UST Alternatives Study Grant: 2005 Energy Act Mandate

The Energy Policy Act of 2005

SEC. 1523 (b) STUDY OF ALTERNATIVE INSPECTION PROGRAMS 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. 699ld(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.

Rich Enander, RIDEM/OTCA

Legislative Requirements

- **2005 Energy Act**
  - Requires all facilities to be inspected once every 3 years
- **RI General Law 46-12-30.2**
  - Requires facility inspections once/2 yrs
  - Past resource constraints allowed facility inspections once every 6 years
  - Management decision to use ERP to meet legislative 2 yr. mandate

2006 SIG Research Objectives

- **To Assess:**
  - Whether ERP can be as effective or more effective than traditional enforcement model
    - Can fewer inspections achieve same/better results?
  - Comparative costs/benefits of each approach
  - Explore determinants of noncompliance and relationship between inspections and leak prevention/compliance (regression analyses)

Project Partners

- **Florida DEP**
- **URI**
  - Center for Pollution Prevention & Environmental Health
    - Research Prof. + 1 undergrad
  - Computer Science and Statistics
    - Prof. of Statistics + 2 grad:
      Ph.D. and M.S. students
- **RI DEM**
  - Offices of Waste Management, and Compliance & Inspection

Assess UST ERP Effectiveness

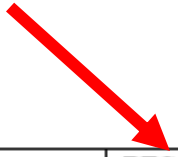
- **2004 RI Baseline Inspections (n=96)**
- **ERP material development (EPA, contractor, stakeholder)/Self-certification filing**
  - 2005: 639/664 certifications rec'd (96%)
  - 1097 RTC plans rec'd
  - Enforcement Actions
    - 2005: 21 $3,000 Penalties for No Submission, 4 $1,500 Penalties for Late Submission, 2 Major Penalties ($16,352 & $16,298)
- **Post-Certification Audits**
  - Nearly complete

UST ERP Statistical Approach

- **2004 Baseline inspection data**
  - 96/664 (14%) random baseline audits
  - 118 RTC certification checklist questions (49,000 data points)
    - 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. I Groundwater Monitoring

UST ERP Compliance Certification Checklist

N = 118 Potential RTC Plan Measures



SECTION C: TANK LEAK DETECTION

	Tank ID Number	Tank #	Tank #	Tank #	Tank #	Tank #	RTC Plan Needed?
C.1	*Do you have a leak detection method in place for each tank?* (complete all that apply below)	Y / N	Y / N	Y / N	Y / N	Y / N	☐
C.2	**Continuous Monitoring System**	☐	☐	☐	☐	☐	
C.3	Manufacturer						
C.4	Model #						
C.5	Installation Date						
C.6	Are the employees who run, monitor, or maintain the release detection system aware of correct operating procedures?	Y / N					
C.7	*Is your leak detection system currently operating properly?*	Y / N					☐
C.8	**Automatic Tank Gauge (ATG)** (Section 4.7.1) (required for single-walled tanks)	☐	☐	☐	☐	☐	
C.9	Date (month/year) installed						
C.10	*Do you use the ATG to conduct monthly 0.2 gallon/hour leak rate tests?*	Y / N	Y / N	Y / N	Y / N	Y / N	☐
C.11	*Did all of your 0.2 gallon/hour leak rate tests pass the most recent test?*	Y / N	Y / N	Y / N	Y / N	Y / N	☐
C.12	*Do you have records of the last 36 months of leak detection tests?*	Y / N	Y / N	Y / N	Y / N	Y / N	☐
C.13	*Do you have records of the last 36 months of ATG system checks?*	Y / N	Y / N	Y / N	Y / N	Y / N	☐
C.14	*Was the ATG system calibrated and inspected in the past year?*	Y / N	Y / N	Y / N	Y / N	Y / N	☐

UST ERP Statistical Approach

- **Analytical Process**
  - 118 Certification checklist questions organized into 3 categories:
    1) Potentially measurable indicators (n=59)
       (performance improvement possible to measure)
    2) Performance trend indicators (n=35)
       (performance improvement measurement not possible)
    3) Indicators not measurable (n=24)

Performance Trend Indicators &

Indicators Not Measurable (n=96 random inspections, 2004)

		Number of Facilities (n_{1f})	Proportion in compliance p_{1fw}	95% Confidence Interval Wald
	Performance Trend Indicators			
10	F.16 Boots sealed to prevent infiltration	80	0.99	0.96, 1.00
11	F.18 Properly operating overfill protection	96	0.99	0.97, 1.00
12	F.37 Drop tubes intact	90	0.99	0.97, 1.00
13	G.20 Hoses not contacting ground	91	0.99	0.97, 1.00
14	B.10 Cathodic protection system operate continuously	7	1.00	1.00, 1.00
15	B.20 Cathodic protection operate continuosly	8	1.00	1.00, 1.00
16	B.24 System pass most recent test	5	1.00	1.00, 1.00

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	Indicators Not Measurable			
1	B.6 Tanks pass most recent liner inspection	1	1.00	
2	C.24 No ATG: Tightness test passing results for past 5 yrs.	2	0.00	
3	D.6 Cathodic protection system operate continuously	0	NM	
4	D.7 Inspect rectifier every 60 dys/keep log	0	NM	
5	D.9 System tested every2yrs/6mos. of repair	0	NM	
6	D.12 System pass most recent test	0	NM	
7	D.13 Records of repairs/test results	0	NM	
8	D.16 Cathodic protection sys operate contin.	0	NM	

24

Facility-level analysis of baseline audit data

Potentially Measurable Indicators 59

Q_1 Periodic Inspection, Recordkeeping, and Testing

		Number of Facilities (n_{1f})	Proportion in compliance p_{1fw}	95% Confidence Interval Wald	Proportion in compliance p_{1faw}	95% Confidence Interval Adj. Wald
	Potentially Measurable Indicators					
1	E.16 Tightness tests annually+	6	0.00	0, 0	0.16	0, 0.36
2	E.17 Passing results for each reqd. yr	6	0.00	0, 0	0.16	0, 0.36
3	B.21 Is system tested every 3 yrs + w/in 6 mos. of repair	7	0.14	-0.12, 0.40	0.27	0.01, 0.53
4	I.4 Records of GW monitoring well checks	55	0.18	0.08, 0.28	0.20	0.10, 0.31
5	B.17 Records of all repairs/test results	5	0.20	0.08, 0.28	0.20	0.10, 0.31
6	C.28 W/ ATG, >20 yrs: tightness test passing results, 2 yrs.	17	0.41	0.18, 0.65	0.43	0.22, 0.64
7	B.25 Records of all repairs/test results	7	0.43	0.06, 0.80	0.45	0.16, 0.75
8	B.11 Record rectifier readings every 60 dys/keep log	7	0.43	0.06, 0.80	0.45	0.16, 0.75
9	E.22 System calibrated and inspected last yr	9	0.44	0.12, 0.77	0.46	0.19, 0.73
10	B.13 Is system tested every 2 yrs + w/in 6 mos. of repair	6	0.50	0.10, 0.90	0.50	0.19, 0.81
11	F.3 Inspect spill buckets daily	94	0.52	0.42, 0.62	0.52	0.42, 0.62
12	E.4 Records of LLD tests for last 3 yrs.	81	0.58	0.47, 0.69	0.58	0.47, 0.68
13	F.11 Sumps free of water/debris/product	81	0.60	0.50, 0.71	0.60	0.50, 0.70
14	E.21 Records of system checks/repairs	10	0.60	0.30, 0.90	0.57	0.31, 0.83
15	E.12 System calibrated/inspected last yr	65	0.66	0.55, 0.78	0.65	0.54, 0.77

Note: Actual # of measurable indicators will be less; 8/59
Stage II vapor recovery +10 small "n" (41/118 over time)

Tank-level analysis of baseline audit data (n=96 random inspections, 2004)

		Number of Tanks (n_{1t})	Proportion in compliance p_{1tw}	95% Confidence Interval Wald	Proportion in compliance p_{1taw}	95% Confidence Interval Adj. Wald	95% Interval Adjusted for Cluster Sampling
	Potentially Measurable Indicators						
13	F.3 Inspect spill buckets daily	287	0.52	0.46, 0.58	0.52	0.46, 0.58	0.42, 0.62
14	E.4 Records of LLD tests for last 3 yrs.	240	0.60	0.54, 0.66	0.60	0.54, 0.66	0.49, 0.71
15	F.11 Sumps free of water/debris/product	243	0.76	0.71, 0.81	0.76	0.70, 0.81	0.69, 0.83
16	E.21 Records of system checks/repairs	29	0.62	0.44, 0.80	0.61	0.44, 0.77	0.32, 0.92
17	E.12 System calibrated/inspected last yr	192	0.67	0.61, 0.74	0.67	0.60, 0.73	0.56, 0.78
18	C.20 Monitoring system been calibrated/inspected past yr.	145	0.66	0.58, 0.74	0.66	0.58, 0.74	0.54, 0.78
19	E.20 Continuously use interstitial monitoring	35	0.71	0.56, 0.86	0.69	0.55, 0.84	0.47, 0.95
20	I.5 Well caps closed tightly and locked	92F	0.67F	NA	NA	NA	NA
21	F.2 Tank have operational spill containment device	294	0.76	0.71, 0.81	0.76	0.71, 0.80	0.68, 0.84
22	C.14 ATG sys calibrated and inspected last yr	233	0.69	0.63, 0.75	0.69	0.63, 0.75	0.59, 0.79
23	E.11 Records of system checks/repairs	197	0.74	0.68, 0.80	0.74	0.68, 0.80	0.63, 0.85
24	I.2 Wells equipped w/road box and lock cap	91F	0.74F	NA	NA	NA	NA
25	C.31 Records of inventory control	280	0.76	0.71, 0.81	0.76	0.71, 0.81	0.68, 0.84

Pre- and Post- Comparisons

- **Pre-/Post- Analysis:** will evaluate all measurable indicators at both facility and tank-levels for performance improvement (statistical correction for multiple comparisons)
  - Rationale:
    - Evaluate entire field of performance—
      more complete understanding of what is happening across all performance categories
    - Maximize opportunity for finding significant improvements
    - Identify areas where intervention may need to be adjusted

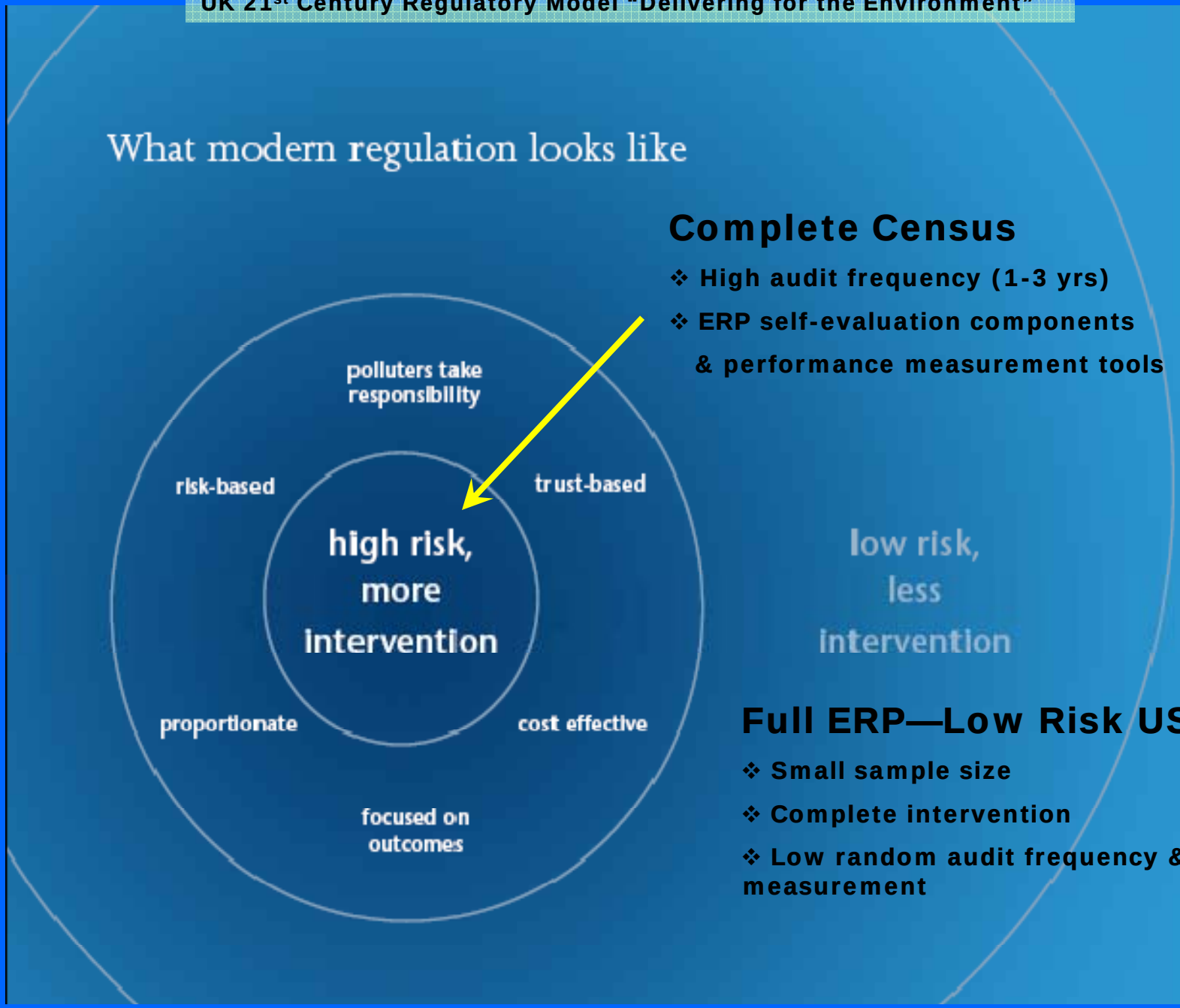
Interstate Comparison

- **Florida DEP**
  - Compare RI post-certification inspection data to FL comprehensive annual inspection data (2005: 7,000 facilities/19,200 inspections, 36%, found to be in non-compliance)
  - Individual indicator comparisons may be difficult: e.g., 1 checklist item in FL's inspection sheet may cover several detailed questions in RI's checklist
- **Vermont/New Hampshire data**

Preliminary Thinking

- **Risk Based Approach**
  - Energy Act calls for audits of complete universe once every 3 years
    - **<u>High Risk Facilities</u>** (e.g., repeat violations, type of violation, tank type/equipment installed): More frequent inspections (<3 yr cycle) of every facility
    - **<u>Low Risk Facilities</u>** (e.g., newer technology, high performers): ERP approach
    - Considering federal funding levels unlikely to increase

UK 21st Century Regulatory Model "Delivering for the Environment"



Complete Census

- High audit frequency (1-3 yrs)
- ERP self-evaluation components & performance measurement tools

Full ERP—Low Risk USTs

- Small sample size
- Complete intervention
- Low random audit frequency & measurement

OBJ: Compare Costs/Benefits & Publish

		1	2			3	
		Traditional Inspection	**ERP (100 Sample Size)**			**ERP (250 Sample Size)**	
		~250 per year	100 per year	100 per 2 years	100 per 3 years	250 per 2 years	250 per 3 years
1	Personnel Required	40% Inspector1 36,964 20% Inspector2 16,698 90% Inspector3 95,566 5% Inspector4 5,878 10% Insp. Supervisor* 13,676	$14,786 $6,679 $38,226 $2,351 $13,676	$7,393 $3,340 $19,113 $1,176 $13,676	$4,929 $2,226 $12,742 $784 $13,676	$18,482 $8,349 $47,783 $2,939 $13,676	$12,321 $5,566 $31,855 $1,959 $13,676
2	Annual Personnel Cost (Salary, benefits, overtime)	$168,782	$75,718	$44,697	$34,357	$91,229	$65,378
3	Travel Expense 30 miles ave./trip @ $.48/mile	$3,600	$1,440	$720	$480	$1,440	$960
4	**TOTAL ANNUAL INSPECTION OPERATING COSTS**	A $172,382	$77,158	$45,417	$34,837	$92,669	$66,338
5	ERP Annual Operating Costs including:** - ERP Manager ($12,000 for 100; $18,000 for 250) - Staff Person (20,000 per year, fixed cost) - Data Entry (intern - $1500 for 100, $4000 for 250) - mailing costs for 750 facilities ($2000)		$35,500	$17,750	$11,833	$22,000	$14,667
6	**TOTAL ANNUAL INSPECTION AND ERP COSTS** (4+5)		$112,658	$63,167	$46,670	$114,669	$81,005
7	**NET ANNUAL SAVINGS FROM TRADITIONAL PROGRAM** (4A-6)		$59,724	$109,215	$125,712	$57,713	$91,377
8	**ERP START-UP COSTS***** workbook, checklist development workshops, baseline analysis		$73,000	$73,000	$73,000	$73,000	$73,000
9	**Years to Recover ERP Start-up Costs (Payback)** (8 divided by 7)		1.22	0.67	0.58	1.26	0.80