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Abstract

Environmental self-auditing by private firms is generally thought to both deserve and require encouragement. Firms can audit themselves more cheaply and effectively than can regulators, but too often are deterred for fear that the information they uncover will be used against them. To reduce this disincentive, the EPA’s “Audit Policy” lowers punitive fines when firms promptly disclose and correct violations that they themselves discover. While some contend that the Audit Policy is inadequate, EPA touts its success, presenting as evidence the policy’s track record to date. Yet our examination of that track record leads us to question EPA’s conclusions. While the policy appears to have encouraged firms to self-audit in a number of instances, a comparison of the violations uncovered in these cases with those detected by standard enforcement practices suggests that the typical self-audited violation is relatively minor. For instance, cases arising under the Audit Policy are more likely to concern reporting violations, rather than emissions. The relative insignificance of self-audited violations raises a number of broader policy questions, including whether the Audit Policy could and should be revised to play a larger role in regulatory enforcement.

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Sanchirico: University of Virginia School of Law.
Lee and Prager: Columbia University, Economics B.A., 2000 (Lee) and 2001 (Prager).

Introduction

The growing technical and legal complexity of environmental regulation over the last several decades has generated a new set of problems for both industry and regulator.² One of the most serious challenges arises from the tension that exists between the necessity that firms conduct environmental “self-audits” and the disincentive that they face in doing so.

Regulatory complexity requires that firms affirmatively and systematically investigate their own operations in order to insure that they are in environmental compliance. To assure such compliance at its four Texas facilities, for example, Occidental Petroleum must deploy a team of technicians armed with sophisticated testing equipment to monitor 140,000 points for potential fugitive emissions. The resulting four to seven million pieces of data must then be organized, summarized, and analyzed.³ Furthermore, Occidental Petroleum’s vigilance must extend beyond ‘the usual suspects’—e.g. pipe joints and valves—to encompass the possibility of emission from unexpected sources such as routine spillage, or transfer and transport practices.

On the other hand, self-discovery of a compliance problem may well increase the chance that the problem will be detected by the regulator—or at least firms may perceive this to be so.⁴

² Federal environmental regulations include the Clean Air Act (CAA), Clean Water Act (CWA), Safe Drinking Water Act (SDWA), Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Emergency Planning Community Right to Know Act (EPCRA), Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) and Toxic Substance Control Act (TSCA). Add to this state and local regulation and one gets a picture of a regulatory structure rivaling the tax system in complexity. Its complexity may surpasses that of the tax system when we take account of the fact that regulatory requirements are often of a highly technical nature, requiring sophisticated scientific equipment and skilled personnel. Further, unlike statistics on income and payroll, the information is not of a kind that the firm would otherwise be keeping.

³ See Hawks (1998) and Lavelle (1992).

⁴ Murray (1995): “Corporate America is worried that the audit provides the regulatory agency, the Department of Justice, or interested citizen groups with a paper trail that leads to expensive cleanup, fines, and possible criminal culpability for the corporation, its officers, directors, and even its employees”. Moore and Newkirk (1995): “Substantial disincentives to self evaluation have existed because of ...fear that the information will be used against

A firm that uncovers ongoing noncompliance may not be able to simply fix the problem and move on. Its self-discovery may make more likely some punishment by the regulator for non-compliance up to this point. The discovery of noncompliance by a disgruntled employee may inspire that employee to “blow the whistle.” Even loyal employees may be subpoenaed to testify against the firm under oath. Further, documents and computer files generated in the course of a self-audit may be subject to inspection as of right by future litigation opponents. Alternatively, such records may simply find their way into unmarked brown envelopes and onto desks at EPA.

That self-auditing produces more frequent penalties for noncompliance may appear to be good for the regulator. But this ignores the possibility that firms may respond by self-auditing less frequently and less earnestly. Facing a risk that self-investigation may produce “emissions of evidence,” firms may well conclude that ignorance is bliss, or that too much self-knowledge can lead to misery. To the extent that fewer problems are uncovered as a result, compliance will suffer. A firm may, for instance, decide that it would actually rather not find out whether a smokestack’s scrubber is faulty, if finding out that it is faulty makes it substantially more likely that EPA will learn of the same shortly thereafter. If the scrubber does indeed have a problem, and if EPA’s unaided discovery of this fact is relatively unlikely or subject to significant delay, the smokestack may continue to spew harmful emissions even though the firm could and would fix the problem relatively cheaply but for its fear of shooting itself in the foot by self-auditing.

This tension between the necessity of self-auditing and its disincentive has been apparent since at least the 1990’s. In a number of well-publicized instances during that decade, firms turned to regulators after discovering that some practice previously thought to be innocuous was

the company.” Feeley (1995): “A self-audit can become a ‘prosecutorial road map,’ allowing disclosure to be used as an enforcement tool.”, Cooney *et al.* (1995): “Environmental auditing is not used as frequently as it should be, however, due in part to governmental reluctance to give formal protection to internal documents...”.

in fact generating noncompliant emissions.⁵ Instead of receiving good citizenship awards for identifying and correcting a problem that the regulators themselves may never have detected, the firms found themselves subject to serious fines. Stories such as these led to calls for protection against punishment for violations uncovered as a result of self-auditing.⁶ First to react were the states. Several created a new self-evaluative privilege whereby confidential documents produced under a regular program of environmental self-auditing would not be subject to discovery and would not be admissible as evidence in court. Others went so far as to propose immunity for firms that voluntarily reported and corrected noncompliance.⁷

The United States EPA was more cautious. EPA at first appeared reluctant to provide any protection on the federal level. At the same time, however, pressure continued to mount from both below and above, with more states threatening to institute privileges or immunities and the

⁵ A costly self-audit of Coors' Golden, Colorado operations revealed that the spillage of beer in the course of the manufacturing process was producing harmful—and illegal—ethanol emissions. Subsequently, the Colorado Department of Public Health and Environment sought to obtain over \$1 million in fines from Coors, based on Coors' own disclosure of its internal review—even though the agency never would have known of the violations but for Coors' own investigative effort. For more detail, see, e.g., Feeley (1995).

⁶ The academic literature is in substantial agreement with industry commentators that firms face a disincentive to self-auditing and that a policy response is warranted. Pfaff and Sanchirico (2000) show that standard liability and negligence regimes adequately induce fixing of known violations, but yield inefficient levels of audits to uncover those violations. One solution they propose is to lower fines to the extent the firm's own auditing aids regulators in detecting violations. Arlen (1994) analyzes the problem of vicarious corporate criminal liability and the incentive to monitor employees. She also proposes basing fines on firms' monitoring efforts. Arlen and Kraakman (1997) extend Arlen's model to the problem of monitoring employee activities that may have harmful environmental consequences. Kesan's (2000) game-theoretic analysis suggests a need for attention to creating positive incentives to self-police. Finally, Innes' work (1999a and b, 2000, 2001) suggests that for self-policing to be optimal (taking into account savings in government enforcement), fine reduction is needed, even when not all violators report in an optimal regime. If firms undertake detection avoidance activities, that also can raise the value of self-reporting.

⁷ For a regularly updated list, see the EPA Region 5 site: http://www.epa.gov/region5/orc/audits/audit_apil.htm. As of August 28, 2001, this EPA site lists as "Privilege Only" Arkansas, Indiana, Illinois, Mississippi and Oregon, with the first such privilege laws enacted as early as 1993 (Oregon) and others being enacted in the mid-1990s. As of the same date, the same EPA web site lists as having "Immunity Only" just one state, Rhode Island, but also lists under "Privilege and Immunity" (in order of first enactment) Colorado, Kentucky, Minnesota, Wyoming, Utah, Texas, Kansas, Virginia, Michigan, Idaho, South Dakota, South Carolina, New Hampshire, Ohio, Montana, Alaska, Nevada, Nebraska, Iowa and Arizona. The earliest laws were in 1994; new laws have arisen ever since.

Administration insisting that federal agencies find ways to “reinvent government.”

The EPA response was to take what some regard as a partial step. In 1995, EPA issued its final policy on “Incentives for Self-Policing: Discovery, Disclosure, Correction and Prevention of Violations” (60 FR 66,706).⁸ The policy is a “guideline” for the exercise of prosecutorial discretion and the conduct of settlement negotiation. It stipulates that the “gravity” component of fines—as opposed to the “economic benefit” component⁹—will be reduced by 100% for a firm that discovers a violation through a systematic auditing program, voluntarily discloses the violation 21 days after discovery without prompting from government or a third party plaintiff, corrects the violation within 60 days, takes steps to prevent recurrence, and cooperates with EPA throughout. The violation cannot be part of a pattern of repeated violations and cannot be one that has caused or may cause “serious harm.” Gravity fines are reduced by only 75% if the violation was not discovered as part of a systematic program, but the other conditions are met.

The fifteen years or so since the EPA audit policy was first proposed have seen ongoing debate among industry commentators, economists and legal scholars over whether the policy is sufficient.¹⁰ Critics point to several shortcomings. First, the policy is only a “guideline” for the regulator in the field; the Policy contains no enforceable promise of fine reduction for the disclosing firm. Second, fine reduction is limited to the add-on gravity component of fines and

⁸ A revised Final Policy Statement (FRL 6576-3) was issued effective May 11, 2000. In terms of the legislative history, note that while the Policy was first finalized in 1995, the basic audit policy was first proposed in 1986.

⁹ The economic benefit component of the fine is intended to capture, roughly, the dollar value of the economic benefit that the firm has derived from its noncompliance to this point. It aims to remove a firm’s incentive to delay the repair of discovered violations. It is quite common in these cases for fines to be levied to eliminate economic benefits, even after gravity-based fines have been reduced by 75% or even 100%. EPA identifies three kinds of economic benefit: 1) benefit from *delaying* pollution control expenditures; 2) benefit from *avoiding* pollution control expenditures; and 3) benefit from an illegal competitive advantage. See the Policy On Civil Penalties And Framework For Statute-specific Approaches To Penalty Assessments, 14 ELR 30001 (February 16, 1984).

¹⁰ Virginia Morton Creighton, *Comment: Colorado’s Environmental Audit Privilege Statute: Striking the Appropriate Balance?* 67 U. Colo. L. Rev. 443, 461 (1996): According to the [Coors Brewing Co.], industry

does not apply to the economic benefit component. Thirdly, there is uncertainty about the EPA's intentions regarding criminal prosecution for non-compliance. Fourthly, fine reduction, such as it is, requires as preconditions a series of "acts of contrition": the firm must promptly disclose the violation, also promptly correct it, and then take whatever measures EPA sees fit to prevent recurrence. In light of these perceived shortcomings of the Policy, the pressure for broader action continues to emanate from industry, the states and several members of Congress.¹¹

EPA continues to maintain, however, that its audit policy is more than adequate. Further, EPA has consistently asserted that farther reaching "secrecy and amnesty" policies, such as those adopted by some of the states, are seriously overbroad. Indeed, it has even threatened to revoke regulatory authority from states that adopt such policies concerning the treatment of audits.¹²

As one of the chief arguments in support of its own policy, EPA regularly touts the tally of violations that have been self-reported since the audit policy was instituted. For instance, in May 2000: "use of the Policy has been widespread. As of October 1, 1999, approximately 670 organizations had disclosed actual or potential violations at more than 2700 facilities."¹³

Yet even a closer look at the EPA's own literature gives some cause for doubt about the real scope of the program to date. It is at least clear that not all of the "violations" uncovered under

perceived EPA's 1986 policy as "small comfort" and not as the "behavior-modifying stimuli" intended by EPA.

¹¹ For the 105th Congress, see S. 860 and S. 1332. For the 104th Congress, see S. 582 and H.R. 1047.

¹² Concerning the EPA's policy, the March 1998 Audit Policy Update quotes EPA testimony before the Senate: the Audit Policy "is working extremely well in encouraging audits, disclosures, and corrections of violations." This was to support the audit policy and EPA's longstanding opposition to audit privileges and/or audit immunities.

Concerning state policies, the revised Final Policy Statement (FRL 6576-3, p.31) notes: "EPA recognizes that States are partners in implementing the enforcement and compliance assurance program ... EPA will generally defer to State penalty mitigation for self-disclosures as long as the State policy meets minimum requirements". See, on requirements, 'Statement of Principles: Effect of State Audit / Immunity Privilege Laws on Enforcement Authority for Federal Programs', Memorandum from Steven A. Herman et al., February 14, 1997, www.epa.gov/oeca/oppa.

¹³ FRL 6576-3. The excerpt here summarizes the evaluation of the audit policy carried out in the spring of 1998, the preliminary results of which were published in the *Federal Register* on May 17, 1999 (64 FR 26,745). Discussion of these results can also be found in the Audit Policy Update, volume 4, number 1 (EPA, Spring 1999).

the policy are significant regulatory breaches. An EPA newsletter from March 1998, for example, provides details about 600 particular violations at 314 facilities in 21 states, which comprise a fair portion of the May 2000 numbers reviewed above. It appears that 511 of these 600 violations consisted of GTE's failure to notify state agencies and local fire departments of the existence of batteries filled with sulfuric acid at 229 "telecommunications sites." Given that little additional information is supplied in the newsletter, one may speculate that most of these 229 "sites" were something on the order of switching stations in GTE's large wireline telephone network, and that EPA counted each unreported battery in each station as a separate violation.¹⁴

Of course, that EPA may have overplayed these particular GTE violations is as anecdotal, and thus just as inconclusive, as EPA's own claims in support of its audit policy. That the GTE violations were apparently relatively insignificant does not imply that all or even most of the other self-reported violations follow suit. Fortunately, EPA makes comprehensive data on the self-reported violations publicly available. In this paper we take advantage of the availability of this data in order to assess the success of EPA's audit policy in a more systematic fashion.

We first show that the great majority of the violations that are reported to EPA under its audit policy are indeed like the GTE case, in that they involve the failure to report or to inventory hazardous materials. In contrast, self-reporting of actual emissions has been rare.

Yet the fact that most self-reported violations concern reporting and inventory might simply reflect the composition of all violations, self-reported or otherwise. To test this we compared self-reported violations with those violations that EPA itself uncovered within its standard

¹⁴ The other 89 violations were failures to have SPCC (Spill Prevention Control and Countermeasure) plans for diesel fuel, which along with notification of locals are required under the CWA in order to help prevent spills. Note that EPA (Spring 1999) pp.1,10 reports that "on the heels" of the GTE case, an agreement with ten other telecommunications companies was reached, concerning 1,300 violations at over 400 facilities. Once again it would

enforcement activities. The difference in composition is dramatic. As the table below conveys, reporting and record-keeping violations constitute more than 90% of the violations uncovered under the Audit Policy, but less than 18% of violations uncovered by standard procedures:¹⁵

	<u>EPA Standard</u>	<u>Audit Policy</u>
<u>Reporting/Record-keeping Violations</u> ¹⁶	17.0%	91.5%
<u>Other (including emissions) Violations</u>	83.0%	8.5%

Still, the disproportionate share of reporting violations in the audit docket does not settle the issue of whether self-auditing violations are relatively insignificant. A reporting violation could be more severe than an emissions violation. A reporting requirement may concern vast quantities of severely harmful substances whose safe use requires disclosure to local authorities in order that they may be adequately prepared to handle any spills. An actual emission, on the other hand, may be a slow leak of a marginally harmful substance. Fortunately, a proxy for violation severity that cuts across different classes of violations is readily available in the data: EPA reports the fines imposed on the violator (prior to any reduction under the Audit Policy). This measure of severity appears to confirm that self-audited violations are less significant.

The rest of the paper proceeds as follows: Section 2 discusses the source and nature of our data; Section 3 the presents our empirical assessment of the EPA’s Audit Policy. Finally, Section 4’s discussion considers some possible interpretations of our results and concludes.

Data Sources

While Appendix 3 discusses at length how we arrived at the data sets used to produce the tables below, here we briefly review the underlying data sources. They are both from EPA. Both

appear that EPCRA violations were predominant, and that the other violations again concerned SPCC plans.

¹⁵ This table summarizes Table 2A below.

are lists of case records involving violations of environmental laws. One concerns solely those uncovered through the Audit Policy, and the other concerns all other recorded cases.

For violations uncovered under the audit policy, collectively denoted the “Audit Docket,” hard copies of case files were furnished by the EPA for audit proceedings from 1994 to 1999. From these hard copy case records we encoded for each audit case the Case Number, Case Name, Law and Section violated. Also, using our best judgment, we chose the best match from the list of Violation types used by EPA in their standard enforcement practices (see below).

These Audit Policy case records include two values for the fine imposed: first, the proposed penalty, as per standard EPA rules; and second, the actual penalty, after the fine reduction for having participated in the Audit Policy process. (Recall, that this reduction is not always a 100% fine reduction of gravity penalties, and also that reductions do not apply at all to the economic benefit portion of the fine). The proposed penalty seems to be the better measure of severity of violation, as it should reflect severity as would fines under standard enforcement procedures.¹⁷

We refer to the non-Audit-Policy cases as the Standard Docket, which EPA provides in two parts, Administrative and Civil.¹⁸ The EPA provides electronic data for all cases under standard enforcement/compliance procedures for all the Federal environmental laws and regulations. The data for each record include several fields: Case Number (a unique identifier for each record),

¹⁶ Specifically these are the violation types REP, TRI and NONOTE (see Appendix 2 for their definitions).

¹⁷ With very few exceptions, we know only the total fine, and not its gravity and economic-benefit components. If the latter element is not correlated with severity, we could better infer severity from the former than from the total. We suggest below that the economic benefit is low for typical Audit docket cases. Thus, when comparing the fines, we focus on comparisons of violations of the same law or same section, where benefits are likely to be comparable. Any residual difference may be partially balanced if, for Audit cases, the gravity fines are higher relative to severity (see the Discussion section). Note that we cannot observe any pre-fine negotiation or plea bargaining that occurred.

¹⁸ For economic purposes, these are similar. The distinction is only where the case is adjudicated: in the independent judicial branch, or within the agency's own quasi-judicial system. The Administrative docket is for cases heard in the EPA's “in-house court system”, where the “administrative law judge” is an agency employee. The Civil docket is for cases that the EPA takes directly to the judicial branch, e.g. the Justice Department, to be tried in federal court. Here, the penalties and/or injunctive relief may be higher, but the EPA clearly has less control over the outcomes.

Case Name, Law Violated, Section Violated, Violation type (using EPA's encoding system), Pollutants, Date Filed, Date Concluded, Judicial District, Court Docket Number, Assessed Federal Penalty, Cost Recovery Awarded, and Result Code. Some records involve multiple violations (e.g., multiple laws and sections, though one penalty). Most of these involve multiple violations of the same law and section, but a small set involve violations of multiple laws. As we discuss below (including in Appendix 3), this matters in particular for our penalty comparisons, as we must in these instances apportion the single Assessed Penalty value among the violations.

Performance of the Audit Policy

How has EPA's Audit Policy performed? Certainly a number of firms have chosen to self-audit and report under the Policy. But the existence of some amount of self-auditing is an unqualified success only if our benchmark is no self-auditing whatsoever. We suggest that, instead, standard EPA enforcement outcomes are a more appropriate benchmark. The standard EPA enforcement outcomes will presumably reveal the EPA's allocation of effort in implementing compliance.

Thus, by comparing Audit Policy outcomes to standard EPA outcomes, we can test whether the Audit Policy is combating the non-compliance that regulators regard as most meaningful.

Specifically, we will compare the Audit Policy cases to the standard cases in three ways. First, we will examine the laws (and sections) that have been violated. Second, we will examine the types of violations (e.g., reporting versus emissions). Finally, we will compare the penalties. For interpreting our tables, Appendix 1 presents the acronyms for and descriptions of the laws, as well as the sections numbers for and a brief description of the sections violated. Also, Appendix 2 provides the list of violations types from EPA, providing a definition for each code and label.

Comparing Laws and Sections Violated

Table 1A shows that in the Audit docket close to 70% of the violations were of EPCRA, while another 15% were violations of RCRA and TSCA and only 6% were violations of CWA. In contrast, the Standard Administrative violations fell under EPCRA only 10% of the time, and EPCRA or RCRA or TSCA only 30% of the time, while over 25% of the violations fell under CWA. For each law, the fraction of Audit cases is statistically significantly different from the fraction of Administrative cases.¹⁹ The Civil cases differ by any even greater degree from the Audit cases (and they are also statistically significantly different from the Administrative cases): over 50% of the violations are of CERCLA, and 20% are of CAA, with almost 14% being of CWA, while very few cases are violations of EPCRA or of TSCA.

Laws Violated by Docket			
	Audit	Admin	Civil
EPCRA	72.19%	10.62%	1.60%
RCRA	9.44%	13.28%	8.75%
TSCA	6.75%	7.98%	0.99%
CWA	6.61%	26.26%	13.93%
FIFRA	4.72%	8.02%	0.80%
CAA	0.15%	11.10%	20.65%
CERCLA	0.12%	7.69%	51.48%
SDWA	0.03%	14.99%	1.73%
MPRSA	0.00%	0.05%	0.06%

Table 1A

Table 1B, which shows the sections of each law that were violated, depicts the dissimilarity even more starkly. EPCRA Section 302 comprises close to 60% of the Audit violations, but essentially does not appear in the two Standard dockets. Further, the five sections that make up almost 90% of the Audit violations make up less than 10% of Administrative and 5% of Civil.

¹⁹ For instance, for ANOVA in a regression context (i.e., docket dummies) comparing Audit to Administrative, the lowest t statistic on the docket difference is 2.5, next lowest is 6.2, and average t statistic across the laws is 25.2.

Laws and Sections Violated in the Audit Docket

Law	Section	Audit	Admin	Civil
EPCRA	302	58.03%	0.03%	0.00%
EPCRA	313	12.34%	4.82%	0.86%
RCRA	3010A	8.95%	0.13%	0.06%
CWA	311	6.56%	1.51%	1.42%
FIFRA	12A1C	4.73%	0.20%	0.00%
TSCA	5	3.22%	0.41%	0.00%
TSCA	153B	1.71%	0.21%	0.00%
TSCA	153	1.09%	0.00%	0.00%
EPCRA	311	1.00%	0.89%	0.00%
EPCRA	312	0.89%	2.53%	0.12%
TSCA	8	0.38%	0.29%	0.00%
TSCA	15	0.24%	1.21%	0.31%
RCRA	3008	0.21%	0.27%	0.74%
RCRA	3002A	0.15%	0.00%	0.00%
CERCLA	103A	0.12%	1.70%	0.68%
RCRA	3005	0.12%	1.11%	1.05%
CAA	111E	0.06%	0.07%	0.25%
CAA	7470	0.06%	0.00%	0.00%
CAA	609C	0.03%	0.00%	0.00%
CWA	301	0.03%	11.03%	4.38%
CWA	301A	0.03%	2.31%	1.05%
TSCA	151C	0.03%	0.33%	0.18%
TSCA	6E	0.03%	1.41%	0.25%

Table 1B

Table 1C below tells the same story. The CWA, Section 301 makes up about 10% of the Administrative docket and about 5% of the Civil docket, but is essentially non-existent among Audit cases. Further, the Audit cases under CWA center on Section 311, which is far less common in the Standard dockets. Finally, Table 1D shows that the sections in CERCLA and CAA that are common in Civil violations simply are not present in the Audit Policy cases.

Laws and Sections Violated in the Admin Docket

Law	Section	Admin	Civil	Audit
CWA	301	11.03%	4.38%	0.03%
EPCRA	313	4.82%	0.86%	12.34%
SDWA	1412	4.30%	0.31%	0.00%
SDWA	1414G	3.89%	0.06%	0.00%
RCRA	9006	2.90%	0.25%	0.00%
RCRA	LUST	2.73%	0.43%	0.00%
EPCRA	312	2.53%	0.12%	0.89%
CWA	404	2.48%	1.54%	0.00%
CAA	112	2.40%	2.77%	0.00%
CWA	301A	2.31%	1.05%	0.03%
SDWA	1414	2.00%	0.25%	0.00%
FIFRA	7C	1.96%	0.06%	0.00%
CWA	308	1.83%	0.37%	0.00%
CERCLA	106	1.71%	2.65%	0.00%
CERCLA	103A	1.70%	0.68%	0.12%
CAA	SUBCHP6	1.57%	0.18%	0.00%
CWA	311	1.51%	1.42%	6.56%
CWA	402	1.44%	1.66%	0.00%
CAA	211	1.43%	0.12%	0.00%
TSCA	6E	1.41%	0.25%	0.03%

Table 1C

Laws and Sections Violated in the Civil Docket

Law	Section	Civil	Admin	Audit
CERCLA	107A	22.56%	0.16%	0.00%
CERCLA	107	7.64%	0.29%	0.00%
CERCLA	106A	6.35%	0.86%	0.00%
CAA	110	4.50%	0.52%	0.00%
CWA	301	4.38%	11.03%	0.03%
CAA	113	3.70%	0.77%	0.00%
CAA	111	2.90%	0.87%	0.00%
CAA	112	2.77%	2.40%	0.00%
CERCLA	106	2.65%	1.71%	0.00%
CAA	114	1.79%	0.44%	0.00%
CERCLA	104000	1.73%	0.00%	0.00%
CWA	402	1.66%	1.44%	0.00%
CERCLA	106B	1.54%	0.01%	0.00%
CWA	404	1.54%	2.48%	0.00%
CWA	311	1.42%	1.51%	6.56%
CERCLA	10400	1.23%	0.00%	0.00%
CERCLA	122	1.17%	0.41%	0.00%
RCRA	7003	1.17%	0.24%	0.00%
CAA	165	1.11%	0.02%	0.00%
CWA	309	1.11%	0.31%	0.00%
CERCLA	107C3	1.05%	0.01%	0.00%

Table 1D

To get a sense of what these differences in laws and sections violated mean (and to preview Table 2’s discussion of types of violations), note that Section 302 of EPCRA, the most prevalent violation in the Audit docket, concerns notification of local authorities about potential risks. The second and third most commonly violated sections in the Audit data are EPCRA Section 313, requiring submission of reports to the EPA and local agencies for the use and manufacture of certain chemicals, and RCRA Section 3010 (A), requiring the submission of manifests for hazardous waste transport. Like violations of EPCRA Section 302, violations of EPCRA Section 313 and RCRA Section 3010 (A) are unlikely to involve actual emissions. In contrast, the most commonly violated section in the Administrative docket, Section 301 of CWA, concerns the discharge of pollutants into waters without express authorization (33 USC Sect 1311 et seq.).

Comparing Types of Violations

That the violations uncovered by the Audit Policy are not of the same nature as those found by EPA's chosen, standard procedures is confirmed in Table 2's comparison across violations (recall, we applied EPA's violation codes (see Appendix 2 for definitions) to the Audit cases).

Violations by Audit Docket frequency			
	Audit	Admin	Civil
REP	71.89%	14.21%	2.34%
TRI	13.25%	1.08%	0.12%
NONOTE	6.36%	2.40%	1.23%
FIFRA	4.69%	4.38%	0.98%
PMN	2.02%	0.30%	0.00%
IMP	0.59%	0.44%	0.12%
PRMTVL	0.47%	10.57%	7.26%
PCB	0.35%	0.95%	0.37%
SPILL	0.18%	1.39%	2.95%
PSD	0.06%	0.07%	2.58%
STR	0.06%	1.37%	2.21%
NOPRMT	0.03%	6.12%	6.15%
NORPTG	0.03%	1.77%	2.46%
STRAT	0.03%	1.49%	0.25%

Table 2A

Over 70% of Audit Policy violations are REP (“reporting”), while another 13% are TRI (“Toxic Release Inventory”) and a further 6% are NONOTE (“failure to notify”) violations. By these figures alone, 90% of violations uncovered under the Audit Policy concern only reporting or submitting, in one form or another, and do not directly concern actual emissions. The RCRA violations of the REP violation type concern the failure properly to label hazardous wastes with EPA ID numbers during transport, and the failure to submit a manifest to EPA agents so that hazardous waste disposal can be properly tracked. The TRI violations (which are violations of the EPCRA law) stem from failures to update and submit a Toxic Release Inventory Form for potentially hazardous chemicals that are legally used in industry. Submission of this form allows state and local officials to track firms’ manufacture and use of certain chemicals.

In the Administrative and Civil cases, less than 20% and 5% of the violations, respectively, are REP, TRI or NONOTE. More generally, for each violation type the fraction of Audit cases is statistically significantly different from that type's fraction of Administrative and Civil cases.²⁰

Violations by Admin. Docket frequency

	Admin	Civil	Audit
REP	14.21%	2.34%	71.89%
PRMTVL	10.57%	7.26%	0.44%
EFF	6.66%	4.18%	0.00%
NOPRMT	6.12%	6.15%	0.03%
FIFRA	4.38%	0.98%	4.69%
OTHER	4.35%	5.54%	0.00%
PWSM/R	4.04%	0.37%	0.00%
UST	3.66%	1.72%	0.00%
NONOTE	2.40%	1.23%	6.36%
PLAN	2.40%	0.62%	0.00%
GFR	2.33%	1.72%	0.00%
PWSNP	2.11%	0.49%	0.00%
NESHAP	2.02%	4.55%	0.00%
NORPTG	1.77%	2.46%	0.03%
STORM	1.67%	0.00%	0.00%
AOVIOL	1.61%	2.71%	0.00%
404PMT	1.60%	2.21%	0.00%
STRAT	1.49%	0.25%	0.03%
REC	1.46%	0.86%	0.00%
PWSMCL	1.41%	0.25%	0.00%

Table 2B

Violations by Civil Docket frequency

	Civil	Admin	Audit
SIP	7.50%	0.35%	0.00%
PRMTVL	7.26%	10.57%	0.44%
NOPRMT	6.15%	6.12%	0.03%
EMIS	6.03%	0.54%	0.00%
OTHER	5.54%	4.35%	0.00%
NSPS	4.92%	1.00%	0.00%
NESHAP	4.55%	2.02%	0.00%
EFF	4.18%	6.66%	0.00%
SPILL	2.95%	1.39%	0.18%
AOVIOL	2.71%	1.61%	0.00%
DSP	2.71%	1.02%	0.00%
PSD	2.58%	0.07%	0.06%
NORPTG	2.46%	1.77%	0.03%
REP	2.34%	14.21%	71.89%
404PMT	2.21%	1.60%	0.00%
STR	2.21%	1.37%	0.06%
GFR	1.72%	2.33%	0.00%
PRETMT	1.72%	0.75%	0.00%
UST	1.72%	3.66%	0.00%
ASB	1.60%	1.10%	0.00%

Table 2C

While REP is the most common type of violation among Administrative cases, at 14%, the next most common is PRMTVL (“permit violation”), at 10%, followed by EFF (“effluent”) and NOPRMT (“discharge without a permit”) at over 6% each. Also, PRMTVL (7%) and NOPRMT (6%) rank second and third in the Civil rankings, while EMIS (“emissions”) is fourth, at 6 % as well, and both NSPS (i.e., a violation of a “new source performance standard”) and NESHAP (i.e., a violation of a “national emission standard for a hazardous air pollutant”) each make up almost 5%. The key point is that other than REP, these violations involve actual emissions.

²⁰ As above, for ANOVA in a regression context (i.e., docket dummies) comparing Audit to Administrative for the major violation types, the lowest t statistic on docket difference is 3.0, next lowest is 10.8, and the average is 35.7.

Fines as a Proxy for Severity

Tables 3A, 3B and 3C use average fines per violation to compare the severity of violations across the three dockets. Table 3A conveys very broad averages for each docket. As shown, Audit fines are the lowest (these are the proposed fines, not the lowered fines after Audit Policy reductions). Given the total number of observations, this difference is statistically significant.²¹

Docket	Observations	Mean Fine	Std. Dev.
Civil	568	\$527,236	2,107,117
Admin	10350	\$17,800	101,968
Audit	1876	\$5,674	8,554

Table 3A -- average fines by docket

The averages in Table 3A suggest that the differences seen in Tables 1 and 2 correspond to differences in the severity of the violations. It is also worth checking whether violations under the Audit Policy for *any given law or section* are more or less severe than those discovered under standard enforcement practices. Table 3B breaks the cases down by law, so that the severity of more similar cases can be compared across the dockets. For every law except CAA the severity as indicated by fines per violation is lower for Audit cases than for Administrative cases. And for CAA, there are so few Audit cases that the mean Audit fine, and thus also the difference in mean fines, may well not be a good predictor of future Policy outcomes (statistically, note that the 95% confidence interval around the difference in mean fines includes zero for CAA, which is not the case for any other law, although CERCLA comes close again because of very few Audit cases).

²¹ Recall (and see Appendix 3) that for multiple-violation cases we must apportion the single recorded fine value for the case among the multiple violations. We divide evenly for cases in which the multiple violations are all of the same law (those plus single-violation cases are over 98% of cases; we are not comfortable doing the same division for the multiple-law cases). If we use only single-violation cases, we find that these results are essentially the same.

This is a good place to note also that the docket-dissimilarity results above are robust to whether the multiple-violation cases are dropped. The qualitative results are very robust. For instance, if the fractions in Table 1A are re-computed using only the first violation in each record, those results and the ones in Table 1B remain. Further, if the same approach were taken for Table 2, still REP and TRI would be the violation types for over 70% of the cases in the Audit Docket. However, treating each violation separately, and counting them all, seems the better approach.

Law	Docket	Obs.	Mean Fine
EPCRA	Audit	1046	\$6,825
	Admin	1522	\$13,847
	Civil	3	\$35,845
RCRA	Audit	312	\$468
	Admin	2012	\$20,537
	Civil	50	\$740,725
TSCA	Audit	228	\$9,672
	Admin	1259	\$40,522
	Civil	4	\$14,788
FIFRA	Audit	160	\$5,000
	Admin	1113	\$10,055
	Civil	8	\$6,129
CWA	Audit	118	\$1,320
	Admin	2085	\$12,912
	Civil (drop outliers)	130	\$260,547
	Civil	134	\$607,993
CERCLA	Audit	4	\$0
	Admin	220	\$46,963
	Civil	104	\$40,102
CAA	Audit	4	\$49,658
	Admin	1287	\$14,121
	Civil (drop outliers)	247	\$270,832
	Civil	255	\$684,296
SDWA	Audit	1	\$0
	Admin	839	\$3,263
	Civil	10	\$208,078

Table 3B -- average fines by law by docket

Recall from above (or see Appendix 3) that for cases with multiple violations of one law, we divide the single fine value provided by the number of violations to get an average fine value.

The results above are robust to these multiple-same-law-violations being dropped. Thus it is a robust result that, even controlling for the laws violated (the distribution of these laws differs by docket, a fact which underlies Table 3A), the Audit Policy seems to turn up less severe cases.

Table 3C then disaggregates Table 3B one step further, i.e. by law and section. To keep the table of manageable size, only the most commonly violated law sections per docket are listed (with one table per docket, each of which lists the docket's most common law sections violated).

That cases with fines do not exist for the last, Audit column of the bottom two parts of the table emphasizes the point from the tables above that the dockets contain different kinds of violations.

Focusing on the ten law/sections most commonly violated in Audit cases, each has lower mean fines for Audit cases than for Standard cases, except for the last two sections, i.e. EPCRA Sections 311 and 312. Thus, generally, even within the set of violations that are most frequently uncovered under the Audit Policy, the Audit Policy is catching relatively less severe violations. The only types of cases for which Audit Policy violations are more severe concern reporting.

Law/Sections Violated by Audit Docket frequency				
Law	Section	% Audit	Avg. Audit Fine	Avg. Admin Fine
EPCRA	302	58.03%	\$1,601	N/A
EPCRA	313	12.34%	\$13,103	\$19,845
RCRA	3010A	8.95%	\$0	\$14,256
CWA	311	6.56%	\$1,175	\$5,021
FIFRA	12A1C	4.73%	\$5,000	\$5,695
TSCA	5	3.22%	\$11,994	\$35,820
TSCA	153B	1.71%	\$6,386	\$15,343
TSCA	153	1.09%	\$3,676	N/A
EPCRA	311	1.00%	\$14,941	\$9,531
EPCRA	312	0.89%	\$12,500	\$7,244

Law/Sections Violated by Administrative Docket frequency				
Law	Section	% Admin	Avg. Admin Fine	Avg. Audit Fine
CWA	301	11.03%	\$15,333	N/A
EPCRA	313	4.82%	\$19,845	\$13,103
SDWA	1412	4.30%	\$2,192	N/A
SDWA	1414G	3.89%	\$1,300	N/A
RCRA	9006	2.90%	\$1,461	N/A

Law/Sections Violated by Civil Docket frequency				
Law	Section	% Civil	Avg. Civil Fine	Avg. Audit Fine
CERCLA	107A	22.56%	\$56,079	N/A
CERCLA	107	7.64%	\$13,179	N/A
CERCLA	106A	6.35%	\$2,893	N/A
CAA	110	4.50%	\$307,824	N/A
CWA	301	4.38%	\$725,414	N/A

Table 3C

Discussion

EPA's Audit Policy appears to be serving quite a different function from what one might have expected after reading the content of the policy and EPA publications touting its success. The policy has not been acting as a substitute for EPA enforcement actions across the board. Rather, its impact has been fairly contained to those violations involving the failure to report or to keep records. Major emissions violations—the bread and butter of EPA's standard enforcement actions—are not the kinds of violations that firms are volunteering to EPA.

What explains the distinctive character of the Audit Docket? We discuss below a suite of possible explanations. As we note in our final summary, the key point is that until it can be determined which of these explanations are the most important, whether and how best to change the Audit Policy will remain unclear. And until then, the Policy could even be detrimental.

Bad Deal: The easiest explanation is that EPA's offer of special dispensation for self-reporters is simply not attractive enough to induce firms to participate. But the bare assertion that the Policy is a "bad deal" for firms does not explain the fact that self-reported violations have been skewed towards less significant reporting and record-keeping violations. If the Audit Policy were a bad deal, we would expect to see few self-reported violations across the board.

Gravity Ratio: Another explanation starts with the fact that EPA reduces only the gravity component of fines for firms that have self-reported, still assessing in full the economic benefit component of the fine—i.e., the dollar value of the economic benefit that the firm derived from noncompliance. Therefore, the benefits of self-reporting are greatest for violations for which the gravity penalty is the major component of the total penalty. Examination of the firm's decision problem reveals that, given the share of the gravity component, the size of the total fine should be of no consequence in determining whether the firm chooses to participate in the Audit Policy.

Consider a violation with total fine F , the fraction x of which constitutes the gravity portion. Imagine that the (risk neutral) firm believes there is a p chance that EPA will detect the violation on its own, if the firm does not self-report. Assuming a 100% reduction in the gravity component for self-reporting, the firm pays a fine of $F(1-x)$, if it reports, and faces an expected fine of pF , if it does not. Self-reporting is best when $pF > F(1-x) \Leftrightarrow x > (1-p)$. Thus, self-reporting is best for the firm only when the gravity portion of the fine exceeds the chance of going undetected. The overall fine F has no independent impact on the firm's decision of whether to self-report.²²

Thus, we would expect to find more self-reporting of violations for which x , the gravity component of the fine, is relatively large compared to the economic benefit portion of the fine. Unfortunately, data currently provided by EPA do not permit computation of x . Thus, it is not possible for us systematically to test the correlation between x and the chance of self-reporting.

Nevertheless, it seems plausible that the gravity portion of total fines would be relatively large for violations that involve the failure to report or record information—the bulk of the Audit Policy violations. Economic benefits from failing to report would appear to be relatively slight, consisting mainly of savings in monitoring costs, clerical costs, and legal fees. In contrast, the cost savings from not preventing emissions, e.g., not replacing pollution control equipment, not properly treating waste water before releasing it into a nearby estuary, or not taking expensive precautions required for the handling of hazardous substances, are likely to be significant.

Furthermore, if the Audit Policy violations are less severe, as we suggest, it is relevant that the factors that EPA uses to determine the gravity component of fines include a number of

²² If firms audit and report more when the reduceable, gravity component is greater, one might suggest making the entire fine reduceable, including the economic benefit portion. However, allowing firms to capture even part of the economic benefit of non-compliance that accrues until self-disclosure would create a perverse incentive to put off remedying violations found. If they could time their self-reporting to precede EPA's own detection, firms might even have an incentive to plan regular, temporary, cost-saving violations. If it knew EPA evaluated its smokestack

dimensions that do not appear to be proportional to the severity of the violation. These include the size of the violator, the extent to which the violator fell short of the requirement,²³ the general presence of compliance problems in the region,²⁴ and whether “the violator already has instituted expeditious remedies to the identified violations prior to the commencement of litigation.”²⁵

Moreover, EPA policy calls for routine imposition of a “non-trivial” gravity component on top of the economic benefit fine to insure proper deterrence.²⁶ For less severe violations, these types of “fixed cost” elements could make the gravity component higher than one might otherwise expect.

What evidence there is on the relationship between self-reporting and the relative size of the gravity component in potential penalties seems to confirm our conjecture that these are positively correlated across violations. In the GTE case touted by the EPA, for example, the economic

emissions every December, a firm might rationally turn off its scrubber every January and “shamefacedly discover” that fact the next November, thus receiving fine amnesty for self-reporting and achieving cost savings via violation.

²³ According to the EPA: “In quantifying the gravity of a violation...the following factors should be considered:

1) Actual or possible harm: This factor focuses on whether (and to what extent) the activity of the defendant actually resulted or was likely to result in an unpermitted discharge or exposure; 2) Importance to the regulatory scheme: This factor focuses on the importance of the requirement to achieving the goal of the statute or regulation. For example, *if labelling is the only method used to prevent dangerous exposure to a chemical, then failure to label should result in a relatively high penalty*. By contrast, a warning sign that was visibly posted but was smaller than the required size would not normally be considered as serious. 3) Availability of data from other sources: *The violation of any recordkeeping or reporting requirement is a very serious matter*. But if the involved requirement is the only source of information, the violation is far more serious. By contrast, if the Agency has another readily available and cheap source for the necessary information, a smaller penalty may be appropriate (e.g., a customer of the violator purchased all the violator’s illegally produced substance. Even though the violator does not have the required records, the customer does). 4) Size of violator: In some cases, the gravity component should be increased where it is clear that the resultant penalty will otherwise have little impact on the violator in light of the risk of harm posed by the violation. This factor is only relevant to the extent it is not taken into account by other factors.” See 14 ELR at 30007 [emphasis added]

²⁴ 14 ELR at 30001 (“In some classes of cases, the normal gravity calculation may be insufficient to effect general deterrence. This could happen if, for example, there was extensive noncompliance with certain regulatory programs in specific areas of the United States. This would demonstrate that the normal penalty assessments had not been achieving general deterrence. In such cases, the case development team should consider increasing the gravity component sufficient to achieve general deterrence.”)

²⁵ 14 ELR at 30002

²⁶ 14 ELR at 30002 (“EPA typically should seek to recover, at a minimum, a penalty which includes the benefit component plus some non-trivial gravity component. This is important because otherwise, regulated parties would have a general economic incentive to delay compliance until the Agency commenced an enforcement action. Once the Agency brought the action, the violator could then settle for a penalty less than their economic benefit of

benefit component of GTE's fine for failing to report sulfuric acid filled batteries was only \$52,264. In contrast, the gravity component, from which GTE was excused as a result of self-reporting, was \$2.38 million, or 98% of the total fine (EPA March 1998). Similarly, in five of the seven other Audit cases for which we have the economic-benefit fine value in EPA's data, this component was 2% or less of the total fine (the other two were 1/3 and 2/3 of the total).

Mandatory Reporting Requirements: A third explanation concerns the mandatory reporting requirements built into emissions-based statutes such as the Clean Water Act²⁷ and the Clear Air Act.²⁸ Under these reporting requirements, firms are required to actively monitor and to report to EPA on effluent discharges and the like. Perhaps such mandatory reporting requirements crowd out the kind of voluntary reporting that would fall under the Audit Policy.

Firms may already be conducting an exhaustive investigation of potential emissions points as a result of these reporting requirements. If so, perhaps this means that they are unlikely to find anything new from investigative efforts they expend over and above what is already required. And even if they do find something in their supra-mandatory investigation, they may not expect to get a break for reporting newly found emissions violations that were supposed to be revealed in a mandatory report. This might explain the relative scarcity of self-reporting under the Audit Policy for emissions violations under statutes such as the Clean Water Act and the Clean Air Act.

That explanation, however, is not entirely consistent with our data. In the first place, we do see emission violations in both of the standard dockets. This would indicate that the mandatory monitoring and reporting is not catching everything. Secondly, we do see emissions violations in the audit docket, indicating that additional auditing does yield additional violations.

noncompliance. This incentive would directly undermine the goal of deterrence.”)

²⁷ 33 USC § 1318 (2001) .

²⁸ 42 USC § 7413(c)(2) (2001) .

Finally, if violations to which the reporting requirements apply are dominating the results, we might expect the audit docket to show a large number of cases with coupled emissions and reporting violations. For instance, a firm that has belatedly discovered an emissions problem that should have been disclosed under mandatory reporting requirements could apply for Audit Policy treatment for both the emissions violation and the corresponding violation of the mandatory reporting requirements. Were this the case, it would help to explain the disproportionately large fraction of reporting violations in the audit docket. A given emissions violation would be more likely to be paired with a corresponding reporting violation in the audit the docket than in either of the standard dockets. But this explanation is not consistent with the data, given that most of the reporting cases within the audit docket are for single violations. Furthermore, when there are cases with multiple violations, they do not clearly match the suggested pattern.

Superfluous Disclosure Requirements: Yet another explanation of the patterns that we have observed is based on the preconditions EPA imposes on fine reduction, which include disclosure. Depending on firms' preferences regarding disclosure (and the possibility that their disclosures could be used against them in suits brought by private parties), the disclosure requirement could be an extra filter biasing Audit cases towards reporting. But, as two of us have argued elsewhere, fine reduction need not be tied to a firm's disclosure to the EPA.²⁹ Effective fine reduction for self-audited violations could address the disincentive issue simply by reducing fines to the extent that a firm's self-investigation aided in detecting a violation. Thus, EPA could correct incentives by discounting fines to such an extent that expected fines—taking into account the increased probability of detection resulting from self-auditing—remain roughly constant whether or not a firm has audited. If this were the policy, firms would have nothing to lose from self-auditing

²⁹ Pfaff, A.S.P. and C.W. Sanchirico (2000). "Environmental Self-Auditing: Setting the Proper Incentives for

across all potential violations, not just those that they would not mind admitting to EPA.

Red Herring: A final explanation for the “small fry” nature of the Audit docket violations could be that firms are trying to use the Audit Policy strategically. It is tempting to speculate that at least a few firms have decided to try to use self-reported minor violations in order to distract EPA’s attention from unreported major violations. In other words, the small fries we see may specifically be red herrings. Thus, a firm might happily bring to EPA its 600 reporting and recording violations, in the hope that this “bounty” will occupy the attention and partly satisfy the ‘enforcement appetite’ of the local EPA office and/or national enforcement officials, in the process directing regulatory attention away from real environmental risks at a local plant.

A Need For Change? Whatever the explanation for the limited nature of disclosures up to this point under the EPA’s Audit Policy, one might argue that the policy is still serving a useful purpose. When firms turn themselves in even for minor violations, the argument might run, this frees up EPA resources to tackle major violations. But given the possibility that self-reported violations are red herrings, as just discussed, this is dubious consolation. If, for example, many firms are successfully strategic, the Audit Policy may actually be detracting from the EPA’s preferred allocation of resources. Generally, without an Audit Policy the EPA is free to decide for itself what violations to focus on, much the way a prosecutor decides what suspects to criminally prosecute. With a “small fry” Audit Policy, however, EPA is obliged to deal with all the minor violations that firms bring to it. This may cause a less than beneficial reallocation of resources, just as a prosecutor may have less time to investigate homicides when she is obliged to respond to every confession, however minor, brought in from the neighborhood.

Thus, we can not even be assured that the EPA’s current Audit Policy is at worst harmless.

Discovery and Correction of Environmental Harm”. *Journal of Law, Economics & Organization* 16(1):189-208.

Accordingly, more research indicating precisely why the Audit Policy is of such starkly different character is of prime importance. Without additional understanding of why the Audit Policy has produced the outcomes it has, it is not possible to recommend with confidence how to improve those outcomes. And in the meantime, the policy could be doing more harm than good.

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APPENDIX 1 -- descriptions of laws and law/sections

Clean Air Act (CAA): enacted in 1970 (and amended in both 1977 and 1990), it is the comprehensive Federal law that regulates air emissions from area, stationary and mobile sources. It gives EPA the right to establish National Ambient Air Quality Standards (NAAQS) to protect public health and the environment. The goal of the Act was to set and achieve NAAQS in every state by 1975. The act was amended in 1990 in order to address related problems such as acid rain, ground-level ozone (smog), stratospheric ozone depletion and air toxics.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA): commonly known as the Superfund Act, it was enacted in 1980 in order to establish prohibitions and requirements concerning uncontrolled or abandoned hazardous waste sites. It also provided for the liability of persons responsible for releases of hazardous wastes at these sites and established a trust fund to provide for cleanup when no responsible party could be identified.

Clean Water Act (CWA): the Federal Water Pollution Control Act Amendments of 1972, as amended in 1977, which set the basic structure for regulating discharges of pollutants to waters of the United States. The law gave EPA the right to set effluent standards on an industry basis and continued the requirements to set water quality standards for all contaminants in surface waters. The CWA makes it illegal for any person to discharge any pollutant from a non-stationary source into navigable waters unless a permit is obtained under the Act.

Emergency Planning and Community Right to know Act (EPCRA): enacted in 1986 (as part of SARA) to be the national legislation on community safety. EPCRA was designed to protect public health, safety, and the environment from chemical hazards. Under EPCRA, firms must inform local emergency planning committees (LEPC) and the state emergency response commission (SERC) of the hazardous chemicals they are using. The EPA determines the criteria for hazardous chemicals. EPCRA also requires companies to disclose to these local agencies as well as to the EPA of any new or unknown chemicals they are using or creating.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA): enacted in 1972 to provide federal control of pesticide distribution, sale and use, it gives EPA authority to require users of pesticides to register when purchasing pesticides. The EPA licenses all pesticide use in the US.

Resource Conservation and Recovery Act (RCRA): enacted in 1976 (and amended in both 1984 and 1986), it gives EPA the right to control the generation, transportation, treatment, storage, and disposal of hazardous waste (but not for abandoned or historic sites; see CERCLA). The HSWA amendments in 1984 require phasing out land disposal of hazardous wastes.

Safe Drinking Water Act (SDWA): established in 1974 to protect the quality of drinking water in the US. This law focuses on all waters actually or potentially designed for drinking use. The Act gives EPA the right to establish safe standards of water purity and to require all owners or operators of public water system to comply with primary (health-related) standards.

Toxic Substance Control Act (TSCA): enacted in 1976, gave EPA the ability to track the 75,000 industrial chemicals produced or imported into the US, and to ban the manufacture and import of chemicals that pose an unreasonable risk. The EPA repeatedly screens these chemicals and can require reporting or testing of those that may pose environmental or health hazards.

<u>Section #</u>	<u>Section Description</u>
CAA	
110	Implementation plans
111	Standards of performance for new stationary sources
112	National emission standards for hazardous air pollutants
113	Federal enforcement
609	Servicing of motor vehicle air conditioners
CERCLA	
106	Superfund cleanup by potentially responsible parties
107	Strict liability and cost recovery
CWA	
301	Point source distribution of pollutants
311	Hazardous materials/minimum reporting requirements
404	Discharge of dredged or fill materials
EPCRA	
<u>Subtitle A</u>	<u>Emergency Planning and Notification</u>
301	Establishment of State commissions, planning districts, and local committees
302	Substances and facilities covered and notification
303	Comprehensive emergency response plans
304	Emergency notification
305	Emergency training and review of emergency systems
<u>Subtitle B</u>	<u>Reporting Requirements</u>
311	Material safety data sheets
312	Emergency and hazardous chemical inventory forms
313	Toxic chemical release forms
FIFRA	
7C	Pesticide producing establishment reporting requirement
MPRSA	
101	Transportation of materials for ocean dumping
RCRA	
3002	Hazardous waste generation
3003	Hazardous waste transportation
3005	Hazardous waste treatment, storage, and disposal
3010	Notification of hazardous waste activity
9006	LUST Compliance & Penalty Order
SDWA	
1412	National drinking water regulations
1414	Monitoring of local water safety regulators
TSCA	
5	Premanufacturing notification of chemical substances
8	Reporting and retention of information
13	Toxic substances importation (entry from other countries)
15	Toxic substance storage and disposal

APPENDIX 2 -- violation codes

<u>Acronym</u>	<u>Description</u>	<u>Acronym</u>	<u>Description</u>
ACC	Accreditation	PWSM/R	PWS monitoring/reporting
ACORD	CERCLA 104E Access order/case	PWSMCL	PWS maximum containment level
ARSN	Arsenic	PWSNP	PWS notification to public
ASB	Asbestos	PWSSA	PWS sampling & analyzing
CLO	Closure & post-closure plan	REC	Required records maintenance
CON	Container	REP	Reporting violations
DSP	Disposal	SIP	State implementation plan
EFF	Effluent	SIPA1	SIP - A1 Source
EMIS	Emissions	SIPA2	SIP - A2 Source
FIFRA	FIFRA	SIPB	SIP - B Source
FIN	Financial responsibility	SLUDGE	Sludge
GFR	General facility requirements	SPILL	Spill
GRANT	P.L. 92-500 facility	STR	Storage
GWM	Groundwater monitoring	TRI	Toxic release inventory (Section 313)
IMP	Imports	TRT	Treatment
IND	Industrial source	UIC	Underground Injection Control (SDWA)
INFO	CAA/114 (Info)	UICCAC	UIC Casing and cementing
IP	Interim prohibition violation	UICMFL	Fluid movement in underground source of drinking water
LBAN	Land ban	UICMIN	Mechanical integrity
LDT	Land disposal & treatment	UICMON	Monitoring
MPRSA	Marine Protection Research and Sanctuary Act	UICNPA	No approved plugging and abandonment plan
N/A	Not applicable	UICOIN	Injection between outermost casing
NESHAP	National Emission Standard for Hazardous Air Pollutant	UICPRS	Injection beyond authorized pressure
NODMR	Failure to submit a Discharge Monitoring Report	UICUNI	Unauthorized injection
NONOTE	Failure to notify	UICUNO	Unauthorized operation of a Class IV well
NOPRMT	Discharge without a permit	UICVPA	Compliance with plugging & abandonment plan
NORPTG	No reporting or monitoring	UST	Leaking underground storage tank
NSPS	New Source Performance Standard	VHAP	Volatile hazardous air pollutants
NSR	New Source Review	VOC	Volatile organic compound
OP	Opacity	WKPR	Work practices (Asbestos D/R)
PCB	Polychlorinated Biphenyl	WRP	Worker Protection
PM	Particulate matter	404PMT	Wetlands Protection
PMN	Pre-manufacturing notice	(404/CWA)	
PRETMT	Pretreatment		
PRMTVL	Permit violation		
PSD	Prevention of significant deterioration		

APPENDIX 3 -- from data sources to tables

EPA's Standard Docket: raw text to spreadsheet

The EPA provides data for the Standard Docket, which has two parts (Administrative and Civil), in the form of zipped files which themselves contain text files (containing fixed width fields). The zipped files we received were admin1.zip, admin2.zip, civil1.zip, and civil2.zip. The text files contained within the zip files were casename.adm, readme.adm, defname.adm, facname.adm, casename.civ, readme.civ, defname.civ, and facname.civ. We utilized only the 'casename' files. When either of these files is opened into a spreadsheet program such as Excel, each fixed width field is converted into a column (although this is not as automatically perfect a process as would be useful, such that checking the results of this conversion seems necessary).

For each record, the following fields are in the casename.adm file:

- Docket Number (this is a unique identifier for each record)
- Case Name
- Law (actually 5 fields here, for each of up to 5 violations within one record)
- Section (again up to 5), Violation (again up to 5), Pollutant (again up to 5)
- Date Issued & Date Final Order Issued
- Court Docket Number
- Assessed Federal Penalty
- Cost Recovery Awarded
- Result Code

The casename.civ file includes the same fields as those listed above, with the exceptions:

- Date Issued is replaced with Date Filed
- Date Final Order Issued is replaced with Date Concluded
- There is an additional field: Judicial District

Using the Docket Number, we discarded Standard cases for before 1994, to match the Audit data. This was achieved by extracting the year (in the middle of the field) from the Docket Number, sorting the list by Year, and keeping only those with years 1994 or above. We detail this process for year identification because it differs from using the Date Issued or Date Final Order Issued. The resulting Excel spreadsheets were saved as admindoc.xls and civildoc.xls.

EPA's Audit Docket: hardcopy to spreadsheet

These data were provided to us in hardcopy form, specifically as copies of the documents in the audit policy case files for 1994 (the program's inception) to 1999. We entered information from these documents into Excel. Specifically, we summarized the information on the violation as well as the law and section violated. Also, we created a violation code by using our judgement to apply EPA's violation codes to these cases after reading all the information provided. While this did not seem very difficult, it is worth noting that we had to create these codes, since we analyze them within Tables 2. The resulting Excel spreadsheet was saved as AuditDoc.xls.

Both Dockets: from spreadsheet to Stata and analyses for tables

The above three Excel files (admindoc.xls, civildoc.xls and auditdoc.xls) were converted into Stata format using StatTransfer. Thus Stata datasets are created which include information on at least each record's law, section, and violation as well as the proposed and the assessed penalties.

One important issue is that for the Standard data there are blank cells in the Excel spreadsheet (following from the raw text files) for about half of the records' fine levels. To the extent that fines can indicate severity of violations, which is the interpretation we give to our Table 3, it is important to understand what a blank means here. If it is equivalent to a zero, then it indicates low severity. If it indicates a different approach by the EPA to achieving its goals, other than through fines, then it is not clearly correlated with severity at all. In part as a result of conversations with EPA Docket personnel, we believe that we should not assume blank fines indicate zero fines levels. However, we test our conclusions for robustness to this choice.

Table 1A -- Distribution of Violations by Law, comparing the Dockets

From the Standard data, again, data from before 1994 were discarded. This was to improve comparison with the Audit data, which exists only from 1994 onward. Recall that each case, or record, can include multiple violations, up to five (this is less common in the Audit docket, with more than one violation appearing in less than ten percent of the cases). We count by violation, i.e. if a single law is listed as being violated five times, that counts as five separate violations. Thus, our total number of violations is significantly greater than the total number of cases.

The percentages by docket by law in the table are the number of violations of a given law (calculated as just described) in a given docket over all violations in the docket. Note that some variations were done to test robustness, including removing from the pool all violations linked to CERCLA 106 and 107 (this includes sections 106, 106A, 106B, 107, 107A, 107C3, 107L; for multiple violation cases, the entire case was dropped, i.e. violations of other laws in that record were not counted) and recalculating the percentages. This affects the pool for the Civil part of the Standard Docket (739 of 1622 total violations dropped), and to a lesser extent also the Administrative (635 of 19731 violations). We also tried eliminating all CERCLA cases, which in Civil meant 843 of 1622 total violations and in Administrative meant 1374 of 19731.

Tables 1B/C/D -- Distribution of Violations by Law/Section, comparing the Dockets

Using the same data, further analysis split each law violated into its particular sections, and then the section percentages were calculated by dividing the total number of violations of any individual section by the total number of sections violated (same as the total number of laws violated, i.e. number of violations). These data were arranged by percentages in three ways: in order of frequency in the Audit Docket, with Standard frequencies to compare; by the frequency in the Standard Administrative data, with Audit data frequencies to compare; and by frequency in the Standard Civil data, with Audit data frequencies to compare. These calculations were then also redone excluding CERCLA sections 106 and 107 and excluding all of CERCLA.

Tables 2 -- Distribution of Violations by Type, comparing the Dockets

Violations codes were created for the Audit docket by looking at law/section violated, the proposed penalties, and the description of the violation, and then choosing the violation code that matched best, from the codes used by the EPA in the Standard docket. Thus, we had to create this “data” in order to compare the types of violations across dockets. Again, the total violations were summed, and multiple violations were counted as multiple instances. Violations in the standard docket with no violation code were discarded. Percentages were calculated within each docket by dividing the total number of instances of an individual violation code by the grand total of violations. The data were arranged by frequency within each of the Dockets.

Note that when this is redone without CERCLA 106 & 107 and without all of CERCLA, despite the importance of CERCLA in at least the Standard Civil data the results here were not substantially different from above. This is due to an anomaly in the data furnished by EPA: CERCLA 106 and 107 cases have a lot of missing violation codes, and were dropped above. For instance, in the Civil data over half the violations have violation type codes, while for the CERCLA data only 40 of 843 violations have violation type codes, i.e. the rest are missing. And in the Administrative data, about 80% of the approximately 20,000 violations have violation type codes, but in the 1374 CERCLA violations only 353 violations have codes.

Table 3A -- Mean Fines, comparing the Dockets

In analyzing fines, we must consider what to do with cases containing more than one violation (in the Audit docket, 5%; Civil docket, 38%; Admin docket, 12%). The reason is that only one fine is provided per case, and thus we must ourselves somehow apportion that single fine among the violations (up to five) included in that case. We take two approaches to this. First, we consider only the single-violation cases. Second, we consider the single-violation cases plus the multiple-violation cases in which only one law was violated, albeit multiple times. It seems reasonable to divide the fine by the number of violations in that situation. But we did not feel comfortable doing so when different laws were violated within the same case. Fortunately, the latter situation is uncommon within these datasets.

The Audit docket contains both proposed and final penalties, because due to the Audit Policy penalties of course can be lowered. The proposed penalty before reduction under the Policy seems the better indicator of severity. The standard docket contains an Assessed Penalty and Cost Recovery. We used only the Assessed Penalty. For either of the dockets, the number of violations and violations actually fined (i.e., number of violations with a recorded positive fine) were totaled. Then the sum of all the penalties for all violations was totaled. The data are shown typically as a ratio, mean fine per violation, sometimes with violation and fine totals.

Tables 3B and 3C -- Mean Fines by Law and Law/Section, comparing the Dockets:

Table 3B shows the same data summarized in Table 3A, but broken down by law. Then Table 3C shows the same data again, but broken down by law/section, for particular sections. Again, we checked the robustness of the single-violation results using multiple-violation cases.