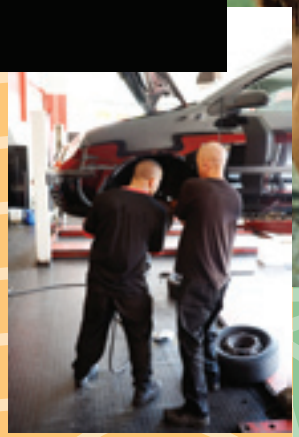
EPA 100-R-07-009
December 2007



ERP States Produce Results

2007 Report

States' Experience Implementing the Environmental Results Program

NCEI
NATIONAL CENTER FOR ENVIRONMENTAL INNOVATION
WWW.EPA.GOV/INNOVATION

Table of Contents

1 ERP Addresses Small Sources of Pollution Efficiently and Effectively

The Environmental Results Program (ERP) is an integrated approach to addressing environmental problems associated with various business sectors and other groups having large numbers of small facilities. While individual facilities within these groups may release small amounts of pollution, the aggregate impact can be significant. The U.S. Environmental Protection Agency's (EPA's) National Center for Environmental Innovation (NCEI) has prepared this report in order to update the story of ERP, the implementation of which has grown substantially since Massachusetts first developed it 10 years ago. This report identifies the many states now using ERP and the environmental problems they are seeking to address, describes the results and benefits state ERPs are generating, and discusses some of the new directions being explored within the ERP community.

"ERP has thrived in Massachusetts because it delivers real results: a cleaner environment, a better business climate, and more efficient government."

— Robert Golledge, Former Commissioner of Massachusetts' Department of Environmental Protection[1]

1.1 Small Sources Present a Large Challenge

Over the past 30 years, U.S. environmental policy has achieved a great deal of success in improving the quality of air, water, and land in the United States, especially with regard to many of the largest sources of pollution. Increasingly, however, environmental agencies are seeing critical problems to which multitudes of small sources of pollution are substantial contributors. For example, hazardous air pollutants released by dry cleaners and auto body shops can significantly degrade air quality. Likewise, leaks from petroleum underground storage tanks (USTs) and uncontrolled runoff from animal feedlots, parking lots, and auto salvage yards can worsen the quality of many water bodies and sources of drinking water. Such polluting facilities can number in the tens of thousands nationally. For instance, the United States has over 130,000 retail gas stations,[2] the vast majority of which are likely to have underground storage tanks.

Consequently, while each small source of pollution may pose a modest threat, these sources in sum can represent as important an environmental problem as many major industrial facilities. In addition, regulatory agencies typically struggle to both identify all such facilities and assess their performance. Also, such facilities often lack sufficient awareness or technical expertise to meet their regulatory responsibilities and to minimize their environmental impacts.

Many states are finding that the conventional tools of permitting, inspections, enforcement, and compliance assurance may not always be well-suited to small sources of pollution when applied in a traditional manner. Resource constraints increasingly confronting most environmental agencies—often in core regulatory programs—are driving states to seek more efficient and sustainable approaches that integrate traditional tools and other strategies.

1.2 The ERP System Integrates Several Tools

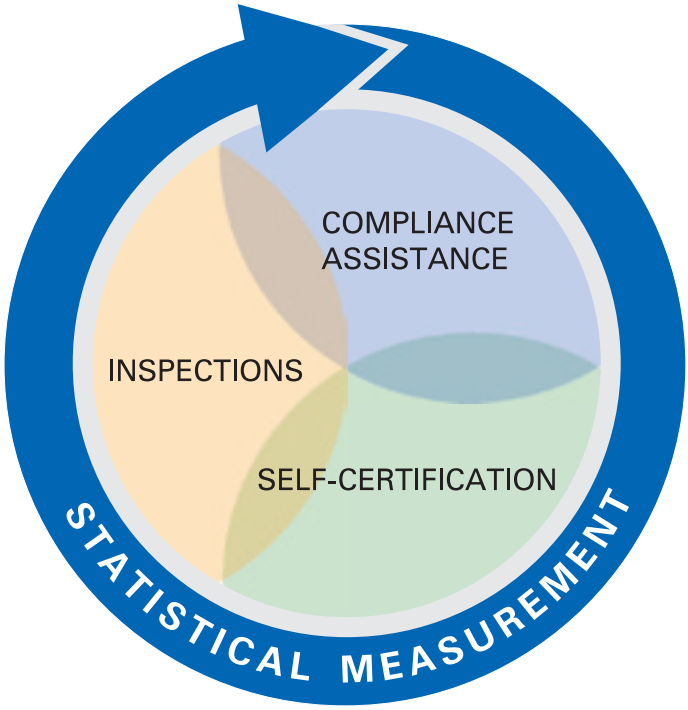
Increasingly, states report ERP to be a cost-effective approach to addressing the environmental problems described previously—an approach that produces objective data measuring overall sector performance over time.

As Figure 1 (right) illustrates, ERP is an integrated system of:

- Plain-language compliance assistance that promotes pollution prevention (P2);
- Facility self-assessment and self-certification;
- Agency inspections to assess performance; and
- Statistically based performance measurement.

In ERP, regulators also typically conduct a comprehensive facility inventory and undertake targeted enforcement actions. The elements of ERP can work together to improve performance across a business sector or other group of pollution sources, while deploying government resources strategically and efficiently.

Figure 1. ERP: Interlocking Tools, Integrated System



"[ERP] complements Minnesota's ongoing efforts to partner with smaller-scale animal feeding operations in a way that focuses on results. We are pleased with the efforts of producers, who have worked to learn more environmentally friendly business practices that may be more cost effective as well. With the success witnessed in our pilot project, we look forward to broadening the program's application."

— Brad Moore, Commissioner of Minnesota's Pollution Control Agency

1.3 More States Are Implementing ERP, Delivering Results

In 1997, the Massachusetts Department of Environmental Protection (DEP) first began applying ERP in the dry cleaner and photo processor sectors. Now, 18 states in eight of EPA's 10 regions have developed or are implementing at least one ERP. These initiatives aim to address challenging environmental issues in 11 sectors/groups. (See Table 1, next page.) ERP states have also banded together with EPA to form a new States ERP Consortium, an association that aims to promote and facilitate the use of ERP tools, when appropriate, to solve pressing environmental problems. (See Section 5.4 of this report for more information on the Consortium.)

EPA has actively supported the diffusion of ERP across states since EPA's Innovation Action Council (IAC) endorsed the approach for "scale up" in 2000.[3] In making its decision, the IAC considered at least three factors: documented evidence of performance improvements in Massachusetts' first years of ERP; a favorable evaluation of the initiative by the National Academy of Public Administration (NAPA); and the significant, cumulative environmental threat that can be posed by large groups of small pollution sources, such as in the sectors where

ERP is now being applied. ERP shows high potential for cost-effectively achieving results with these small entities, which historically are under-regulated—in part because their large numbers can seem daunting to tackle with traditional approaches. For instance, several states have developed or are planning ERPs for one such group, auto body shops—which number more than 30,000 nationwide and are associated with serious environmental and health impacts.[4]

Six states have now completed measuring the results of at least one ERP: Delaware, Florida, Massachusetts, Maryland, Maine, and Rhode Island. These states have seen initial average performance improvements of 5 to 30 percentage points on measures tracking the most important compliance and best management practices, across environmental media.[5] These improvements have been observed in just the first cycle of ERP inspections, compliance assistance, self-certification, and performance measurement. Results from longer-term ERP efforts show those initial performance improvements increasing or being maintained over time. The box below discusses some of the reasons regulators believe ERP may help improve the performance of sectors where it is applied, and points readers to more detailed information on ERP performance data.

Table 1. ERP States, by Sector/Group

Sector/Group	ERP States
Animal Feedlots (Small)	MN
Auto Salvage Yards	IN, RI
Auto Body Shops	DE, MD*, ME, NY, RI, WA
Auto Repair Shops	FL*, MD*
Dry Cleaners	MA, MI, NH, NV
Gas Stations	RI, VA, VT
Oil & Gas Extraction Facilities	LA
Photo Processors	MA
Printers	MA, NY, WI
Stormwater Dischargers	ME, RI
Underground Injection Wells	IL

*No longer implementing ERP.[6] Note that MD had one ERP that covered both auto body and auto repair.

Evidence of performance improvements reported by ERP states to date has led EPA to endorse ERP and to support its state partners. EPA has provided support through technical assistance, $2.9 million in startup grant funding, and, in some cases, the flexibility to use resources that otherwise might be dedicated to more traditional oversight programs.

Why Do ERP's Performance Improvements Happen?

The six states that have completed at least one ERP have seen average sector improvements of 5 to 30 percentage points for the most important indicators of environmental performance—after just one round of inspections and self-certification. Why?

Regulators believe that ERP's mix of compliance assistance, self-certification, and agency verification drives facilities to hold themselves more accountable and gives facilities the capability and incentive to improve performance. Further, a recent extensive evaluation of the Massachusetts dry cleaners ERP suggests that the cooperative ERP approach helps engender trust vis-à-vis industry, increasing the willingness of facility owners and operators to proactively improve their environmental performance.[7]

For a more detailed example discussing the improvements realized by one state, see the case study discussing Rhode Island's experience with ERP (next page). For substantial detail on ERP results to date for all six states, see Section 3 of this report. The appendix to this report, published separately, provides additional performance data, a detailed list of sources, and explanations of EPA's data verification and analysis approach for key analyses conducted by EPA for this report.

Case Study

Rhode Island Successfully Adapts ERP Approach

Auto Body Shops Present a Problem. In 2002, auto body shops in Rhode Island represented a serious environmental and public health concern. The sector had historically been ignored by regulators even though many shops were using highly hazardous methylene chloride paint strippers, as well as releasing toxic sanding dust and volatile organic compounds (VOCs) to the environment. Further, research by staff at the state's Department of Environmental Management (DEM) suggested that lead paint dust had been carried home to workers' families on contaminated work clothes, and that the average level of lead in auto body workers' blood was greater than five times the national average.[8]

ERP Offers a Potential Solution. Solving this problem with the usual approaches was not an option, because of resource constraints. Rhode Island's DEM and business leaders in the sector saw the answer in the efficiency of Massachusetts' ERP approach, modified for Rhode Island's circumstances. While Massachusetts typically *requires* businesses to submit self-certification forms, Rhode Island opted to design a voluntary self-certification program. Whether or not they participated, shops needed to comply with standards. To encourage participation, DEM offered compliance assistance and the opportunity to come into compliance without fear of enforcement action. Further, non-participants were informed they were more likely to be targeted for inspection.

Many Facilities Sign Up. Responding to these incentives, and demonstrating their commitment to resolving worker and community concerns, 47% of the state's 367 facilities submitted self-certification forms.[9]

"I'm Doing It Wrong Over Here." Twenty percent of the state's shops indicated they were out of compliance—particularly with issues impacting worker health and safety—and submitted plans to address their problems.[10] The state requires that all plans be signed by responsible company officials committing to take specific actions by specific dates.

Performance Improves across the Sector. DEM audited random samples of *all* facilities—both certifiers and non-certifiers—before and after the initiative. Inspectors observed sector-wide improvements averaging 21 percentage points across all indicators. (See Section 3 for more information.)

DEM Finds More ERP Opportunities. DEM has since expanded its ERP activities to include a mandatory certification program for underground storage tank (UST) facilities and voluntary certification programs for auto salvage yards and small construction sites. The Department also completed a second round of auto body self-certification in 2006 and conducted post-certification random inspections in late 2007. Analytical results are expected in 2008.

2 How Does ERP Work?

ERP combines innovative approaches with conventional regulatory tools in a rigorous and repeating process. Synergy among the tools can help improve environmental performance at each stage. States have developed some variations on ERP, but the general approach, tools, and steps in the process remain the same. Figure 2 (right) is a stepwise diagram of the major tasks in a typical ERP. This section describes the ERP process in more detail, and demonstrates how each step is intended to help support those that follow.

2.1 Conduct a Comprehensive Inventory of Facilities

Often, states have not developed a comprehensive inventory of small-source polluters within the various sectors that can be effectively targeted by ERP. ERP implementers strive to better identify the universe of sources, in order to reach as many businesses as possible with ERP and to accurately assess the performance of the sector as a whole. ERP states use a variety of public and private data sources and data collection approaches to compile much more complete lists of relevant facilities than are typically maintained.

Once completed, the ERP inventory often shows that only a fraction of the businesses in a sector were on a state's "radar screen." For instance, Massachusetts' statewide ERP inventories increased the numbers of facilities in each of DEP's sector databases by about 4 to 20 times. The number of printers in DEP's database grew from about 250 facilities to around 1,000; its records of photo processors rose from approximately 100 to about 500; and its dry cleaners listings expanded from about 30 facilities to around 600.[11]

ERP inventories do not always include so many facilities, such as when ERP is implemented as a pilot program in a portion of a state. In fact, experience shows that ERP's benefits can be reaped on a more local level with smaller populations of facilities. For example, Maryland's ERP, discussed later in this report, demonstrated performance improvements while focusing solely on a single neighborhood in Baltimore.

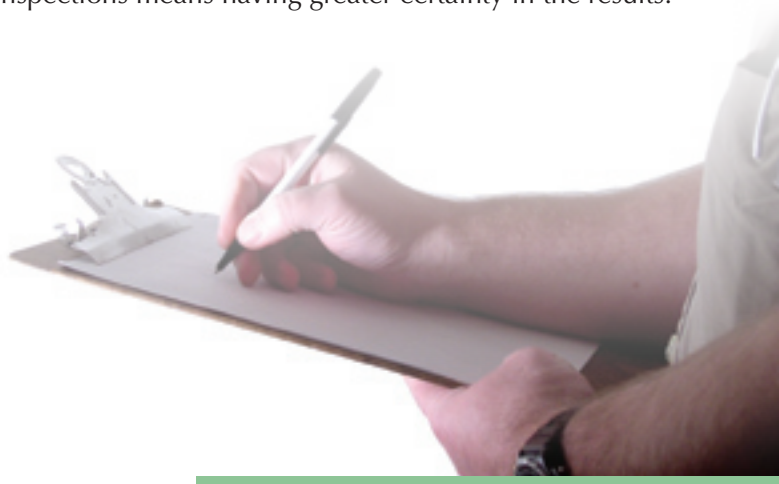
Figure 2. A Typical ERP Cycle

2.2 Conduct Statistically Based Baseline Inspections

Once the facilities to be targeted by ERP have been identified, a state will randomly select a sample of those facilities. Next, inspectors assess performance at each of these facilities using detailed checklists. Using the data from these inspections, states can accurately estimate the sector/group's performance level before the beginning of compliance assistance and certification. For instance, agencies typically calculate the percentage of facilities achieving key compliance and pollution prevention practices. This information can help agencies identify problem areas to highlight during compliance assistance, and serve as a baseline for understanding whether sector/group performance changes over time.

ERP's random sampling approach is intended to help ensure that the set of facilities visited is representative of the overall sector or group being targeted. This random sampling provides agencies with the foundation for statistically calculating how confident they can be that the findings from these inspections shed light on overall sector/group performance. By contrast, many other policy and measurement approaches collect data from samples of facilities that may not be representative, leaving agencies with greater uncertainty about overall sector/group performance. (Sections 2.6 and 2.7 discuss the role of statistics in ERP in greater detail.)

To date, the number of baseline inspections conducted by states ranges from 35 to more than 250, with most states conducting 35 to 50 site visits. The precise number of visits depends on how the state chooses to balance the resources available for site visits with the need for increased confidence in the results—because doing more inspections means having greater certainty in the results.



2.3 Provide Plain-Language Compliance Assistance Across Environmental Media

Many business owners want to comply with environmental regulations to protect their workers and communities, but they may not always know how—or even where—to start. ERP tries to help by reaching out to facilities with fact sheets, workbooks, workshops, and even videos.

Agencies actively work with key members of the business community, such as trade associations, to ensure outreach approaches are as helpful as possible. The best ERP materials are easy to use and intuitive to facility operators, translating regulatory requirements into plain language. For instance, ERP workbooks are written in terms the operators are familiar with, not legalistic regulatory language. They simply tell businesses what they need to do and how to complete the certification form. The workbooks typically provide information on requirements for all environmental media (e.g., air, water, and waste). They also discuss pollution prevention practices that are good for the environment, worker health and safety, and/or businesses' bottom line.

"Small-business owner/operators want to do the right thing, if we only know how. We need it to be simple and easy to understand. We want to protect our [real estate] investment and protect the environment, too. We have grandchildren who we want to enjoy the same environment as we have. ERP looks good...."

— George Gardner of Gardner Foreign Auto Parts in Pompano Beach, Florida[12]

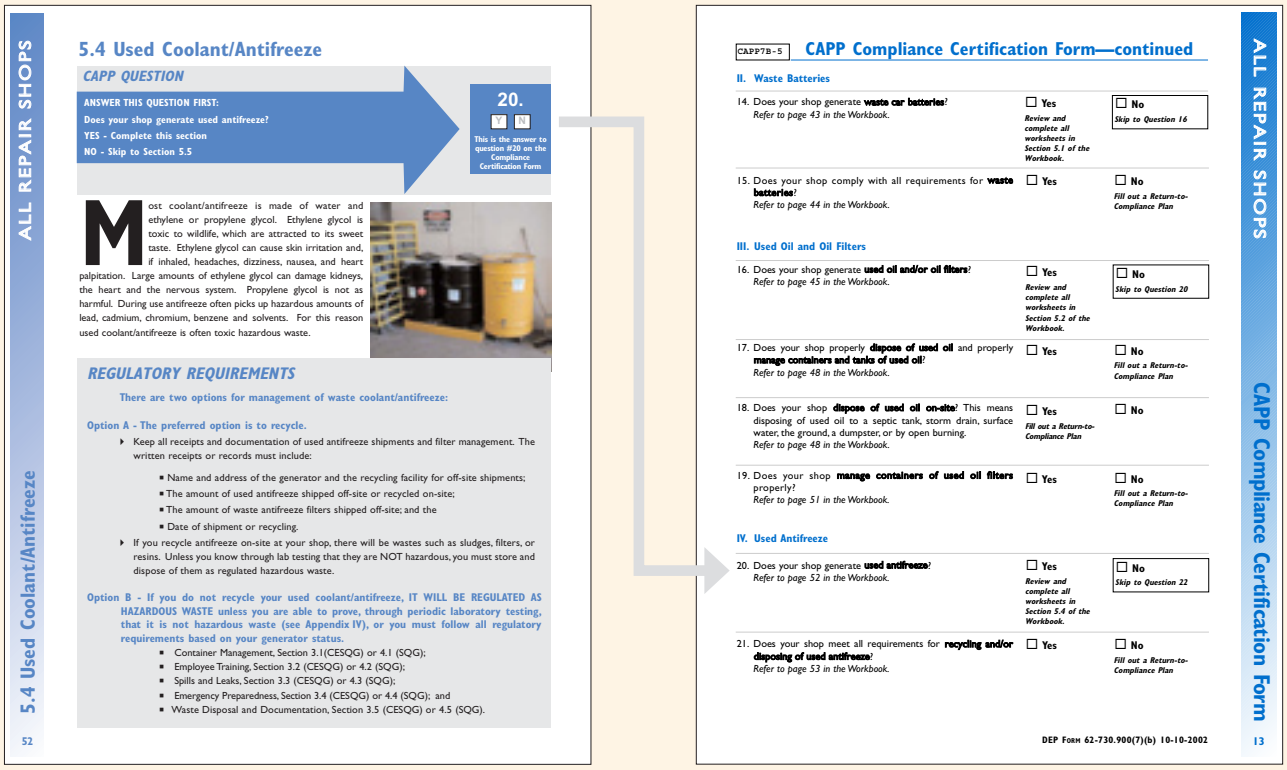
2.4 Collect Facility Self-Certification Forms

Reflecting ERP's integrated nature, its compliance assistance workbooks help facilities conduct standardized self-assessments of their operations on a regular basis (usually annually). Facility self-assessment checklists are typically integrated into certification forms and correspond closely with the checklists used by agency inspectors. This correlation is intended to better enable facilities to address an agency's concerns and priorities, and to empower the agency to measure progress and track the accuracy of certification forms.

Following a self-assessment, a responsible official for each facility signs and submits a certification form that specifies whether or not the facility is meeting the requirements and best practices laid out by the agency. In some ERPs, the submission of certification forms is mandatory. In others, like the Rhode Island auto body ERP discussed in the case study box in Section 1, certification is voluntary. Whatever the approach chosen by states, all facilities are still expected to comply with applicable regulatory requirements.

If facilities indicate any noncompliance, they must also submit return-to-compliance plans. In return-to-compliance plans, facilities indicate how and within what time frame they will comply with regulatory requirements. While agencies retain the authority to take enforcement action in all cases, they generally refrain from enforcement against good-faith actors who self-report problems and act promptly to correct violations. The next page explains how ERP states consider and utilize the self-reported data from ERP.

ERP Workbooks Connect to Self-Certification Forms



ALL REPAIR SHOPS

5.4 Used Coolant/Antifreeze

5.4 Used Coolant/Antifreeze

CAPP QUESTION

ANSWER THIS QUESTION FIRST:
Does your shop generate used antifreeze?
YES - Complete this section
NO - Skip to Section 5.5

20. Y N
This is the answer to question #20 on the Compliance Certification Form

Most coolant/antifreeze is made of water and ethylene or propylene glycol. Ethylene glycol is toxic to wildlife, which are attracted to its sweet taste. Ethylene glycol can cause skin irritation and, if inhaled, headaches, dizziness, nausea, and heart palpitation. Large amounts of ethylene glycol can damage kidneys, the heart and the nervous system. Propylene glycol is not as harmful. During use antifreeze often picks up hazardous amounts of lead, cadmium, chromium, benzene and solvents. For this reason used coolant/antifreeze is often toxic hazardous waste.

REGULATORY REQUIREMENTS

There are two options for management of waste coolant/antifreeze:

Option A - The preferred option is to recycle.

- Keep all receipts and documentation of used antifreeze shipments and filter management. The written receipts or records must include:
  - Name and address of the generator and the recycling facility for off-site shipments;
  - The amount of used antifreeze shipped off-site or recycled on-site;
  - The amount of waste antifreeze filters shipped off-site; and the
  - Date of shipment or recycling.
- If you recycle antifreeze on-site at your shop, there will be wastes such as sludges, filters, or resins. Unless you know through lab testing that they are NOT hazardous, you must store and dispose of them as regulated hazardous waste.

Option B - If you do not recycle your used coolant/antifreeze, IT WILL BE REGULATED AS HAZARDOUS WASTE unless you are able to prove, through periodic laboratory testing, that it is not hazardous waste (see Appendix IV), or you must follow all regulatory requirements based on your generator status.

- Container Management, Section 3.1(CESQG) or 4.1 (SQG);
- Employee Training, Section 3.2 (CESQG) or 4.2 (SQG);
- Spills and Leaks, Section 3.3 (CESQG) or 4.3 (SQG);
- Emergency Preparedness, Section 3.4 (CESQG) or 4.4 (SQG); and
- Waste Disposal and Documentation, Section 3.5 (CESQG) or 4.5 (SQG).

52

CAPP7B-5 **CAPP Compliance Certification Form—continued**

ALL REPAIR SHOPS

CAPP Compliance Certification Form

II. Waste Batteries

14. Does your shop generate **waste car batteries**? *Refer to page 43 in the Workbook.* ☐ Yes *Review and complete all worksheets in Section 5.1 of the Workbook.* ☐ No *Skip to Question 16*

15. Does your shop comply with all requirements for **waste batteries**? *Refer to page 44 in the Workbook.* ☐ Yes ☐ No *Fill out a Return-to-Compliance Plan*

III. Used Oil and Oil Filters

16. Does your shop generate **used oil and/or oil filters**? *Refer to page 45 in the Workbook.* ☐ Yes *Review and complete all worksheets in Section 5.2 of the Workbook.* ☐ No *Skip to Question 20*

17. Does your shop properly **dispose of used oil** and properly **manage containers and tanks of used oil**? *Refer to page 48 in the Workbook.* ☐ Yes ☐ No *Fill out a Return-to-Compliance Plan*

18. Does your shop **dispose of used oil on-site**? This means disposing of used oil to a septic tank, storm drain, surface water, the ground, a dumpster, or by open burning. *Refer to page 48 in the Workbook.* ☐ Yes *Fill out a Return-to-Compliance Plan* ☐ No

19. Does your shop **manage containers of used oil filters** properly? *Refer to page 51 in the Workbook.* ☐ Yes ☐ No *Fill out a Return-to-Compliance Plan*

IV. Used Antifreeze

20. Does your shop generate **used antifreeze**? *Refer to page 52 in the Workbook.* ☐ Yes *Review and complete all worksheets in Section 5.4 of the Workbook.* ☐ No *Skip to Question 22*

21. Does your shop meet all requirements for **recycling and/or disposing of used antifreeze**? *Refer to page 53 in the Workbook.* ☐ Yes ☐ No *Fill out a Return-to-Compliance Plan*

DEP Form 62-730.900(7)(b) 10-10-2002

13

A page from Florida's ERP workbook (above, left) explains the potential environmental and health hazards of used antifreeze, and what steps auto repair shops must take to comply with state regulations for handling the substance. A blue arrow at the top of the page helps indicate that all facilities must answer question 20 on the self-certification form, as to whether they generate used antifreeze. The corresponding page in the self-certification form (above, right) shows question 20 under a header related to used antifreeze. Shops indicating that they generate used antifreeze are instructed to answer a subsequent question about their compliance status, and they are told to refer to pages 52 and 53 of the workbook.

What Is the Role of Self-Reported Information?

Newcomers to the ERP concept often express concerns about letting facilities identify their own compliance levels. Such concerns generally appear founded on a misconception that ERP primarily relies upon self-reported data to determine group performance, as well as a correct understanding of the historic difficulty agencies have had in verifying self-reported data.[13] To the contrary, ERP states typically use self-reported data in low-risk ways that can add substantial value to efforts to improve sector performance. ERP states are comfortable with and confident about the certification process for many reasons:

- **Sector-wide compliance assessments are based on agency site visits, not facility-reported data.** Statistical analysis of data from inspections has allowed states to demonstrate objectively that sector performance is improving. (See Section 3 for performance data.)
- **Random and targeted inspections can enable verification and (when necessary) enforcement.** When an inspector visits a facility that has self-certified, he or she can assess the veracity of its certification form and can follow up with appropriate enforcement action if certification responses appear to have been falsified.
- **Surprising numbers of facilities report noncompliance.** In the first cycle of an ERP, up to 34% of facilities have self-reported that they are out of compliance on at least one issue.[14] Further, ERP states typically follow up with each facility to ensure its plan to return to compliance has been implemented.
- **Performance may be improving even if some certification data are inaccurate.** Levels of certification accuracy appear to vary across ERPs, while inspector observations consistently indicate that group performance has improved after ERP implementation. (Section 3 of this report has substantial detail on objectively measured performance improvements.) For instance, Massachusetts DEP has seen relatively accurate certification, with sector-wide agreement between inspector and facility responses as much as 86% of the time.[15] Florida's Department of Environmental Protection (DEP) looked at certification accuracy in a different way. DEP inspectors found that 74% of randomly sampled auto repair shops were out of compliance on at least one issue on which the facility had previously indicated compliance on its first self-certification form.[16] Despite this inconsistency, DEP inspectors' observations also indicate that the sector's performance on key indicators improved by an average of 7 percentage points after self-certification, and that the sector's compliance rate also improved. (See Section 3 for details.) Further, none of the self-certification inconsistencies involved issues of significant noncompliance.[17]
- **Certification accuracy appears to improve over time.** As facilities better understand their obligations and agencies better communicate their concerns, certification accuracy appears to increase in later certification cycles. For example, Florida found that the proportion of inspected facilities with completely accurate certification forms increased by 14 percentage points from the first round of certification to the second.[18]
- **States choose when to trust certification data.** Based on inspector observations, professional judgment, and common sense, agencies are able to decide which kinds of certification data are likely to be accurate and can serve as a basis for decision-making.
- **Inaccuracies can be used to improve outcomes.** Some inaccuracy is to be expected, and can even be helpful. As discussed in the next section, inaccuracies identified during desk analysis of certification data can provide an opportunity for agencies to find "needles in the haystack," targeting facilities that need compliance assistance or enforcement.

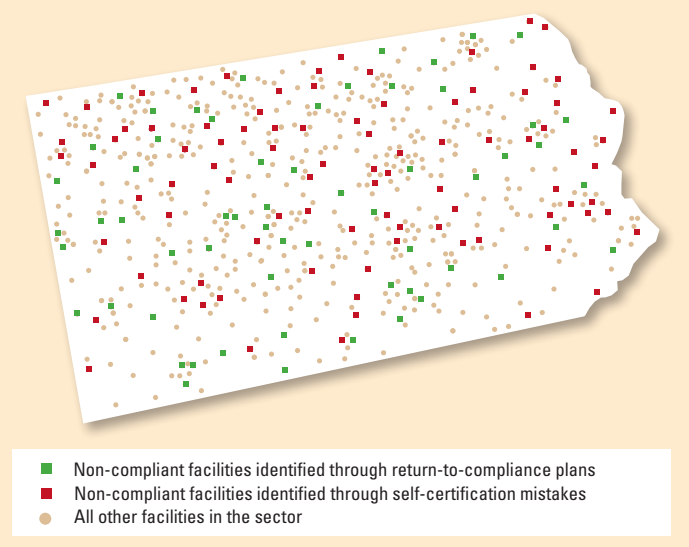
2.5 Target Compliance Assistance and Enforcement Actions

The self-certification process is not just for helping facilities improve their performance, but also for identifying those facilities most in need of further technical assistance or possible enforcement action. ERP states can use the large quantity of certification data made available through the process as one tool to identify "red flag" facilities—i.e., those which require follow-up ranging from a simple helpful phone call to a formal enforcement action.

Figure 3 (right) illustrates how facility return-to-compliance plans and self-certification "red flags" might help a state locate many of the scattered facilities needing the most attention—a targeting process that might not be possible without ERP certification data. Widespread inaccuracies with respect to certain self-certification questions can suggest communication problems that need to be addressed in future rounds of compliance assistance and certification.

Such follow-up can be a cost-effective way for the state agency to identify and improve the performance of lagging facilities. Follow-up also demonstrates that an agency is paying attention to self-certification data, which helps assure facilities that their submissions are not just a paperwork exercise. This assurance, in turn, encourages facilities to take great care in preparing their self-certification forms. Without ERP, this kind of adaptive management might be more difficult. Section 4.1 provides more information on such targeting, in the context of discussing ERP's cost-effectiveness.

Figure 3. Needles in a Haystack? ERP Data Can Help Find Problem Facilities



2.6 Conduct Statistically Based Post-Certification Inspections

The ERP process next calls for more random inspections at another representative sample of all facilities. This round of inspections serves two primary purposes—one that relates to the actual facilities that are visited, and one that relates to all facilities in the sector.

First, inspectors are able to observe how well the facilities visited are performing. These findings can be compared to the performance reported on each participating facility's certification form. Agencies typically undertake standard enforcement approaches when they encounter violations, particularly those associated with false self-certification.

Second, just like with the baseline inspections before certification, the random sampling approach allows agencies to use statistical methods to draw inferences about all facilities being targeted by ERP—not just those facilities visited by inspectors. Consequently, regulators can better understand how well the entire population is performing and how accurately facilities within the population are certifying. Further, regulators can compare estimates of the population's post-certification performance to estimates of its baseline performance, and understand how certain they can be that any observed changes in performance have actually occurred.

2.7 Use Data for Informed Decision-Making

Each round of random inspections provides substantial information about sector performance at that particular point in time. Agencies analyze these data to address several key questions: the extent to which performance has improved; whether adequate performance has been achieved and, if so, whether it has been maintained over time; and areas in which the sector must improve.

The wealth of data ERP creates to help answer these questions can be a double-edged sword. These data can present an opportunity to better understand environmental problems facing regulatory agencies, but they can also seem overwhelming if the agency does not have a clear strategy and a rigorous approach for data assessment. ERP states' response to this conundrum is typically to first concentrate data analysis on indicators that summarize group performance with regard to agency priorities—pursuing issues in finer detail if data indicate a closer look is merited. ERP states also apply principles of statistics, as well as their best professional judgment, to gauge how confidently to move ahead.

Focus on Measures That Summarize Performance. ERP states collect detailed data in their inspections, but regulators don't give equal weight to every single compliance item. Instead, they focus measurement activities on what they consider to be the most important aspects of facility and sector performance. Most states focus analytical efforts initially on the building blocks of ERP measurement, Environmental Business Practice Indicators (EBPIs, described further in the next paragraph). States can also calculate concise figures that provide a "snapshot" of sector or group performance, such as a traditional compliance rate or what can be called a "group compliance score," a new measure created by Massachusetts. When feasible, regulators can also estimate changes in public health or environmental conditions, such as pollution reductions. Section 3 presents state data on each of these kinds of measures: EBPIs, "sector snapshots," and measures of environmental conditions.

Examples of Performance Improvements on Environmental Business Practice Indicators (EBPIs)

A. Do auto body shops dispose of hazardous waste properly? In Delaware, compliance with hazardous waste regulations grew from 66% to 91% in one year.

B. Do auto repair shops illegally discharge polluted wastewater? In its first year of ERP, Florida saw a drop of 12 percentage points in the incidence of sampled facilities with illegal discharges.

C. Are dry cleaners properly checking for equipment leaks? After the first two rounds of annual self-certification, Massachusetts observed an increase of 33 percentage points in the use of this key emission-reduction practice.[19]

D. Do auto body shops utilize solvents that are low in volatile organic compounds (VOCs)? Maine's Department of Environmental Protection (DEP) saw an increase of 48 percentage points in the use of environmentally friendly solvents, from 49% to 97% in one year.

E. To what extent are neighborhood car repair operations following preferred painting procedures? Maryland saw the number of facilities using emission-reducing painting practices jump from 40% in 2002 to 62% in 2004.

F. Do auto body shops use methylene chloride, a dangerous paint-stripping chemical? Before ERP certification, Rhode Island found 33% of facilities were using methylene chloride; after, they found only 5% choosing to use it.

Notes: Percentages are of relevant, randomly sampled facilities. Results from Delaware, Florida, Maine, Massachusetts and Rhode Island are "statistically significant" at a 95% confidence level, meaning we can be confident that performance changed among all facilities targeted by ERP. Maryland's result is not significant, because of particularly small sample sizes. Except where noted above, changes were observed in the first ERP cycle.

Sources: Unless indicated by endnote, data sources for this box are the same as for Table 2 in this Report. Sources for Table 2 are presented in the appendix, Section 1.

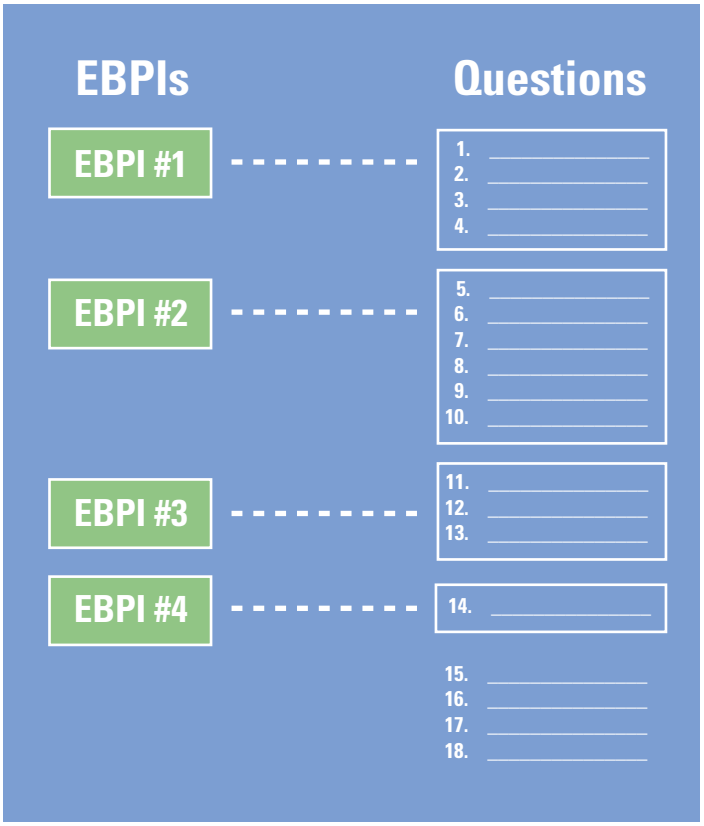
Environmental Business Practice Indicators (EBPIs). For many sectors, there can be well over 100 questions on a comprehensive ERP inspection form or facility self-audit checklist, covering both major and minor issues. This level of detail helps agencies work with individual facilities to thoroughly improve compliance, but can be overwhelming to regulators looking at the sector as a whole, because individual data points can number in the tens of thousands. Concentrating on the highest-priority concerns in the sector can conserve analytical resources and focus management attention. EBPIs can help do this because they summarize performance data on a subset of checklist questions regarding what an agency considers to be the most important compliance and best management practices.

The sidebar (previous page) gives examples of actual EBPIs chosen by states, and performance improvements shown by those indicators. Most ERP states choose between 10 and 30 EBPIs, depending on the sector and the state's needs. States typically choose EBPIs that track facility and sector behavior across all relevant environmental media categories (e.g., air, water, and waste). EBPIs generally cover both compliance and "beyond-compliance" activities, and sometimes practices related to occupational safety and health.

Figure 4 (right) illustrates the two typical types of EBPIs, and how they fit with the questions on a comprehensive checklist. The first type, represented by EBPIs #1 through #3 in the figure, can be called a "roll-up" EBPI, because it rolls up, or summarizes, the answers to several sub-questions. For a real-world example, look at EBPI "E" in the sidebar on the previous page. This EBPI from Maryland summarizes inspector responses on several different checklist questions, all of which involve painting practices that can reduce air emissions from auto body shops.

The second type of EBPI, represented by EBPI #4 in Figure 4, can be called a stand-alone EBPI. A stand-alone EBPI is linked to one important question on the facility checklist. This kind of EBPI can indicate performance on a single, salient issue, or it can be used as a "leading" indicator of performance on other questions that are not tracked. For instance, EBPI "F" in the sidebar (previous page) is a stand-alone indicator that examines Rhode Island auto body shops' use of methylene chloride, a greenhouse gas and an extremely important worker health and safety issue.

Figure 4. The Link Between EBPIs and ERP Checklist Questions



The Role of Statistics in Decision-Making. From a measurement perspective, the ideal way to understand how a population of facilities is performing is to take a census of that population, visiting all facilities over a relatively limited time frame in order to evaluate their performance. Doing so can provide regulators with little doubt that they are basing decisions on the very best available information about the group being investigated.

Such census approaches can be resource-intensive, however, so regulators using a variety of policy approaches often base their decisions on data collected from only a sample of facilities. As a result, regulators usually are not sure how well the data from their samples represent the whole group being investigated. If a sample is not drawn carefully, it may not reflect the performance of the group as a whole. For instance, imagine an agency's sample includes a disproportionate number of facilities that are less likely to be in compliance than other facilities—such as facilities with a history of complaints. In such cases, inspectors may find the performance of sampled facilities to be worse than typical. Using data from the sample to draw inferences about the rate of noncompliance in the overall population—i.e., inferring that the overall population is performing more poorly than it actually is—might lead to biased policy decisions.

Using statistics enables regulators to clarify how certain they can be that data taken from a random, yet representative, sample of facilities reflects the performance of the group as a whole. For instance, the box presented earlier in this section shows several EBPIs for which ERP inspectors observed "statistically significant" changes between the baseline and post-certification random samples. "Statistically significant" means we can be confident that a change occurred in the group as a whole.

Using statistics enables regulators to clarify how certain they can be that data taken from a random, yet representative, sample of facilities reflects the performance of the group as a whole.

How confident? Each of those changes was statistically significant at a 95% confidence level. A 95% confidence level means there is at most a 5% chance we would be mistaken in saying there was a change in performance for the group as a whole. Other observed changes that are not statistically significant may indeed point to genuine changes in the whole group, but we cannot be as certain that they occurred—oftentimes because states are basing their inferences upon small samples of the population. Smaller sample sizes typically allow only fairly large observed changes to be deemed "significant" at a 95% confidence level, a very rigorous level that is used in this report and is the most common one used by ERP states. (Some states may choose to use a 90% confidence level—lower, but still generally considered acceptable as long as it meets an agency's decision-making needs.)

Other Factors in Assessing Performance. ERP states do not solely rely upon determinations about statistical significance and other statistical tests, however. Other ways of looking at the data can help regulators credibly assess the performance levels of facilities, by using professional judgment and common sense.

For instance, certification data can provide valuable information, even though the information is self-reported. Return-to-compliance plans are one example. ERP states feel it is unlikely that facilities will knowingly claim to be out of compliance when they are actually in compliance. Consequently, high rates of submission of return-to-compliance plans for particular EBPIs suggest performance improvement on those EBPIs, even if the change in performance observed by inspectors is not statistically significant.

Similarly, statistically significant change may not be the best benchmark of success when performance is already at a high level. Some states have found there are EBPIs for which inspectors observed 100% compliance among facilities before certification. In such cases of high-performing facilities, one would not expect (or desire) statistically significant change, because such change could only be downward. In this case, a lack of significant change is a sign that facilities are maintaining their high performance level.

3 ERP Results Consistently Show Improvement

As discussed in Section 2, ERP states focus on the most important aspects of performance in three primary ways: (1) by tracking progress on individual indicators of compliance and best practices; (2) by compiling "sector snapshots" that summarize, in a single metric, group performance across multiple measures; and (3) by estimating environmental outcomes, such as emissions reductions.

The individual performance metrics often vary among states—and particularly sectors—in part because ERP provides states with the flexibility to tailor their measurement to issues of particular interest. This variety in reporting has made the development of this report challenging and limits comparability among ERPs. Nevertheless, shared performance improvement is evident among the six states that have completed a full ERP cycle in one or more sectors: Delaware, Florida, Maine, Maryland, Massachusetts, and Rhode Island. This section summarizes results from those states. (The appendix to this report, published separately, provides more detail on the results, data sources and EPA's approach to data verification and analysis.)

3.1 ERP Groups Improve on Priority Indicators, Across the Board

To date, all ERP states have reported seeing progress on Environmental Business Practice Indicators (EBPIs) across multiple regulatory or performance categories. The observed improvements are statistically significant in many cases.

Table 2 (next page) summarizes results from each of the completed ERPs, showing initial average improvements of 5 to 30 percentage points across each ERP's EBPIs. For example, the table summarizes results observed by the Rhode Island Department of Environmental Management (DEM) for its auto body ERP. DEM's results were reported in a peer-reviewed publication, *American Journal of Public Health,* in May 2007.[20]

DEM inspectors observed improvements on 19 of 24 performance indicators. Seven of those 19 improvements are statistically significant at a 95% confidence level. Improvements were observed across each of the following categories: hazardous waste management, air pollution control, wastewater discharge, and worker health and safety. Overall, Rhode Island results demonstrate an observed performance increase of 21 percentage points, when averaged across all indicators.

This is not to say that every ERP indicator shows performance improvements. For instance, for two EBPIs, Rhode Island inspectors observed 100% of facilities achieving each EBPI in both rounds of inspections, making it impossible to show improvement. DEM also observed performance decreases associated with three EBPIs (although none were statistically significant).

Nevertheless, when considered in aggregate, states' experience to date demonstrates a net performance gain across all EBPIs. In fact, the bottom line of Table 2 indicates that, for every EBPI showing decreased performance, nearly four show improvements. And, while states found that more than one-third of observed performance improvements were statistically significant at a 95% confidence level, they found *none* of the observed performance decreases to be statistically significant at that level.

Table 2. Observed Average EBPI Improvement in First ERP Self-Certification Cycle

State	Sector	Number of EBPIs	Number Improving (# Significant*)	Number Worsening (# Significant*)	Number Unchanged From Initial 100% Performance	Average Improvement (Percentage Points)†
DE	**Auto Body‡**	19	17 (13)	1 (0)	1	30
FL	**Auto Repair**	17	13 (7)	3 (0)	1	7
MA	**Dry Cleaners**	15	5 (0)	5 (0)	5	5
MA	**Photo Processors**	8	3 (1)	2 (0)	3	12
MA	**Printers**	25	17 (1)	6 (0)	2	13
MD	**Auto Body/ Repair‡**	5	4 (1)	1 (0)	0	12
ME	**Auto Body‡**	22	18 (3)	4 (0)	0	10
RI	**Auto Body‡**	24	19 (7)	3 (0)	2	21
Total		**135**	**96 (33)**	**25 (0)**	**14**	**N/A**

Notes:
* "# Significant" indicates the number of EBPIs, either improving or worsening, for which the observed change reflects a statistically significant difference. The significance figures here are based upon a 95% confidence level, which means we are 95% confident that the true percentage of facilities in the population (as opposed to the sample) achieving such EBPIs has increased.

† For each ERP, the average percentage point improvement represents a simple (not weighted) average of the percentage point changes in EBPI values after the first round of self-certification (e.g., if 40% of facilities were in compliance with an EBPI in the baseline, with 60% in the post-certification round of inspections, the change would be 20 percentage points; the average for an ERP is an average of all these percentage point changes, positive or negative). EBPIs for which there was no improvement, but for which there was already 100% performance, were not included in the calculation of average improvement, because improvement is not possible in that circumstance. This analysis includes both compliance and pollution prevention EBPIs.

‡ Each of these ERPs utilized a voluntary certification approach. However, readers should recognize that the results presented here are based upon random samples of the entire population of facilities in the sector targeted by the ERP, not just the facilities that voluntarily submitted self-certification forms.

A detailed list of data sources and methodological notes underlying this table is available in Section 1 of the appendix to this report.

What happens when states do not see progress on key indicators? One of the potential benefits of ERP is that its measurement system can allow states to identify facilities lagging behind in performance, so that agencies can target their efforts appropriately. For instance, a key emission-reducing practice among dry cleaners is to ensure that cleaning machines have completed all operations before doors are open and clothes are transferred. After Massachusetts noted that the state's dry cleaners continued to have poor practices in this area after the first ERP cycle, DEP communicated its concern to the trade association, which in turn drew the attention of facilities to the matter. The next round of random inspections documented that performance had improved, because more dry cleaners had installed lockout mechanisms to prevent premature opening of machines.[21]

3.2 "Sector Snapshots" Show Progress, Sustained Performance

In addition to examining individual EBPIs, states can calculate "sector snapshots" to summarize the performance of business sectors subject to an ERP. These benchmarks express performance levels even more concisely than EBPIs—communicating, in a single metric, the extent to which businesses are achieving compliance or other agency goals. Environmental agencies have historically calculated a sector snapshot called the "compliance rate" to assess performance in regulatory programs. This section begins by describing how the traditional compliance rate is typically calculated, and provides an example of Florida's observed change in compliance rates. The section also discusses how the "group compliance score" developed by Massachusetts can complement the traditional compliance rate as a performance management tool.

Compliance Rates. The compliance rate is an easily calculated summary measure of a regulated group's compliance level. The compliance rate has been customarily used by EPA and states to help guide agency activities. A compliance rate can be calculated in a few different ways. Most commonly, it is expressed as the percentage of facilities in full compliance with all regulatory requirements—a key goal of many environmental agencies. Compliance rates are often focused upon a single environmental medium—such as a compliance rate for air regulations.

Agencies typically calculate compliance rates based on whatever facility data they have available, which may not be representative of the population as a whole. ERP's random, representative sampling approach can allow states to more confidently express compliance rates—and their changes over time—for sectors as a whole. For instance, Florida inspectors observed that the proportion of what it called "straight-A" auto repair facilities—those with no violations of any kind, across environmental media—had risen 17 percentage points among randomly sampled facilities after two rounds of self-certification.[22] This improvement is statistically significant at a 95% confidence level.

Although ERP allows for calculating a statistically based compliance rate, states implementing ERP have not substantially relied upon on the compliance rate in describing the performance of their ERP groups or sectors, for two primary reasons. First, ERP states tend to focus more on the most important indicators of performance (i.e., the EBPIs), arguing that doing so can help regulators allocate resources and attention to the highest priority issues. Some kinds of compliance rates address this concern—focusing only on "significant noncompliance" and counting facilities as out of compliance only if they fail to meet one or more core indicators of performance.

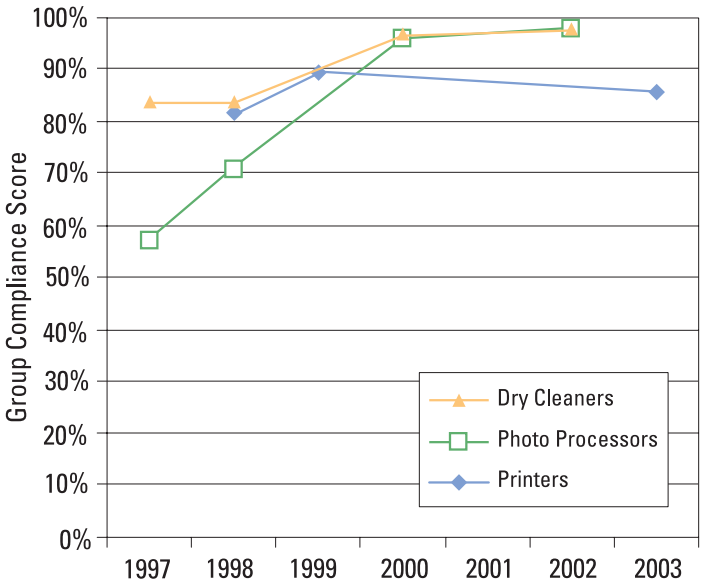
Second, compliance rates—whether indicator-focused or not—are limited in their ability to show gradations in performance. Because of how they are calculated, compliance rates can only indicate the proportions of facilities that have either perfect records or imperfect records, and whether those proportions are changing over time. As such, compliance rates are a valuable measure for determining the extent to which full compliance is being achieved. Yet, compliance rates do not provide information on *how* imperfect those imperfect facilities are. Is the average facility achieving almost nothing, nearly everything, or something in between? And, over time, is performance among these imperfect facilities getting better or getting worse? Mathematically, the traditional compliance rate cannot answer these questions. For instance, if a facility was achieving 10% of indicators, then improved to 90%, the compliance rate calculation would treat the facility as out of compliance in both cases. The performance improvement, although substantial, would not be reflected in the measure.

Group Compliance Scores. Massachusetts has found a way to begin to address these questions with its "group compliance score," which is rooted in a mathematical concept called an index. It expresses the extent to which facilities are achieving compliance-related EBPIs, as observed by inspectors during random visits to facilities. A score of 80%, for instance, would mean that, on average, each facility is achieving 80% of the indicators that apply to it.

Massachusetts uses this score to reflect varying degrees of compliance at individual facilities. The following example illustrates the potential decision-making value of the group compliance score. Imagine a situation in which no facility visited by inspectors during the baseline round of ERP random inspections is achieving even a single EBPI. In this case, both the group compliance score and the compliance rate would equal 0%. But what if inspectors observe facilities achieving an average of 85% of all indicators after ERP certification, but still no single facility is achieving all EBPIs? In this case, the compliance rate would remain at 0%, showing no facility had as yet achieved the goal of full compliance. The group compliance score would be 85%, complementing the compliance rate by reflecting the substantial progress in the sector.

In practice, what has the group compliance score shown about the performance of ERP sectors in Massachusetts? The metric demonstrates that each sector's score is higher than when Massachusetts began implementing ERP in 1997. As Figure 5 (right) shows, the photo processing sector showed a dramatic increase from 57% in 1997 to 98% just five years later. In the dry cleaning and printing sectors, performance started at a relatively high level, and has been maintained or improved over time. In the case of printers, performance has remained relatively steady, between 80% and 90%. With dry cleaners, no change was observed after the first round of certification, but Massachusetts inspectors saw performance jump higher in later years, leveling off near 100%.

Figure 5. Massachusetts Group Compliance Scores, Over Time



Notes:

(1) Massachusetts did not evaluate changes in group compliance scores for statistical significance. Retroactively doing so was beyond the scope of this report.

(2) Graph reflects most recent available data. Massachusetts has decreased inspection frequency over time for these sectors because of their trends toward sustaining high performance levels. The next round of random inspections is anticipated later in 2007, for the dry cleaning sector.

(3) Dry cleaners data points: 1997, 84%; 1998, 84%; 2000, 97%; and 2002, 98%.

(4) Photo processors data points: 1997, 57 %; 1998, 71%; 2000, 96%; and 2002, 98%.

(5) Printers data points: 1998, 82%; 1999, 89%; and 2003, 86%.

For data sources and analytical notes, see appendix, Section 2.

3.3 Results Suggest Improvements in Environmental Conditions

The leading edge of state ERP efforts involves estimating changes in environmental conditions, or outcomes, associated with ERP initiatives. Doing so for any kind of initiative can be quite challenging, because such estimation requires adequate underlying data, numerous assumptions (such as emissions rates associated with a variety of business practices), and consideration of extraneous factors that could impact environmental conditions. In the face of these challenges, Massachusetts has experimented with a variety of different approaches for estimating environmental outcomes for each of its three sectors. Presented below are the results for two outcome measures, from the dry cleaning and printing sectors, in which Massachusetts has high confidence.

Dry Cleaners. Traditional dry cleaning relies upon the use of perchloroethylene, a toxic and volatile solvent also known as "perc." Massachusetts dry cleaners must report information on perc usage and waste disposal on ERP certification forms. Using those data, the state estimates that dry cleaners reduced average perc waste by 28% and average perc air emissions by 32% between the first round of self-certification in 1997 and the second round in 1998. These improvements are responsible for a 151-ton reduction in annual perc waste and a 135-ton reduction in annual perc emissions.[23]

As explained on page 8, ERP measures typically do not rely on self-reported data. However, Massachusetts believes these data are reliable because the state does not perceive that dry cleaners have any incentive to falsely report—there is no penalty or reward based upon perc usage and waste levels.[24] Further, while the state's inspectors do not currently verify self-reported perc usage against on-site facility records, the fact that they could do so may create a disincentive against falsification.[25]

Dry cleaners in Massachusetts reduced their annual air emissions of perchloroethylene by an estimated 135 tons by the second round of self-certification (1998). This amount would be enough to fill the lungs of over 3.6 million adults.[26]

Printers. Massachusetts explored a number of ways to measure how changes in the practices of the state's printing businesses, as measured by several different EBPIs, could translate into changes in environmental conditions in the state. DEP inspectors observed varied performance over time, with EBPIs indicating positive as well as negative changes. Only one of those estimated outcomes is presented here, because it is based on the only statistically significant EBPI performance change (at a 95% confidence level) among the subset of EBPIs DEP examined.

Massachusetts inspectors observed that, in 1998, only 3% of facilities they visited were utilizing ultraviolet (UV) ink, so called because it is cured with ultraviolet light. UV ink is environmentally preferable because it contains little or no amount of volatile organic compounds (VOCs), a class of pollutants that can cause respiratory problems and often contributes to the formation of ground-level ozone. Although UV ink emits much less (if any) of the air pollution that can result from the use of standard printing inks, printers are not compelled by regulation to use the inks. However, Massachusetts has consistently encouraged printers, through ERP, to switch to this ink as a voluntary pollution prevention measure. By 1999, 9% of randomly sampled facilities were utilizing UV ink, and in 2003, the figure had grown to 23%.

Statistical analysis of the inspector findings shows that Massachusetts can be 95% confident not only that an improvement occurred in the population between 1998 and 2003, but also that the proportion of all printers statewide using UV ink increased by at least 1% and perhaps as much as 38% from 1998 to 2003—a wide margin due to small sample sizes, but informative nonetheless. By incorporating this range of performance improvement data into Massachusetts' environmental outcome analysis methodology, it can be estimated that the increased use of UV ink among printers led to a reduction in statewide VOC emissions of between 157 and 8,011 tons per year (TPY), with a midpoint of 4,084 TPY.[27] Massachusetts does not have clear evidence that the change is solely attributable to ERP, but the measure nonetheless helps show that printers are moving in the right direction and helping the environment. Even if ERP is not fully driving the change, ERP can allow a much better understanding of whether change is occurring, and to what extent.

4 Agencies May Use Resources More Effectively With ERP

The evidence that sectors have improved and maintained performance after ERP has been applied appears to be a primary factor motivating states to implement new ERPs and to continue with existing ones. But agencies also indicate they are adopting ERP because they believe it will empower them to use their increasingly scarce resources much more effectively. As this section discusses in detail, states implementing ERP have reported enhanced targeting capabilities, reduced long-term need for enforcement, improved permitting approaches, and an effective voluntary policy option. ERP states also take advantage of cost savings associated with using statistics and automation, and they benefit from delivering measurable mission-based results and from better meeting stakeholder demands. These reported benefits, when considered along with results from ERPs to date, suggest that ERP can represent a cost-effective option for regulating sectors or groups with large numbers of pollution sources.

4.1 States Report Enhanced Targeting Capabilities

As discussed earlier, EPA and states have historically focused traditional regulatory approaches on easier-to-target large businesses, where a single agency action may have a significant environmental impact. Currently, however, regulators increasingly face the challenge of addressing impacts of regulated groups comprising many small polluting facilities. For these sources, limited information is typically available to help regulators prioritize their resources.

ERP self-certification data provide a means to efficiently identify facilities most in need of attention. States can mine certification data to identify and follow up with facilities that did not return self-certification forms, that submitted return-to-compliance plans, and that provided self-certification responses that are internally inconsistent or otherwise raise "red flags." Such inconsistencies can mean facilities either do not understand their obligations or are neglecting them. When data analysis identifies a facility in need of attention, agencies can choose the most appropriate response, ranging from providing compliance assistance to initiating enforcement actions. The box at right describes a Massachusetts targeting success story that impacted the performance of numerous facilities.

At least one state has found that targeted ERP inspections may be more likely to find problems than random inspections—although random inspections are still considered critical for measurement purposes and for deterring regulatory violations. Massachusetts' preliminary analysis of ERP data indicates that facilities targeted for inspection based upon suspicious certification data have been substantially more likely to have serious problems than facilities

Cost-Effective Targeting Through ERP

Massachusetts' analysis of ERP certification forms and accompanying wastewater sampling data allowed the state to identify and address pervasive problems at three major retail chains, each with numerous photo processing facilities. Without ERP, these persistent violations may not have been detected. Massachusetts' efforts led to the payment of $215,000 in civil and administrative penalties by the three companies combined. Further, the state suspended an additional $131,000 in penalties on the condition that two of the companies implement initiatives intended to ensure against such violations in the future. The other company also agreed in settlement to take similar steps to improve the environmental performance of its stores.[28]

The president of the Environmental League of Massachusetts indicated his satisfaction with the effort: "Thanks to the DEP, the enforcement picture is becoming very clear: Photo processors that don't take care of the environment expose themselves to fines. This is a very positive development."[29]

inspected during random visits. Massachusetts examined four rounds of random and targeted inspections across three different sectors. Enforcement actions resulted from 63% of targeted inspections, as opposed to 42% of random inspections—a difference of 21 percentage points. The analysis did not specifically examine the seriousness of the violations, but anecdotal information from inspectors suggests that more serious violations are found during targeted inspections.[30]

ERP inspection data may help improve the focus and effectiveness of compliance assistance as well. Baseline data from the Maine Department of Environmental Protection's (DEP's) auto body ERP indicated that only 29% of sampled shops were meeting the requirement to recycle mercury-containing fluorescent light bulbs. Consequently, DEP staff emphasized in workshops, workbooks, and certification forms why and how to recycle the bulbs—and facilities responded. Maine's second random sample discovered 85% compliance with this requirement. This 56 percentage point improvement is statistically significant at a 95% confidence level.[31]

4.2 ERP May Reduce the Need for Enforcement

In many ERPs, a surprising number of businesses submit return-to-compliance plans the first time they self-certify—suggesting that facilities can improve their compliance even without an inspector at their doors and with limited direct resource investment by the state. Three states with voluntary certification programs for auto body facilities provide evidence to support this finding. In Rhode Island, 20% of all facilities in the state volunteered that they were out of compliance and submitted return-to-compliance plans the first time they self-certified. In Delaware, the figure was 13%. In Maine, 34% self-declared violations.[32]

But what happens after that? States track the implementation of return-to-compliance plans to ensure that facilities follow through with plan implementation. Further, data from random inspections demonstrate that once ERP facilities achieve compliance, they typically maintain that level of environmental performance, requiring less and less attention from regulators. This improved performance means facilities need to submit fewer return-to-compliance plans after the first cycle of ERP.

Sustained, documented high levels of performance can offer regulators flexibility in strategically targeting resources. For instance, regulators in Florida and Massachusetts saw a substantial drop in return-to-compliance plan submissions after early certification cycles, backed up by inspection results showing sustained performance at high levels. In response, Florida chose to reallocate inspection resources from the auto repair sector to other, higher-priority sectors. For its part, Massachusetts chose to reduce the frequency of random ERP site visits, believing that facility performance would be sustained. ERP's measurement approach allows states to confirm such beliefs by periodically checking on facility performance. For example, Massachusetts conducted follow-up random inspections in the dry cleaning sector in 2007, and the state will be analyzing the data in order to understand whether the sector has maintained the high level of performance described in Section 3.

4.3 ERP Can Complement or Replace Permitting

ERP has the potential to enhance the performance of traditional permit programs, and in some cases even replace them. In Massachusetts, ERP's industry-wide environmental performance standards and annual self-certification submissions replaced certain state permits in the dry cleaning, printing, and photo processing sectors.

Although ERP cannot substitute for federally required permits for large-scale facilities, it can complement other traditional permitting programs. For instance, ERP measurement and self-certification could potentially help core regulatory program offices to improve and verify performance in some permitted sectors. ERP could also

be used as a vehicle for implementing general permitting programs, which require facilities to periodically report on and certify to specified compliance standards—similar to a mandatory ERP self-certification. To those features, ERP adds compliance assistance and performance measurement to create an even more robust system.

Finally, ERP may be used as a tool for implementing new regulations that could, but may not necessarily, trigger permitting requirements—informing the regulated community about new requirements and helping to ensure compliance. For instance, EPA is actively exploring the extent to which ERP could help implement pending new regulations facing small "area sources" of air pollution. Some of these categories of small area sources, like auto body shops, are sectors or groups for which states have already successfully developed ERPs.

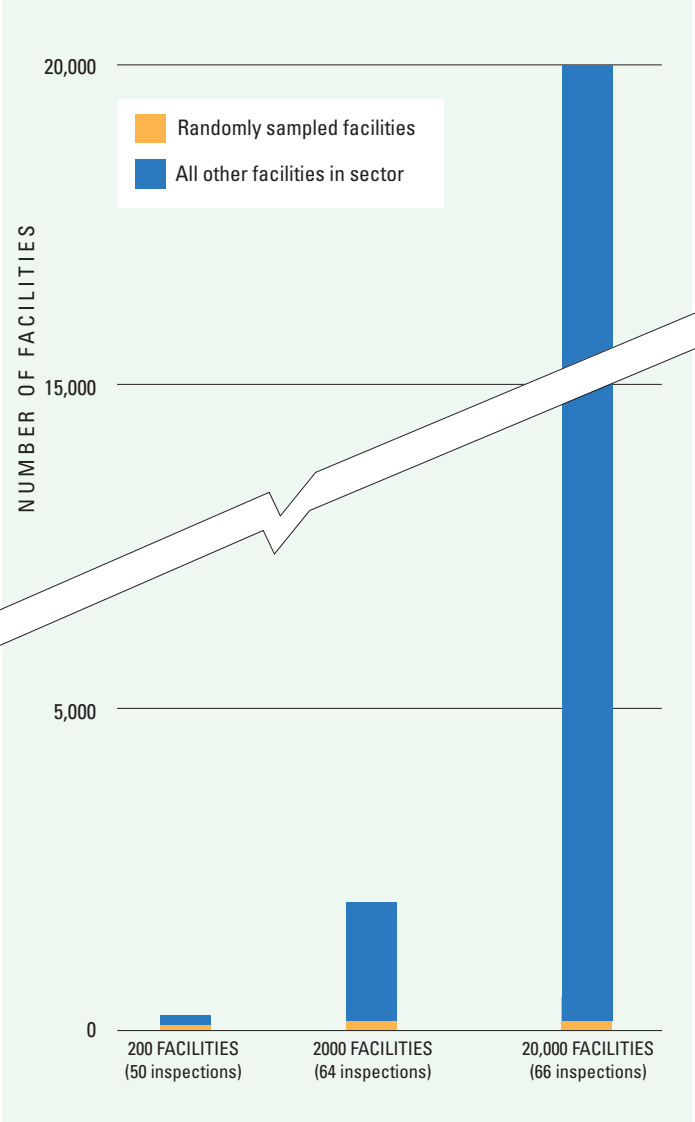
4.4 Statistics and Technology Provide Economies of Scale

More and more, ERP is being implemented in sectors with very large numbers of pollution sources, such as among oil and gas extraction operations, small animal feedlots, and facilities with underground storage tanks. Large populations of facilities can present significant opportunities for states to take advantage of economies of scale in automation and statistics.

Information technology can offer states the opportunity to substantially streamline their processes and readily assess the performance of individual facilities, groups of facilities, or entire sectors. For instance, Massachusetts DEP's ERP tracking and analysis system saves substantial staff time by automatically screening certification data for inconsistencies and generating performance results reports.

Statistics plays its role in efficiency by offering what some consider to be surprising economies of scale. As populations of facilities grow larger and larger, agencies only need to undertake relatively small numbers of additional random inspections to achieve the same confidence in their results from a statistical point of view. Figure 6 (right) shows an example of how states need proportionally fewer random inspections as the sector population grows, even by orders of magnitude. For instance, imagine that a state planned to conduct 50 random baseline inspections among a population of 200 facilities. If they instead had a population of 2000 facilities, they could achieve the same statistical confidence in their results by doing just 14 more inspections, for a total of 64. With 20,000 facilities, they would need to do only two more inspections, for a total of 66.[33]

Figure 6. Economies of Scale with Statistics



Note: Figures are based upon a 95% confidence level and maximum margin of error of approximately +/- 12 percentage points.

4.5 ERP's Results Can Help Meet Demands for Better Measurement

Increasingly, regulatory agencies are being required to set measurable goals and document their performance against those goals. Many agencies struggle to meet the requirements of these performance measurement obligations. For instance, EPA strives to show credible measurable progress in achieving its core mission, as required under the Government Performance and Results Act (GPRA) of 1993 and the White House Office of Management and Budget's (OMB's) Program Assessment Rating Tool (PART) initiative.

Agencies often find particular difficulty in tracking mission-oriented outcomes, such as improvements in compliance or environmental quality. Agencies' customary measures—like numbers of inspections conducted or the total penalties associated with enforcement actions—fail to tell the full story.

ERP performance data can help states demonstrate project outcomes to those stakeholders demanding credible tracking of the outcomes of agency efforts. Furthermore, ERP's portraits of group performance can allow for more informed priority-setting and budgeting.

4.6 Many Businesses Value ERP as Fair and Helpful

ERP can help create a level playing field by holding all businesses to a uniform standard and following through with enforcement action. In many ERP states, business owners actually ask the state to make certification mandatory rather than voluntary. In Massachusetts, where regulations allow the state to reduce the frequency of certification when a sector has demonstrated sustained high performance levels, business leaders in at least one sector have urged the state not to do so.

Businesses also appreciate ERP's consistent emphasis on all environmental media. Most agencies do not typically take a multimedia approach in working with regulated facilities. Instead, agencies often interact with facilities via several different offices or departments, each responsible for a separate environmental medium (e.g., air, water, and waste). ERP, on the other hand, is a single, focused package that is intended to help businesses better manage *all* aspects of environmental compliance.

Further, ERP's regular certification process may help businesses routinize environmental management and reduce compliance problems related to employee turnover. It may also help save money, because the plain-language, step-by-step certification process can substantially reduce the need for consultants.

Praise for ERP from the Business Community

"[T]he ERP model is working and has reduced the burden on DEP and on regulated sectors with absolutely no reduction in environmental protection....

"The ERP model, combined with DEP's continued focus on electronic data initiatives, has saved the business community hundreds of thousands of dollars in fees and consultant time."

— Robert A. Rio, Esq., Senior Vice President for Government Affairs, Associated Industries of Massachusetts (AIM). AIM describes itself as the largest employer association in Massachusetts.[34]

4.7 ERP Offers the Public Visible Improvements and Broader Accountability

Residents Credit ERP for Neighborhood Improvements

The Maryland Department of the Environment focused its ERP on auto repair and body shops in the Park Heights neighborhood of Baltimore, a low-income area with a high minority population. Regulators were concerned about "environmental justice" issues in this neighborhood because these shops were considered by many residents to be a blight on the community and were in close proximity to schools and facilities for health care, child care, and elder care.

Project partners randomly surveyed residents after the project to gauge how they felt about ERP's accomplishments. They found that 47% of a large sample of residents knew about the project, and 87% of those believed the project was working to improve the neighborhood's environmental conditions. Further, the survey indicated that residents perceived a number of neighborhood improvements over the timeframe of the project. These improvements include perceived reductions in discarded parts and tires, used oil spills, odors, smoke, and nighttime noise.[35]

The success of this project shows that, while ERP may be most cost-effective on a larger scale, it can help create meaningful and noticeable improvements at the local level as well.

For its part, the public has shown an awareness of ERP's positive impacts, such as visible improvements attributed to Maryland's ERP (see box at left). On a larger scale, reports on sector performance can enable agencies to show public interest groups and concerned citizens the extent to which regulators are achieving their mission and allocating resources appropriately.

States also typically make individual certification forms available upon public request, allowing citizens to check on the performance of facilities in their own neighborhoods. Some agencies envision going further, using the Internet to make non-confidential certification information immediately available to the public. Such information could be bundled with mapping software to enable each citizen to see what nearby businesses are reporting about their performance.

4.8 ERP Can Offer an Effective, Voluntary Option

Many ERP states have found voluntary certification to be an effective alternative to mandating that facilities submit certification forms, which is sometimes not feasible. As Table 2 showed earlier, results from several voluntary-certification ERPs clearly indicate that performance has improved post-ERP—not just among volunteers, but across the sector as a whole.

Why? No thorough analysis has been undertaken yet, but the data provide clues suggesting that voluntary-certification ERPs have been effective to date at engendering trust between state agencies and industries, which in turn may help drive broad-based changes in behavior. Experience to date suggests that higher proportions of facilities may submit return-to-compliance plans when an ERP has voluntary, rather than mandatory, certification. Further, ERPs to date have generally seen high levels of voluntary certification, and states anecdotally report that many facilities that do not submit certification forms still appear to conduct self-audits and improve their performance.

It is not yet possible to say whether, and under what circumstances, a voluntary certification approach may work better than a mandatory one. This question may be explored more in future years. Perhaps it is telling that state staff managing voluntary certification programs tend to say they would prefer that the certification be made mandatory, for a variety of reasons—such as to level the playing field for businesses, to increase the economies of scale associated with managing certification data, and to improve their own ability to garner program management resources, such as by charging certification fees. Nonetheless, when mandatory certification is not feasible or desired, it appears that ERP can offer an effective, voluntary option.

Maine's Voluntary Approach Engages Businesses

"[T]he Environmental Results Program has increased our Department's ability to work with smaller businesses and gain their engagement in protecting the Maine environment. By using the ERP compliance assistance and education model, many more smaller businesses in the state are aware of compliance regulations and how to implement them…."

— David P. Littell, Commissioner of Maine's Department of Environmental Protection

4.9 ERP Appears to Be a Cost-Effective Alternative

ERP results to date, combined with the various other benefits described elsewhere in this report, strongly suggest that ERP can be a cost-effective option for regulating sectors or groups with large numbers of pollution sources. It would be instructive to compare each existing ERP with comparable traditional approaches, specifically in terms of costs and performance levels. Doing so is challenging, however, in large part because of the difficulty in directly comparing traditional compliance programs with ERP: Traditional programs do not typically have comparable data depicting sector-wide performance levels, and state environmental agencies differ significantly in how they track their resource expenditures.

EPA is working with states to overcome this measurement challenge. For instance, Rhode Island DEM has received a grant from the National Center for Environmental Innovation to conduct a detailed study comparing the cost-effectiveness of its ERP for underground storage tanks (USTs) to the cost-effectiveness of one or more traditional approaches for regulating USTs. Results of that study are anticipated in 2008.

To more closely assess ERP's cost-effectiveness for the purpose of this report, EPA examined two dry cleaner programs, in Massachusetts and Michigan, whose data lend themselves to comparison. Massachusetts' dry cleaners have been regulated under the ERP model since 1997, and achieved very high scores on EBPIs the last two times Massachusetts conducted random inspections of the sector. The approach to dry cleaner compliance assurance taken by the Air Quality Division of Michigan's Department of Environmental Quality (DEQ) has been more traditional, with the state inspecting every dry cleaning facility once per year and providing compliance assistance upon request. Michigan DEQ's census-based inspections approach for this sector stems from particular circumstances: annual inspections of dry cleaning facilities are required under an industry-supported Michigan law, and Michigan DEQ's dry cleaning program is substantially funded through a license fee paid by dry cleaning facilities.[36] The next two subsections compare these two programs on the basis of the environmental performance of the dry cleaners they regulate and the personnel resources each program uses to implement its goals.

Environmental Performance Under ERP Compared to "Inspect Everyone" Approach. In December 2006, as part of implementing a pilot ERP, Michigan DEQ completed random inspections of its dry cleaner population, using an EBPI-based checklist to evaluate "baseline" sector performance. Inspection results show how well a random sample of 262 Michigan dry cleaners is performing on the state's EBPIs, after having been regulated for years under Michigan's annual-inspection program, but before ERP self-certification had begun.[37] Those data can be compared to results from Massachusetts DEP's dry cleaners inspections during the most recent ERP random sample in 2002. Those Massachusetts results demonstrate how well a representative sample of 25 Massachusetts dry cleaners was performing on that state's EBPIs after the fifth round of ERP self-certification in 2002.[38]

Dry cleaners regulated under Massachusetts' ERP appear to perform as well as those regulated under an "inspect everyone, every year" approach, while allowing staff resources to be applied toward other issues.

EPA worked with staff from the two states to identify six comparable EBPIs, and examined each state's findings from random inspections for those EBPIs. The ability to draw conclusions from the comparison is somewhat limited because of the small number of indicators that are comparable—all related to the prevention and control of air pollution—and also because the small size of Massachusetts' sample makes that state's figures much less precise than Michigan's. The data analysis nonetheless suggests that both populations of dry cleaners were performing fairly well on the selected indicators, and does not point to substantial differences in performance among each state's dry cleaners at the points in time EPA examined. On average, 82% of dry cleaners visited by Michigan inspectors were achieving the EBPIs in question; for Massachusetts, the figure is also 82%. A look at performance on individual EBPIs shows similar equality: each state's randomly inspected dry cleaners were performing better than those of the other state on three of the six indicators. Also, the largest observed difference in compliance proportions is six percentage points, and none of the observed performance differences are statistically significant.[39] (For more information on data sources and analysis, see Section 5 of the appendix.)

ERP Resource Use Compared to "Inspect Everyone" Approach. Dry cleaners in each state appear to be performing at similar levels after years of experience under each state's respective regulatory approach. How do the two different approaches compare in terms of resource usage? To examine this question, EPA compared each state's estimated annual staffing deployment, as a proxy for overall resource expenditures.[40]

Michigan DEQ utilizes approximately 4.75 full-time equivalent (FTE) employees per year to manage its dry cleaner program, inspecting each of nearly 900 facilities once a year (including both those using perc and those using other solvents). For its part, Massachusetts DEP estimates it expends a maximum of two FTEs per year to maintain its ERP for roughly 600 perc dry cleaners, and approximately 1.5 FTEs in years where it does not conduct random inspections. In the first six years of ERP (1997-2002), Massachusetts conducted four rounds of random inspections. On this basis, EPA estimated average Massachusetts dry cleaners ERP FTE usage at 1.83 per year.[41] Adjusting for differences between the states in numbers of hours per FTE and numbers of perchloroethylene dry cleaners, EPA estimates that the Massachusetts approach utilizes approximately 50% fewer FTEs than the traditional Michigan approach. (For more information on data sources and analysis, see Section 5 of the appendix.)

When considered along with the other information presented in Sections 3 and 4 of this report, this comparison suggests that, when allowed by law, agencies might be able to achieve resource efficiencies by using an ERP approach, thereby enabling agencies to shift personnel resources, such as inspectors, to other pressing priorities. This comparison, combined with the performance data available on ERPs to date, suggest states may be able to make this shift while maintaining existing performance levels in the sector. Before doing so, however, states must carefully weigh the extent to which reductions in inspections will increase their uncertainty about environmental performance in a sector. For instance, regulators moving from a census inspections regime to an ERP approach, especially one with small-sized random samples, may need to grapple with substantially different levels of uncertainty. In those cases and others—if resources are sufficient—states may wish to find a middle ground between efficiency and measurement certainty.

Greatest Efficiency Requires Manageable, Up-Front Investment. The apparent efficiency associated with ERP does not come without some investment, of course. For instance, a review of workplans for 12 states receiving EPA grant funds to implement ERP shows an average startup cost for ERP of approximately $226,000.[42] States typically spread out these expenditures over a period of about three years, the typical implementation time for the first ERP cycle. States pursuing advanced data management approaches have higher-than-average investment costs, but may generate greater-than-average operating efficiencies. Currently, data are too limited to develop more precise estimates of startup and operating costs, but EPA intends to work with states to improve the data in this area, and present findings in future reports.

Even without substantial grant funding, states can find that startup costs are not insurmountable. After all, Massachusetts developed and increased its use of ERP largely with in-state resources, even while adapting to substantial budget and personnel cuts. Rhode Island's first ERP was also primarily funded by the state itself. Further, now that Rhode Island and Delaware have completed their first ERP cycles for the auto body sector, these states are continuing to implement ERP for this sector using relatively small expenditures of their own resources.

New ERPs Benefit From Peer and EPA Support. Achieving ERP efficiencies appears to have grown easier over time as a result of accumulated benefits of state and EPA investments. For instance, workbooks, checklists, and helpful information about lessons learned are available for those sectors that have already been piloted by one or more states. A large community of ERP states has formed a States ERP Consortium that conducts frequent meetings by phone and in person to share lessons learned. States also report that readily available state and federal ERP tools and documents have improved implementation efficiency and reduced startup time. The box below ("Transferable Tools Streamline ERP Startup") provides a sample of available resources.

Transferable Tools Streamline ERP Startup

With so many states implementing ERP, and with EPA and the recently formed States ERP Consortium providing long-term capacity-building support, many tools and resources are already available to reduce the costs of ERP startup and to share lessons learned.

Examples include:

- Sector-specific workbooks, certification forms, inspector checklists, and other materials;
- Novice-friendly statistical planning and analysis tools;
- Automated data storage, processing, and analysis systems;
- Detailed ERP implementation strategies and schedules; and
- An online "ERP Roadmap" that provides implementation guidance for each phase of ERP, as well as an extensive ERP resource library.

Since 2002, the National Center for Environmental Innovation has awarded $2.9 million in State Innovation Grants, helping 14 states to initiate new ERPs.

As mentioned, EPA has helped to defray upfront costs with grants and other support. Since 2002, the National Center for Environmental Innovation has awarded $2.9 million in State Innovation Grants, helping 14 states to initiate new ERPs. Moreover, EPA staff and contractors develop tools to share with states developing ERPs, and provide states with free technical assistance, especially on measurement approaches and ERP best practices. Performance partnership agreements with EPA regional offices have allowed states to utilize enforcement resources on ERP inspections.

More recently, Massachusetts was awarded resource flexibility "credit" through EPA's State Review Framework (part of EPA's enforcement program accountability system). This flexibility was granted based on the recognized success of the state's ERP for dry cleaners and the overall performance of Massachusetts' core enforcement programs in air and waste. The state anticipates this arrangement will enable it to focus more resources on emerging priorities for environmental improvement while ensuring more traditional performance objectives are still being met.

5 ERP's Future Promises Improvement, Experimentation, and Growth

Table 3 (below) demonstrates the expansion of ERP since it was first developed and implemented by Massachusetts 10 years ago. Now, 18 states have implemented or initiated an ERP in a total of 11 sectors or groups, and 16 states currently have active programs. Four states are implementing multiple ERPs. Eleven of the 25 ERPs involve mandatory certification requirements, typically based on new state regulations. Eight of the 10 EPA regions now have experience with ERP in at least one of their states.

As the following subsections discuss, EPA in the coming years anticipates that the number and type of ERP applications will grow, and that ERPs will produce increasingly more comparable environmental performance data. EPA plans to continue supporting states that are interested in adopting ERP, but also expects that states will increase their collaboration with one another, gathering to share information and develop new tools through the new States ERP Consortium. Finally, EPA plans to work closely with the Consortium and other interested parties to continue to explore important questions about ERP in future years.

Table 3. ERP Activity in 18 States*

ERP State	ERPs Initiated	ERPs Completed	ERPs with Mandatory Certification
Delaware	1	1	-
Florida†	1	1	1
Illinois	1	-	-
Indiana	1	-	-
Louisiana	1	-	1
Maine	2	1	-
Maryland†	1	1	-
Massachusetts	3	3	3
Michigan	1	-	-
Minnesota	1	-	-
Nevada	1	-	-
New Hampshire	1	-	1
New York[43]	2	-	2
Rhode Island[44]	4	2	2
Vermont	1	-	1
Virginia	1	-	-
Washington	1	-	-
Wisconsin	1	-	-
Total	**25**	**9**	**11**

* This table defines "ERP Activity" as the implementation of initiatives that use all of the ERP tools—i.e., combining compliance assistance, self-certification, inspections, and statistically based performance measurement. Many states are also implementing valuable "ERP-like" initiatives, utilizing subsets of those four ERP elements, that show promise to achieve demonstrable performance improvements. (See Section 5.3 for more information).

† No longer implementing ERP.[45]

5.1 More States Work to Produce Results

ERP results have thus far accumulated gradually because states typically take about three years to fully implement their first ERP, from conception to first post-certification statistical results. Nonetheless, each year more states finish an initial ERP performance cycle. In the next two years, EPA expects to see results from several ERPs—and several states—that are completing full measurement cycles for the first time. These efforts include ERPs for underground storage tanks, auto salvage yards, and animal feedlots. The results will be the first ever for these ERP sectors. EPA also expects to see results from new rounds of random inspections for the Massachusetts dry cleaner and Rhode Island auto body ERPs, which will provide additional insights into the long-term efficacy of ERP.

5.2 Agencies Act to Improve Comparability of Results

ERP has appealed to regulatory agencies in part because of its adaptability to specific state circumstances. However, this adaptability has led to substantial variety in reporting that in turn makes assembling and comparing data from different ERPs—even in the same sector—quite challenging and resource-intensive. EPA expects to see increasing convergence among ERP states and others on indicators to be used for tracking the performance of business sectors and other groups. For instance, the States ERP Consortium (discussed in Section 5.4) plans to develop a set of recommended ERP reporting standards in order to help ensure that data reported by all Consortium members meet core minimum needs for transparency and comparability.

This Consortium effort will draw substantially upon lessons learned in an important, ongoing ERP-related measurement initiative: the Common Measures Project. Explicit goals of this project are to encourage more widespread adoption of the ERP-style statistical performance measurement techniques and to allow participating states to benchmark their performance against others—whether using ERP initiatives or other traditional or innovative tools. Under this EPA-funded project, Massachusetts DEP is leading a group of several states in developing common measurement indicators for two regulated groups: auto body shops and small quantity generators (SQGs) of hazardous waste. SQGs are facilities—from a variety of sectors—that produce a moderate amount of waste defined by regulation as "hazardous." Most states have hundreds, if not thousands, of SQGs and vary in their approaches for regulating those facilities.

Common Measures Project participants have just begun their work on the auto body sector, but their work on SQGs is well underway, with participants having agreed upon EBPIs and a statistical approach for measuring SQG performance. Data from the Common Measures Project may soon help regulators adapt their approaches to regulating this important group, based upon the experience of other states.

5.3 Agencies Apply ERP Tools in Innovative Ways

States are adapting ERP to serve new purposes, address emerging problems, and juggle competing priorities. Emerging experiments include applying some (but not all) ERP tools to address a problem, using ERP approaches as an alternative to new or more stringent regulations, and developing watershed-based ERP approaches.

Applying the ERP Tools in New Ways. A number of states—such as Colorado, Florida, Massachusetts, and Rhode Island—are implementing initiatives that utilize more limited sets of the ERP tools. Some states—like those in the Common Measures Project—use ERP-style statistical measurement approaches to assess the efficacy of various policy initiatives, not necessarily self-certification approaches. Other states are using certification approaches without random inspections.

For instance, in 2000, Massachusetts began implementing a certification-based approach to address poor compliance by the state's roughly 3,000 gas stations with vapor recovery regulations. Those regulations are intended to substantially reduce air emissions that can occur during the refueling of motor vehicles.

Noncompliance meant that "at-the-pump" releases of volatile organic compounds (VOCs) were not being sufficiently controlled, which in turn suggested that the state was at risk of violating national ambient air quality standards for ozone. EPA could have required Massachusetts to try to increase compliance through annual facility inspections, a resource-intensive proposition. In this case, however, EPA's New England regional office approved Massachusetts' plan for mandatory annual self-certification, combined with more stringent testing and self-inspection requirements. The state verifies performance through independent, third-party testing of vapor recovery system integrity, as well as targeted (not random) inspections. Now, 98% of the 2.7 billion gallons of motor fuel dispensed annually in the state flows through certified facilities. Massachusetts estimates that this approach has substantially reduced emissions by controlling an additional 3,960 tons of volatile organic compounds (VOCs) each year.[46]

Mercury Falling

In its first year, a Massachusetts voluntary certification program for dentists, in lieu of regulation, reduced estimated annual mercury discharges by the equivalent of cleaning up approximately 171,000 broken mercury thermometers or salvaging about 130,000 mercury-containing automotive switches.[47,48]

Alternative to New or More Stringent Regulation. ERP may in some cases offer a promising alternative to new or more stringent regulation for both the potentially regulated community and for regulatory agencies. In 2005, motivated in part by a desire to postpone regulatory action, 74% of Massachusetts' 3,600 dentists voluntarily certified that they were meeting new mercury management standards. This ERP-like initiative uses self-certification only, without random inspections. Massachusetts estimates this voluntary action resulted in an immediate annual reduction in mercury discharges of approximately 230 pounds, with further reductions anticipated as the state continues to encourage more dentists to certify.[49] These estimates are based on facility-reported data, bolstered by requirements that facilities provide independently verifiable information on hazardous waste disposal.

Impaired Water Bodies and Watersheds. Some ERP states have already targeted their efforts in defined geographic areas impacted by specific environmental problems, such as air quality degradation or environmental justice issues. ERP partners are also exploring the use of ERP tools to demonstrably and effectively address water body impairments caused by stormwater runoff. EPA awarded two different State Innovation Grants in 2007 to explore this use of ERP.

Under one grant, Maine DEP and Massachusetts DEP will be using a wholly voluntary certification approach to try to reduce discharges of polluted stormwater from drive-through facilities and shopping malls, respectively. Both states will be targeting high-priority watersheds, and strongly encouraging the adoption of voluntary best management practices by entities whose stormwater discharges are not otherwise subject to state regulation. Under the other grant, Rhode Island DEM will work with municipal separate storm sewer systems (MS4s) on a mandatory ERP to reduce stormwater discharges from certain construction sites.

Targeting multi-state watersheds may be the next step in this evolution. In a recent report, the National Academy of Public Administration identifies ERP as one of several innovative approaches that could have an impact in improving water quality in the Chesapeake Bay Basin.[50]

5.4 States Convene an ERP Consortium

In October 2006, a large group of states formed a consortium to explore, develop, promote, and implement the use of ERP approaches for addressing priority environmental issues efficiently and effectively (see Figure 7, below). The States ERP Consortium is officially organized as a "forum" of the Environmental Council of States (ECOS), and includes 18 states either currently using ERP or interested in learning how to use ERP. The National Center for Environmental Innovation is on the organization's steering committee and is providing contractor support.

The Consortium is implementing action plans in four areas its members deem critical to the growth of ERP:

(1) Communicating results in order to build stakeholder support;

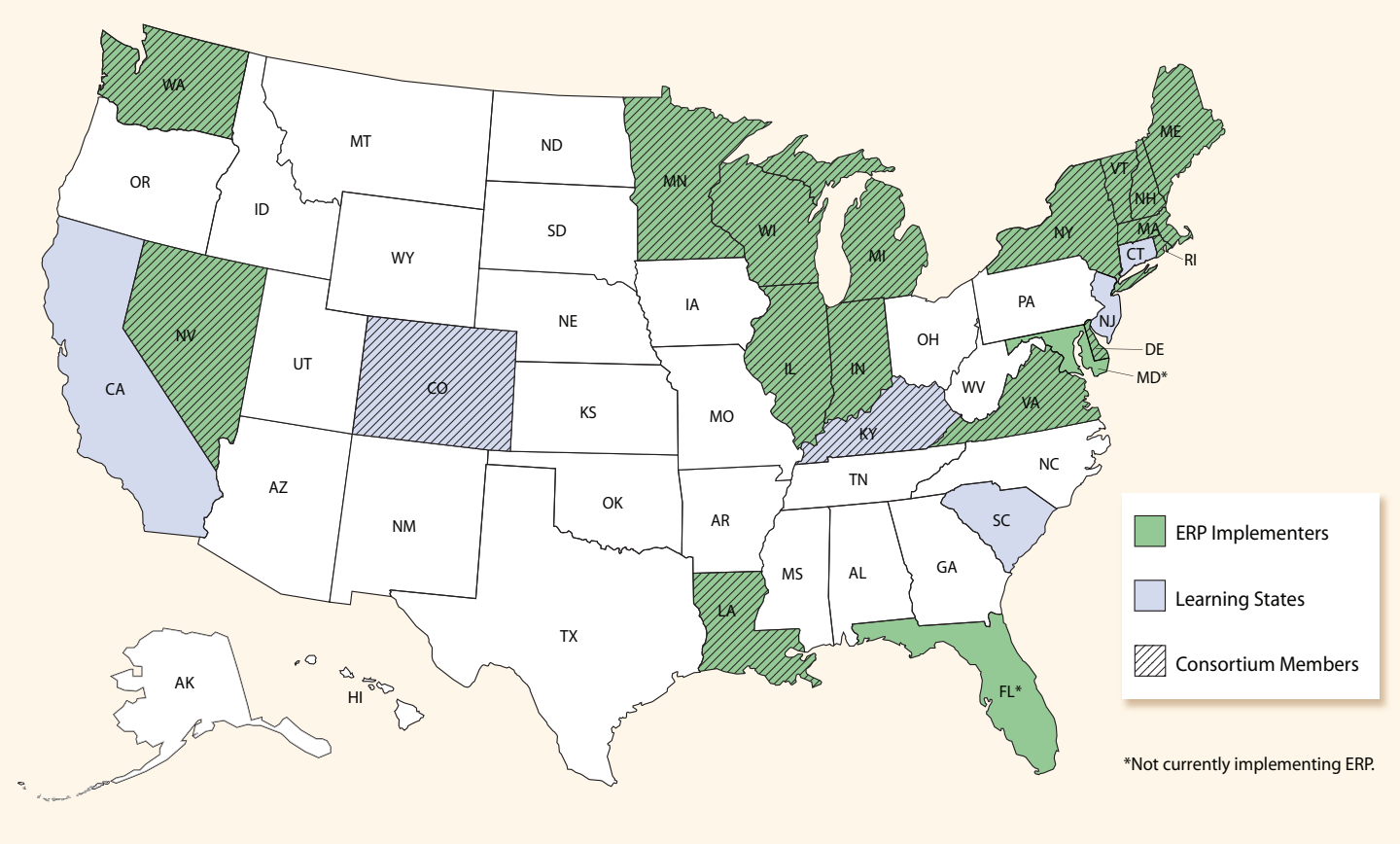
(2) Sharing information among practitioners;

(3) Promoting ERP as a proven compliance strategy, and expanding support for ERP within and beyond EPA; and

(4) Enhancing and disseminating tools that streamline key aspects of ERP, such as automation and measurement.

Consortium members hope that providing states with a common voice and more formal lines of communication will create new possibilities for identifying and addressing important problems associated with the use of ERP and its component tools. EPA is committed to working with the Consortium in the future to continue evaluating the many applications of ERP, communicating ERP results, and finding and developing opportunities to integrate ERP into the federal regulatory framework. For more information about the Consortium and its work, visit www.ERPstates.org.

Figure 7. Growing ERP Community Represented by a New Consortium of States



5.5 EPA Plans to Further Explore Questions Raised by ERP

This document is the first major report on ERP activity since EPA produced *The Massachusetts Environmental Results Program: User's Guide for Government Agencies* in 2002. Since that time, 17 additional states have implemented or begun developing ERPs for eight new groups or sectors. Many of these ERPs involve voluntary submission of self-certification forms by facilities, an innovation developed in the last five years.

This report has compiled and presented results for eight ERPs, covering five sectors. The data from these ERPs, along with the lessons learned in implementing them, have helped make a case for regulators to consider using ERP when faced with problems caused by large numbers of small sources. Yet the full story of ERP is still unfolding. Many questions about ERP—particularly those related to environmental performance and cost-effectiveness—still bear further examination, especially as states provide new information.

The box at right provides examples of some of the many questions EPA plans to explore in the coming years, using the wealth of data that ERP provides. EPA intends to work diligently to identify and execute approaches for addressing these and other questions, and invites the States ERP Consortium, the academic community, and other researchers to join in this important work.

Sample Issues for Further ERP Research

Environmental Performance

- Long-term performance of ERP, using new data from Massachusetts and other states that have been using ERP for a relatively long period
- Performance of ERP in the newest sectors
- Changes to the environment and public health that may occur as outcomes of ERP
- Efficacy of emerging "ERP-like" approaches that do not use all of the tools in the integrated ERP system

Cost-Effectiveness

- Cost-effectiveness for agencies, relative to other compliance approaches
- Costs of ERP implementation over time (after startup)
- Cost-effectiveness for the private sector

Efficacy of Voluntary Approaches

- Efficacy of ERP in promoting compliance versus efficacy in promoting voluntary best management practices and pollution prevention measures
- Relative efficacy of voluntary versus mandatory self-certification, in the same sector

Notes

[1] Golledge, Robert, et al. "Regulating Small Business Facilities—The Environmental Results Program." ECOStates: The Journal of the Environmental Council of the States. Pages 5-7, 37-40. Fall 2003.

[2] Nationwide figure for retail gas stations is 130,515. *Source:* U.S. Census Bureau. 2002 Economic Census. NAICS code 447 (Gasoline Stations). Accessed September 26, 2007 http://www.census.gov/econ/census02/data/industry/E447.HTM.

[3] EPA's Innovation Action Council comprises the senior career leadership of EPA's program and regional offices.

[4] Nationwide figure for auto body shops is 32,892. *Source:* U. S. Census Bureau. 2002 Economic Census. NAICS code 8111211 (Automotive Paint or Body Repair). Accessed September 26, 2007 http://www.census.gov/econ/census02/data/us/US000_81.HTM.

[5] Performance changes in this report are expressed in terms of "percentage points," which is distinct from the expression of changes in terms of "percent." For instance, imagine sector performance with regard to a particular regulatory requirement improved from 50% of facilities in compliance to 75% in compliance. That change can be described as an improvement of 25 percentage points, or a 50% increase. This report uses the former convention.

[6] Maryland's Department of the Environment implemented ERP on a small, pilot basis, but leaders of the initiative left the Department shortly after project completion and no further attempts to implement ERP are known to have occurred in the state. Florida's Department of Environmental Projection (DEP) implemented ERP as a large pilot in two of the state's six administrative regions. ERP measurement indicated facilities in those regions were already performing fairly well prior to self-certification. The sector showed further improvement after two cycles of mandatory self-certification in those regions. (See Section 3 of this report for performance data.) At that point, DEP determined that a statewide, full ERP for the auto repair sector would be unnecessary and not cost effective. DEP continues to offer the opportunity to all auto repair facilities statewide to conduct self-audits of their operations using ERP-based materials, but does not require self-certification and does not conduct regular ERP random inspections in the sector.

[7] Lee, Eungkyoon. Why Did They Comply While Others Did Not?: Environmental Compliance of Small Firms and Implications for Regulation. Ph.D. dissertation. Massachusetts Institute of Technology. September 2005.

[8] *Sources:* (1) Enander, Richard T., et al. "Chemical Characterization of Sanding Dust and Methylene Chloride Usage in Automotive Refinishing: Implications for Occupational and Environmental Health." Pages 741-749. AIHA Journal. Volume 63, Issue 6. 2002. (2) Enander, Rich. Rhode Island Department of Environmental Management. "Rhode Island's ERP Experience: Automotive Refinishing Sector." Presentation at 2004 California Environmental Protection Agency Environmental Results Program Workshop. Slides 6-7. September 30, 2004.

[9] Enander, Richard T., et al. "Environmental Health Practice: Statistically Based Performance Measurement." Pages 819-824. American Journal of Public Health. Volume 97. 2007.

[10] Enander, Richard T., et al. 2007.

[11] *Initial inventory size:* April, Susan and Tim Greiner. Evaluation of the Massachusetts Environmental Results Program. Learning from Innovations and Environmental Protection: Research Paper Number 1. Page 27. National Academy of Public Administration. June 2000. *Maximum inventory size:* Peck, Susan. Massachusetts Department of Environmental Protection. "erp universes by year.xls," unpublished Microsoft Excel spreadsheet. E-mail communication with U.S. EPA contractor. March 23, 2007.

[12] Golledge, Robert, et al. Fall 2003.

[13] U.S. Government Accountability Office. Environmental Enforcement: EPA Cannot Ensure the Accuracy of Self-Reported Compliance Monitoring Data. Washington: GPO, March 1993.

[14] 34% figure of noncompliance reporting based upon 34 facilities reporting noncompliance on one or more items, out of a post-certification universe of 100 facilities. *Source:* Maine Department of Environmental Protection, Office of Innovation. Auto Body Environmental Results Program: Final Report. Pages 4, 10. May 7, 2007.

[15] *Sources:* (1) Massachusetts DEP. ERP Industry Progress Report: Photo Processing Industry. Page 8. July 2003. (2) Massachusetts DEP. ERP Industry Progress Report: Dry Cleaning Industry. Page 7. July 2003. (3) Massachusetts DEP. ERP Industry Progress Report: Printing Industry. Page 7. July 2003.

[16] Florida Department of Environmental Protection. "Compliance Certification Program (CCP). Compliance Assistance for Auto Repair Pilot Project (CAPP). Florida 2001–2004 Project." Slide 57. March 24, 2005.

[17] Florida Department of Environmental Protection. "Compliance Certification Program (CCP). Compliance Assistance for Auto Repair. PILOT PROJECT Preliminary Results." PowerPoint presentation, Slide 28. 2003.

[18] Florida Department of Environmental Protection. Slide 57. March 24, 2005.

[19] Tetra Tech EM, Inc., for Massachusetts DEP. "Environmental Results Program for Dry Cleaners and Photo Processors, Round 2 Versus Round 3 and Self-Certification, and Printers Round 1 Versus Round 2 and Self-Certification Data Analysis. Final Report." Page 5. July 16, 2001.

[20] Enander, Richard T., et al. 2007.

[21] DeGabriele, Steven. Director, Business Compliance Division, Massachusetts Department of Environmental Protection. "Re: other Biennial Report follow-up items." E-mail to U.S. EPA contractor. January 8, 2007.

[22] Florida Department of Environmental Protection. Slide 33. March 24, 2005.

[23] For a description of the calculation and data sources, see appendix, Section 3.

[24] Steve DeGabriele and Susan Peck. Massachusetts DEP. Telephone interview with U.S. EPA NCEI staff and contractor. March 12, 2007.

[25] Reilly, Paul. Dry cleaners ERP manager. Massachusetts Department of Environmental Protection. "Re: relative perc usage data." E-mail to U.S. EPA contractor. September 27, 2007.

[26] For a description of the calculation and data sources, see appendix, Section 3.

[27] Refer to appendix, Section 4, for more information on data sources and methodological approach.

[28] *Sources:* (1) U.S. Environmental Protection Agency and Massachusetts Department of Environmental Protection. The Massachusetts Environmental Results Program: User's Guide for Government Agencies. Page 12. January 2002. (2) DeGabriele, Steven. "Re: [No subject.]" E-mail to U.S. EPA contractor. October 31, 2007.

[29] Hartwell, Christopher A. Simplify, Simplify: Alternative Permitting at the State Level. Reason Foundation. February 1999. Accessed October 9, 2007 http://www.reason.org/ps253.html.

[30] DeGabriele, Steven. "Re: Information Requested." E-mail to U.S. EPA contractor. November 2, 2006.

[31] *Sources:* (1) Maine Department of Environmental Protection, Office of Innovation. May 7, 2007. (2) Lippert, Sara. Maine Department of Environmental Protection. "Re: Information Request for ERP Biennial Report." E-mail to U.S. EPA contractor. November 27, 2006.

[32] *Delaware data:* Delaware Department of Natural Resources and Environmental Control. Final Report. EPA 2002 State Innovation Pilot Grant Program. December 2005. *Maine data:* Maine Department of Environmental Protection, Office of Innovation. May 7, 2007. *Rhode Island data, based upon 74 of 367 facilities submitting return-to-compliance plans:* Enander, Richard T., et al. 2007.

[33] This example and figure 6 both assume states are resource-constrained and can only do a limited number of inspections, which has been common with the early ERPs. The figures are based upon a 95% confidence level and a margin of error of approximately +/- 12 percentage points. For instance, if a state discovered 50% of facilities to be in compliance with an EBPI, it could be 95% confident that somewhere between 38% and 62% of all facilities in the population were in compliance with that EBPI. ERP states have found that margins of error of this magnitude, and larger ones, have often been sufficient for ensuring quality policy decision-making. More inspections would be required to achieve smaller margins of error at each population size (assuming a confidence level of 95%), but similar economies of scale would still be observed.

[34] Rio, Robert A., Esq. Vice President for Associated Industries of Massachusetts. Letter to Ms. Karen Regas of Massachusetts DEP regarding "Amendments to 310 CMR 7.00 - For the Control of Air Pollution." March 22, 2007.

[35] McGrath, Dennis. "Report of the Results of a Survey of the Park Heights Neighborhood Before and After the Initiation of the Park Heights Environmental Compliance Assistance Program." Schaefer Center for Public Policy, University of Baltimore. Attachment 7 to the Maryland Department of Environment's Park Heights Project Final Report, prepared by Bernard A. Penner. June 30, 2004.

[36] *Sources:* Ostrowski, James. Michigan DEQ. Telephone interview with U.S. EPA contractor. October 18, 2007. (2) Section 133.13307 of the Michigan Public Health Code, Act 368 of 1978.

[37] EPA decided to utilize random sample data, as opposed to data from the annual inspections of all facilities, for two reasons. First, Michigan DEQ recently adapted its inspection checklist to an ERP style checklist, allowing for greater comparability. Second, random sampling may help remove potential bias caused by inspectors visiting facilities at a relatively the same timeframe each year. Michigan's large sample size still leaves high confidence in estimates of population performance.

[38] 2002 Massachusetts data were used for this analysis because results from the latest round, occurring in 2007, were not available for this report.

[39] At either a 90% or 95% confidence level.

[40] A complete cost analysis of each program was beyond the scope of this report. Each state's program benefits from additional resources not reflected in this estimate. For instance, Michigan's dry cleaners receive technical assistance from a separately funded Clean Air Assistance Program, and the Massachusetts dry cleaners ERP has benefited from substantial investments in automation that have lowered operational costs across all Massachusetts ERPs.

[41] The actual, long-term FTE average may be marginally lower, since Massachusetts has reduced inspection frequency over time. Once Massachusetts completes its 2007 round of random inspections in the dry cleaner sector, it will have conducted five rounds of random sampling over 11 years of ERP. On that basis, Massachusetts DEP's average FTE usage would be 1.73. EPA chose to use the higher average (1.83 FTEs), since 2007 performance data were not available for comparison.

[42] Precise average is $225,565. Data from U.S. Environmental Protection Agency State Innovation Grants work plans for ERP implementation (2002-2006), as of spring 2007. State work plans included in analysis: Delaware, Illinois, Indiana, Louisiana, Maine, Michigan, Minnesota, Nevada, Rhode Island, Vermont, Virginia, and Wisconsin. Please note that the first full cycle of ERP would be considered the "implementation phase." The true average implementation costs may be somewhat higher, since these state grant workplans may not account for all agency staff time involved in developing an ERP.

[43] At present, New York intends that its ERPs for printers and for auto body shops will have, at minimum, mandatory certification covering certain hazardous waste aspects of ERP. It is also exploring regulatory and statutory authority for making mandatory the submission of a broader range of information, across environmental media. *Source:* Killeen, Tom. New York State Department of Environmental Conservation. Telephone interview with U.S. EPA contractor. September 26, 2007.

[44] This report presents results for only one completed Rhode Island ERP (for auto body shops), because results have not yet been fully analyzed for Rhode Island's other completed ERP (for underground storage tanks).

[45] See note 6.

[46] In 1997, before initiating the program, the state was only able to demonstrate that 4,860 tons of volatile organic compounds (VOCs) were under control. As of 2005, the state demonstrated that 8,820 tons of VOCs were under control. *Sources for vapor recovery program information:* (1) Massachusetts Department of Environmental Protection. "Stage II Goals and Measures—1997-2005," Microsoft PowerPoint slide. Received from Steven DeGabriele via e-mail to U.S. EPA contractor on March 29, 2007. (2) Massachusetts Department of Environmental Protection. "MA Using ERP Differently Than Full ERP for Dry Cleaners. Example 1: Stage II Vapor Recovery Program for Fuel Dispensers" draft. May 13, 2005.

[47] Assumes average amount of mercury in mercury-containing, household thermometer equals 0.61 grams. *Source:* U.S. Environmental Protection Agency. Mercury Study Report to Congress. Volume II: An Inventory of Anthropogenic Mercury Emissions in the United States. Office of Air Quality Planning & Standards and Office of Research and Development. EPA-452/R-97-004. Page 4-45. Washington: GPO, 1997.

[48] Assumes average amount of mercury in mercury-containing automotive switch assemblies equals 0.8 g. *Source:* Adsit, Dan, et al. Michigan Mercury Switch Study. Alliance of Automotive Manufacturers, Michigan Department of Environmental Quality, et al. 2002.

[49] The executive summary of this report, published prior to this report, incorrectly refers to estimated annual mercury reductions of "several hundred pounds," suggesting 300 pounds or more. *Source for dental mercury program information:* Massachusetts Department of Environmental Protection. "MA Using ERP Differently Than Full ERP for Dry Cleaners. Example 2: Voluntary Program for Dental Mercury Facilities" draft. May 13, 2005.

[50] National Academy of Public Administration. Taking Environmental Protection to the Next Level: An Assessment of the U.S. Environmental Services Delivery System. Pages 33–35. 2007.

This report, along with its executive summary and appendix, were prepared for EPA under Contract No. EP-W-04-023.

Reader's Notes

State ERP Contacts

Delaware
Kimberly Chesser
Small Business Ombudsman
Department of Natural Resources and Environmental Control
kimberly.chesser@state.de.us

Florida
Michael Redig
Bureau of Solid and Hazardous Waste
Department of Environmental Protection
michael.redig@dep.state.fl.us

Illinois
Andrew Jankowski
Office of Pollution Prevention
Illinois Environmental Protection Agency
Andrew.Jankowski@illinois.gov

Indiana
Rosemary Cantwell
Industrial Waste Section
Department of Environmental Management
rcantwel@idem.in.gov

Louisiana
Melissa Lantz
Office of Management and Finance
Department of Environmental Quality
melissa.lantz@la.gov

Maine
Julie Churchill
Office of Innovation
Department of Environmental Protection
julie.m.churchill@maine.gov

Massachusetts
Steven DeGabriele
Business Compliance Division
Department of Environmental Protection
steven.degabriele@state.ma.us

Michigan
James Ostrowski
Environmental Science and Services Division
Department of Environmental Quality
OSTROWSJ@michigan.gov

Minnesota
Alister Innes
Prevention & Assistance Division
Pollution Control Agency
alister.innes@pca.state.mn.us

Nevada
Jim Trent
Bureau of Waste Management
Division of Environmental Protection
jtrent@ndep.nv.gov

New Hampshire
Rudolph Cartier, Jr., PE
Small Business Ombudsman
Department of Environmental Services
rcartier@des.state.nh.us

New York
Paul Counterman
Division of Solid and Hazardous Materials
Department of Environmental Conservation
prcounte@gw.dec.state.ny.us

Rhode Island
Ronald Gagnon
Office of Technical and Customer Assistance
Department of Environmental Management
ron.gagnon@dem.ri.gov

Vermont
Marc Roy
Waste Management Division
Department of Environmental Conservation
marc.roy@state.vt.us

Virginia
Russell P. Ellison III
Underground Storage Tank Compliance
Department of Environmental Quality
rpellison@deq.virginia.gov

Washington
Michelle Underwood
Hazardous Waste and Toxics Reduction
Department of Ecology
mund461@ecy.wa.gov

Wisconsin
Renee Lesjak Bashel
Small Business Clean Air Assistance Program
Department of Commerce
Renee.Bashel@Wisconsin.gov

ERP Contacts at EPA's National Center for Environmental Innovation

EPA welcomes your comments about this document.

Scott Bowles
bowles.scott@epa.gov

Kimberly Green-Goldsborough
green-goldsborough.kimberly@epa.gov

Beth A. M. Termini, Esq.
termini.beth@epa.gov

For more information on ERP, including the executive summary and appendix of this report, visit **www.epa.gov/erp**.

Recycled/Recyclable – Printed with vegetable oil based inks
on 100% (minimum 50% postconsumer) recycled paper.