



# **States Common Measures Project**

**Suzi Peck**

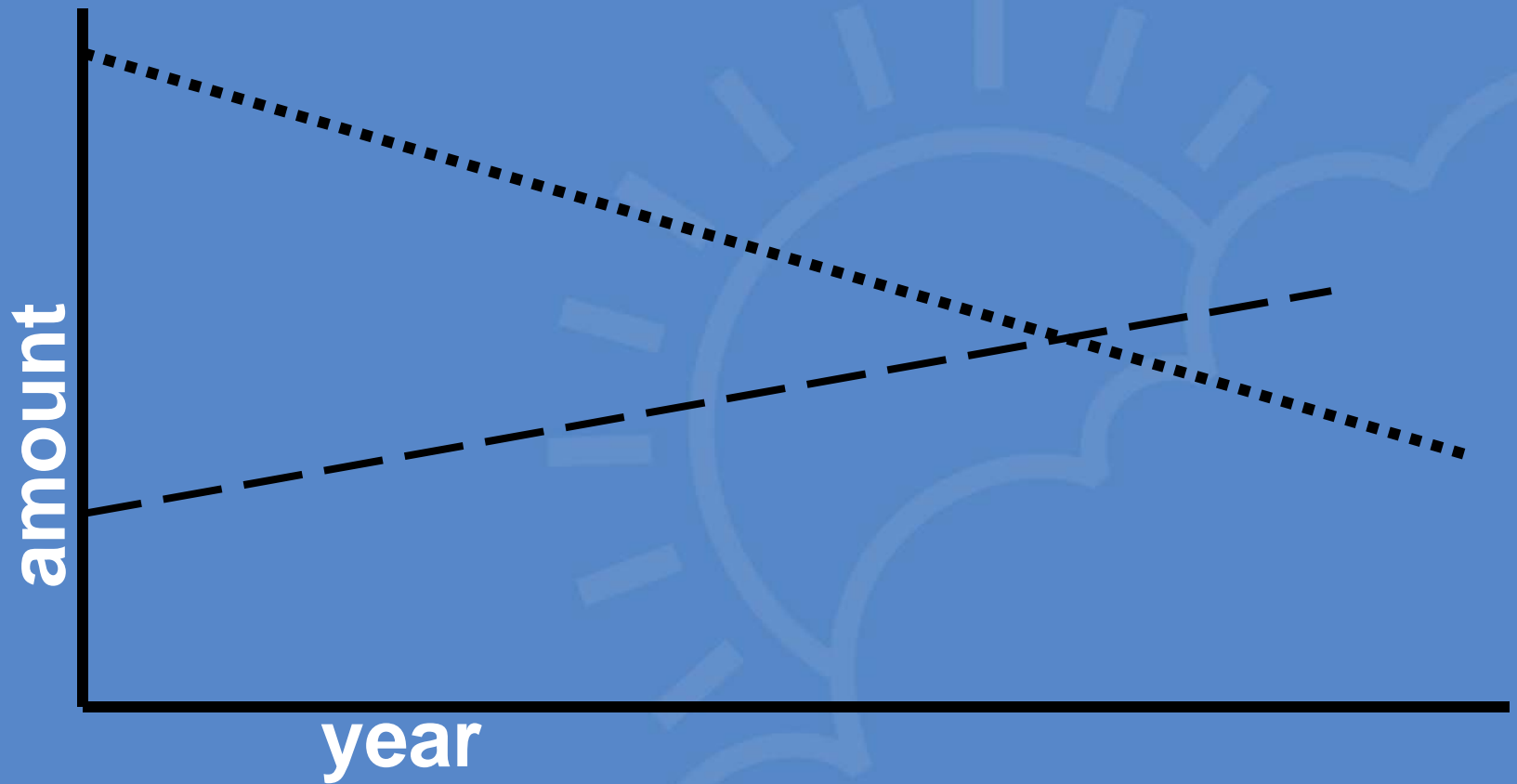
**Associate Director, Business Compliance Division  
Massachusetts DEP**

**NEWMOA HW INSPECTOR TRAINING  
June 2012**

# Common Measures Project Overview

- **EPA State innovation Grant – May 2006 – May 2009**
- **Project states: CA, CO, CT, ME, MA, NH, NY, RI, VT, WA**
- **Pick a sector to evaluate**
- **Conduct the evaluation**

# Why?



# Why Common Measures?



**Environmental Inspector**

# Goals of Common Measures

- **Try to evaluate the performance of targeted business sectors across states (and teach agencies how to do it)**
- **Try to use the results to identify effective and efficient environmental performance improvement strategies**



## Roots of the Common Measures Project: MassDEP Environmental Results Program

**ERP combines a set of tools for effectively and efficiently regulating large groups of facilities or activities with limited resources**

- **Lay person's explanation of the requirements in an easy to read workbook**
- **Self certification of compliance with the requirements (with appropriate enforcement follow up)**
- **Statistical evaluation of the performance of the group to assess systemic compliance problems**
- **Adjustment to program to address compliance programs**

# ERP Measurement –

using statistical approaches to efficiently and effectively measure the performance of a group

- Identifying and understanding the “universe” to be measured
- Creating a set of “Environmental Business Practice Indicators” (EBPIs) for the group – single or multi-media, compliance or beyond compliance
- Inspecting a relatively small randomly selected subset of the universe
- Using statistical analysis to generalize the findings to the entire universe with a selected confidence level and with confidence intervals
- Choosing what to measure:
  - Performance of group at a point in time
  - Performance of group by each indicator or groups of indicators
  - Comparison of group performance at two (or more) points in time
  - Comparison of group performance across two (or more) states

# What Did The States Have to Do?

- **Make choices about groups**
  - e.g., single medium vs. multi-media, existing vs. new sector, known universe, common definitions, problem sector
- **Understand data quality issues**
  - e.g., bias, precision, sensitivity, representativeness, new data versus old data
- **Select indicators**
  - e.g., regulatory, beyond compliance (P2), outcome based
- **Pick an effective sample size,**
  - e.g., minimum number of inspections per universe size within an agreed upon confidence level
- **Collect data the same way**
  - e.g., inspectors asking and answering questions the same way
- **Use statistics to interpret and report data results**



## **SQG Common Measurers Regulatory Indicators -- Container Management**

- Are all hazardous waste containers properly labeled with the words “hazardous waste” and clearly marked with the date on which accumulation began?**
- Are all hazardous waste containers closed unless waste is being added or removed?**
- Are all hazardous waste containers in good condition, (i.e., free of severe rusting or apparent structural defects, and not leaking)**

# **SQG Common Measures Regulatory Indicators -- Accumulation Limits**

- **At the time of the inspection has the facility accumulated more than \_\_\_\_\_\* kg of RCRA hazardous waste onsite?**
- **At the time of the inspection, does the facility have any RCRA hazardous waste onsite that has been accumulated**

# **SQG Common Measures Regulatory Indicators: Other Hazardous Waste Management**

- Does the facility use a hazardous waste manifest to ship its hazardous waste when a manifest is required?**
- Has the facility identified all of its hazardous waste streams?**
- Has the facility posted the current name and telephone number of the emergency coordinator, the location of fire extinguishers and spill control material, and if present, fire alarm, and the telephone number of the fire department, unless the facility has a direct alarm?**



# **SQG Common Measures: Beyond Compliance Indicators**

- Has the facility implemented toxic use reduction over the past 3 years?**
- Has the facility undertaken recycling projects over the past three years?**
- Has the facility implemented water conservation projects over the past three years?**
- Has the facility implemented energy conservation/alternative energy projects over the past three years?**

# Project Data Quality Standards for SQGs

- Deciding acceptable confidence level, confidence interval and sample size
- Developing common random sample selection procedures
- Developing a common performance checklist and training field observers to verify compliance/performance consistently
- Requiring individual state sign-off on meeting data quality standards
- Implementing data quality control procedures for data entry and analysis

# What Was Measured?

Each State's "Achievement Rate" on Each Indicator

# of facilities found to be in compliance  
with the indicator


100 X

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total # of facilities inspected

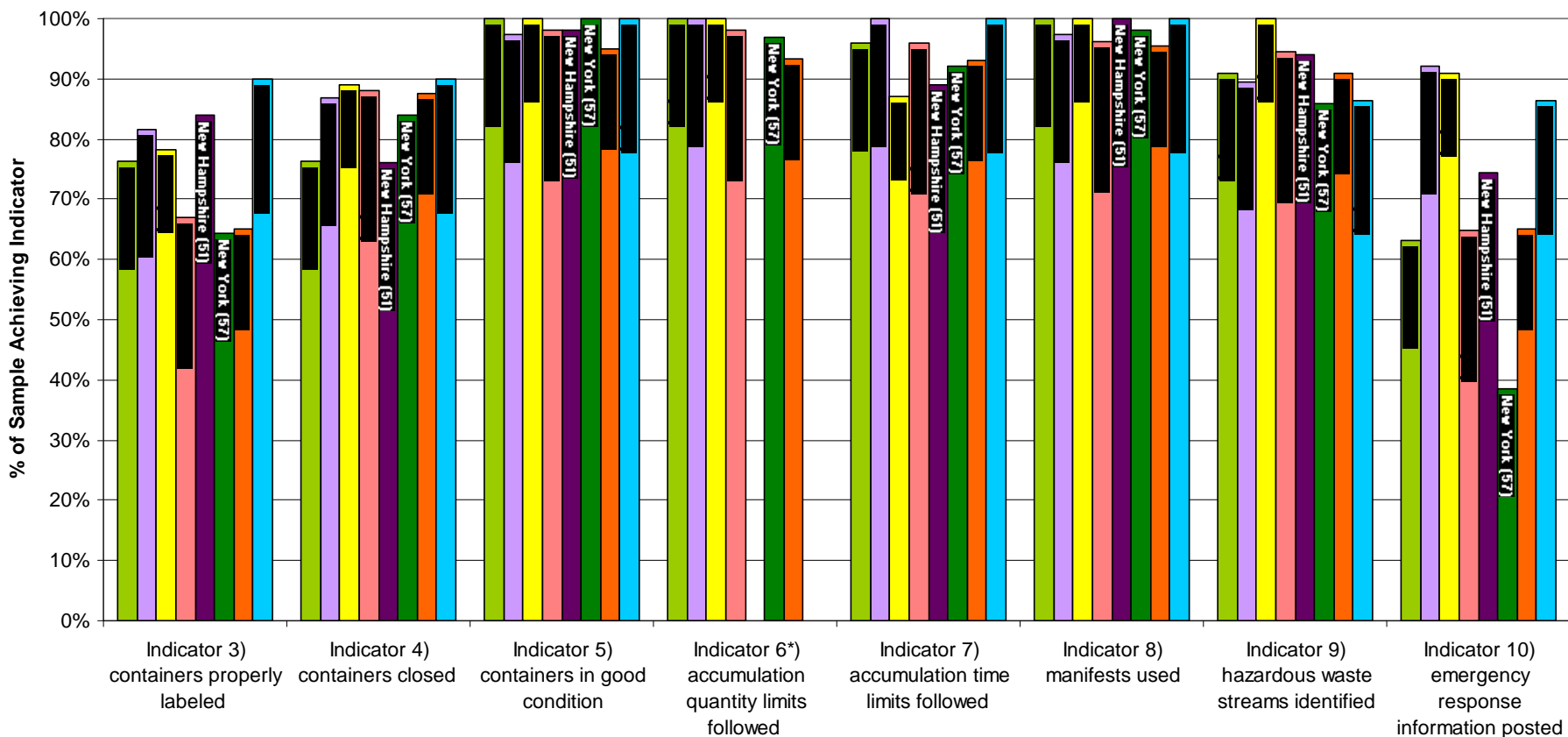


# Color Code

- **Yellow = Maine**
  - **Dark Purple = New Hampshire**
  - **Light Purple = Connecticut**
  - **Blue = Rhode Island**
  - **Orange = Vermont**
  - **Pink = Massachusetts**
  - **Dark Green = New York**
  - **Light Green = Colorado**
- 

# Baseline Performance Results— Achievement Rates on Each Regulatory Indicator (YAY NEWMOAA STATES)

States Common Measures Project:  
Observed State SQG Achievement Rates on Regulatory Indicators

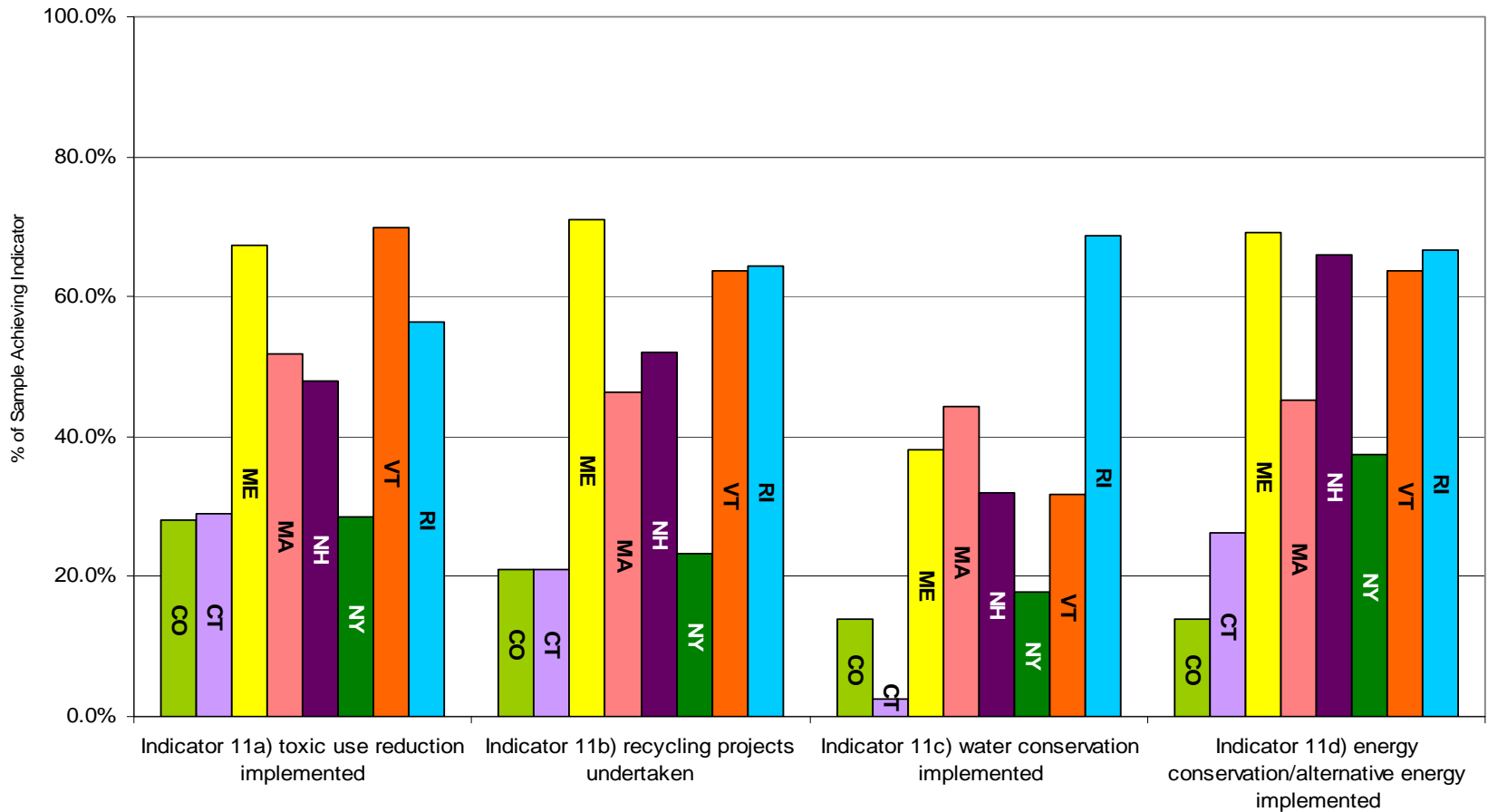


\* Indicator 6 does not apply to RI or NH  
#s in parentheses indicate # of facilities included in the state's sample



# Baseline Performance Results by Individual Beyond Compliance Indicator (SQG Sector)

STATES COMMON MEASURES PROJECT  
Observed State SQG Achievement Rates on Beyond Compliance Indicators



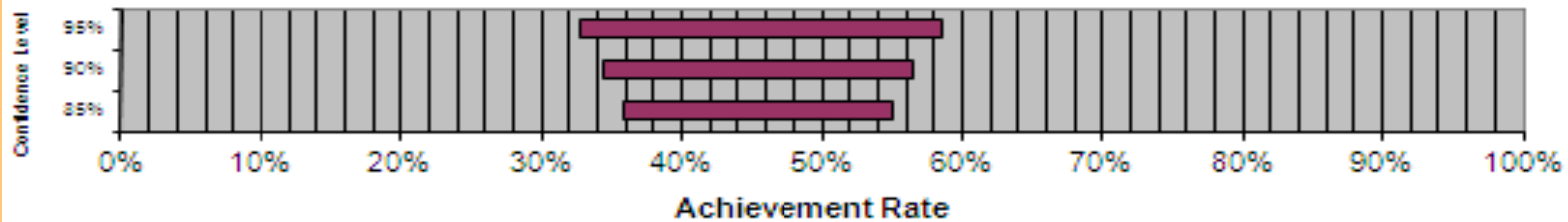


## But How Accurate are These Results?

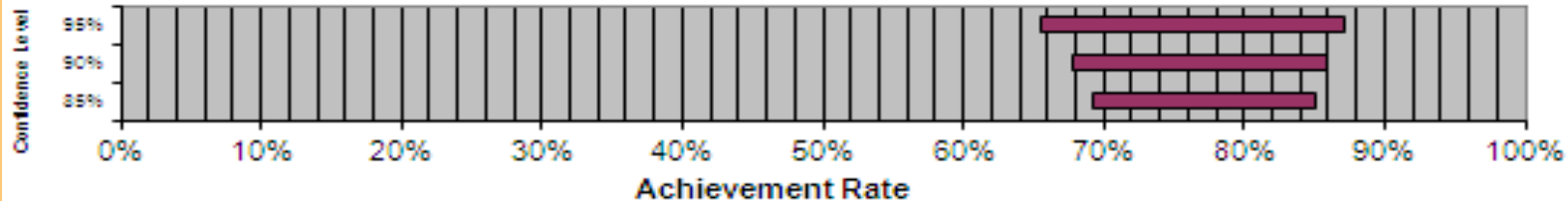
- **Based on an inspection of a random sample so there is a confidence interval – a range within which the “true” achievement rate or facility score falls**
- **Confidence interval depends on**
  - Observed Rate or Score
  - Number of Facilities Inspected
  - Desired Confidence level

# Example Confidence Intervals

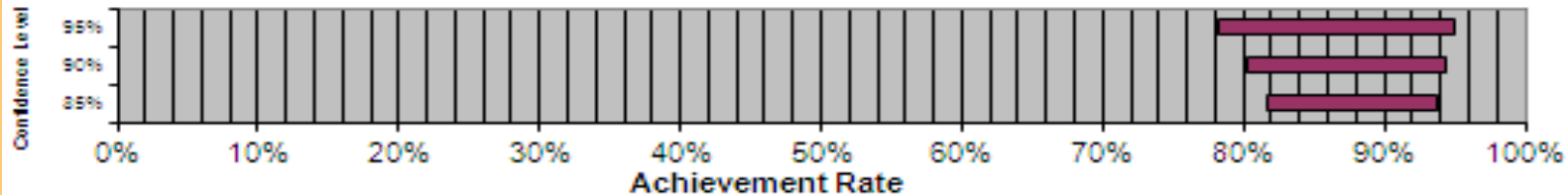
MA Indicator 11d (Energy conservation/alternative energy implemented)



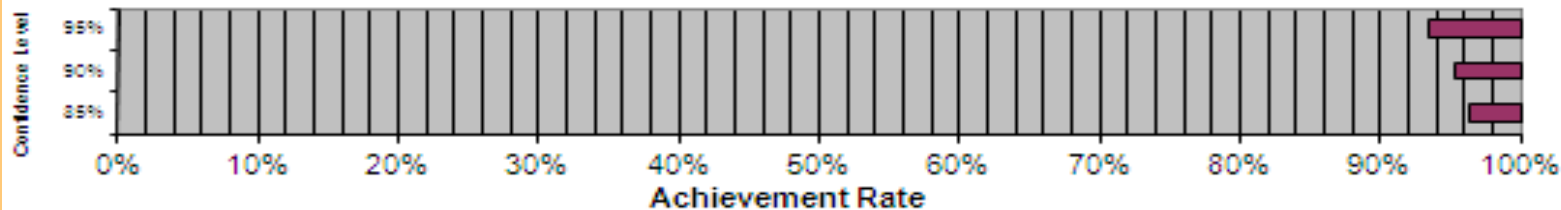
ME Indicator 3 (Containers properly labelled)



ME Indicator 4 (Containers closed)



ME Indicator 5 (Containers in good condition)



# Are The Differences Between the States Due to Chance?

- One project goal was to see if differences in state program design affected performance
- Need to use statistical analysis to determine if the observed differences are “real” or just the luck of the draw
- Result depends on desired confidence level
- Rule of Thumb: the less the overlap in the confidence intervals the more likely the observed differences between the states are NOT due to chance

# SQG Common Measurers Regulatory Indicators -- Container Management

- **CONTAINERS LABELLED\***
  - Observed Range: 64% - 90%
  - Actual Range: 53% - 97%
- **CONTAINERS CLOSED**
  - Observed Range: 76% - 90%
  - Actual Range: 65% - 96%
- **CONTAINERS IN GOOD CONDITION**
  - Observed Range: 95% - 100%
  - Actual Range: 86% - 100%

# SQG Common Measures Regulatory Indicators -- Proper Hazardous Waste Management

- **ACCUMULATION TIME LIMITS MET\***
  - Observed Range: 87% - 100%
  - Actual Range: 77% - 100%
- **ACCUMULATION QUANTITY LIMITS MET\***
  - Observed Range: 93% - 100%
  - Actual Range: 84% - 100%
- **WASTE MANIFESTED**
  - Observed Range: 96% - 100%
  - Actual Range: 87% - 100%
- **WASTE STREAMS IDENTIFIED\***
  - Observed Range: 86% - 100%
  - Actual Range: 77% - 100%
- **EMERGENCY RESPONSE PROCEDURES\***
  - Observed Range: 39% - 92%
  - Actual Range: 29% - 97%

# Differences in Beyond Compliance Indicators

- **TOXICS USE REDUCTION\***
  - Observed Range: 28% - 70%
  - Actual Range: 19% - 80%
- **RECYCLING\***
  - Observed Range: 21% - 71%
  - Actual Range: 12% - 80%
- **WATER CONSERVATION\***
  - Observed Range: 3% - 70%
  - Actual Range: 1% - 80%
- **ENERGY CONSERVATION / ALTERNATIVE ENERGY\***
  - Observed Range: 14% - 69%
  - Actual Range: 8% - 78%

# Facility Score Calculations

## Individual Facility Score:

$$\frac{\text{\# of Applicable Performance Indicators* the Facility Achieved}}{\text{\# of Performance Indicators Applicable to the Facility}} \times 10$$

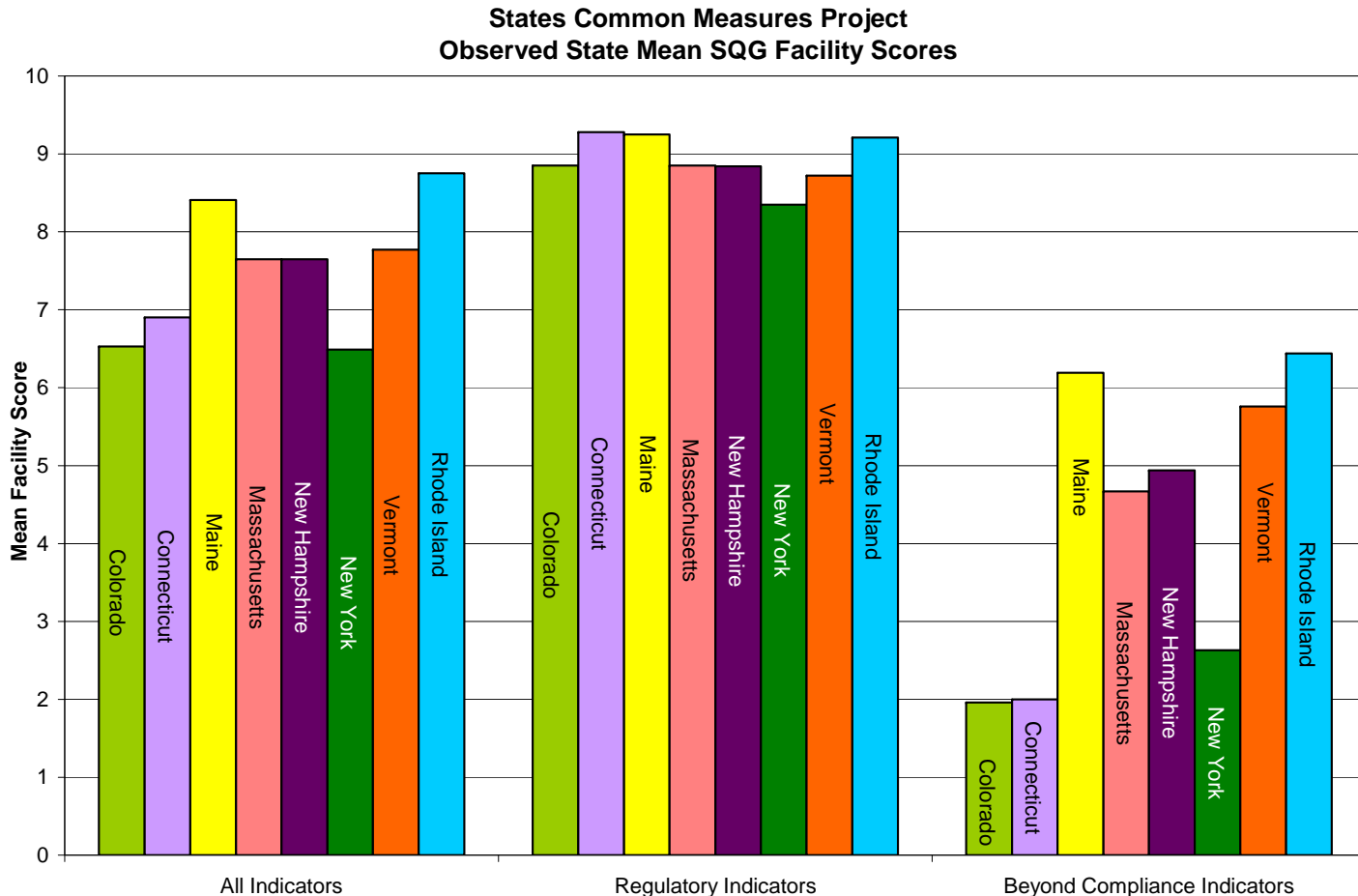
## State's SQG Mean Facility Score:

$$\frac{\sum \text{Individual Facility Scores}}{\text{Total \# of Facilities Inspected}}$$

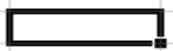
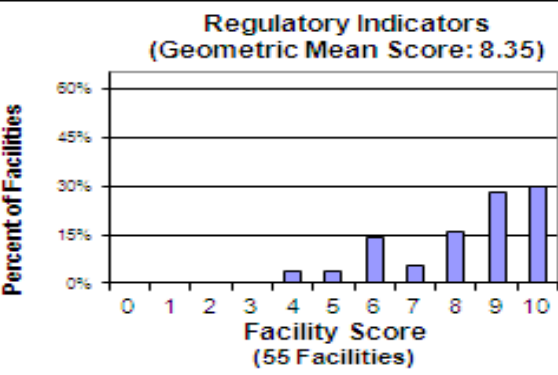
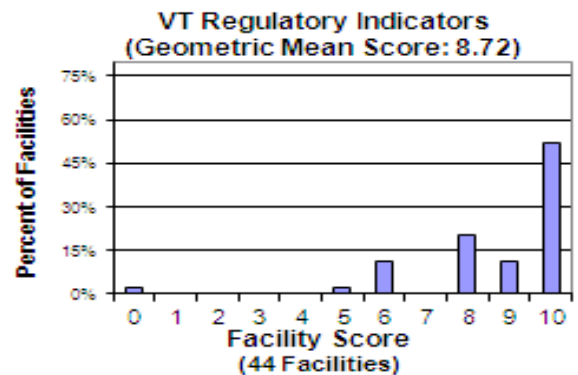
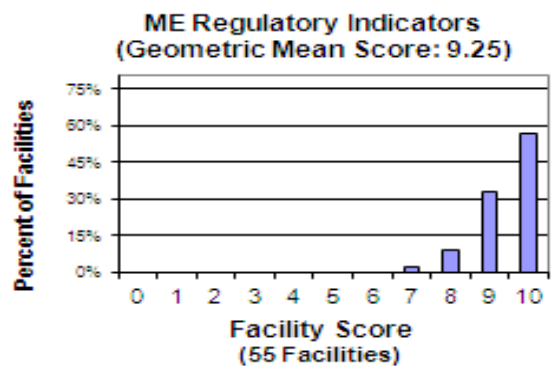
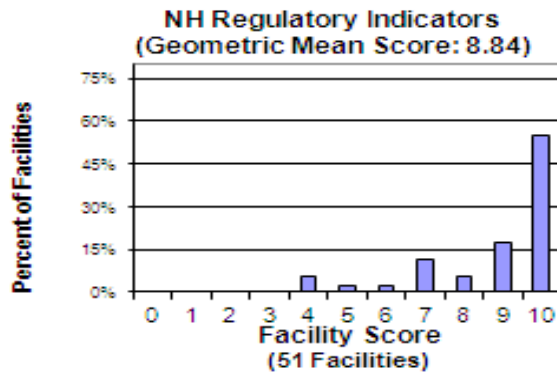
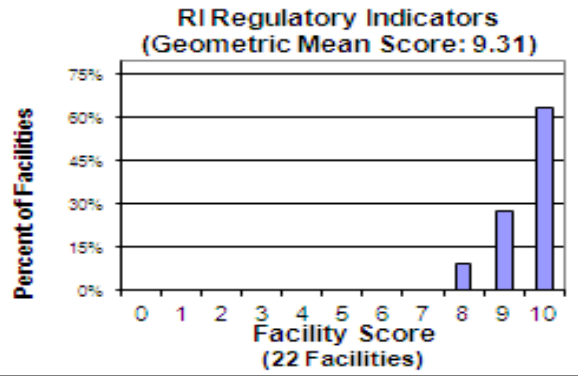
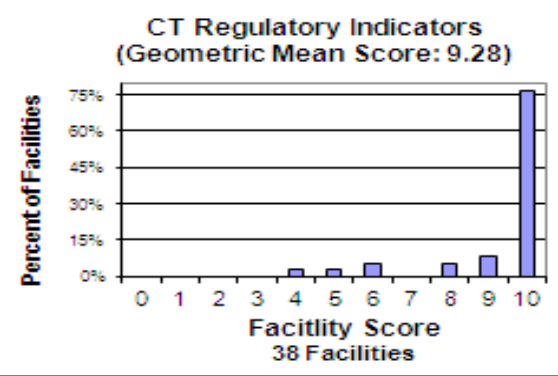
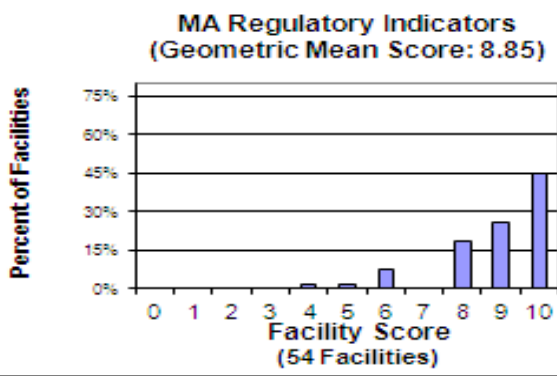
(\*regulatory requirements and “beyond compliance” best practices)



# Baseline Performance Results -- Average Facility Scores by State



# It's Not just the Average Facility Score





# Average Facility Scores

- **REGULATORY INDICATORS\***
  - Observed Range: 8.4 – 9.2
  - Actual Range: 8.0% - 9.4%
- **BEYOND COMPLIANCE INDICATORS\***
  - Observed Range: 2.0 – 6.4%
  - Actual Range: 1.5% - 7.9%

# State Activities Influence (June 2004 – June 2007) on Measured SQG Performance

- Did the **frequency of inspections** influence performance? SIGNS POINT TO **NO**
- Did the **most common inspection triggers** influence performance? SIGNS POINT TO **NO**
- Did **who conducted SQG compliance inspections** influence performance? **MAYBE -- IT DEPENDS**
- Did the **type of SQG enforcement actions** influence performance? SIGNS POINT TO **NO**
- Did the nature and amount of **SQG reporting requirements** influence performance? SIGNS POINT TO **NO**

# State Activities Influence (June 2004 – June 2007) on Measured SQG Performance

- Did the nature and extent of **regulatory compliance assistance** provided (between June 2004 and June 2007) influence SQG performance? **SIGNS POINT TO YES**
- Did the nature and extent of **beyond compliance assistance** provided influence performance? (toxics use reduction, recycling, water conservation, energy conservation) **SIGNS POINT TO YES**

# What Does this Mean for States and EPA

1. CAN MEASURE COMPLIANCE MANNER ACROSS STATES
2. CAN MEASURE IN WAYS THAT DIAGNOSE COMPLIANCE PROBLEMS THAT NEED TO BE ADDRESSED
3. CAN SEE INFLUENCE OF PROGRAM DESIGN ON COMPLIANCE OUTCOMES
4. “ACTIVE” TECHNICAL ASSISTANCE APPEARS TO IMPROVE ENVIRONMENTAL PERFORMANCE – COMPLIANCE AND BEYOND COMPLIANCE
5. THIS CAN BE USED TO SUPPORT MOVING EPA BEYOND BEANS AND INSPECTIONS OF MAJORS AS THE GOLD STANDARD OF COMPLIANCE ASSURANCE PROGRAMS

# Regulatory Indicators with No Statistically Significant Differences

| <b>Indicator 4 (Containers closed)</b>            |    |        |                |
|---|----|--------|----------------|
| RI  | 20 | 90.0%  | 73.8% - 96.6%  |
| ME  | 55 | 89.1%  | 80.3% - 94.3%  |
| MA  | 51 | 88.2%  | 78.8% - 93.8%  |
| VT  | 40 | 87.5%  | 76.5% - 93.8%  |
| CT  | 38 | 86.8%  | 75.3% - 93.4%  |
| NY  | 55 | 83.6%  | 73.9% - 90.2%  |
| CO  | 55 | 76.4%  | 65.8% - 84.4%  |
| NH  | 50 | 76.0%  | 64.9% - 84.4%  |
| <b>Indicator 5 (Containers in good condition)</b> |    |        |                |
| CO  | 55 | 100.0% | 95.3% - 100.0% |
| ME  | 55 | 100.0% | 95.3% - 100.0% |
| NY  | 55 | 100.0% | 95.3% - 100.0% |
| RI  | 20 | 100.0% | 88.1% - 100.0% |
| MA  | 51 | 98.0%  | 91.7% - 99.6%  |
| NH  | 50 | 98.0%  | 91.5% - 99.6%  |
| CT  | 38 | 97.4%  | 89.0% - 99.4%  |
| VT  | 40 | 95.0%  | 86.0% - 98.3%  |

| <b>Indicator 8 (Manifests used)</b> |    |        |                |
|-------------------------------------|----|--------|----------------|
| CO                                  | 57 | 100.0% | 95.5% - 100.0% |
| ME                                  | 55 | 100.0% | 95.3% - 100.0% |
| NH                                  | 51 | 100.0% | 95.0% - 100.0% |
| RI                                  | 22 | 100.0% | 89.0% - 100.0% |
| NY                                  | 56 | 98.2%  | 92.4% - 99.6%  |
| CT                                  | 38 | 97.4%  | 89.0% - 99.4%  |
| MA                                  | 53 | 96.2%  | 89.2% - 98.7%  |
| VT                                  | 44 | 95.5%  | 87.2% - 98.5%  |

## Beyond Compliance Indicators Only

|             |    |      |             |
|-------------|----|------|-------------|
| RI          | 16 | 6.44 | 4.86 - 7.88 |
| ME          | 55 | 6.19 | 5.34 - 7.00 |
| VT          | 44 | 5.76 | 4.86 - 6.64 |
| <i>NH</i> ← | 50 | 4.94 | 4.08 - 5.81 |
| MA ←        | 54 | 4.67 | 3.78 - 5.58 |
| → NY ←      | 56 | 2.63 | 1.93 - 3.40 |
| → CT ←      | 38 | 2.00 | 1.42 - 2.65 |
| → CO ←      | 57 | 1.96 | 1.45 - 2.53 |



# Average Facility Scores – Regulatory Indicators

| Regulatory Indicators Only |    |      |             |
|----------------------------|----|------|-------------|
| RI*                        | 22 | 9.21 | 8.94 - 9.44 |
| CT                         | 38 | 9.28 | 8.99 - 9.53 |
| ME                         | 55 | 9.25 | 9.10 - 9.39 |
| MA                         | 54 | 8.85 | 8.57 - 9.10 |
| CO                         | 57 | 8.85 | 8.61 - 9.06 |
| NH*                        | 51 | 8.84 | 8.51 - 9.14 |
| VT                         | 44 | 8.72 | 8.27 - 9.11 |
| NY                         | 57 | 8.35 | 7.99 - 8.67 |

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# Differences in Beyond Compliance Indicators

**Indicator 11a (Toxics use reduction implemented)**

|    |    |       |               |
|----|----|-------|---------------|
| VT | 43 | 69.8% | 57.4% - 79.8% |
| ME | 55 | 67.3% | 56.3% - 76.7% |
| RI | 11 | 56.3% | 36.5% - 74.2% |
| MA | 54 | 51.9% | 40.8% - 62.7% |
| NH | 50 | 48.0% | 36.8% - 59.4% |
| CT | 38 | 28.9% | 18.6% - 42.1% |
| NY | 56 | 28.6% | 19.8% - 39.3% |
| CO | 53 | 28.1% | 19.4% - 38.7% |

**Indicator 11b (Recycling projects undertaken)**

|    |    |       |               |
|----|----|-------|---------------|
| ME | 55 | 70.9% | 60.0% - 79.8% |
| RI | 14 | 64.3% | 42.6% - 81.4% |
| VT | 44 | 63.6% | 51.2% - 74.5% |
| NH | 50 | 52.0% | 40.6% - 63.2% |
| MA | 54 | 46.3% | 35.6% - 57.4% |
| NY | 56 | 23.2% | 15.3% - 33.6% |
| CO | 57 | 21.1% | 13.6% - 31.1% |
| CT | 38 | 21.1% | 12.3% - 33.7% |

**Indicator 11c (Water conservation implemented)**

|    |    |       |               |
|----|----|-------|---------------|
| RI | 16 | 68.8% | 48.2% - 83.9% |
| MA | 54 | 44.4% | 33.9% - 55.6% |
| ME | 55 | 38.2% | 28.2% - 49.3% |
| NH | 50 | 32.0% | 22.3% - 43.5% |
| VT | 44 | 31.8% | 21.6% - 44.1% |
| NY | 56 | 17.9% | 11.0% - 27.7% |
| CO | 57 | 14.0% | 8.1% - 23.3%  |
| CT | 38 | 2.6%  | 0.6% - 11.0%  |

**Indicator 11d (Energy conservation/Alternative energy implemented)**

|    |    |       |               |
|----|----|-------|---------------|
| ME | 55 | 69.1% | 58.1% - 78.2% |
| RI | 15 | 66.7% | 45.5% - 82.7% |
| NH | 50 | 66.0% | 54.4% - 75.9% |
| VT | 44 | 63.6% | 51.2% - 74.5% |
| MA | 53 | 45.3% | 34.5% - 56.5% |
| NY | 56 | 37.5% | 27.7% - 48.5% |
| CT | 38 | 26.3% | 16.4% - 39.4% |
| CO | 57 | 14.0% | 8.1% - 23.2%  |

# Regulatory Indicator With Statistically Significant Differences

| STATE  | # Facilities | Observed Achievement Rate | Confidence Interval<br>(90% confidence level) |
|--|--------------|---------------------------|---|
| <b>Indicator 7 (Accumulation time limit followed)</b>      |              |                           |   |
| CT   | 35           | 100.0%                    | 92.8% - 100.0%                                |
| RI   | 21           | 100.0%                    | 88.6% - 100.0%                                |
| CO   | 57           | 96.5%                     | 89.9% - 98.8%                                 |
| MA   | 53           | 96.2%                     | 89.2% - 98.7%                                 |
| VT   | 43           | 93.0%                     | 83.8% - 97.2%                                 |
| NY   | 52           | 92.3%                     | 83.9% - 96.5%                                 |
| NH   | 46           | 89.1%                     | 79.3% - 94.6%                                 |
| ME   | 53           | 86.8%                     | 77.3% - 92.7%                                 |
| <b>Indicator 6* (Accumulation quantity limit followed)</b> |              |                           |   |
| CO   | 57           | 100.0%                    | 95.5% - 100.0%                                |
| ME   | 55           | 100.0%                    | 95.3% - 100.0%                                |
| CT   | 37           | 100.0%                    | 93.2% - 100.0%                                |
| MA   | 54           | 98.1%                     | 92.1% - 99.6%                                 |
| NY   | 57           | 96.5%                     | 89.9% - 98.8%                                 |
| VT   | 44           | 93.2%                     | 84.1% - 97.2%                                 |
| * Note: Indicator 6 does not apply to NH or RI             |              |                           |   |

# Regulatory Indicators – More Statistically Significant Differences

| STATE   | # Facilities | Observed Achievement Rate | Confidence Interval<br>(90% confidence level) |
|---|--------------|---------------------------|---|
| <b>Indicator 3 (Containers properly labelled)</b> |              |                           |   |
| RI  | 20           | 90.0%                     | 73.8% - 96.6%                                 |
| NH  | 50           | 84.0%                     | 73.8% - 90.7%                                 |
| CT  | 31           | 81.6%                     | 69.3% - 89.7%                                 |
| ME  | 55           | 78.2%                     | 67.8% - 85.9%                                 |
| CO  | 55           | 76.4%                     | 65.8% - 84.4%                                 |
| MA  | 51           | 66.7%                     | 55.2% - 76.4%                                 |
| VT  | 40           | 65.0%                     | 52.0% - 76.1%                                 |
| NY  | 55           | 63.6%                     | 52.6% - 73.4%                                 |

|   |    |       |               |
|---|----|-------|---------------|
| <b>Indicator 10 (Emergency response information posted)</b> |    |       |               |
| CT  | 38 | 92.1% | 81.8% - 96.8% |
| ME  | 55 | 90.9% | 82.5% - 95.5% |
| RI  | 22 | 86.4% | 70.3% - 94.4% |
| NH  | 51 | 74.5% | 63.4% - 83.1% |
| VT  | 43 | 65.1% | 52.6% - 75.9% |
| MA  | 54 | 64.8% | 53.7% - 74.6% |
| CO  | 57 | 63.2% | 52.3% - 72.8% |
| NY  | 57 | 38.6% | 28.7% - 49.5% |

|   |    |        |                |
|---|----|--------|----------------|
| <b>Indicator 9 (Hazardous waste streams identified)</b> |    |        |                |
| ME  | 55 | 100.0% | 95.3% - 100.0% |
| MA  | 54 | 94.4%  | 86.9% - 97.8%  |
| NH  | 51 | 94.1%  | 86.2% - 97.6%  |
| VT  | 44 | 90.9%  | 81.2% - 95.9%  |
| CO  | 57 | 91.2%  | 83.1% - 95.7%  |
| CT  | 38 | 89.5%  | 78.5% - 95.2%  |
| RI  | 22 | 86.4%  | 70.3% - 94.4%  |
| NY  | 57 | 86.0%  | 76.8% - 91.9%  |