Reevaluation of the Use of Recidivism Rate Measures for EPA's Civil Enforcement Program

Report to OMB

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EXECUTIVE SUMMARY

A. Focus of the Report

This report was developed to respond to the Office of Management and Budget (OMB) recommendation, in the 2004 Program Assessment Rating Tool (PART) review of the Environmental Protection Agency's (EPA) civil enforcement program, that the Office of Enforcement and Compliance Assurance (OECA) reevaluate issues that led to the discontinued use of recidivism rates as a performance measure for the civil enforcement program and decide whether it serves an important program purpose to begin calculating them again. OECA broadened the focus of the report to include consideration of other programmatic uses of recidivism-related concepts. These include identifying national compliance and enforcement priorities, targeting inspections, bringing timely and appropriate enforcement responses, and calculating noncompliance penalties.

B. Actions Taken to Conduct Research

OECA took the following steps to develop the findings and recommendations in this report: consulted with managers and staff within OECA's Office of Civil Enforcement (OCE), Office of Criminal Enforcement, Training and Forensics (OCEFT), and Office of Compliance (OC); reviewed and reconsidered all available internal documentation concerning the discontinued recidivism metric; researched recidivism measures used or contemplated by other federal departments such as the Department of Labor (DOL) and several state environmental enforcement programs; consulted with staff in the U.S. Department of Justice's (DOJ) National Institute of Justice (NIJ) and selected academic compliance research and measurement experts.

C. Major Findings[1]

1. Recidivism is a real phenomenon defined as the reversion by past lawbreakers to illegal behavior. One means of measuring the extent of recidivism in a particular context is through recidivism rates, defined as the percentage of a certain universe of past violators which violate the law again, and are caught doing so, during a specified observation period.

2. The relative ability of law enforcement agencies to detect violations impacts all recidivism rate measures to varying degrees, as does the extent to which the underlying compliance monitoring is targeted versus random. Consequently, in general, recidivism rates cannot be considered statistically valid measures of the true rate at which violations occur, or recur, among violators.

3. Recidivism rate measures require definitional choices be made in three key areas, each of which introduces subjective elements. These are: -1- determining the universe of entities subject to the measure; -2- establishing the observation period, both when it begins and how long it runs; and -3- defining what constitutes an act of recidivism. OECA's own discontinued recidivism rate measure represented a particular set of definitional choices, across these three categories, reflecting practical database considerations.

[1] A brief additional discussion of each of these findings is included in subsection V.A of the report.

4. Information on which facilities recidivate, as well as on which facilities initially commit violations and are therefore potential recidivists, is necessarily limited by the availability of environmental inspection data. Because OECA environmental inspections are targeted to achieve maximum detection and deterrence, recidivism rates calculated on the basis of this data are not statistically valid measures of the true rate at which past violators return to noncompliance. Moreover, changes in OECA's targeting process would likely result in changes in the observed recidivism rate measure unreflective of underlying change in repeat offender behavior among regulated entities. Although there are ways to lessen this problem, it is fundamentally unavoidable.

5. All recidivism rate measures are influenced by exogenous or confounding factors such as the impact of state inspections and enforcement, general economic trends, etc., as well as by changes in the makeup of the universe of potential recidivists and by random fluctuations. Any potential OECA recidivism rate measure would be influenced by exogenous or confounding factors such as the impact of state inspections and enforcement and general economic trends, as well as by changes in the makeup of the universe of potential recidivists and by random fluctuations. Some of these factors both material and outside of OECA's direct control. In addition, in general, as the heterogeneity of the universe subject to a recidivism rate increases, the scope and magnitude of exogenous concerns tend to increase, as well. These considerations limit the potential utility of a national recidivism measure for reporting or management purposes by rendering it difficult to identify trends in recidivism rate measures and/or ascribe these trends to specific causal factors.

6. The use of a recidivism rate measure as a national performance management measure could result in poor national compliance and enforcement program management decisions. Perhaps the most serious example is managers potentially overemphasizing, and thus over-allocating resources to, reducing recidivism rates at the expense of maximizing overall benefits to human health and the environment.

7. For the reasons expressed in Findings (1)-(6), above, OECA finds that that *nationally calculated recidivism rates for the civil enforcement program* are inherently limited in their potential to serve as effective program management and reporting tools.

8. While nationally calculated civil enforcement recidivism rates are inherently limited in utility, addressing recidivism, history of noncompliance, and chronic noncompliance are legitimate program objectives that OECA has historically considered, along with other relevant considerations in many areas of its enforcement and compliance assurance program. Leading ways include in selecting national strategic compliance and enforcement priorities, targeting enforcement actions, and assessing appropriate penalties and injunctive relief.

9. Recidivism rate measures, by definition, overlook certain categories of important violators such as entities in chronic noncompliance that cannot "recidivate" because they do not return to compliance at all during the observation period. Chronic noncompliance measures (e.g. the percentage of entities in chronic noncompliance or the mean or median length of time entities spend in noncompliance) are conceptually related to recidivism rate measures. Although they

are not perfect substitutes for one another in that recidivism can be high while chronic noncompliance is low and vice versa, they may correlate in many real-world situations. Tracking and addressing chronic noncompliance may therefore represent both a more feasible and a more useful performance measure and goal than reducing recidivism rates per se.

10. While OECA's compliance data may not lend itself well to a national civil enforcement program recidivism and/or chronic noncompliance performance management measure, there still may be useful information in the existing data on patterns of noncompliance among regulated entities, e.g., on a sector, national priority, or other limited universe context, which could be gleaned through a systematic, statistical review of the data. In addition, there may be additional useful programmatic and targeting uses for available data on facilities in chronic noncompliance.

B. Recommendations

1. OECA should not, at this time, begin to again calculate national civil enforcement program recidivism rates for program management and reporting purposes. This recommendation is limited to recidivism rates for the civil enforcement program, calculated on a national level. This report offers no opinions as to, nor was any work conducted in its preparation, on the potential benefits and costs of calculating a national *criminal* program recidivism metric. Due to significant differences in the federal civil and criminal enforcement programs such as, for example, the sizes of the relative universes subject to a potential recidivism measure and potential significantly different approaches to defining appropriate observations periods and recidivist acts or omissions, this report establishes no precedents with respect to the criminal enforcement program.

2. OECA should continue to consider and address recidivism, history of noncompliance, and chronic noncompliance, along with other relevant considerations and objectives, in its enforcement and compliance assurance program. This includes considering recidivism-related concepts, in selecting national strategic compliance and enforcement priorities, targeting enforcement actions, and assessing appropriate penalties and injunctive relief.

3. OECA should, employing the results of the OECA-ORD Deterrence and Compliance Assistance Outcomes Measurement Project state-of-the-science deterrence measurement white paper, *Monitoring, Enforcement, and Environmental Compliance: Understanding Specific and General Deterrence State of the Science White Paper* (October 2007) and follow-up Deterrence and Compliance Assistance Outcomes Measurement Workshop, consider the potential usefulness and feasibility of sub-national level recidivism-oriented measures and/or evaluative approaches for specific projects or priorities. This consideration should occur prospectively on a case-by-case basis, through regular planning and targeting processes, taking into account the environmental problems the projects and priorities are intended to address, their goals and objectives, and available resources.

4. OECA should continue to use the Facilities Watch List Management Tool (Watch List) to identify and prioritize for review and potential enforcement response facilities in chronic

noncompliance. At the same time, OECA should explore and, if appropriate, develop potential new uses for, and distribution of, the Watch List and possible newly-derived subsets and permutations of it. These efforts should focus on addressing chronic noncompliance in priority areas in an effective and efficient manner, potentially taking into account, among other factors, overall length of time in noncompliance, seriousness of the violations and their health and environmental consequences, root causes of noncompliance, potential criminal conduct, marginal costs and benefits of new or additional enforcement against chronic non-compliers, and other specific and general deterrence considerations. Examples of potential new subsets of Watch List data which OECA could consider developing could be facilities in noncompliance for over a full year or Watch List facilities in national priority sectors. OECA could also consider the potential usefulness of developing and implementing a measure of chronic noncompliance derived from the Watch List, its underlying data, or subsets of both intended not to serve as a national recidivism rate measure per se but for other useful management purposes.

SECTION I. PURPOSE, CONTEXT, AND METHODOLOGY

A. Purpose of the Report

In its 2004 PART review[2] of the EPA's civil enforcement program, OMB found the program to be performing at an adequate level and provided recommendations for improvement. These recommendations included the following one that OECA reevaluate the development and use of a recidivism rate measure for its civil enforcement program:

Year Began	Improvement Plan	Status	Comments
2005	Calculate and evaluate recidivism rates.	Action taken, but not completed	EPA is re-evaluating issues that led to discontinued use of recidivism rates in the past. The Agency will make a decision in September on whether it serves an important program purpose to begin calculating recidivism rates again.

Subsequently, in its July 31, 2006 report to OMB titled *Expanding the Use of Outcome Measurement for EPA's Enforcement and Compliance Assurance Program*, OECA made the following recommendation:

> By September 2006, OECA will complete an analysis of its experience with the recidivism measure used from 1999-2004 and the chronic non-compliers data it has developed in the last two years. The re-evaluation will make recommendations about using one of those approaches for a pilot project to be conducted in FY 2007 to develop a repeat offenders measure for the civil enforcement program.

This report was developed to respond to the OMB recidivism rate measure recommendation and to fulfill OECA's recommendation to consider potential new measures of repeat offenders. The report includes specific responses to the 2005 Improvement Plan directive, including an overview and reevaluation of the discontinued measure (part B of this section), as well as consideration, in Section II, of potential alternative formulations of recidivism measures.

For background and context, part C of this section discusses EPA's compliance and deterrence program goals as they relate to recidivism and part D discusses OECA's approach to program management. Part E presents the methodology used to generate this report.

Section III evaluates some of the potential advantages and disadvantages of using recidivism as a program performance measure and considers other potential uses for recidivism measures. Section III also fulfills OECA's recommendation above to consider other potential measures of chronic noncompliance.

[2] http://www.whitehouse.gov/omb/expectmore/detail.10000220.2005.html.

In order to maximize the value of this report to OECA, OMB, and other potentially interested parties, section IV reviews and describes ways, other than through a recidivism rate or other chronic noncompliance measure, in which OECA applies recidivism-related concepts, along with other relevant considerations, in the design, management, and implementation of the nation's environmental enforcement and compliance assurance program. Section V presents findings and recommendations.

B. OECA's Discontinued Recidivism Metric

OECA first considered recidivism measurement in 1997 in initiating its National Performance Measures Strategy (NPMS). OECA used the NPMS process, developed pursuant to the Government Performance and Results Act (GPRA), to develop an enhanced set of performance measures for EPA's enforcement and compliance assurance program. These measures consisted of a combination of output measures, outcome measures, and environmental indicators to be used to strategically manage and evaluate the effectiveness of EPA's enforcement and compliance assurance program.

The measures developed as a result of the NPMS process included the recidivism rate measure referenced by OMB in its 2004 PART Review of EPA's civil enforcement program. This measure, in fact, consists of three separate recidivism rates, one each for the air, water,[3] and solid waste media programs.

OECA formally reported the recidivism rate measure from Fiscal Year (FY) 1999 to FY2002. Subsequently, OECA discontinued the measure as a formal component of OECA's annual reporting process. It is still calculated annually, however, as part of the National Enforcement Trends (NET) report. The most recently available NET report covers FY2006.[4]

To calculate the recidivism rates via the discontinued measure, OECA analyzes facility-specific compliance data under three environmental statutes, the Clean Air Act (CAA), Clean Water Act (CWA), and Resource Conservation and Recovery Act (RCRA). OECA determines, individually for each of the three media, the percentage of the facilities that returned to compliance from Significant Noncompliance (SNC)[5] in a given fiscal year which then reverted to SNC, in the same medium, within two years. This formulation of a recidivism rate measure does not require that a facility receive an enforcement action from EPA to be considered a potential recidivist, only that it have been in SNC and then come into compliance for any reason.

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[3] Because of database compatibility conflicts brought about by the modernization of the Permit Compliance System (PCS), recidivism rates for water facilities may not be available in coming years. It is expected that these conflicts will eventually be resolved and recidivism rates will then be able to be calculated retroactively if desired.

[4] Available internally at EPA for FY2004 - 2006 at http://intranet.epa.gov/oeca/oc/etdd/nets/index.html. The most recent report for FY2006, which has only recently been released, does not include the discontinued measure, but the other two do.

[5] Under the CAA, the term "High Priority Violator," or HPV, is used rather than SNC. The concepts are similar in that both reflect significant violations that are a relatively high priority for response. The term SNC is used throughout this paper to refer to both SNC and HPV, though both terms are defined differently program-to-program. Program-specific definitions of SNC and HPV can be found at http://www.epa.gov/compliance/resources/policies/civil/index.html. In the CAA and RCRA programs, SNC is a monthly designation (all facilities are either in or out of SNC in any given month for the entire month); in the CWA program, it is a quarterly designation.

The procedure for determining the recidivism rates based on data accessed from the Integrated Data for Enforcement Analysis (IDEA) database, is as follows:

(1) The universes for each of the three media programs are constructed as the set of facilities[6] which exited SNC in the given medium at any time during the fiscal year two years prior to the one in question. For the FY2005 recidivism measures, for example, this would be FY2003. If a facility exited SNC more than once during the year in question (i.e. was in SNC, exited SNC, returned to SNC, and then exited again), it is not double counted, and is necessarily a recidivist. Facilities which were in SNC in September 2002 but not in October are included in the FY2005 recidivism universe and not the FY2004 universe consistent with FY2003 beginning on October 1, 2002.

(2) Next, it is determined which of the facilities in each of the three universes returned to SNC status in the same medium at any point during the twenty-four months beginning with the first non-SNC month. These facilities are considered recidivists.

(3) In the CAA and RCRA programs, among the remaining facilities which did not return to SNC within two years, those facilities which did not receive an inspection in the medium in question during this period are dropped from the universe. This is because their compliance status cannot be accurately assessed without an inspection. In the CWA program, which relies more heavily on self-reported data, this step is not taken.

(4) The value of each of the three measures is calculated as the percentage of remaining facilities in the relevant universe which were recidivists as defined in (2).

Appendix I presents, graphically, the FY2005 2-year recidivism rates for the CAA, CWA, and RCRA programs broken down by EPA's ten geographic regions. For FY2005, the CAA recidivism rate was 26%, the CWA rate 44%, and the RCRA rate 12%. The results for all three media for FYs 1999-2005 are presented in a longitudinal graph in Appendix II.

Because the SNC definitions and the opportunities a facility has to enter and exit SNC vary across media, comparing recidivism rates across media is of limited if any utility. That being said, in all of the FYs 1999-2005, the RCRA program had the lowest recidivism rate and CWA the highest, likely because of the greater availability of self-reported data under the CWA. In general, it is difficult to identify specific trends in the data, and more difficult still to attribute these trends to specific causal factors.

As discussed in greater detail in subsection III.E below, the recidivism rates calculated as part of the discontinued measure, like all recidivism rates, should not be considered statistically valid measures of the true rate at which violations recur at facilities which have recently come out of noncompliance. Violations may occur and be missed even if an inspection takes place at a

[6] The broader universe of facilities under consideration are those contained in the IDEA database, which includes both major facilities and federally-reporting minor facilities, where major and minor designations are defined in the environmental statutes and accompanying regulations. The coverage of minor facilities in the database varies across states and may change from year to year.

given facility during the two years following a return to compliance. In the case of RCRA and CAA, eliminating facilities at which no inspections took place may bias the measure as well, particularly given the targeted nature of EPA and state inspections. Furthermore, the universe of potential recidivists excludes facilities where an initial violation went undetected. Because of these factors, changes in how EPA targets inspections may result in changes in the recidivism rate measure unreflective of underlying changes in the behavior of regulated facilities.

For these and other reasons,[7] formal reporting of the recidivism measure was discontinued in FY2003. The FY2003 change in programmatic status of the discontinued recidivism measure did not reflect a substantive change in OECA's overall program goals or strategies, summarized immediately below. As described more fully in Section IV, below, this decision to discontinue formally reporting the recidivism measure reflected no change in OECA's civil enforcement program mission, priorities, or objectives. OECA will continue to consider and address recidivism, history of noncompliance, and chronic noncompliance, along with other relevant considerations and objectives, through the civil enforcement and compliance assurance program. Nor did it reflect a substantive change to OECA's performance-based approach to measurement and management, discussed in part D of this section. Rather, the decision to discontinue publicly reporting the recidivism rate measure reflected a determination by OECA that, as a practical matter, the measure was of limited utility in managing and evaluating the federal civil enforcement program's performance and results. While, to some degree, this lack of utility was a consequence of the particulars of the discontinued measure it also reflected concerns intrinsic to any potential design of a recidivism rate measure. The general limitations and difficulties in designing and implementing recidivism measures generally are discussed below in Section II.

C. Overview of EPA's Compliance and Deterrence Program Goals

EPA's mission is to protect human health and the environment.[8] Pursuant to that mission, EPA, together with its state and tribal partners, is responsible for assuring compliance with the nation's environmental laws. Within EPA, OECA is the lead office for compliance assurance. EPA also seeks to promote an environmental stewardship ethic by which firms and individuals strive to exceed regulatory requirements and prevent pollution at its source. The Office of Planning, Economics, and Innovation (OPEI) is the lead Agency office for environmental stewardship and the Office of Prevention, Pesticides and Toxic Substances (OPPTS) for pollution prevention. Securing these outcomes for the American people is at the heart of EPA's mission and a key element of EPA's Strategic Plan under *Goal 5: Compliance and Environmental Stewardship*.[9]

Enforcement is one tool that OECA uses to help fulfill EPA's goal of ensuring environmental compliance. OECA's goals for its enforcement program include deterrence, fair and equitable treatment of the regulated community, and swift resolution of environmental

[7] *See* section III below for a discussion of other defects of recidivism rate measures..
[8] http://www.epa.gov/epahome/aboutepa.htm.
[9] http://www.epa.gov/ocfo/plan/plan.htm.

problems.[10] A successful enforcement response should both: -1- persuade the violator in that specific case to return to compliance and take precautions to avoid future noncompliance (specific deterrence), and -2- dissuade other regulated entities from violating the law (general deterrence). Indeed, deterrence is the first goal of federal civil administrative and judicial environmental penalty actions.[11]

As recidivism occurs when an entity that has violated the law in the past returns to noncompliance, it is conceptually related to deterrence. A strong deterrent impact (especially specific deterrence) should serve to reduce incidents of recidivism. A useful recidivism measure, therefore, should reflect the specific deterrent performance of the civil enforcement program. As discussed in sections II and III below, however, it can also reflects other causal factors.

D. Overview of OECA's Approach to Performance Measurement

Beginning with its National Performance Measures Strategy report completed in FY1998, OECA has had an active and conscientious effort underway to identify, develop, and use performance indicators to manage the national compliance and enforcement program and enhance accountability to the public. In particular, OECA has focused on measuring not just outputs or activities (e.g., the number of enforcement actions), but the intermediate and end outcomes or results of those activities (e.g., pounds of pollution reduced through enforcement actions).[12]

The managers of EPA's national compliance and enforcement program, in their efforts to identify, develop, and use performance measures as an important tool for managing and improving program performance have been guided by a set of principles.

(1) A combination of output and outcome measures is necessary to manage and improve the national compliance and enforcement program.

(2) Intermediate outcome measures provide valid and useful information that helps identify and correct performance issues.

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[10] *See EPA General Enforcement Policy # PT 1.1* (February 16, 1984) (formerly # GM-21). http://www.epa.gov.tw/attachment_file/upload/G/%E9%98%B2%E6%AD%A2%E8%88%B9%E6%B1%A1%E5%9F%B7%E6%B3%95%E7%A0%94%E7%BF%92/%E8%AC%9B%E8%AD%B0/09-EPA%20Policy%20on%20Civil%20Penalties.pdf.

[11] "This document, Policy on Civil Penalties, establishes a single set of goals for penalty assessment in EPA administrative and judicial enforcement actions. … The first goal of penalty assessment is to deter people from violating the law. Specifically, the penalty should persuade the violator to take precautions against falling into noncompliance again (specific deterrence) and dissuade others from violating the law (general deterrence). In addition, it ... address[es] noncompliance before it occurs. … If a penalty is to achieve deterrence, both the violator and the general public must be convinced that the penalty places the violator in a worse position than those who have complied in a timely fashion." *Id*.

[12] The text of this and the following paragraph as well as the four measurement principles below, are taken directly from OECA's *Expanding the Use of Outcome Measurement for EPA's Office of Enforcement and Compliance Assurance* report to OMB (July 31, 2006).

(3) Performance measures should be used for more than reporting results to the public. Their most important use is as a management tool to identify and correct performance problems and improve performance effectiveness.

(4) Expansion of existing measures or development of new measures must take resource implications into account.[13]

As the third principle states, OECA's most important use of performance measures is as a tool to manage its large and complex enforcement and compliance assurance program. Such a management strategy is essential for an organization responsible for assuring compliance in 58 separate programs under 14 different environmental statutes among millions of regulated entities distributed across the United States.[14] Therefore, in considering OMB's recommendation to reconsider calculation of a national civil enforcement program recidivism metric, OECA has placed significant weight on determining whether, as a practical matter, such a measure would be a useful management tool to identify and correct performance issues and increase program effectiveness.

E. Report Methodology

To address OMB's recommendation to reevaluate the development and use of a national program recidivism rate measure, OECA managers and staff gathered and analyzed information from a wide range of sources through a variety of means. Specifically, OECA took the following steps to develop the findings and recommendations in this report:

- ✓ Consulted with staff and managers from OECA's Office of Civil Enforcement (OCE), Office of Criminal Enforcement, Training and Forensics (OCEFT), and Office of Compliance (OC).

- ✓ Reviewed and reconsidered all available internal documentation concerning the discontinued recidivism metric from 1997 through the present, including applicable NPMS documentation.

- ✓ Researched recidivism measures used or contemplated by other federal departments, e.g., the Department of Labor (DOL), and several state environmental enforcement programs.

- ✓ Consulted with the U.S. Department of Justice's (DOJ) National Institute of Justice (NIJ) and selected academic experts in the areas of compliance research and measurement.

[13] For additional background information on OECA's approach to performance measurement in general and the meaning and application of the above four measurement guiding principles, *see* OECA's *Expanding the Use of Outcome Measurement for EPA's Office of Enforcement and Compliance Assurance* Report to OMB (July 31, 2006). The Report to OMB, among other things, presents, as Appendix I, the full GPRA architecture for EPA's enforcement and compliance assurance program with the specific performance indicators associated with each sub-objective.

[14] A copy of the tabular breakdown of these statutes, programs, and entities is included as appendix A of the following document: http://www.epa.gov/oig/reports/2005/20050919-2005-P-00024.pdf.

SECTION II. BACKGROUND AND DEFINITIONAL CONSIDERATIONS FOR RECIDIVISM RATE MEASURES

A. Background on Recidivism Rate Measures and Their Uses

Subsection I.B. explains, among other things, how OECA developed the recidivism rate measure cited by OMB in the 2004 PART review but discontinued using it for performance management purposes. The discontinued measure, however, is but one possible formulation for a potential OECA civil enforcement recidivism measure. This section provides general background on measuring recidivism (this subsection) and discusses the various definitional choices that must be made in formulating a recidivism rate measure for a civil enforcement program such as OECA's (subsections B-E). Subsection F considers the potential use of a survey-based method of measuring recidivism rates in a civil enforcement context.

Recidivism is predominantly studied in a criminal justice context. Consequently, the underlying theory behind recidivism measurement is far better developed in that context. It is useful, therefore, to consider the concept of recidivism in the criminal enforcement context before applying it to civil enforcement.

"Recidivism, in a criminal justice context, can be defined as the reversion of an individual to criminal behavior after he or she has been convicted of a prior offense, sentenced, and (presumably) corrected."[15] It is important to distinguish this real phenomenon of recidivism from recidivism *rates*, defined generally as the percentage of some well-defined universe of prior offenders who recidivate, that is, commit a crime (and get caught doing so), during a specified observation period.[16] Recidivism rates are one approach to measuring recidivism in a given situation.

The principal advantage of using recidivism rates for this purpose is that they are quantitative measures which, in criminal justice settings, are relatively straightforward to calculate and to interpret. Recidivism rates are disfavored, however, by some researchers because they overlook a great deal of the information about recidivism contained in longitudinal data about criminal behavior.[17] This includes, in particular, the length of time it takes individuals to recidivate and any information about individuals who exit the study before the conclusion of the observation period. It is also generally difficult to control for the effects of exogenous explanatory variables that affect recidivism, e.g. prevailing economic and social conditions or changes in laws or enforcement practices, or for the demographic characteristics of the criminals themselves, e.g. socioeconomic status, criminal history, and the nature of their crimes. Where these effects are controlled for using recidivism rates, it is generally by

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[15] Maltz, Michael D. ([1984] 2001). *Recidivism*. Originally published by Academic Press, Inc., Orlando, Florida. Internet edition available at http://www.uic.edu/depts/lib/forr/pdf/crimjust/recidivism.pdf. Quotation from page 1.

[16] The term "observation period" does not appear to be universal. "Exposure period" is used by some authors, while many do not give this period of time a specific a name. The length of the observation period and the specific point at which it begins differ according to the recidivism rate definition; *see* subsection II.D for a more thorough treatment.

[17] *See*, e.g. Maltz, Michael D. ([1984] 2001), f.n. 15 above.

calculating separate recidivism rates for the different groups.[18] Event history and survival/failure analysis[19] may be suggested as alternatives to recidivism rates in order to overcome many of these problems. These are advanced statistical techniques, however, that require considerable additional sophistication both to calculate and to interpret. Consequently, the use of recidivism rates remains common in criminological research.

A search of a scholarly database of relevant academic articles [20] reveals hundreds of studies making use of recidivism rates. As discussed above, most of these studies address criminal recidivism and either compare different institutional treatments of prisoners, e.g. addressing whether work training programs reduce recidivism relative to more traditional prisons, or compare different demographic classes of prisoners, e.g. addressing whether prisoners with more prior offenses are more likely to recidivate. There are also surveys of many recidivism rate studies on a particular topic, though these tend to be complicated by the use of different recidivism rate definitions by different researchers.

Within the federal government, DOJ's Bureau of Prisons, which has responsibility over all federal prisons, does not publish annual recidivism rates on its website; however, links are provided to several recidivism studies.[21] According to a recidivism expert at DOJ's NIJ,[22] while some state and local correctional authorities do publish annual statistics on recidivism rates, these publications are generally not high-profile. A web search did not reveal any examples.

The use of recidivism measures in a civil enforcement context, as is being discussed now for EPA's civil enforcement program, is far less common than in the criminal context. In general, the concepts of criminal recidivism are transferable to civil enforcement. That being said, the notions of what constitutes a crime and how crimes are detected are fundamentally different in a civil regulatory context than in a criminal justice context. In the criminal justice context, for the most part, a crime occurs as a *distinct event* which law enforcement detects with a certain probability which is affected by the type of crime, the quality of the law enforcement program, and so on. In the civil regulatory context, for the most part, a violation may occur for a *period of time* during which a regulated entity is out of compliance. Whether or not that violation is detected by the regulator depends on the length of time the entity is out of compliance, how often the civil enforcement program conducts inspections, how it targets those inspections, and so on (for this purpose, self-reported data can be regarded as a special case of an

[18] As is done, e.g., in the case of OECA's discontinued measure, which calculates separate rates for air, water, and solid waste facilities.

[19] A complete discussion of these statistical techniques is beyond the scope of this report. Generally, however, they involve applying a chosen functional form to the statistical distribution of the lengths of time it takes individuals to recidivate. These functions may take into account a variety of potential explanatory variables as well as one or more parameters reflecting the degree of recidivism. These parameters are then estimated using a maximum likelihood technique based on data on the lengths of time it takes different individuals to recidivate. Observations of individuals who do not recidivate as well as those that exit the study prematurely are included in the estimation procedure. Maltz, Michael D. ([1984] 2001), f.n. 12 above, contains a more thorough discussion of the methods involved in these techniques as well as their relative merits. Outside statistical expertise would surely be required were OECA to adopt such a measurement approach.

[20] *See*, e.g., http://www.google.com/scholar?q=recidivism.

[21] http://www.bop.gov/

[22] Phone interview on 3/1/07 with Dr. Gerry Gaes. Dr. Gaes also expressed a preference for event history analysis over recidivism rates.

inspection). In sum, it would make little sense for police officers to inspect potential criminals while most environmental violations would go undetected were it not for inspections.[23] These factors necessarily impact the relative utility of recidivism rates to criminal justice versus civil regulatory programs.

Five examples of the available studies and program performance measures that attempt to measure recidivism in a civil context are summarized in Appendix III. None represents a potential formulation for a recidivism measure that OECA believes it could adopt directly for all, or even specific subsets of, EPA's civil enforcement program. Rather, were OECA to revisit the use of a civil program recidivism measure, it would need to carefully consider and address the critical definitional issues discussed below to craft a priority or program-specific recidivism measure suitable specifically for EPA's civil enforcement program.

While a definition for criminal recidivism is quoted above, there is no universal definition of a recidivism rate measure.[24] All recidivism rate measures necessarily express subjectivity in three key areas as discussed in the remainder of this section: -1- the identification of the universe of individuals or companies to which the measure is to be applied, i.e. potential recidivists (subsection B); -2- the specification of the observation period of the measure (subsection C); and -3- the definition of what specifically constitutes an act of recidivism (subsection D). In addition, limitations in the ability of the enforcement agency to detect violations will necessarily impact the usefulness of even well-designed recidivism measures (subsection E).

B. Defining the Universe Subject to the Recidivism Measure

Recidivism rates are generally presented relative to a specific universe of past violators. This subsection considers three definitional choices which must be made with respect to the universe of entities subject to an OECA civil enforcement recidivism rate measure: -1- the degree to which the universe is aggregated or disaggregated, -2- whether the universe is defined on a facility or company basis, and -3- whether the universe includes all facilities which came out of violation (for EPA's civil enforcement programs, this is presumed to mean Significant Noncompliance or SNC) –or– only those which received an enforcement response and/or a civil judgment or settlement.[25]

Universe Aggregation

An initial consideration in defining any recidivism rate measure is the extent to which the universe should be aggregated or disaggregated across different subsets of violators. For

[23] Of course, a particularly egregious violation might be "detected" and reported to EPA or a state environmental agency by nearby residents or by a whistleblower at the facility, etc. Such a tip would generally result in an inspection. In recent years, EPA has increased the accessibility of its tips and complaints reporting process (*See* http://www.epa.gov/compliance/complaints/index.html); however violation detections of this type remain the exception rather than the rule.

[24] A thorough discussion of some of the differences between definitions of recidivism used in a criminology context, and the difficulties these cause when researchers attempt to draw conclusions from meta-studies is presented in Maltz, Michael D. ([1984] 2001, pp. 54-67), footnote (f.n.) 15 above.

[25] Additionally, temporal cohorts must be designated. As the measure is being considered for a performance management measure, it seems sensible to retain the discontinued measure's use of annual cohorts based on facilities which exit SNC during a given FY.

example, the universe could be divided by types of companies or facilities (e.g., differentiated by size or industrial sector); by types of violations (e.g. the violated statute); by geographic regions; and so on. A separate recidivism rate could then be calculated for each sub-universe. OECA adopted this type of approach, in the case of the discontinued recidivism measure, by disaggregating facilities by media and calculating three separate, statute/media-specific recidivism rates.

Selecting a more aggregated universe, in general, reduces the magnitude of the effects of random fluctuations on the recidivism rate measure.[26] On the other hand, this could reduce the usefulness of the measure by blurring the effects of potential explanatory variables.[27] For this reason, aggregation decisions are among the most significant definitional decisions that must be made in constructing a recidivism rate measure.

Facilities v. Companies

To date, for measurement purposes, OECA has focused on facilities for purposes of recidivism measurement. However, it is possible to define the universe instead in terms of companies.[28] Arguments for doing so include that enforcement actions, though generally initiated for site-specific violations, are taken against defendants and respondents who are named as firms or individuals. In addition, settlements may include multi-facility injunctive relief. However, in practice it can be challenging to determine or even define facility ownership, with efforts to do so introducing additional complexity/subjectivity into the analysis.

Perhaps the strongest argument for assessing recidivism at the company level is that, to maximize the deterrent impact of enforcement, an enforcement action against any facility owned by a multi-facility company is most effective when it evokes a corporate-wide response to ascertain, communicate, and address the root cause(s) of the violations. As a practical matter, however, corporations are organized and managed with varying degrees of centralization and decentralization. Multiple facilities of heavily decentralized companies, while parts of the same regulated entity from an ownership perspective, can function more as different entities from a deterrence perspective. In addition, companies vary significantly in the number of facilities they operate. Companies with many facilities would be expected to be considerably more likely to trigger recidivism determinations than companies with few or one facility if only because they have more overall opportunities to violate.

Moreover, EPA's compliance databases do not currently track the corporate ownership structures of regulated facilities with any degree of precision, meaning that calculating firm-based recidivism rates would be difficult or impossible without a major supplementary data-

[26] *See* subsection III.B below.

[27] E.g., if recidivism were to increase at water facilities and contemporaneously decrease at air facilities, an aggregate measure would fail to capture this, showing a steady overall trend. The same might be true across a wide variety of explanatory variables.

[28] It is worth noting too that "regulated entities" extend far beyond the large companies and environmental facilities being considered here. Anyone, for example, who applies a commercial pesticide or owns an apartment building that may contain lead paint is subject to EPA regulations. It is not envisioned that the recidivism measures being considered here would extend to such individuals. OECA's Agriculture Division, however, is in the process of implementing a recidivism measure for its pesticide enforcement program; *see* appendix III for details.

gathering effort. These factors argue against defining potential recidivists as companies for program measurement purposes.

Tying the Measure to OECA Enforcement Actions

Another decision which must be made with respect to the universe of potential recidivists is whether to include all entities which come out of SNC for any reason, as the discontinued measure does, or to limit the universe to those entities which received an OECA enforcement action or even only those which received a civil judgment or settlement. The latter formulation might be seen as a more natural application of the concepts of criminal recidivism, as criminal recidivism measures generally do not include individuals whose initial offense did not result in their serving jail time because they were not prosecuted or convicted or given some lesser sentence. It would also tie the measure more closely to the specific deterrent effect of the civil enforcement program as one could more reasonably reach inferences about the efficacy of EPA's interventions through such a formulation.

A preliminary review of EPA's data systems suggests that calculating a recidivism measure limited to the universe facilities which were the target of an OECA enforcement action during a specified time period would not be prohibitively difficult. There are disadvantages, however, to restricting the recidivism universe in this way. As discussed in subsection D below, this complicates the decision of when to begin the observation period for the measure. Also, as discussed in subsection III.C, such a formulation introduces additional confounding factors to the measure because OECA changes how it targets its enforcement actions from year to year. Thus, for example, if OECA were to target a particularly recalcitrant group of facilities for enforcement in a given year, recidivism rates might be seen to increase even though the underlying propensity of all facilities to recidivate was unchanged.

C. Defining the Observation Period for the Recidivism Measure

Two definitional decisions must be made with respect to the observation period: 1) the length of the period; and 2) when it begins.

Length of Observation Period

A recidivism rate, by definition, requires a specified observation period whose length is necessarily somewhat arbitrary. A relatively long observation period arguably better measures whether changes in attitude and behavior induced by enforcement responses are long-term and systemic.[29] In addition, generally speaking, the longer the time period, the more total opportunities an individual, facility, or company will have to recidivate. These results may be more or less desirable depending on the goals and uses for the measure. A longer observation period has the downside of being more lagged, i.e., one must wait more years for the data to become available.

[29] Some compliance research literature suggests that the deterrent impact of inspections and enforcement actions wanes intrinsically over time. *See*, e.g., Shimshack, J. P. & Ward, W. B. (2005). "Regulator Reputation, Enforcement, and Environmental Compliance" in *Journal of Environmental Economics and Management* Vol. 50: pp. 519-540. Available at: http://www.tufts.edu/~jshims01/Regulator_Reputation.pdf. In this empirical analysis of compliance at 217 major pulp and paper mills from 1988-1996, results show a strong general deterrent impact from penalty actions on the order of a 64% reduction in the statewide violation rate in year one from a new, marginal fine, dropping to a 30% reduction in year two.

Start of Observation Period

In addition to choosing the observation period's length, the recidivism measure must specify when the observation period begins. This can significantly impact the rates the measure produces. In the criminal context, for example, upon release from prison, former inmates are sometimes placed into parole programs or halfway houses where their behavior is carefully monitored and opportunities for recidivism reduced. It is not always clear, in such cases, when to begin the fixed-length observation period.

In OECA's case, if the measure applies to all facilities which come out of SNC for any reason as the discontinued measure does, the start of the observation period is seemingly well-defined as the specific date on which compliance resumed. If the measure is tied to enforcement actions[30] it would seem logical to begin the observation period upon the violator returning to compliance following its enforcement action but this is not always as straightforward as it seems. In some cases, facilities return to compliance before the conclusion of their enforcement actions or even before they are commenced.

Where a facility is in compliance at the termination date of an enforcement action[31], it seems sensible to commence the observation period the month following the termination of the case. Where the facility remains in SNC through the termination of the enforcement case, however, there are new complications. Environmental enforcement actions result in legally binding settlement agreements or judicial decisions. Where a facility has not already returned to compliance, the settlement agreements or court order will typically specify actions the violators must take to return their facilities to compliance and/or to remediate the impact of their violations. Thus, for defendants and respondents in all media, there may be significant time periods following the conclusion of their enforcement responses during which the facilities remain in technical noncompliance although operating pursuant to legally-approved compliance schedules. In all such cases, it seems straightforward to begin the observation period during the first full month of compliance with the applicable compliance schedules.

D. Defining the Acts or Omissions by the Potential Recidivist That Constitute Recidivism

Three decisions must be made with respect to defining the acts or omissions by a potential recidivist that would constitute recidivism: -1- the severity of the subsequent violation, -2- how similar the subsequent violation must be to the original one, and -3- the required level of proof that a subsequent violation has occurred. For practical purposes, with respect to an OECA recidivism rate measure, it is both practical and reasonable to set the required severity at the level of SNC which will remain the working presumption through this subsection.

Severity and Similarity to the Original Offence

Two important recidivism rate considerations are how severe and similar the repeat violation must be to the initial offense for the violator to be deemed a recidivist. In the criminal

[30] *See* subsection B above

[31] Defining the "termination date" of an enforcement action is also not entirely straightforward; however standard operation definitions exist and are used in other OECA performance measures.

context, researchers differ in whether they count criminal acts unrelated to the initial offenses as recidivism. In large part, their decision depends on the purpose of the particular study. For example, if the purpose of a study is to analyze the effectiveness of a treatment program for sex offenders, an offender who is released and later commits a burglary might not be counted as a recidivist because the second crime was not sexual in nature. If, on the other hand, the study is focused on violent crime, a rapist who is released and later commits an assault would likely be deemed a recidivist, while one who commits tax fraud would not.

An obvious initial consideration in the case of an OECA measure is media/statute.[32] It is not self-evident that a repeat violation in a different medium should be measured as recidivism. Whether a potential recidivist (facility or company) that originally violated the CWA by exceeding a discharge limit should be deemed a recidivist for later violating the CAA by exceeding an emission limit is a definitional issue with policy implications. Even within media, a decision is required as to how closely related the violations need be to defined as recidivism, e.g. whether a facility that originally violated the CAA by exceeding an emission limit, returns to compliance, and later fails to submit a required CAA report should be measured as a recidivist.

An argument can be made to limit recidivism determinations to violations of the same or similar regulatory provisions or that share a common root cause. In those situations, the strongest possible expectation exists that the violator's remedial actions for the initial offense should have been sufficient to prevent the second violation.[33] This formulation would be difficult-to-impossible to calculate using EPA's current compliance data systems as there are no "root cause of violation" data elements. Statute/media distinctions are feasible under the three primary environmental statutes, the CAA, CWA, and RCRA. Violations could be further narrowed to a certain extent, within media, by section of the law violated. Such an approach would not, however, guarantee the selection of violations by shared common root causes. In the alternative, it can be argued that recidivism determinations should not necessarily be limited to similar violations on the ground that facilities should react to any noncompliance by instituting management reviews and improvements to reduce the potential for any future violation(s).

Level of Proof

In the criminal context, researchers differ significantly in how they define the level of proof required to show that a potential recidivist has recidivated. Some consider rearrest a sufficient condition. Others, following the presumption of innocence in our criminal justice system, require reconviction or reincarceration.

In developing a potential EPA recidivism measure, OECA would be required to address similar considerations. Civil law analogies to criminal rearrest range from a SNC determination made on the basis of self-reported data or an environmental inspection by EPA, state, or tribal

[32] E.g. water/CWA, air/CAA, solid waste/RCRA.

[33] EPA conducts a similar analysis, under Condition 7 of EPA's Audit Policy, under which facilities self-report violations in exchange for a reduced penalty, to determine whether a subsequent disclosure of a new violation by the same facility should be disqualified for Audit Policy treatment. Condition 7 disqualifies only repeat violations that are "the same or closely related" to the prior violation or part of a "pattern at multiple facilities owned or operated by the same entity" within the past 3 and 5 years, respectively. In crafting the condition, EPA rejected defining repeat violations more broadly, e.g., all violations within the same media or rule or all SNCs. EPA's Audit Policy is available at http://www.epa.gov/compliance/incentives/auditing/auditpolicy.html.

inspectors, to the filing of the civil or administrative complaint alleging the violations. Civil law analogies to reconviction or reincarceration include the final resolution of an enforcement response, whether by decision or by settlement agreement, culminating in a determination of liability.[34]

In practice, how the acts or omissions necessary for recidivism are defined can result in significantly different recidivism measures and rates. For example, the discontinued recidivism rate measure takes as its universe all facilities which enter and exit SNC for any reason. Arguably, a more natural application of the concepts of criminal recidivism would be to consider only those facilities which were subject to an EPA enforcement action as, in the case of EPA's civil enforcement program, findings of SNC do not necessarily result in formal enforcement responses, judgments, or settlements. Examples may include when a subsequent review determines that an initial finding of a violation was incorrect or where a facility quickly returns to full compliance. In such instances, generating formal enforcement responses may not be an appropriate or efficient use of limited compliance assurance resources.

For violations that do result in formal enforcement, a significant time period may elapse between the finding of noncompliance, the filing of a civil or administrative complaint, and the ultimate disposition of the enforcement action through settlement or decision. In general, the more stringent the requirement for a finding of recidivism in terms of the formality and conclusiveness of the Agency noncompliance determination and response, the longer the observation period of the recidivism rate measure will need to be to "catch" the instances of recidivism (i.e. the more lagged the measure will be). For these reasons, were OECA to develop a new civil enforcement national program recidivism measure, as a practical matter, the relevant acts or omissions would most likely need to continue to be defined as SNC determinations, not initiated or concluded formal enforcement actions.

E. Effects of the Limited Ability of Enforcement Agencies to Detect Noncompliance

In the criminal justice context, many if not most crimes ultimately go undetected, and still more go unpunished. For the purposes of calculating recidivism rates, as discussed in subsection D above, this is handled by setting a threshold of proof required for a potential recidivist to be labeled a recidivist, such as rearrest or reconviction. Formally then, recidivism rates are not statistically biased but represent a true value of the percentage *of potential recidivists* who are caught recidivating. The implications, however, include that recidivism rates are affected very significantly by the ability of enforcement agencies to detect crimes, and are not statistically valid measures of the true rate at which violations recur among past violators.

If some types of crimes are harder to detect or harder to prosecute than others, recidivism rates will be artificially lower among criminals who commit these types of crimes relative to others. If the enforcement agency were to shift enforcement resources, or monitoring resources, recidivism rates might appear to go up or down even if repeat criminal behavior were unaffected

[34] While defendants/respondents are not normally required to admit or deny the factual allegations in their complaints, as a condition of settlement, they are required to admit the facts stipulated in the settlement agreement and consent to the assessment of the stated civil penalty. *See, e.g.*, 40 CFR Section 22.19(b)(4).

or indeed went in the opposite direction.[35] These critical considerations for recidivism measure development are discussed further in subsections II.E and III.B and C, below.

The same considerations would impact a potential OECA civil recidivism rate measure. Environmental violations are typically detected in one of two ways: either through self-reporting, e.g., self-reporting of CWA discharge data, or through inspection by EPA, state, or tribal environmental inspectors. In the absence of data from one of these two sources, or in the case of accidentally or intentionally misleading data, incidents of SNC will generally go undetected. The media programs differ significantly in the degree to which they rely on self-reported data to detect instances of SNC. The CWA program makes the most extensive use of self-reported data due to statutory large discharger reporting requirements. In the RCRA program, by contrast, self-reporting is generally not required, meaning that the majority of RCRA violations are detected through inspections. These media-specific factors greatly influence facilities' odds of being found to be recidivist.

To avoid underestimating recidivism rates as a result of the variability of reliable self-reported data from facilities regulated primarily under different media, in developing the discontinued recidivism measure, OECA eliminated from its media-specific universes apparently non-recidivist RCRA and CAA facilities if they did not receive at least one inspection during the observation period. This correction was intended to at least partially address the reporting differences between CWA, versus CAA and RCRA, regulated facilities.

Clearly, however, this is only a partial solution. Left unaddressed – because OECA lacked a fair and effective means of doing so – was the potential impact on the recidivism rates of *when* facilities are inspected relative to their observation period and one another. In particular, one would expect to observe a higher probability of detection for recidivism on the part of facilities inspected later in their observation periods. By contrast, facilities inspected earlier in their observations periods have a longer period of time during which to revert to noncompliance with the change in status potentially being missed for recidivism measurement purposes because they postdated the inspections. Inspections at any time, however, may miss acts of recidivism which take place earlier or later during the observation period but are not ongoing at the time of the inspection.

F. Survey-Based Recidivism Rate Measures

One novel method of measuring recidivism in a civil context, which would be largely nonsensical in a criminal context, is to measure the compliance status of a randomly selected set of entities from the universe of potential recidivists at some time during or at the end of the observation period.[36] This method would alleviate some of the uncertainties caused by data limitations but would involve all the same definitional choices discussed in subsections B-E.

[35] Note the paradox: devoting more resources to enforcement might lower repeat criminal behavior but raise recidivism rates because more crimes get detected. Moreover, this further limits the comparability of recidivism rates between different jurisdictions, even if the rates are defined identically. That is, a particular jurisdiction may have higher recidivism rates than another because it is more effective at detecting crime rather than because it is less effective at deterring them.

[36] We are aware of only one existing recidivism rate measure that uses this methodology, that used by DOL's WHD. This measure inspects entities randomly at any point during a five-year observation period. *See* appendix III.C.

Additionally, inspections would likely still miss instances of noncompliance during the observation period which were not ongoing at the time of the inspection.

This method is also subject to statistical uncertainties dependent on the size of the sample. A larger sample size would reduce these uncertainties; however this would also require more resources be devoted to the data gathering effort rather than being targeted for maximum detection and deterrence of noncompliance. In general, such a measure would be extremely resource intensive and would raise essentially the same issues as efforts to expand the use of statistically valid noncompliance rates.

SECTION III. RECIDIVISM RATES AS A POTENTIAL PERFORMANCE MEASURE

A. General Considerations for a Potential OECA Recidivism Performance Measure

The principal value of any potential national civil enforcement program recidivism measure to OECA would, presumably, be to assist OECA in assessing the national program's deterrent impact, especially specific deterrence. The most important use for a performance measure, however, is as a management tool to identify and correct performance problems and increase program effectiveness in order to improve protection of human health and the environment (s*ee* Section I.C). It is therefore incumbent upon OECA, before developing and implementing a national recidivism rate performance measure for the civil enforcement program, to identify clearly why such a measure would be worthwhile and how it would be used to manage the enforcement and compliance assurance program to improve program performance.

Subsection B presents an analytical, but nonmathematical model of recidivism rates to frame the discussion of this section. Subsection C discusses some of the potential deficiencies of a possible OECA national civil enforcement recidivism rate measure. Subsection D discusses potential alternative measures of chronic noncompliance other than recidivism rates. Subsection E discusses other potential uses for measuring recidivism and/or chronic noncompliance besides as a national performance measure.

B. A Model of Recidivism Rates

As discussed in section II.A above, recidivism is a real phenomenon that may be measured using recidivism rates or otherwise. Recidivism rates are considered census measures (with the exception of the measures discussed in section II.F above) of the percentage of all entities, within a defined universe, that get caught committing a defined act of recidivism during a defined observation period.

It is not possible to generalize observed recidivism rates among facilities which were inspected to those which were not inspected, or to predict how recidivism rates would be affected if the method of targeting inspections were to change. Necessarily, some entities will be missed committing acts which, if they were caught doing so, would constitute recidivism. By the same token, some entities will be excluded from the universe of potential recidivists because their initial violations go undetected. The impact of these factors and considerations is that recidivism

rates are generally not a statistically valid measure of repeat violative behavior on the part of the entire regulated community.

Any given entity in the universe of potential recidivists either recidivates or it does not. Whether or not it does so is, from the perspective of law enforcement,[37] stochastic. Many factors common to all entities influence the probability that a given entity will recidivate. These include variables of interest such as the strength of the specific deterrent effect of the civil enforcement program; as well as confounding factors such as economic conditions, production processes, environmental regulations, the strength of state environmental enforcement programs, the ability of the enforcement agency to detect violations, and other factors.[38] In addition, entities differ between one another in ways that are known to law enforcement, including by media, sector size, and geographic location. These factors, which also affect the probability that they may recidivate, may interact with the previously discussed factors.

In general, little is assumed about how the above factors affect the probability that a given entity recidivates except that the key variables of interest, i.e., the specific deterrent effect of the civil enforcement program, will affect the measure in the appropriate way, i.e., the stronger the deterrent impact, the less likely a given entity is to recidivate. Thus, all else being equal, lower recidivism rates can be taken as an indication of a stronger specific deterrent effect; however, the relationship between the two is not straightforward. For example, if recidivism rates were to decrease by 5%, even if all other potential causes were perfectly accounted for, this would not imply that the specific deterrent effect of the civil enforcement had increased by 5%, but merely that it had increased.

There are three primary reasons why changes in recidivism rates might fail to correspond with changes in the variable of interest: -1- because of random fluctuations, -2- because of the effect of changes in confounding factors, and -3- because the makeup of the universe of potential recidivists changes.

The measure is affected by random fluctuations because each entity's recidivism status is ultimately stochastic. By the Law of Large Numbers, however, as the number of facilities in the universe increases, the relative magnitude of these fluctuations decreases. Given universe sizes for the discontinued measure of approximately 250-750 facilities for each of the three media, these fluctuations can be expected to be small. However, were this universe to be restricted further, either by limiting the overall size of the universe of facilities or by subdividing the universe into a greater number of separate recidivism rates, the magnitude of the random variation would be relatively greater.

The magnitude of the effects of confounding variables and of changes in the makeup of the recidivism universe relative to the magnitude of the effects of the variable(s) of interest might be large or small depending on the specifics of the situation. By using statistical techniques to

[37] I.e. as opposed to from the perspective of the entity itself, which may decide with certainty whether to recidivate or not.

[38] Formally, there are complications here caused by the targeted nature of inspections. In particular, entities with a higher probability of recidivating may also have a higher probability of being inspected even controlling for their observed characteristics. This leads to a simultaneity problem which is beyond the scope of this report to address.

control for changes in confounders and in the makeup of the recidivism universe, it might be possible to reduce the impact of these factors.[39] These effects almost certainly could not be eliminated, though, and addressing them would be time and resource-consuming to OECA and likely require the regular use of outside experts and contractors. The use of advanced statistical techniques might also increase the complexity of interpreting the measure.

C. Possible Deficiencies of a Civil Enforcement Recidivism Rate Performance Measure

Possible deficiencies of a civil enforcement recidivism rate performance measure fall into two broad categories: First, for a variety of reasons, recidivism rate measures may not closely track what they are intended to measure, i.e., the deterrent (particularly specific deterrent) impact of OECA's civil enforcement program. In other words, OECA may not be able to reduce measured recidivism rates because the measure reflects factors beyond OECA's control to too great an extent. Second, adopting such a measure as a performance measure might lead to unintended, undesirable results. In other words, OECA might indeed be able to reduce recidivism rates but its means of doing so – and/or the resulting human health and environmental outcomes of its doing so – might be undesirable or inefficient, as discussed further below.[40]

Subsection B, above, presents a framework to explain why a recidivism rate measure might fail to track closely what it is intended to measure. However, whether a measure is in fact deficient in this regard is largely an empirical question. OECA's experience with the discontinued recidivism rate measure indicates that this is a significant concern. *See*, e.g., the historical recidivism rate data presented in appendix II. The rates do show some variability from year to year but it is difficult to identify specific trends and even more difficult to attribute those trends to specific causal factors.

In discussions with OECA staff and management for the purposes of preparing this report, the impact on the usefulness of a recidivism measure of external confounders was the most frequently cited basis of concern with developing a national recidivism rate measure for civil enforcement program management. There are good reasons, both theoretical and practical, to suppose that a recidivism rate measure for OECA's civil enforcement program would be strongly influenced by confounders and changes in the universe of potential recidivists. Most environmental inspections and enforcement is undertaken by state environmental agencies with federal inspections and enforcement responses targeted disproportionately on national priority areas, larger facilities with more significant compliance obligations, and violation scenarios requiring particularly complex injunctive relief to return the violators to compliance and keep them there.

For these reasons, were the universe of potential recidivists limited to past OECA enforcement targets, this universe would be particularly variable from year to year. This would

[39] We are envisioning here a binomial (logit or probit) regression of facilities' recidivism status on a variety of explanatory variables, both those specific to individual facilities as well as those which are common to all facilities, Once these factors were controlled for, changes in recidivism propensity from year to year (accounted for using annual dummy variables) would be attributed to changes in the success of OECA's civil enforcement program.

[40] While these two deficiencies are presented in opposition, they are not mutually incompatible. That is, a recidivism rate measure might be largely reflective of factors outside OECA's control, but also affected by some factors within OECA's control.

likely have significant, possibly perverse effects on recidivism rate measures.[41] On the other hand, were the universe not restricted in this way, then the impact of the civil enforcement program's deterrent effect would likely be small relative to the impact of state enforcement and other factors. While OECA does review and oversee the implementation of state enforcement programs, a recidivism rate measure of this type does not seem like a particularly good means of assessing the overall performance of state environmental enforcement programs.

The above notwithstanding, OECA staff and managers may in fact be able to – or believe they will be able to – reduce measured recidivism rates through some application of program tools.[42] It is not at all clear that such a strategy is desirable from a program management perspective. In general, devoting resources to lowering recidivism rates would come at the expense of being able to apply those same resources to OECA's other enforcement and compliance assurance program goals that are discussed in subsection I.D, above. These include, most notably, maximizing benefits to human health and the environment by targeting enforcement based primarily based on risk and the potential to reduce pollution rather than to reduce recidivism, per se.

While the empirical literature on environmental recidivism is limited, the deterrence measurement researcher engaged by OECA as part of the Deterrence and Compliance Assistance Outcomes Measurement Project to develop a state-of-the-science white paper on deterrence measurement, Professor Jay Shimshack of Tufts University, identified some relevant theoretical literature on recidivism. This literature was deemed to suggest a cautious approach to focusing deterrence efforts specifically on recidivism. Noting the importance to such a strategy, from an economist's perspective, of the assumption is that it is socially optimal to deter violations by recidivist facilities, the researcher found:

> "It is possible that large numbers of repeat violations may signal extremely high costs of compliance (due, for example, to plant vintage or industrial subcategory) at the relapsing facility. In some cases, this facility may actually be expending greater costs to reduce marginal units of pollution than society is receiving in benefits from these marginal reductions. Further, given limited agency enforcement budgets, significantly greater abatement and environmental benefits may be achieved by targeting resources towards violators with smaller marginal abatement costs and greater ability to comply. In short, while it is likely that increasing sanctions for repeat offenders is an optimal policy for many recidivists, this strategy may not achieve the greatest social and environmental benefits when applied to facilities with numerous repeat offenses driven by extreme

[41] Consider, for example, the case of Simpson's Paradox. Assume that OECA enforces against two types of violators in equal numbers, accidental violators and recalcitrant violators, and that the baseline recidivism rates for these two types of violators are 10% and 90% respectively. The overall baseline recidivism rate is thus 50%. Next consider that OECA moves to a new enforcement strategy such that 80% of its enforcement targets are now recalcitrant violators and only 20% accidental violators. Assume further that this strategy is a resounding success, lowering recidivism rates among recalcitrant violators from 90 to 70% and among accidental violators from 10 to 5%. Despite the fact that recidivism has been reduced in both groups, the overall recidivism rate increased from 50% to .8*70%+.2*5% = 57%.

[42] E.g. by tracking more closely facilities which have been the target of enforcement actions in the past or which have recently come out of noncompliance, possibly small or other facilities where the environmental benefits might be expected to be lower, but the potential to prevent recidivism might be expected to be higher.

abatement costs." … Targeting these facilities for stringent sanctions may be socially wasteful and may achieve significantly less environmental benefits than an equivalent resource allocation towards facilities that are able to reduce emissions more cost effectively."[43]

Finally, because OECA's actions affect recidivism rates in a variety of ways, there are other, more pernicious ways in which OECA staff and managers might conceivably influence recidivism rates, including, for example, by targeting inspections on facilities deemed less likely to be recidivists or by inflating the universe of potential recidivists with entities whose violations can be easily corrected.[44] While OECA would never formally sanction these approaches, they are actions which could be carried out at low levels by individual employees and could be difficult to detect.

D. Other Potential Measures of Chronic Noncompliance

A significant drawback to all measures of recidivism, including recidivism rate measures and measures based on survival/failure analysis, is that they ignore information on non-complying facilities that, for one reason or another, are never targeted for enforcement and/or never come out of noncompliance. With this consideration in mind, an alternative to measuring recidivism could be to measure chronic noncompliance. A potentially useful formulation of a chronic noncompliance measure could be the average or median length of time facilities spend in noncompliance.

Recidivism measures and measures of chronic noncompliance are conceptually related in that both focus management attention on violators who are demonstrably ineffective at correcting their violations over long periods of time. Measures of chronic noncompliance, however – in contrast to the discontinued recidivism measure – can be developed to directly reference and incorporate timely and appropriate enforcement criteria in OECA's Enforcement Response Policies (ERPs) and related policy and guidances.[45] As such, they more directly lend themselves to use by OECA to promote and ensure timely and appropriate enforcement responses, consistent with existing program enforcement guidelines.[46]

A chronic noncompliance measure, defined as the average length of time facilities spend in noncompliance, broken down by the three main media programs, is already routinely calculated and reported by OECA, along with the discontinued recidivism measure, in the National Enforcement Trends report.[47] However, just as recidivism rate measures overlook facilities which remain in chronic noncompliance, this measure is thwarted by chronic

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[43] Shimshack, J.; *Monitoring, Enforcement, & Environmental Compliance: Understanding Specific & General Deterrence State-of-Science White Paper* (October 2007) at 13-14. http://www.epa.gov/compliance/resources/reports/compliance/research/meec-whitepaper.pdf

[44] If the universe were defined as those facilities which were the target of enforcement actions, this might be done by selecting cases with a low probability of recidivating in the first place. If it were defined as all facilities which exit SNC, this might be done by targeting inspections to find more easily corrected violations.

[45] *See* subsection IV.D below for a discussion of how these policies incorporate recidivism as a factor for prioritizing enforcement responses.

[46] *See* subsection I.D above.

[47] *See* f.n. 4 above.

recidivists, i.e. facilities which flip quickly in and out of compliance. Such facilities have a low average SNC duration, but are essentially chronic noncompliers. Moreover, this measure, like the discontinued recidivism rate measure, does not distinguish between facilities that have received formal enforcement response actions and those that have not, nor does it distinguish between facilities on the basis of whether or not they are complying with court-ordered compliance schedules.

An alternative formulation of a chronic noncompliance measure could be to establish a list of priority facilities in each medium based on a variety of factors related to their history of noncompliance. The measure might then be simply the percentage of all facilities which are on that list. In fact, such a list already exists: the Facilities Watch List Management Tool (Watch List) discussed further below in subsection IV.D. While developing a measure based on the Watch List would have the advantage of tying into existing management practices and could be relatively easy to calculate because it draws on existing selection criteria, there are drawbacks and difficulties with such a measure. These are discussed in subsection IV.D, below.

E. Other Uses for Recidivism and Chronic Noncompliance Measures

A potential alternative purpose for measuring recidivism, in addition to assessing the performance of the civil enforcement program, is to better understand the regulated universe and the specific deterrent impacts of carefully-tailored subsets of enforcement and other compliance assurance strategies. Better understanding patterns of recidivism as well as chronic noncompliance could help OECA improve its understanding of the degree to which environmental violations of significant concern are predominantly occurring at particularly recalcitrant facilities or dispersed more generally among a wider universe of facilities. This could have ramifications for the targeting of enforcement, compliance monitoring, and compliance assistance. Tailored efforts to assess recidivism and compliance behavior by specific subsets of regulated entities, such as on a sector-wide or limited geographic basis, could also prove valuable in evaluating specific programs and initiatives.

The recidivism measures that would be most useful for these types of limited inquiry appear qualitatively dissimilar from the types of national program measures being considered in this report. Initial review suggests survival/failure analysis, discussed in subsection II.A, above, could be a more worthwhile tool for investigating recidivism for purposes of better understanding the regulated universe than a simple recidivism rate.[48] Survival/failure analysis, however, is a far more complex undertaking than calculating a recidivism rate measure and would likely require specialized outside expertise to accomplish.

Another option could be to conduct a case study-based recidivism analysis that could include process tracking characterized by an intensive, detailed focus on a small number of cases

[48] It is possible that survival/failure analysis, which emphasizes the length of time it takes an entity to recidivate, might not be appropriate in a civil recidivism context, because there is more uncertainty as to this value (because recidivism is often not detected until an inspection is conducted making it hard to determine when the violation actually began). Fully addressing this concern is beyond the scope of this report and would require outside statistical expertise.

to delineate the causal pathways to recidivist behavior and outcomes.[49] Unlike a survival/failure analysis approach, this type of study would not have the potential to yield statistically generalizable results. It could, however, produce detailed information about the underlying causes of recidivism at specific facilities that could prove useful in making policy decisions intended to reduce recidivism.

SECTION IV. OTHER PROGRAMMATIC USES OF RECIDIVISM CONCEPTS

A. Introduction to Program Applications for Recidivism Concepts

Neither Congress, in drafting the statutes EPA is tasked with implementing and enforcing, nor EPA, in conducting its strategic planning, targeting, enforcement, and penalty guidance, focus expressly on reducing recidivism as a key program element or goal. Rather, Congress and EPA reference broader, more inclusive concepts such as "patterns of noncompliance" and "history of noncompliance" to address the set of deterrence-related issues within which the potential for recidivism is a subset.

Consistent with its statutory authorities, in pursuing its strategic goals, EPA routinely considers patterns, instances, and history of noncompliance, including a history of recidivism, in media, sector, and facility-level contexts. These factors are used both to identify national strategic compliance and enforcement priorities and to select timely and appropriate corporate and facility-specific inspection targets, enforcement responses, and civil penalties. In many cases, examples of which are provided below, these processes include the express or implicit consideration of recidivism-related concepts as one among multiple relevant considerations. Thus, although OECA is not, in this report, recommending restoring the discontinued national civil enforcement program recidivism rate measure or developing a new national measure, in practice, OECA takes the potential for recidivism into account, in its civil enforcement program, on both the macro (national strategy) and micro (targeting and prosecuting or settling compliance monitoring and/or civil enforcement actions) levels.

The remainder of this section explains how OECA, in practice, applies recidivism concepts in the context of EPA's enforcement and compliance assurance strategies, goals, responses, and tools. Subsection B discusses how history of noncompliance is taken into account in the selection of national strategic compliance and enforcement priorities. Subsection C discusses how history of noncompliance is taken into account in targeting facilities for inspections, investigations, and evaluations. Subsection D discusses how history of noncompliance is taken into account in prioritizing instances of noncompliance for enforcement action, including through the use of the Watch List. Subsection E discusses how history of noncompliance is taken into account in the selection of appropriate penalties for environmental violations. Subsection F discusses how history of noncompliance is taken into account in the selection of appropriate injunctive relief. Subsection G discusses a research project, co-sponsored by OECA and EPA's Office of Research and Development (ORD), to better measure the civil enforcement program's deterrent impacts, both general and specific.

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[49] *See*, e.g., Hall, D.; *Overview of Research Methodologies for Environmental Compliance and Enforcement*; INECE (2005). http://www.inece.org/ucsb/MemoMethodolgies_final.pdf

B. Strategic Targeting and National Priorities Selection

OECA uses a strategic targeting process to identify a limited number of national strategic compliance and enforcement priorities which focus on significant environmental risks and noncompliance patterns.[50] The three evaluation criteria used in selecting the priorities are:

> *Significant Environmental Benefit*: Can significant environmental benefits be gained, or risks to human health or the environment be reduced through focused EPA action directed at specific regulated entities, geographic areas, industrial or governmental sectors, or environmental program areas?
>
> *Pattern of Noncompliance*: Are there identifiable and important patterns of noncompliance among specific regulated entities, industrial or governmental sectors, in geographic areas, or within environmental statutes or programs?
>
> *Appropriate EPA Responsibility*: Are the environmental and human health risks or the patterns of noncompliance sufficient in scope and scale such that EPA is best suited to take action or pursue a collaborative approach in which EPA leverages other resources?

By applying these criteria, OECA selects its multi-year national priorities to address specifically identified environmental problems, risks, or patterns of noncompliance. A performance based strategy is developed for each national priority characterizing the problem and setting goals for addressing it. Under the pattern of noncompliance criterion, OECA can and does consider a wide range of geographic, sector, and facility-specific noncompliance patterns, including recidivism:

- In selecting *RCRA: Mineral Processing* as a national priority, OECA took into account EPA findings that, over the past decade, many mineral processing and mining facilities have contaminated groundwater, surface water and soil either through failure to comply with state or federal environmental requirements or legally permissible waste management practices.

- In selecting the *CWA: Combined Sewer Overflows (CSOs)* national priority, OECA took into account information indicating that a significant number of communities with CSOs have not implemented the so-called "nine minimum controls" (NMC) typically required, by States, of these systems, in permits or compliance orders. OECA also considered statistically valid compliance rate information showing essentially static NMC CSO compliance rates from 2002 to 2004 (45.6% and 47%, respectively).

- In selecting the *CAA: New Source Review/Prevention of Significant Deterioration (NSR/PSD)* priority, EPA took into account evidence showing that industrial facilities substantially increased production across almost all sectors of the economy with a review of state permitting indicating states were issuing very few PSD or NSR permits.

[50] *See* http://epa.gov/compliance/data/planning/priorities/index.html for descriptions of OECA's FY 2008-2010 National Priorities.

- In selecting the *CWA: Sanitary Sewer Overflows (SSOs)* national priority, OECA took into account empirical data indicating that there is a significant non-compliance problem. EPA estimates that, nationally, there may be 25,000 to 89,000 SSOs each year discharging anywhere from 3 to 10.6 billion gallons of SSO discharges.

- In selecting the *CWA: Concentrated Animal Feeding Operations (CAFOs)* national priority, OECA took into account inadequate manure management and the resulting risks, a pattern of noncompliance in the industry, and the need for EPA leadership in implementing the federal CAFO regulations.

- In selecting the *CAA: Air Toxics* national priority, OECA took into account noncompliance concerns in the areas of leak detection and repair (LDAR), industrial flares, and surface coating. For example, LDAR was selected initially as a national initiative due to widespread noncompliance and the potential for significant emission reductions when facilities are brought into compliance.

- In selecting the *Financial Responsibility* national priority, OECA took into account recent Office of Inspector General (IG) and Government Accountability Office (GAO) compliance issues and findings with the financial responsibility requirements under RCRA closure/post-closure, RCRA corrective action, CERCLA cleanups and SDWA UIC program. OECA also considered ongoing Regional assessments of owner/operators' compliance status that have identified a wide range of violations.

- In selecting the *CWA: Stormwater* national priority, OECA took into account observed levels of observed noncompliance in three main areas of the storm water program: homebuilding construction; big box store construction; and ready mix concrete with crushed stone and sand and gravel operations.

- In selecting the *Indian Country* national priority, OECA took into account EPA monitoring data showing that public drinking water systems in Indian country regularly fail to collect required water samples and submitting required reports and have high levels of reported violation of health-based regulatory standards. In addition, EPA determined that unregulated dumping of wastes is a pervasive problem in Indian country.

- In addition, in selecting the FY 2005-2007 *CAA: Petroleum Refining* national priority (now returned to the core program due to meeting its primary goal of addressing 80% of the national petroleum refining capacity), OECA took into account demonstrated sector-wide unpermitted emissions and multimedia noncompliance.[51]

[51] For additional information on the enforcement and compliance program's national priorities, *see* OECA's National Priorities for Enforcement and Compliance Assurance web site. http://www.epa.gov/compliance/data/planning/priorities/index.html *See also, Fiscal Year (FY) 2008 National Program Managers Guidance* (June 19, 2007). http://epa.gov/compliance/resources/policies/data/planning/npmguidance2008.pdf

In summary, under the *Pattern of Noncompliance* criterion, in defining the noncompliance problems of concern in national priority areas, OECA considers a variety of factors. These include the size of the priority universe, geographic distribution of the problem, existing level of compliance, and environmental justice issues. Recidivism and chronic noncompliance are considered as subsets of the overall level of compliance, along with other relevant factors. This is consistent with OECA's general approach to considering and addressing recidivism, history of noncompliance, and chronic noncompliance, along with all other relevant considerations and objectives, in implementing its enforcement and compliance assurance program.

C. Targeting for Inspections, Evaluations, and Investigations

Targeting is the process of identifying the most significant or egregious environmental problems at which to direct enforcement resources to inspect, evaluate, or investigate noncompliance and ascertain the need for an enforcement response. EPA's Regional offices consider many factors in identifying the facilities they will inspect, evaluate, or investigate each year, including:

(1) *Statutory/Regulatory Requirements*
Several programs have fixed statutory or regulatory minimum inspection or evaluation requirements, e.g., under RCRA, treatment, storage and disposal facilities are required, by the statute, to be inspected every two years.

(2) *Inspection/Evaluation Plans*
Several programs identify their inspection/evaluation plans or strategies through guidance documents, such as the CAA Stationary Source program's Compliance Monitoring Strategy, which outline different types of inspections/evaluations, what inspections/evaluations need to be reported, and how many inspections/evaluations should be conducted.

(3) *State-Regional Worksharing*
The Regions work with their states in developing annual Performance Partnership Agreements (PPAs) that outline how the Region and states will optimize their resources to maximize the coverage and deterrent effect of their inspections, evaluations, and investigations.

(4) *National Priorities*
National priorities are identified in OECA's National Program Managers Guidance through which annual work planning commitments are negotiated and captured in the Agency's Annual Commitment System.

(5) *Regional Initiatives*
In addition to national priorities, each Region usually identifies initiatives for specific regional industry issues or geographical areas along with the number of inspections, evaluations, or investigations that will be conducted.

(6) *Citizen Complaints*
EPA's tips and complaints Website (www.epa.gov/compliance) is an important tool for identifying potential environmental violations. Established in January 2006, EPA's badge icon enables concerned citizens and employees to report potential violations in their communities or workplaces which are then reviewed for potential civil or criminal violations. During FY 2007, EPA received a total of 6,781 tips.

(7) *Referrals from Other Agencies/Organizations*
EPA receives referrals from states, tribes, local environmental agencies, other federal agencies, and other organizations which may result in targeting of an individual facility or a group of facilities for a compliance inspection, evaluation, or investigation.

OECA uses a number of systems and tools to conduct inspection targeting. The Online Tracking Information System, or OTIS,[52] is a set of Web-based analytic tools that are maintained and developed by OECA to enable improved strategic and tactical targeting by OECA, the Regions, and the States. It allows users to analyze information on a single medium or multimedia basis, and to combine pollutant and demographic data with enforcement and compliance data. OECA uses OTIS and other tools, as necessary, to conduct targeting analyses to assist in identifying important problems. Eight examples follow.[53] Such analyses permit the detection and in-depth consideration of a range of patterns of noncompliance to support individual facility targeting as well as national priority selection:

(1) Examination of hazardous air pollutant release data to identify facilities that are above permitting thresholds, but have not applied for the correct permit.

(2) Examination of emissions trends to determine which facilities have had substantial increases without the requisite permit modifications/changes.

(3) Evaluation of violation patterns for critical chemicals (e.g., mercury violations reported under the Clean Water Act).

(4) Comparison of Risk Management Plan submissions (Clean Air Act Section 112) to known permitted facilities to determine whether non-filers exist.

(5) Examination of multiple data sets to identify RCRA non-notifiers.

(6) Analysis of chronic late filers under the EPCRA Section 313) Toxics Release Inventory (TRI) program.

(7) Analysis of location and compliance patterns of combined sewer overflows.

(8) Analysis of facilities that are self-certifying they are in full compliance, but have known violations (e.g., CAA Title V program).

[52] http://epa.gov/idea/otis.
[53] *Targeting for Inspections/Evaluations/Investigations* (Office of Compliance – Enforcement Targeting and Data Division (January 8, 2004).

D. EPA's Enforcement Response Policies and Facility Watch List Management Tool

EPA's national Enforcement Response Policies (ERPs) specify by media (and sometimes by programs within media) the types and characteristics of violations that cause a facility to be labelled in SNC and the response actions required on the part of the lead agency - EPA region, state or tribe, or both jointly - in terms of timely and appropriate enforcement responses.[54] The ERPs' importance to EPA, states, tribes, the regulated community, and the public lies primarily in how they are used to prioritize violators for response based on the seriousness of the violations and their potential health and environmental consequences and duration.

To enhance the enforcement program's ability to identify and track facilities with serious CAA, CWA, and RCRA violations but no apparent formal enforcement responses, OECA developed and implemented in FY2004 the Facility Watch List Management Tool (Watch List).[55] The Watch List uses a formal set of criteria[56] to generate a monthly list, in each of the three principal media programs, of recidivist and chronically noncomplying facilities whose violations have not been formally addressed by either the state or EPA.

In principle, the Watch List concept could be extended to generate a national program performance measure. A natural formulation for this might be the percentage of facilities on the Watch List during a given month or at any time during a given year. An advantage of this measure would be that, because the Watch List is used to manage the civil enforcement program already, use of this outcome measure would be closely tied to program performance.

There are, however, several potential, significant downsides associated with developing a measure which uses the Watch List as a basis for developing a national civil enforcement program measure. First and most importantly, the Watch List is deliberately expressed as such – as opposed to being deemed an "Action" or "Enforcement" List – specifically because its intent is to identify and focus the enforcement programs' attention on the facilities meeting its criteria, not to force specific federal civil enforcement programmatic responses. This important feature is an intrinsic Watch List design and implementation element intended to address many of the same concerns expressed in this paper with potentially managing the national civil enforcement program to reduce recidivism rates at the expense of the more important overriding goals of human and environmental protection and pollution reduction through compliance. For this reason, any national level, recidivism-like measures developed from the Watch List would fail to correlate precisely to recidivism and could potentially promote undesirable national outcomes, e.g., by creating implicit pressures to prioritize reducing the number of Watch List facilities over more important program goals.

[54] The ERPs are available at http://www.epa.gov/compliance/resources/policies/civil/.
[55] Information on the Watch List is available for those with OTIS access at http://63.160.3.204/watchlist/.
[56] These criteria are not public; however more specific information on the Watch List criteria has previously been provided to OMB previously by OECA's Office of Compliance. Generally the criteria differ by media and take into account the pattern of noncompliance at a given facility over the previous several years.

Second, such measures would likely be more difficult to interpret by those unfamiliar with EPA's civil enforcement program than a recidivism measure[57], not only for the above reasons but also because the Watch List criteria and results are not currently available to the public. As such, it would be difficult for the public to make sense of a publicly reported national performance measure derived from it.[58] Finally, the same concerns regarding the impacts of factors such as targeting biases, external confounders, and universe makeup changes that limit one's ability to generate a useful national-level recidivism measure, as discussed above, could presumably limit the generalizability and usefulness of a national-level Watch List measure, as well.

For these reasons, while OECA plans to continue to use the Facilities Watch List Management Tool (Watch List) to identify and prioritize for review and potential enforcement response facilities in chronic noncompliance, developing a national civil enforcement program measure based on it to approximate a recidivism rate is not deemed advisable. However, it could be productive for OECA to further explore and, if appropriate, develop other potential new uses for, and distribution of, the Watch List and possible newly-derived subsets and permutations of it.

If so, these efforts should focus on addressing chronic noncompliance in priority areas in an effective and efficient manner, potentially taking into account, among other factors, overall length of time in noncompliance, seriousness of the violations and their health and environmental consequences, the root causes of noncompliance, potential criminal conduct, marginal costs and benefits to the facility and society from new or additional enforcement against chronic non-compliers, and other specific and general deterrence considerations. Examples of potential new subsets of Watch List data which OECA could consider developing and distributing as a management aid include such clusters as facilities in noncompliance for over a full year or Watch List facilities in specific national priority sectors. OECA could also consider the potential usefulness of developing and implementing a measure of chronic noncompliance, derived from the Watch List, its underlying data, or subsets of both, intended not to serve as a recidivism rate measure per se but for other useful management purposes.[59]

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[57] Although ironically, as discussed in section II above, a large part of the seeming ease of interpreting a recidivism rate measure is actually largely a result of widespread unfamiliarity with the multitude of choices involved in defining a recidivism rate measure.

[58] Both the criteria for and the list of facilities on the Watch List for any given month are not public. The underlying compliance data on which the Watch List is largely based are public; however the status of ongoing enforcement actions, a factor also used in constructing the Watch List is not public.

[59] OECA's August 14, 2007 memorandum, *Response to the Evaluation Report: Better Enforcement Oversight Needed for Major Facilities With Water Discharge Permits in Long-Term Significant Noncompliance (Report No. 2007-P-00023)* and *Revised OECA Corrective Action Timetable: October 2007* describe OECA corrective actions planned in response to the referenced May 14, 2007 Office of Inspector General (OIG) report. These actions include potentially developing, distributing, and using new subsets of Watch List and/or SNC data to better address chronic noncompliance among CWA NPDES major facilities. Specifically, the corrective actions committed to by OECA are to develop an action plan for review of a Watch List pilot criterion focused on serious bacteria violations, implement corresponding changes (if any) to the Watch List, and adjust the Watch List process to notify Water Division Directors of a to-be-defined subset of long-term SNC cases.

E. EPA's Statutory Enforcement Authorities and Penalty Policies

The primary environmental statutes enforced by EPA include enforcement sections that direct the Agency expressly to consider a violator's history of noncompliance, duration of noncompliance, and similar factors in determining an enforcement response and/or penalty amount. These include the CAA ("violator's full compliance history"; CAA Section 113(e)(1) and (2)), CWA ("prior history of violations"; CWA Section 309(g)), Toxic Substances Control Act (TSCA) ("history of prior such violations"; TSCA Section 16 (a)(2)(B)), Emergency Planning and Community Right-To-Know Act (EPCRA) ("prior history of such violations"; EPCRA Section 325 (b) (1) (C)), Comprehensive Environmental Response Compensation and Liability Act (CERCLA) ("any prior history of such violations"; CERCLA Section 109 (a) (3)), Safe Drinking Water Act (SDWA) ("any history of such violations"; SDWA Section 1423 (c) (4) (B)), and Oil Pollution Act (OPA) ("history of prior violation"; OPA Section 4303 (a).[60]

In all instances, these statutes refer to the violator's overall history of noncompliance, payment of penalties assessed previously for the same violation, prior history of violations, or similar factors. Consequently, the corresponding media-specific ERPs and penalty policies developed by EPA to guide the implementation of these provisions reflect these statutory mandates. An in-depth analysis of how all of OECA's ERPs and penalty policies address history of noncompliance factors (of which recidivism is a subset) would be lengthy and beyond the scope of this paper, which is focused on measurement issues. However, two examples are provided for illustrative purposes:

- Clean Air Act: The CAA penalty assessment criteria state that the Administrator or court may take into consideration the violator's full compliance history and good faith efforts to comply, the duration of the violation and the payment of the violator of penalties previously assessed for the same violation. Penalties may be assessed for each day of the violation. *See* CAA Section 113(e)(1) and (2); 42 U.S.C. Section 7413(e)(1)(2). The *Clean Air Act Stationary Source Civil Penalty Policy* notes that history of non-compliance can be used to raise a penalty, and that, unless the lack of compliance with the environmental regulation was out of the control of the violator, the penalty may be increased. The Policy sets out guidelines, including the similarity of the violations, the time elapsed between them, and other factors for the litigation team to determine penalties.[61]

- Clean Water Act: The civil penalty provision for violations of the CWA lists factors including the history of violation. *See* CWA Section 309(d), 33 U.S.C. Section 1319. Administrative penalties are assessed under subsection (g) of CWA Section 309 where

[60] Two key statutes, RCRA and Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), make no specific reference to history of noncompliance or similarly worded factors. However, those statutes direct penalty assessments to consider, among other things, the "seriousness of the violation" and "gravity of the violation," respectively. Based on these factors, EPA's corresponding penalty policies provide for upward penalty adjustments in response to, respectively, history of noncompliance or repeat penalties. *See* http://www.epa.gov/compliance/resources/policies/civil/rcra/rcpp2003-fnl.pdf (*RCRA Civil Penalty Policy*) and http://www.epa.gov/compliance/resources/policies/civil/fifra/respon-fifra-rpt.pdf (*FIFRA ERP*).

[61] *See* Clean Air Act Stationary Source Civil Penalty Policy at p. 20. http://www.epa.gov/compliance/resources/policies/civil/caa/stationary/penpol.pdf

factors to be considered include the violator's prior history of violations. *See* CWA Section 309 (g) (3), 33 U.S.C. 1319. The Clean Water Act Civil Penalty Policy penalty calculation places weight on a "history of recalcitrance" to increase the gravity of violation factor in calculating the penalty.[62] The *Revised CWA Section 404 Settlement Penalty Policy* refers to the statutory penalty factors, including the prior history of violations, as discussed in Section 309 (d) and Section 309 (g) (3) as guidance. The compliance history of the violator is a weighted component in determining the penalty mount.[63]

F. Selection of Appropriate Injunctive Relief

Another area in which enforcement personnel take patterns and history of noncompliance into account is in the selection of the appropriate injunctive relief to resolve enforcement actions. EPA's approach in all enforcement actions is to seek appropriate injunctive relief to return violators to compliance and minimize or eliminate the potential for repeat violations by addressing the root causes of noncompliance. For example, pursuant to OECA's *Guidance on the Use of Environmental Management Systems in Enforcement Settlements as Injunctive Relief and Supplemental Environmental Projects* (June 12, 2003),[64] where EPA determines, taking into account a violator's size, characteristics, and overall compliance obligations, that the root cause of a defendant's or respondent's violations is the absence of a systematic approach to identifying, understanding, and managing the regulated entity's compliance with applicable environmental requirements, the appropriate injunctive relief should include an EMS with a compliance focus. In addition, where specific elements or requirements common to EMSs are independently required by law or regulation, such elements/requirements should be sought as injunctive relief whether or not a compliance-focused EMS, per se, is sought.[65]

G. Research and Evaluation of Enforcement and Compliance Assurance Deterrent Impacts

At this point in the evolution of OECA's performance measurement, one of the biggest measurement challenges facing the program is measuring the deterrent effect of enforcement. As components of its plan to address these challenges, OECA recently (1) published and publicized a new *Compliance Literature Search Results* report and research literature web site [66], and (2) co-sponsored, with ORD, the development of a state-of-the-science "white paper" on the measurement of deterrent impacts and follow-up targeted workshop:

(1) The *Compliance Literature Search Results* report (April 2007) was published on a newly-created Compliance Research Literature web page. The report provides citations and summaries for 215 compliance-related books and articles, from 1999 to 2007,

[62] *See Interim CWA Settlement Policy* at 12.
http://www.epa.gov/compliance/resources/policies/civil/cwa/cwapol.pdf
[63] *See, Issuance of Revised CWA Section 404 Settlement Penalty Policy* at 6 and 14.
http://www.epa.gov/compliance/resources/policies/civil/cwa/404pen.pdf
[64] http://www.epa.gov/compliance/resources/policies/incentives/ems/emssettlementguidance.pdf
[65] Since 1993, OECA and the Regions have concluded cases requiring the defendants to develop and implement compliance-focused EMSs at more than 280 facilities nationwide.
[66] http://www.epa.gov/compliance/resources/reports/compliance/research/index.html

addressing a broad range of compliance and environmental behavior topics. These include compliance assurance, compliance monitoring, deterrence, enforcement, environmental management, program measurement and evaluation, voluntary programs, environmental performance, and the relationship of compliance and performance to business value and competitiveness. Citations to pre-1999 compliance literature are provided in OECA's April 1999 *Compliance Information Project Literature Summaries* report. Electronic versions of both reports may be downloaded from the new web page at http://www.epa.gov/compliance/resources/reports/compliance/research/index.html. All of the sources in both reports are in the public domain and may be shared with any interested persons.

(2) A component of a broader project addressing both deterrence and compliance assistance outcome measurement, the deterrence measurement project, *Compliance and Deterrence Research and Workshop Project: Measurement of General and Specific Deterrent Impacts of Compliance Monitoring and Enforcement,* is presently in its post-Workshop phase. There is a significant body of literature about deterrence theory that examines the forces that seem to influence compliant and non-compliant behavior, and there are now a number of studies documenting and analyzing the deterrent, motivational, and performance-related effects of compliance monitoring, enforcement, technical assistance, incentives, and other government interventions. Additional forces include market and community pressures, and corporate policy, organization, and compensation. Knowing more about the interplay of these factors and how to measure their impact on deterrence could lead to subtle-to-significant changes in how OECA targets assistance, incentives, monitoring, and enforcement to address environmental risks and noncompliance patterns. Contractor support for this project was provided by Professor Jay Shimshack of Tufts University, a deterrence measurement expert with leading publications in the field. Professor Shimshack was identified and selected pursuant to a competitive bidding process open to academia and private groups with the contract awarded May 23, 2007. Professor Shimshack's final report, *Monitoring, Enforcement, & Environmental Compliance: Understanding Specific & General Deterrence State-of-Science White Paper* (October 2007) addresses the following key questions: (1) What does the compliance literature identify as the key factors motivating regulated entities to respond positively or negatively to routine compliance activities, i.e., compliance assistance, monitoring, and enforcement?; (2) What approaches to deterrence measurement – database analysis; econometrics; surveys; interviews; case studies; others – are suggested in the relevant compliance literature that can be used by OECA to evaluate performance?; (3) How should OECA act on information developed to respond to these questions and use it strategically to select and target future compliance and enforcement priorities and activities? In responding to these questions, the author of the deterrence measurement white paper developed the recidivism-related findings quoted earlier in this report.

As of the date of publication of this recidivism report, OECA and ORD were in the process of finalizing a second contract with Professor Shimshack for additional deterrence measurement follow-up work. The work will include simplifying two already peer-reviewed deterrence models from the 2007 deterrence white paper and applying them to new sectors.

SECTION V. RECIDIVISM FINDINGS AND RECOMMENDATIONS

A. Major Findings

1. Recidivism is a real phenomenon defined as the reversion by past lawbreakers to illegal behavior. One means of measuring the extent of recidivism in a particular context is through recidivism rates, defined as the percentage of a certain universe of past violators which violate the law again, and are caught doing so, during a specified observation period.

Discussion: Recidivism rates are typically applied in the context of criminal law enforcement. OECA's review of existing civil recidivism measures (*see* appendix III) did not identify any measures which could be directly applied to managing EPA's national enforcement and compliance assurance program.

2. The relative ability of law enforcement agencies to detect violations impacts all recidivism rate measures to varying degrees, as does the extent to which the underlying compliance monitoring is targeted versus random. Consequently, in general, recidivism rates cannot be considered statistically valid measures of the true rate at which violations occur, or recur, among violators.

Discussion: The degree to which recidivism rates are statistically biased depends on the nature of the crime detection methods. There is some reason to believe that this problem is particularly acute in the case of a potential OECA civil recidivism rate measure. *See* subsection II.E and III.C above, as well as finding 4, below.

3. Recidivism rate measures require definitional choices be made in three key areas, each of which introduces subjective elements. These are: -1- determining the universe of entities subject to the measure; -2- establishing the observation period, both when it begins and how long it runs; and -3- defining what constitutes an act of recidivism. OECA's own discontinued recidivism rate measure represented a particular set of definitional choices across these three categories reflecting practical database considerations.

Discussion: Were OECA to being again to calculate a civil recidivism rate measure for its civil enforcement program, practical data concerns would continue to argue strongly for certain definitional choices: -1- The universe should be defined on a facility rather than a company basis. -2- The observation period should begin in the first full month of compliance following either the conclusion of an enforcement action or a return to compliance from SNC, depending on how the universe of potential recidivists is defined. -3- The severity of violation that constitutes an act of recidivism should be a SNC-level violation. -4- A finding of SNC should be sufficient to label the facility a recidivist, rather than requiring a successful civil action. The discontinued measure adopted each of these conventions.

Some definitional decisions are less clear: -1- The universe may be restricted to those facilities which were previously the target of an EPA enforcement action, or include all facilities which came out of SNC for any reason as the discontinued measure does. -2- The universe may be aggregated or disaggregated to different extents by media, sector, size, geographic location, etc. The discontinued measure disaggregates facilities only by the three main media programs, calculating three separate recidivism rates. -3- The length of the observation period is arbitrary. The discontinued measure uses a two-year observation period. -4- Subsequent violations at a facility that are dissimilar to the original violation may or may not be counted as recidivism. The discontinued measure considers any SNC violations in the same media to be recidivism even if it is unrelated to the original violation, while not considering violations in other media to be recidivism.

4. Information on which facilities recidivate, as well as on which facilities initially commit violations and are therefore potential recidivists, is necessarily limited by the availability of environmental inspection data. Because OECA environmental inspections are targeted to achieve maximum detection and deterrence, recidivism rates calculated on the basis of this data are not statistically valid measures of the true rate at which past violators return to noncompliance. Moreover, changes in OECA's targeting process would likely result in changes in the observed recidivism rate measure unreflective of underlying change in repeat offender behavior among regulated entities. Although there are ways to lessen this problem, it is fundamentally unavoidable.

Discussion: The discontinued recidivism measure attempted to lessen this problem by excluding from the universe of potential CAA and RCRA recidivists those facilities at which no inspections took place during the observation period. (In the CWA program, which relies far more on self-reported data, this step was not taken.) This is an imperfect solution both because inspections may be targeted at those facilities most likely to recidivate and because inspections that take place earlier in the observation period may be less likely to catch recidivists than those that occur later. An alternative strategy could be to conduct a random sample of the compliance status of past enforcement targets at some point during or at the end of their observation period. This would be an extremely resource-intensive solution that would not entirely solve the problem. Violations during the observation period which are not ongoing may be missed and statistical uncertainty introduced by the sampling.

5. All recidivism rate measures are influenced by exogenous or confounding factors such as the impact of state inspections and enforcement, general economic trends, etc., as well as by changes in the makeup of the universe of potential recidivists and by random fluctuations. Any potential OECA recidivism rate measure would be influenced by exogenous or confounding factors such as the impact of state inspections and enforcement and general economic trends, as well as by changes in the makeup of the universe of potential recidivists and by random fluctuations. Some of these factors are both material and outside of OECA's direct control. In addition, in general, as the heterogeneity of the universe subject to a recidivism rate increases, the scope and magnitude of exogenous concerns tend to increase, as well. These considerations limit the potential utility of a national recidivism measure for reporting or management purposes by

rendering it difficult to identify trends in recidivism rate measures and/or ascribe these trends to specific causal factors.

Discussion: OECA's experience with the discontinued recidivism rate measure suggest a consensus, among OECA personnel, that the measure was not useful in tracking the performance of the civil enforcement program primarily for these reasons. Trends were difficult to identify, difficult to attribute to specific factors, and it was unclear to what extent OECA could affect the measure. It is possible that these effects could be controlled for using the right statistical tools, however, this would require outside expertise, is not guaranteed to achieve results, and would increase the complexity of interpreting the measure as well as calculating it. Even if OECA were able to overcome all of the decisional, methodological, and resource issues associated with recidivism rates as described in this report, the resulting recidivism rates would, necessarily, capture the combined impacts of both federal and state inspections and enforcement. There is no straightforward and effective way to disentangle these effects.

6. The use of a recidivism rate measure as a national performance management measure could result in poor national compliance and enforcement program management decisions. Perhaps the most serious example is managers potentially overemphasizing, and thus over-allocating resources to, reducing recidivism rates at the expense of maximizing overall benefits to human health and the environment.

Discussion: While OECA prefers, all else being equal, lower recidivism rates to higher rates, elevating a recidivism rate measure, with all of its unavoidable definitional weaknesses, to the status of a national performance measure might well result in unintended undesirable consequences. The most obvious of these would be an overemphasis on reducing recidivism relative to other program goals. For example, where repeat violations signal exceptionally high compliance costs at facilities already expending more to reduce marginal units of pollution than society is receiving in benefits from the reductions, economic theory would suggest that greater environmental benefits may be obtained more efficiently by strategically targeting limited Agency enforcement resources at non-recidivists with lower marginal abatement costs and/or a greater practical ability to reduce pollution.

7. For the reasons expressed in *Findings* (1)-(6), above, OECA finds that *nationally calculated recidivism rates for the civil enforcement program* are inherently limited in their potential to serve as effective program management and reporting tools.

Discussion: Studies of recidivism can also be undertaken for purposes other than as a national performance measures, such as to gain a better understanding of regulated entities or help identify effective intervention strategies. A single-rate national recidivism performance measure, however, would not be optimal for this purpose. A preliminary review suggests that survival/failure analysis or case-study analysis might be preferable, however outside expertise would likely be needed for such a study. Such experts might determine that other methods are more worthwhile.

8. **While nationally calculated civil enforcement recidivism rates are inherently limited in utility, addressing recidivism, history of noncompliance, and chronic**

noncompliance are legitimate program objectives that OECA has historically considered, along with other relevant considerations in many areas of its enforcement and compliance assurance program. Leading ways include in selecting national strategic compliance and enforcement priorities, targeting enforcement actions, and assessing appropriate penalties and injunctive relief.

Discussion: Following are five examples of key ways in which OECA considers recidivism and history of noncompliance, along with other relevant factors, in targeting enforcement and compliance resources, developing appropriate national strategies, and identifying and responding to noncompliance: -1- the selection of national strategic compliance and enforcement priorities, -2- the targeting of inspections, -3- the prioritizing of enforcement actions, -4- the selection of appropriate penalties and injunctive relief, and -5- ongoing research efforts at understanding the route causes of noncompliance by regulated entities. Importantly, in each case, OECA's overriding goal is to protect human health and the environment through strategic and efficient combinations of enforcement and compliance assurance tools, including civil enforcement responses to address repeat or chronic noncompliance.

9. Recidivism rate measures, by definition, overlook certain categories of important violators such as entities in chronic noncompliance that cannot "recidivate" because they do not return to compliance at all during the observation period. Chronic noncompliance measures (e.g. the percentage of entities in chronic noncompliance or the mean or median length of time entities spend in noncompliance) are conceptually related to recidivism rate measures. Although they are not perfect substitutes for one another in that recidivism can be high while chronic noncompliance is low and vice versa, they may correlate in many real-world situations. Tracking and addressing chronic noncompliance may therefore represent both a more feasible and a more useful performance measure and goal than reducing recidivism rates per se.

Discussion: Possible chronic noncompliance measures include OECA's existing measure of the average length of time facilities of different types remain in SNC which, like the discontinued recidivism rate measure, is not actively used to manage the civil enforcement program, or a measure based on the facility Watch List. The latter option has the advantage of being closely associated with the performance of the civil enforcement program because the Watch List is based on criteria established in OECA's Enforcement Response Policies and is already used for management purposes. However, the criteria which cause a facility to be placed on the Watch List and the list of facilities on the Watch List have deliberately not been made public (a fact which argues against a public measure based on the List).

10. While OECA's compliance data may not lend itself well to a national civil enforcement program recidivism and/or chronic noncompliance performance management measure, there still may be useful information in the existing data on patterns of noncompliance among regulated entities, e.g., on a sector, national priority, or other limited universe context, which could be gleaned through a systematic, statistical review of the data. In addition, there may be additional useful programmatic and targeting uses for available data on facilities in chronic noncompliance.

Discussion: An important consideration with respect to recidivism largely unaddressed by this report is the empirical question of whether recidivism and/or chronic noncompliance are actually serious problems among regulated facilities in from a health and environmental perspective. The answer to this question has implications for targeting of federal and/or state environmental enforcement resources. OECA's data systems include some information which might speak to this question. A thorough analysis of this data is beyond the scope of this report and would likely require outside statistical expertise. As described in the report, OECA is already exploring potential new uses for the Watch List and subsets of facilities developed from it for program management and targeting.

B. Recommendations

1. OECA should not, at this time, begin to again calculate national civil enforcement program recidivism rates for program management and reporting purposes. This recommendation is limited to recidivism rates for the civil enforcement program, calculated on a national level. This report offers no opinions as to, nor was any work conducted in its preparation, on the potential benefits and costs of calculating a national *criminal* program recidivism metric. Due to significant differences in the federal civil and criminal enforcement programs such as, for example, the sizes of the relative universes subject to a potential recidivism measure and potential significantly different approaches to defining appropriate observations periods and recidivist acts or omissions, this report establishes no precedents with respect to the criminal enforcement program.

2. OECA should continue to consider and address recidivism, history of noncompliance, and chronic noncompliance, along with other relevant considerations and objectives, in its enforcement and compliance assurance program. This includes considering recidivism-related concepts, in selecting national strategic compliance and enforcement priorities, targeting enforcement actions, and assessing appropriate penalties and injunctive relief.

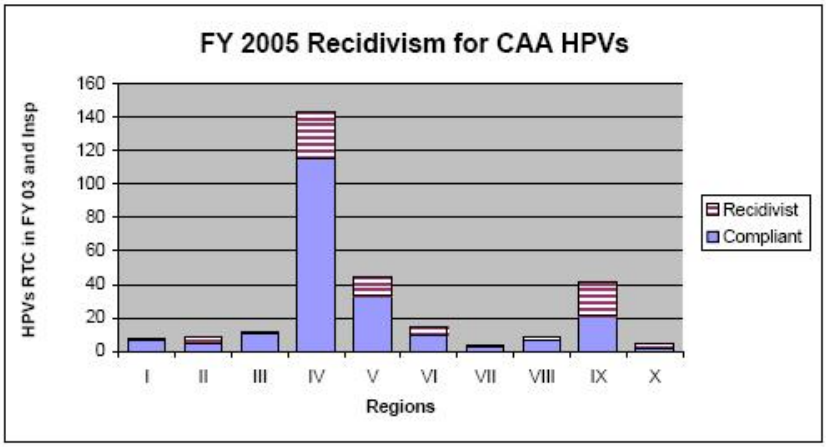
3. OECA should, employing the results of the OECA-ORD Deterrence and Compliance Assistance Outcomes Measurement Project state-of-the-science deterrence measurement white paper, *Monitoring, Enforcement, and Environmental Compliance: Understanding Specific and General Deterrence State of the Science White Paper* (October 2007) and follow-up Deterrence and Compliance Assistance Outcomes Measurement Workshop, consider the potential usefulness and feasibility of sub-national level recidivism-oriented measures and/or evaluative approaches for specific projects or priorities. This consideration should occur prospectively on a case-by-case basis, through regular planning and targeting processes, taking into account the environmental problems the projects and priorities are intended to address, their goals and objectives, and available resources.

4. OECA should continue to use the Facilities Watch List Management Tool (Watch List) to identify and prioritize for review and potential enforcement response facilities in chronic noncompliance. At the same time, OECA should explore and, if appropriate, develop potential new uses for, and distribution of, the Watch List and possible newly-derived subsets and permutations of it. These efforts should focus on addressing chronic

noncompliance in priority areas in an effective and efficient manner, potentially taking into account, among other factors, overall length of time in noncompliance, seriousness of the violations and their health and environmental consequences, root causes of noncompliance, potential criminal conduct, marginal costs and benefits of new or additional enforcement against chronic non-compliers, and other specific and general deterrence considerations. Examples of potential new subsets of Watch List data which OECA could consider developing could be facilities in noncompliance for over a full year or Watch List facilities in national priority sectors. OECA could also consider the potential usefulness of developing and implementing a measure of chronic noncompliance derived from the Watch List, its underlying data, or subsets of both intended not to serve as a national recidivism rate measure per se but for other useful management purposes.

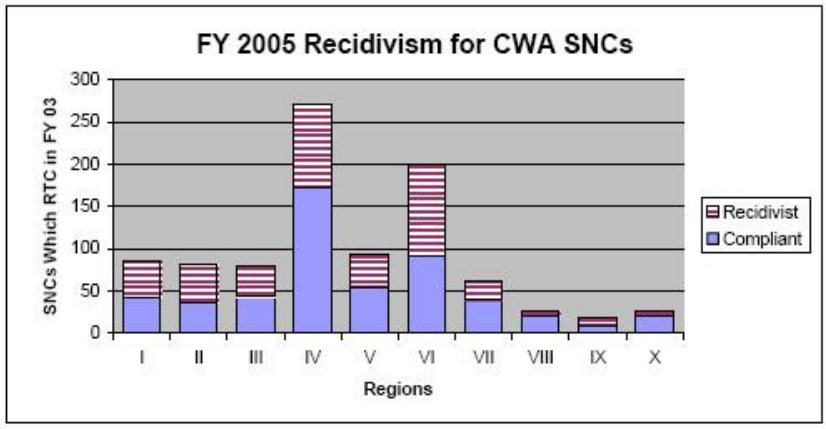
APPENDIX I. FY 2005 2-YEAR SNC RECIDIVISM RATES

FY 2005 2-Year SNC Recidivism Rates



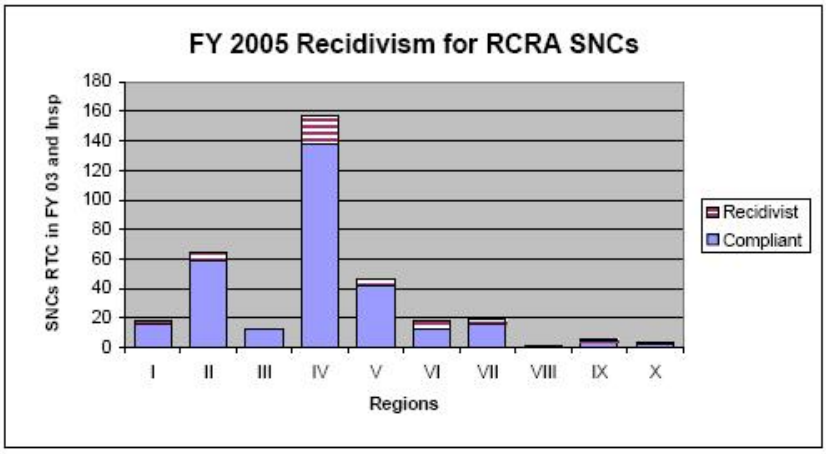
CAA

Region	Recidivism Rate
I	13%
II	44%
III	8%
IV	20%
V	25%
VI	33%
VII	25%
VIII	22%
IX	49%
X	60%
Nation	26%
FY04	*29%*
FY03	*22%*



CWA

Region	Recidivism Rate
I	51%
II	56%
III	46%
IV	36%
V	42%
VI	54%
VII	37%
VIII	26%
IX	58%
X	23%
Nation	44%
FY04	*43%*
FY03	*42%*



RCRA

Region	Recidivism Rate
I	11%
II	8%
III	8%
IV	12%
V	9%
VI	33%
VII	16%
VIII	0%
IX	33%
X	33%
Nation	12%
FY04	*13%*
FY03	*15%*

Prepared by: OECA/OC/ETDD/IUTB
Data Source: AFS, PCS, and RCRAInfo

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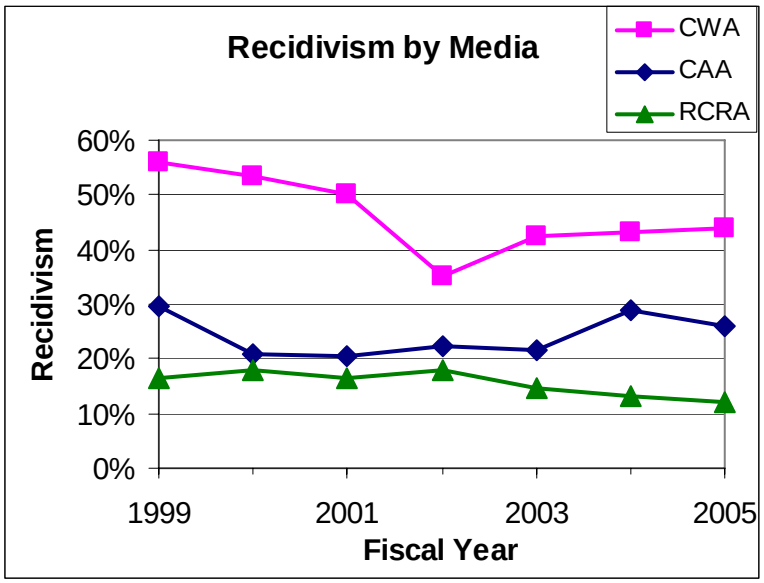
January 2006 IDEA extracts of data systems

APPENDIX II. HISTORICAL DATA FOR OECA'S DISCONTINUED CIVIL RECIDIVISM MEASURE



CAA=Clean Air Act
CWA=Clean Water Act
RCRA=Resource Conservation and Recovery Act.

Source: Data for FY2002-FY2005 are available in the National Enforcement Trends report, available internally at EPA at http://intranet.epa.gov/oeca/oc/etdd/nets/index.html. Older data were obtained from archived reports.

APPENDIX III. OTHER RELEVANT EXAMPLES OF THE USE OF RECIDIVISM RATES

A. OECA's Agriculture Division Recidivism Rate Measure

The Agriculture Division (AgD) in OECA's Office of Compliance recently adopted a recidivism measure for its pesticide enforcement State and Tribal Grant (STAG) program in response to a 2004 PART review.[67] This program distributes approximately $18 million annually to seventy-seven state, territorial, and tribal governments to enforce regulations related to the Federal Insecticide Fungicide and Rodenticide Act. Reporting for the measure began in FY2006 and is done separately for each grant recipient.

The AgD recidivism measure is a reverse recidivism measure in that instead of tracking a set universe that was enforced against some years back and counting the percentage that are enforced against during a subsequent observation period, it considers the universe of entities that are enforced against in the current year, and counts the percentage that were enforced against during a preceding pseudo-observation period. These two values should have the same long-run average; however the latter is easier to calculate, as it does not require the same sort of sophisticated databasing and tracking of offenders. It is not immediately clear though whether the value of the measure is the same.

AgD selected an observation period length of three years after consultation with its grant recipients, many of whom use a three-year statute of limitations. All decisions on how to define the universe of enforcement targets and on who counts as a recidivist are left up to the grant recipients themselves[68].

Perhaps because data definitions vary significantly, the results to date have been largely incomparable between states. Of the seventy-seven grant recipients, sixteen had no enforcement actions in FY2006 (mostly the small Indian tribes); the recidivism rates (in percent) for the others are displayed in the following stem-and-leaf plot:

```
0 | 000000000011122233344444
0 | 556667999
1 | 00111233444
1 | 78999
2 | 0244
2 | 5677
3 | 2
3 |
4 | 14
```

[67] http://www.whitehouse.gov/omb/expectmore/detail/10002286.2004.html. Other information in this section is derived from a 3/26/07 personal interview with AgD personnel.

[68] Instructions for data submission are available at http://www.epa.gov/compliance/state/grants/fifra.html. Follow the second link on the page labeled "Appendix 6."

B. OECA's Office of Criminal Enforcement Forensic and Training's Recidivism Rate Measure

OCEFT is currently in the process of developing and implementing a recidivism measure in response to a 2004 PART review.[69] OCEFT, in cooperation with DOJ, handles all of EPA's criminal enforcement cases, which can have as a target either an individual or a company. The following paragraph describes a draft version of the measure under consideration by OCEFT at the time of development of this report.

The universe for the measure consists of all those companies which are convicted of a criminal violation of environmental laws in a given year taken together with all those individuals who in a given year complete their prison sentence (including those who are convicted of a criminal violations and do not serve prison time) for an environmental crime. A company is considered a recidivist if it goes on to be convicted of another criminal or civil environmental violation within five years. An individual is considered a recidivist if he or she is convicted of another criminal violation or is involved in another civil violation (with the same or a different company) within the subsequent five years. The annual measure, which is lagged five years, is the straightforward percentage of recidivists.

This draft measure has not yet been calculated. Therefore, no data exist for it.

C. Department of Labor's Wage and Hour Division's Recidivism Measure[70]

DOL's Wage and Hour Division (WHD) is responsible for enforcing many of the nation's worker protection laws, including minimum wage, overtime, and child labor provisions of the Fair Labor Standards Act.[71] Because the universe of WHD's regulated entities is so vast and constantly changing (every low-wage company in the United States), WHD relies heavily on tips and targeting to select its enforcement targets. It concludes approximately 30-35,000 compliance actions annually.

In order to assess recidivism, WHD conducts a survey each year of 68 randomly selected firms which have been the target of WHD enforcement at any time within the past five years. These firms undergo a full inspection to ascertain their compliance status. The recidivism measure is the percentage of these 68 firms in compliance. (The recidivism rate itself would be this number subtracted from 100%; however WHD reports the measure as the percentage of non-recidivists.)

Note that the firms being investigated do not all have the same observation period. Some may have been enforced against nearly five years ago, while others may have been enforced against less than one year ago at the time their compliance status is assessed for the measure.

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[69] http://www.whitehouse.gov/omb/expectmore/detail/10001134.2004.html. Other information in this section is derived from a 3/8/07 interview of OCEFT personnel.

[70] Information for this section is derived largely from a personal interview on 3/19/2007 with Erica Roberts (202-693-0131) at DOL WHD. References to WHD's recidivism measure appear in DOL's FY2006 Performance and Accountability Report: http://www.dol.gov/_sec/media/reports/annual2006/.

[71] http://www.dol.gov/esa/whd/

The average observation period will be 2.5 years. This strategy is necessary to catch recidivism which may occur at different latencies from the initial enforcement action but also complicates interpretation of the results.

In FY2005 the value of the WHD recidivism measure was 72%. In FY2006 it was 76%.

It is important that the statistical uncertainty involved in this sort of measure not be overlooked. While WHD reports only point estimates for their recidivism measure, the fact that 68 companies were surveyed implies that the 95% confidence intervals for the true values (without continuity correction) were [60.4%, 81.3%] and [65.1%, 85.0%] in FY2005 and FY2006 respectively. While the value of the recidivism measure itself clearly increased between FY2005 and FY2006, a two-sided z-test of this difference yields a p-value of 0.56, indicating roughly a 56% probability that this large an apparent change in recidivism might be observed as the result of pure chance even if the underlying pattern of recidivism remained unchanged. It is common when drawing conclusions using statistical data to require that this probability be less than 5%.

Without devoting more resources to conducting more random recidivism re-inspections, the power of this measure to detect changes in the underlying recidivism rate remains low. Thus, this measure may not be well-suited to use as a management measure because the statistical uncertainties involved are simply too great.

D. Simpson, Sally S. et. al. (2007)[72]

This research paper investigates, among other topics, recidivism by companies in the pulp and paper, steel, and oil industries, considering only CWA violations. While the paper does not formally define or calculate a recidivism measure, it does examine the causal factors that influence the number of violations at facilities owned by a particular company, including past enforcement actions. This work involved linking multiple facilities by their corporate ownership structure which required a significant amount of additional background work, even within three industrial sectors, because EPA databases do not contain this information.

E. Miller, Andrew B. (2005)[73]

This research paper uses EPA enforcement data from 1970 to 1997 to estimate factors which influence recidivism. The universe is taken to be companies targeted for enforcement during this period rather than facilities, and enforcement actions in any media are taken as acts of recidivism regardless of the initial offense. The observation period is two years. Note that this definition, which is also a "two-year recidivism rate," differs significantly from OECA's discontinued recidivism metric discussed in Appendix I.

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[72] Simpson, Sally S., Joel Garner, and Carole Gibbs; "Why Do Corporations Obey Environmental Law? Assessing Punitive and Cooperative Strategies of Corporate Crime Control." Department of Criminology and Criminal Justice, University of Maryland. *Technical report for NIJ* (August 12, 2006 unpublished draft).

[73] Miller, Andrew B. (December 2005, unpublished draft). *What Makes Companies Behave? An Analysis of Criminal and Civil Penalties Under Environmental Law*. Available at: http://ssrn.com/abstract=471841.

Miller is particularly interested in the effects of judicial civil prosecution on recidivism rates as opposed to administrative prosecution, which is considered less serious, consumes fewer EPA resources, and generally carries a lower threat of penalties. Miller finds that judicial prosecution is generally associated with higher recidivism rates more than administrative prosecution, even when other factors are controlled for. The likely explanation for this is that EPA reserves judicial prosecution for worse offenders who are more likely to recidivate. According to Miller, under his recidivism definition, the percentage of companies that underwent administrative and judicial civil prosecution by EPA between 1970 and 1997 which went on to recidivate within two years were 19% and 22%, respectively.