programs/benviron/assist/usterp/index.htm

- 141 pp. Certification Workbook explains regulations (in plain English)
- Model Underground Storage Tank Environmental Results Program Workbook (EPA 510-R-04-003) June 2004. http://www.epa.gov/OUST/pubs/erp.htm
- Used in conjunction w/self-certification checklist & as a facility reference
  - Sec. A Tank Profile
  - Sec. B Corrosion Protection
  - Sec. C Tank Leak Detection
  - Sec. D Piping Corrosion Protection
  - Sec. E Piping Leak Detection
  - Sec. F Spill Prevention
  - Sec. G Spill Containment
  - … Sec K Closed Tanks


Environmental Results Program

Certification Workbook

For

Underground Storage Tank Facilities

December 2004 (rev. 1)

State of Rhode Island
Department of Environmental Management
Office of Waste Management, UST Program
235 Promenade Street
Providence, RI 02908 (401) 222-2797
www.state.ri.us/dem

Detailed, Step-by-Step Guidance

The illustration below shows a typical tank area of a gasoline dispensing facility, with a cargo tanker delivering gasoline product to, and recovering vapor, from two underground storage tanks.

Cargo tank delivering product to, and recovering vapor from, two underground storage tanks.

The illustration below shows both product delivery and vapor recovery sides of a tank, with some of the components labeled. In the dual, two point system, as shown in the illustration, the manhole above the underground storage tank contains two tank risers. One riser is for delivering product from the cargo tank to the underground tank. The other riser, which includes the vapor recovery adapter (drybreak), is for delivering displaced vapor from the underground tank back to the cargo tank.

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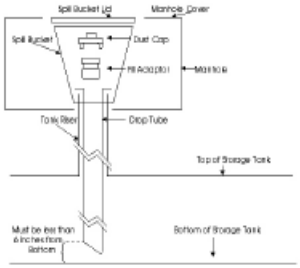
Stage I Product Delivery

DIAGRAM OF PRODUCT DELIVERY PIPING INTO THE UNDERGROUND STORAGE TANK AT A GDF



The schematic to the left shows the product delivery piping.

Product is delivered to the UST from the cargo tank via a submerged pipe called a drop tube.

The drop tube is guided into the UST by the tank riser pipe.

The Vent Area

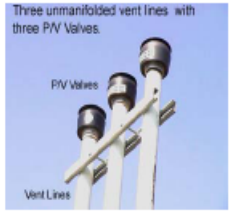
Storage tanks have vent pipes equipped with pressure/vacuum (P/V) relief valves. P/V valves are designed to open at specified positive and negative pressures, so that the tank is protected from physical damage or permanent deformation caused by routine increases in internal pressure or vacuum. They also provide a safeguard in the event any pipes become blocked or inoperable. Additionally, the P/V valve setting on the tank vent is such that it acts as a flow control device that preferentially allows displaced vapors to pass to the tanker compartment during a drop.

Tanks need to breathe because of volume fluctuations due to temperature changes, barometric pressure changes, and variations in the vapor/liquid ratio during refueling. When the internal pressure exceeds the valve design setting, the valve opens to vent the excess pressure to the atmosphere. When the vacuum exceeds the design setting, the valve opens to allow air to flow into the tank and relieve the excess vacuum condition.

The vent area contains one to three product vent lines, usually one vent for each underground storage tank. Each vent line must be capped with a pressure/vacuum relief (P/V) valve, as shown in the illustration below on the right, or manifolded with the other lines, as shown in the illustration on the left.

Three vent lines manifolded into one.

Three unmanifolded vent lines with three P/V Valves.



Thanks to California Air Resources Board, Stationary Source Division, Compliance Assistance Program Vapor Recovery Interactive CD, August 2002; CARB Interactive CD w/ Stage I & II

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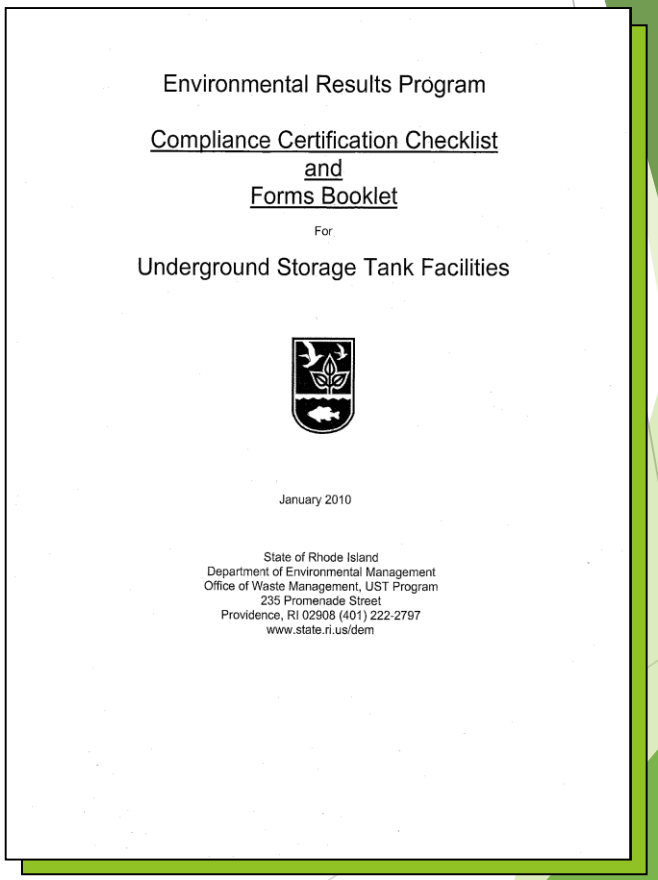
UST ERP Certification Checklist

- ✓ **Checklist contains a series of compliance questions, which generally require “yes” or “no” answers**
- ✓ **Certification Statement**
- ✓ **Return to Compliance Plan**

Joe’s Overfill Protection Checklist For USTs With Overfill Alarms

Circle the UST number for each UST that has an overfill alarm. Fill out the questions below for each UST you circled.	UST # =	1	2	3	4	5
Questions		Yes (Y) or No (N)				
1. Does your overfill alarm activate at 90% of tank capacity or at least one minute before being overfilled?		1 Y / 1 N	2 Y / 2 N	3 Y / 3 N	4 Y / 4 N	5 Y / 5 N
If no, have a qualified person adjust your overfill device to the right height. Also, submit a Return to Compliance plan and submit it with your Certificate of Compliance.						
2. Can your overfill alarm be seen and/or heard from the delivery location so that it will alert the delivery person that the tank is almost full?		1 Y / 1 N	2 Y / 2 N	3 Y / 3 N	4 Y / 4 N	5 Y / 5 N
If no, have a qualified person fix your overfill alarm so that it can be heard and/or seen from the delivery location. Also, submit a Return to Compliance plan and submit it with your Certificate of Compliance.						


Environmental Results Program

Compliance Certification Checklist
and
Forms Booklet

For

Underground Storage Tank Facilities

January 2010

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UST ERP Statistical Approach: Follow 3-Step Process

1) **2004 Baseline inspection data**
   - 96/664 (14%) random baseline audits

   Sample size: DEM *Environmental Health Practice: Statistically-Based Performance Measurement." Am. J. Pub. Health 97(5):1-6 (2007)*

2) **2005 Agency-led Intervention**
   - 6 Workshops/training 297 people
   - OCTA/UST Guidebook & Checklist mailing (N=608)
   - Industry self-audits/deficiency reporting/corrective actions
   - >1,200 Return-to-Compliance plans submitted

3) **2007 Post-Intervention inspection data**
   - 93 random post-intervention audits

Summary Data: Baseline vs Post-intervention Comparisons

Statistically significant improvements in performance were found subsequent to ERP implementation

1) 95% confidence level, 12 of 41 compliance indicators showed statistically significant improvements—Fisher exact test
2) 90% confidence level, 19 of 41 indicators showed significant improvement
3) Holm's modified Bonferroni adjustment for multiple comparisons, 3 of the 12 indicators with p-values <.05 were no longer significant
4) Significant Operational Compliance: Approx. 20% performance improvement in release prevention & release detection
5) Facilities equipped w/ sump sensors (15% improvement)

UST Study Conclusions

- **The evidence-based approach, utilizing an emphasis on technical assistance tools:**
  - Produces measurable improvements in compliance performance
  - Can be a cost-effective adjunct to traditional facility-by-facility inspection & enforcement programs
  - Has the potential to allow regulatory agencies to decrease their frequency of inspections among low risk facilities without sacrificing compliance performance or increasing public health risks
- **Cost-Benefit Analysis Findings:**
  - Due to fewer inspections required, costs associated with inspections reduced
  - Additional expenses to support ERP-related activities (workshops, data gathering, statistical analysis, oversight) are incurred, but the overall costs (reduced inspections & ERP activities) were still lower than that for the traditional program
  - "Payback" or time to recover ERP start-up costs & realize savings was shown to vary from 0.65 to 1.22 years

Benefits

- ✓ Produces measurable improvements in compliance performance
- ✓ Statistically-based performance measurement tracks sector-wide progress
- ✓ Higher percentage of the regulated universe compared to traditional, facility-by-facility inspection & enforcement programs can be reached
- ✓ Accommodates multi-media environmental issues
- ✓ Provides level playing field for all facilities in the targeted sector
- ✓ Efficient/strategic use of government resources
- ✓ Requires limited agency resources—e.g., only a relatively small number of random on-site inspections
- ✓ Educates small businesses through self-study (workbook tutorials) & "detailed", checklist-guided self-assessments
- ✓ Strong complement to targeted field inspections

2017-2018 RIDEM Initiatives

- **Chemical Facilities Mapping/Mitigation (2016-2020)**
  - Identify & map chemical hazards at facilities located in areas subject to sea level rise/storm surge inundation
  - Facility universe includes: hazardous waste generators, above ground storage tanks (ASTs), Tier II/Toxic Release Inventory/Risk Management Program facilities, Air Emissions Inventory & Emergency Generators
  - Start w/EPA Region I FY17 grant for AST facilities (N=761, ~1,800 tanks)
  - Use evidence-based model to implement disaster mitigation/resiliency measures
- **MS4 Construction Site Runoff (2017)**
  - Applicable to all construction sites which disturb ≥ 1 acre of land
  - Workbook/checklists developed under EPA Region I grant
  - Expand application in 2017