Big Field, Small Potatoes: An Empirical Assessment of EPA's Self-Audit Policy

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Abstract

Environmental self-auditing is said to deserve and require encouragement. Although firms can audit themselves more cheaply and effectively than regulators, they are deterred for fear that information they uncover will be used against them. To reduce this disincentive, the Environmental Protection Agency's (EPA's) Audit Policy lowers punitive fines when firms promptly disclose and correct self-discovered violations. While some contend that the Audit Policy is inadequate, EPA touts its success based on the policy's track record. Our examination of that track record leads us to question EPA's claim. Comparing the violations in these cases with those detected by standard EPA enforcement suggests that the typical self-audited violation is relatively minor. Cases arising under the Policy are more likely to concern reporting violations and less likely to concern emissions. The relative insignificance of self-audited violations raises a number of policy questions, including whether the Audit Policy should be revised to play a larger role in enforcement. © 2004 by the Association for Public Policy Analysis and Management.

INTRODUCTION

Growth in the quantity and complexity of environmental regulation over the last several decades has generated a new set of problems for both industries and regulators. One serious challenge arises from a tension that exists between the necessity that firms conduct environmental self-audits and the disincentive to do so arising from possibility that what firms discover will be used against them.

On the one hand, if a firm wishes to be in compliance with environmental regulations—in light of the penalties for noncompliance, including fines, civil liability, and consumer dissatisfaction—it often has no choice but to devote substantial resources to self-investigation. To achieve compliance at its Texas facilities, for example, Occidental Petroleum must deploy technicians with sophisticated testing equipment to monitor 140,000 points for potential fugitive emissions. The resulting 4 million to 7 million data points (Hawks, 1998; Lavelle, 1992) must then be organized, summarized, and analyzed. In cases like this, purposeful and systematic self-auditing is required if a firm is to identify problems and take appropriate corrective action.

On the other hand, discovering a problem through such an investigation may increase the chance that the problem will be detected by a regulator—or at least

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firms may perceive this to be the case (Cooney et al., 1995; Feeley, 1995; Moore and Newkirk, 1995; Murray, 1995).[1] Such a discovery may inspire a disgruntled employee to "blow the whistle." Even loyal employees may be subpoenaed to testify against the firm under oath. Documents and computer files generated in the course of a self-audit may be subject to inspection by future litigation opponents, or such records may find their way into unmarked brown envelopes and then onto desks at the Environmental Protection Agency (EPA). In response to this issue, firms may self-audit less frequently and less earnestly than might be expected or hoped.

This tension between the necessity of self-auditing and its disincentive has been apparent since at least the 1990s. In a number of well-publicized instances, firms turned to regulators after discovering that certain practices thought to be innocuous were in fact generating noncompliant emissions (Feeley [1995] discusses the well-known Coors–Colorado case). Instead of being rewarded for correcting problems the regulators might never have detected, the firms found themselves subject to significant fines, leading them to call for protection against such punishments for violations uncovered as a result of self-auditing.

Several states reacted by creating a new self-evaluative privilege whereby confidential documents produced under a regular program of environmental self-audits are neither subject to discovery nor admissible as evidence in court.[2] Others even proposed immunity for firms voluntarily reporting and correcting noncompliance.

The U.S. EPA subsequently responded with what some regard as a partial step. In 1995, the EPA issued its policy on "Incentives for Self-Policing: Discovery, Disclosure, Correction and Prevention of Violations" (EPA, 1995). A revised final policy was issued in May 2000 (EPA, 2000). Technically, the policy is a guideline for government actors on the exercise of prosecutorial discretion and the conduct of settlement negotiation. It concerns the "gravity" component of fines, as opposed to the "economic benefit" component, which is intended to capture gains derived from delaying or avoiding pollution control expenditures or obtaining a competitive advantage (EPA, 1984). The gravity component of a fine will be reduced by 100 percent for a firm that discovers a violation through a systematic auditing program, voluntarily discloses the violation 21 days after discovery without prompting from the 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 or be one that has caused or may cause "serious harm." Gravity fines are reduced by only 75 percent if the violation was discovered outside the context of a systematic program of self-auditing but the other conditions are met.

Since the EPA's Audit Policy was first proposed, industry commentators, economists, and legal scholars have debated whether the policy is sufficient (see, e.g., Creighton, 1996). Critics have pointed to several shortcomings. First, the policy is merely a guideline for the regulator, containing no enforceable promise of fine reduction for disclosing firms. Second, fine reduction is limited to the add-on gravity

[1] Many considerations go into firms' decision of whether to self-audit, including importantly the series of costly steps required by compliance. For more detail on a firm's decision to self-audit, see the sources cited in our discussion below of the existing literature.

[2] 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 passed in 1994; new laws have arisen ever since.

component of fines and does not reach the economic benefit component. Third, there is uncertainty about the EPA's intentions regarding criminal prosecution for non-compliance. Fourthly, any fine reduction requires as preconditions that the firm must promptly disclose the violation, promptly correct it, and then take whatever measures EPA sees fit to prevent recurrence. Because of these perceived shortcomings, calls for broader action continue to emanate from industry, the states, and several members of Congress.

EPA maintains that its Audit Policy is more than adequate and also that further reaching "secrecy and amnesty" policies such as those adopted by some states are seriously overbroad. EPA has threatened to revoke regulatory authority from states that adopt such policies (see, e.g., EPA, 2000, p. 31). In support of its policy, EPA touts the tally of violations self-reported to EPA since the policy was instituted. In May 2000, for instance, EPA announced that "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" (EPA, 1998, 2000).

Yet a closer look at EPA's own literature makes it clear that not all violations uncovered under the policy are significant regulatory breaches. A March 1998 EPA newsletter (EPA, 1998) highlights 600 specific violations at 314 facilities. Of the total, 511 violations concerned GTE's failure to notify authorities of batteries containing sulfuric acid at 229 telecommunications sites (the other 89 violations were failures to have spill prevention control and countermeasure plans in place for diesel fuel). One may reasonably speculate that most of the 229 telecommunication sites were switching stations in GTE's large telephone network, and that EPA counted each of the unreported batteries within each station as a separate violation. And on the heels of the GTE case, EPA reached agreement with 10 other telecommunications companies under the policy for 1300 violations at more than 400 facilities, with reporting failures again the dominant violations.

Of course, evidence that EPA may have overplayed such violations is as anecdotal and inconclusive as EPA's claims in support of its Audit Policy. That the violations GTE disclosed were relatively insignificant does not imply that all or most self-reported violations follow suit. Fortunately, EPA makes comprehensive data on self-reported violations available. We use these data to assess the success of EPA's Audit Policy in a more systematic fashion.

The great majority of the violations reported to EPA under its Audit Policy are indeed like the GTE case, in that they involve a 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 or inventory might simply reflect the composition of the full set of violations. To test this we compared these self-reported violations with those that EPA itself uncovered under its standard enforcement procedures. The difference in composition is dramatic. As the matrix below (summarizing Table 2) conveys, reporting and record-keeping violations constitute more than 90 percent of the violations uncovered under the Audit Policy, but less than 20 percent of violations uncovered by standard procedures:

	Standard EPA	Audit Policy
Reporting/record-keeping violations[3]	17.0%	91.5%
Other (including emissions) violations	83.0%	8.5%

[3] Specifically these are the violation types REP, TRI, and NONOTE (see the appendix for their definitions).

Still, the disproportionate share of reporting violations in the Audit Policy cases does not settle fully the issue of whether the self-auditing violations are relatively insignificant because 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 so that local authorities can be prepared to handle spills. An actual emission, on the other hand, may be a slow leak of a marginally harmful substance. Fortunately, a proxy for the severity of violations that cuts across different classes of violations is available. EPA reports the fines that were imposed on the violators (prior to any reduction under the Audit Policy). This measure of severity appears to confirm that self-audited, self-reported violations are less significant.

The Literature

The present empirical paper fits into a theoretical literature that is in substantial agreement with industry commentators regarding firms' disincentive to conduct environmental self-audits and the desirability of a policy response. In a model wherein self-auditing is necessary for directing firms' corrective efforts, but increases the probability of detection, Pfaff and Sanchirico (2000) analyze the two-tiered incentive problem regarding the decision both to test for and to effect compliance. After demonstrating the failure of standard liability regimes, they propose several candidate solutions. Under one of these solutions, the regulator lowers the fine to the extent that it made use of the firm's own auditing in detecting violations.[4] Arlen (1994) analyzes the problem of vicarious corporate criminal liability and the firm's incentive to monitor employees. Employees' wealth constraints preclude adequate individual-level fines. In this context, she proposes basing firm-level 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. Innes' work (1999a, b; 2000; 2001) emphasizes the problem that firms have insufficient incentive to remediate violations unless and until those violations are detected by the regulator. He proposes making fines contingent on the firm's pre-detection remediation costs.[5]

More generally, the present paper contributes to a growing literature analyzing innovative efforts to increase compliance at low cost. In particular, two approaches other than self-audits that have been advocated for environmental settings. First, several commentators have proposed that firms form alliances to work cooperatively with both nongovernmental organizations (NGOs) and government. Such relationships could improve the credibility of firms' environmental claims and could also lower compliance costs or improve environmental outcomes by permitting greater flexibility and creativity in addressing environmental regulations (Arora and Cason, 1995; Coglianese and Nash 2001; Gunningham, Grabosky, and Sinclair, 1998).

[4] This work extends a related literature on the incentives within various legal or policy regimes. In a model wherein self-investigation does not affect the probability of detection, Shavell (1992) finds that conventional strict liability is efficient. Kaplow and Shavell (1994) show that self-reporting can lower the cost of enforcement and risk-bearing. Agents in their model know the nature and magnitude of all violations without having to investigate.

[5] Other researches have focused specifically on audit privileges, as adopted in some states. Dana, 1996, argues against such privileges as they would effectively weaken firms' incentives to prevent and fix such violations. Orts and Murray 1997 propose an evidentiary self-evaluative privilege for firms conducting audits under an EPA-supervised disclosure system. They append fine reduction to this to "encourage self-reporting and self-policing."

Second, commentators have proposed employing education and awareness initiatives to empower citizens to monitor the environment (Ariasingam, 1999) and challenge firms' practices. Because the environment has no advocate besides the public at large, it is argued, empowering citizens would help to create a favorable "pollution equilibrium" (for discussion of, e.g., how citizen complaints trigger regulatory processes, see Dasgupta and Wheeler, 1996; Pargal and Wheeler, 1995). Moreover, with some form of popular empowerment, local preferences can be taken into account (see Hartman, Huq, and Wheeler, 1997).

Considered in light of these other initiatives, our results fit within a broader theme: up to this point, a number of cost-lowering environmental policy initiatives appear not to have lived up to initial optimistic expectations. Gunningham (2002) and Sinclair and Gunningham (2002), for example, conclude that what little systematic evidence exists suggests that environmental partnerships may be seriously underperforming. Further anecdotal evidence seems to indicate that any success to date has relied in part upon the background threat of regulation. (A similar point applies to self-auditing [Pfaff and Sanchirico, 2000].) In the area of popular empowerment and information provision, the studies cited above do provide evidence that suggests the potential for effective new policy initiatives in developing economies. But for the United States, Bui and Mayer (2003) find that an actual policy effort along these lines—namely, publishing Toxic Release Inventory data—had little effect on households' perceptions as reflected in housing prices.

DATA SOURCES

The data sets are lists of EPA records of cases involving violations of environmental laws. One set solely concerns Audit Policy cases[6] while the other concerns all other recorded cases. These data, from EPA's dockets, are the source for all of the analyses whose outputs are below.

For violations uncovered under the Audit Policy, collectively denoted the "Audit Docket," the EPA furnished hard copies of case files from 1994 to 1999 for audit proceedings. From the 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 appendix for list).

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. Proposed penalties seem to be the better measure of severity, reflecting the standard enforcement

[6] We use the following standard terminology throughout: A "case" is a single violation or a collection of violations identified and processed as a group by the regulator. A "violation" is a specific event or condition (e.g., emissions of a given quantity of a given chemical from a given source) paired with a specific legal dictate (e.g., a specific portion of a specific subsection of a specific statute regarding such emissions). The legal dictate determines what constitutes a unit event or condition. A "statute" or "law" is a set of legal dictates typically passed by the legislature in the form of a package (e.g., the Clean Air Act). A "section" of a law, or "law section," (e.g., Clean Air Act § 111(e)) may itself contain subsidiary sections, and even the most elemental of these may contain more than one legal dictate. (As is common practice, we refer to the section number of the Congressional Act, rather than the section number assigned in incorporating the act into the full U.S. code—i.e., in "codifying" it.)

Therefore, each violation is associated with a single law section. But each law section may give rise to several violations. This is both because a given law section may contain several legal dictates and also because a single legal dictate may have been violated more than once in a given case.

procedures. With few exceptions, we know only the total fine, not the gravity and benefit components. Recall that fine reductions are not always 100 percent for gravity and do not apply at all to the economic-benefit fine component. The 137 cases in the Audit Docket include approximately 3400 violations (the observations for Tables 1 and 2 vary slightly due to missing values).[7]

We refer to the non–Audit Policy cases as the "Standard Docket," which EPA provides in two parts, Administrative and Civil Dockets (for our purposes they are similar[8]). EPA provides electronic data for cases under standard enforcement procedures for all federal environmental laws and regulations. We use the data from 1994 to 1999 to match with the Audit Policy data.[9] These cases include, first, approximately 19,700 observations of violations within 17,338 Administrative Docket cases. Second, there are 1053 Civil Docket cases including 1622 observations of laws violated.

Because of missing values for violation types,[10] for Table 2 the administrative docket is reduced to 15,859 observations from 11,667 cases. For the same reason,[11] for Table 2 the civil docket has 813 observations of violation types from 519 cases. Cases lacking observations of violation type are included in the other tables (Tables 1A-B and Tables 3A-C). For Table 2, we have no reason to believe that the observations missing from the standard docket differ systematically from those that are present. In any event, even if we assume that the missing observations are as unfavorable as possible for our results—i.e., they are all reporting violations—our results from this table not only still hold, but are still quite dramatic.

Tables 3A-C also have fewer observations than Tables 1A-B but for two different reasons. First, in the standard data, there are blank entries for about half of the records' fines. Following conversations with EPA staff, we believe these should be interpreted as missing data, not zeros. Even if we used zero values, lowering the standard fine values within Tables 3A-C, the tables would still support our conclusion. Second, as can be gleaned from the above, a given case may involve multiple violations.[12] This becomes important when fines are considered. For each case, only one fine value is reported. It is not clearly appropriate equally to apportion a single fine value across violations of different law sections. Accordingly, multiple-

[7] EPA provided another six cases that had no value recorded for the number of violations. This number of cases is consistent with the 670 figure in the EPA quote in the Introduction because the latter refers to actual or potential violations, i.e., it includes cases where no violations were found as well as many cases that were still under review.

[8] Administrative cases are adjudicated in the agency's own quasi-judicial system. Civil cases are adjudicated in the courts. In the courts, the remedies may be more severe, but EPA has less control over process outcomes.

[9] The data for each record include several fields: the case number (a unique identifier for each record), case name, law violated, section violated, type of violation (see the appendix for EPA's type encoding system), Pollutants, date filed, date concluded, judicial district, court docket number, assessed federal penalty, cost recovery awarded, and finally result code.

[10] Cases not listing any indication of violation type include over 850 cases arising under the Clean Water Act, RCRA, and CERCLA (most of the CERCLA cases), more than 650 cases arising under the Clean Air Act, SDWA, and EPCRA, and more than 400 cases arising under FIFRA and TSCA.

[11] Almost all of the many CERCLA cases do not code violation type.

[12] The average case in the Audit Docket includes 25 violations. Regarding the distribution of violations per case in this docket, 29 cases have one violation, while 102 cases have fewer than 10. The 102 cases with fewer than 10 violations account for 359 of 3400 violations.Of these 102 cases, only one has violations of multiple laws. In the remaining 35 Audit Docket cases (137 less 102), three cases involve violations of multiple laws. These three cases are quite large, accounting for 1493 of the 3400 violations (1390 of the primary laws violated, 103 of the secondary laws). One of these three cases is the GTE case noted above. The other 32 cases exceeding 10 violations average about 48 violations per case and account for 1531 violations in total.

law-section cases are not included in Tables 3A-C.[13] Note that including these multiple-law-section cases (with evenly apportioned fines) would have little effect on the average fine in the standard docket and would lower the average audit docket fine, thus strengthening our results.

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, instead, that 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 with 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.

Comparing Laws and Sections Violated

Table 1A shows that in the audit docket close to 70 percent of the violations were of EPCRA, while another 15 percent were violations of RCRA and TSCA, and only 6 percent were violations of CWA. In contrast, standard administrative violations fell under EPCRA only 10 percent of the time, and EPCRA or RCRA or TSCA only 30 percent of the time, while over 25 percent of the violations fell under CWA. For each law, the fraction of audit cases is statistically significantly different from the fraction of administrative cases.[14] The civil cases differ by an even greater degree from audit cases (and they are also statistically significantly different from the administrative cases).[15]

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 percent of the audit violations, but essentially does not appear in the two standard dockets. Further, the five sections that make up almost 90 percent of the audit violations make up less than 10 percent of administrative and 5 percent of civil.

To get a sense of what these differences 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 cases, concerns notification of authorities about potential

[13] A relatively small fraction of Standard cases involve multiple violations. Most of them involve multiple violations of the same law and section (we count each violation separately even if they are of the same law and section), but a small subset involve violations of multiple law sections. Thus both the audit and standard data feature cases with violations of multiple law sections. But for standard, this is less than 2 percent of violations, while for audit, the 1499 violations in the four cases noted are a large fraction of total violations in that docket.

[14] 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.

[15] These conclusions are robust to dropping CERCLA 106 and 107 cases, and to dropping all the CERCLA cases.

Table 1A. Laws violated by docket.

	Audit	Admin.	Civil
EPCRA	72.2%	10.6%	1.6%
RCRA	9.4%	13.3%	8.8%
TSCA	6.8%	8.0%	1.0%
CWA	6.6%	26.3%	13.9%
FIFRA	4.7%	8.0%	0.8%
CAA	0.2%	11.1%	20.7%
CERCLA	0.1%	7.7%	51.5%
SDWA	0.0%	15.0%	1.7%
MPRSA	0.0%	0.1%	0.1%

Table 1B. Laws and sections violated by audit docket.

Law	Section	Audit	Admin.	Civil
EPCRA	302	58.0%	0.0%	0.0%
EPCRA	313	12.3%	4.8%	0.9%
RCRA	3010A	9.0%	0.1%	0.1%
CWA	311	6.6%	1.5%	1.4%
FIFRA	12A1C	4.7%	0.2%	0.0%
TSCA	5	3.2%	0.4%	0.0%
TSCA	153B	1.7%	0.2%	0.0%
TSCA	153	1.1%	0.0%	0.0%
EPCRA	311	1.0%	0.9%	0.0%
EPCRA	312	0.9%	2.5%	0.1%
TSCA	8	0.4%	0.3%	0.0%
TSCA	15	0.2%	1.2%	0.3%
RCRA	3008	0.2%	0.3%	0.7%
RCRA	3002A	0.2%	0.0%	0.0%
CERCLA	103A	0.1%	1.7%	0.7%
RCRA	3005	0.1%	1.1%	1.1%
CAA	111E	0.1%	0.1%	0.3%
CAA	7470	0.1%	0.0%	0.0%
CAA	609C	0.0%	0.0%	0.0%
CWA	301	0.0%	11.0%	4.4%
CWA	301A	0.0%	2.3%	1.1%
TSCA	151C	0.0%	0.3%	0.2%
TSCA	6E	0.0%	1.4%	0.3%

risks. The second and third most commonly violated sections in the Audit data are EPCRA Section 313, requiring the 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 (yet barely present in Audit cases), Section 301 of CWA, concerns discharges of pollutants into waters without express authorization (U.S. Code, Title 33).

Comparing Types of Violations

That the violations uncovered by the Audit Policy are not the same as those found using EPA's standard procedures is confirmed in Table 2. In excess of 70 percent of Audit Policy violations are REP (reporting), another 13 percent are TRI (Toxic Release Inventory), and 6 percent are NONOTE (failure to notify). This alone means that more than 90 percent of violations under the policy concern reporting in one form or another, not emissions. RCRA violations of the REP type concern the failure properly to label hazardous wastes during transport and to submit a manifest to EPA. TRI violations (of EPCRA) stem from failures to update and submit a form for potentially hazardous, though legally used, chemicals whose manufacture and use are tracked by state and local officials.

In the administrative and civil cases, less than 20 percent and 5 percent of the violations, respectively, are REP, TRI, or NONOTE. More generally, for each violation type, the fraction of audit cases differs to a statistically significant degree, from that type's fraction of administrative and civil cases.[16]

While REP is the most common violation among administrative cases, at 14 percent, the next is PRMTVL (permit violation), at 10 percent, then EFF (effluent) and NOPRMT (discharge without a permit) at over 6 percent each. PRMTVL (7 percent) and NOPRMT (6 percent) rank second and third in civil, while EMIS (emissions) is fourth, at 6 percent, and both NSPS (new source performance standard) and NESHAP (national emission standard for a hazardous air pollutant) each make up almost 5 percent as well. The key point for our purposes is that, other than REP, all these violations involve actual emissions.[17]

Table 2. Violations by audit docket frequency.

	Audit	Admin.	Civil
REP	71.9%	14.2%	2.3%
TRI	13.3%	1.1%	0.1%
NONOTE	6.4%	2.4%	1.2%
FIFRA	4.7%	4.4%	1.0%
PMN	2.0%	0.3%	0.0%
IMP	0.6%	0.4%	0.1%
PRMTVL	0.5%	10.6%	7.3%
PCB	0.4%	1.0%	0.4%
SPILL	0.2%	1.4%	3.0%
PSD	0.1%	0.1%	2.6%
STR	0.1%	1.4%	2.2%
NOPRMT	0.0%	6.1%	6.2%
NORPTG	0.0%	1.8%	2.5%
STRAT	0.0%	1.5%	0.3%

[16] 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.

[17] Here dropping CERCLA cases makes little difference since most CERCLA records did not have violation codes.

Fines as a Proxy for Severity

Tables 3A, 3B, and 3C use average fines per violation to compare the severity of violations. Table 3A conveys broad averages per docket. Audit fines (proposed, not lowered by disclosure) are the lowest and, given the number of observations, this difference is statistically significant.[18]

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 are more or less severe for any given law or section than those under standard enforcement practices. Table 3B breaks the cases down by law, so 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 percent 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 having very few audit cases).

Table 3C disaggregates Table 3B by law and section. To keep the table manageable, only the most common laws-sections in the Audit cases are listed. (Note that Audit cases with fines do not exist for the most common law sections in the other dockets, excepting EPCRA section 313). 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, even within the set of violations that are most frequently uncovered under the Audit Policy, generally the Audit Policy is catching relatively less severe violations. The only types of cases for which Audit Policy violations are more severe concern reporting.

DISCUSSION

The vast majority of reports under EPA's Audit Policy have involved failures to report or to keep records. There have been relatively few reports of major emissions violations—the "bread and butter" of EPA's standard enforcement actions.

What explains the distinctive character of the Audit Docket? We discuss below a set of candidate explanations. Determining whether the policy should be revised and, if so, how, requires first understanding the reason for the current policy's limited application.

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

[18] Recall that for different reasons, the observations used here and below are about half of those used for the Tables 1A-B. For the standard docket, about half the fines are missing (and we have tested for robustness to interpreting those as zeros). For the audit docket, about 1500 violations are from cases with violations of multiple laws and we are not comfortable dividing the single fine value across the multiple violations (doing so equally as we do when multiple violations are of the same law, though, lowers the mean fine above). For standard, we drop less than 2 percent of violations for this reason. Also, using only single-violation cases we find these results are essentially the same.

Note also that the docket dissimilarities above are robust to whether the multiple-violation cases are dropped. For instance, if the fractions in Tables 1A and 1B are re-computed using only the first violation in each record, the results remain. For Table 2, still REP and TRI would be the violation types for over 70 percent of the cases in the audit docket. In any case, treating each violation in a record separately and counting them all seems the better approach.

Table 3A. Average fines by docket.

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 3B. Average fines by law by docket.

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 3C. Law and section violated by audit docket frequency.

Law	Section	% Audit	Avg. Audit Fine	Avg. Admin. Fine
EPCRA	302	58.0	$1,601	N/A
EPCRA	313	12.3	$13,103	$19,845
RCRA	3010A	9.0	$0	$14,256
CWA	311	6.6	$1,175	$5,021
FIFRA	12A1C	4.7	$5,000	$5,695
TSCA	5	3.2	$11,994	$35,820
TSCA	153B	1.7	$6,386	$15,343
TSCA	153	1.1	$3,676	N/A
EPCRA	311	1.0	$14,941	$9,531
EPCRA	312	0.9	$12,500	$7,244

bare assertion that the policy is a "bad deal" for firms does not explain the fact that self-reported violations have been skewed toward less significant reporting and record-keeping violations.

Red Herring: One explanation for the "small fry" nature of the audit cases lies in the possibility that firms are using the Audit Policy strategically. It is tempting to speculate that at least a few firms have disclosed relatively minor violations in order to distract attention from major unreported violations. Thus, a firm might happily bring to the attention of EPA its 600 reporting and recording violations in the hope that this bounty will help to satisfy the enforcement appetite of local and national regulators and thereby lower the probability or intensity of future external audits. Such disclosures might help to favorably dispose the regulator toward the firm. Alternatively, the regulator (or its agent) might be separately interested in the number of firms that have been subject to regulatory action without regard to the nature of that action. Discussions with EPA personnel on this possibility are nuanced and inconclusive. Adjusting future audit probabilities is certainly not consistent official EPA policy. However, some EPA programs do reward "good behavior." And EPA has certainly emphasized breadth over depth in touting its Audit Policy. In any event, it seems important to keep in mind that firms' decisions to disclose are conscious choices that are likely driven by their perceived best interests.

Structure of Fine Reduction: Another explanation starts with the fact that EPA reduces only the gravity component of fines for firms that have self-reported, while still assessing in full the economic benefit component of the fine—i.e., the dollar value of cost savings and competitive gains derived from noncompliance. This implies that the benefits of self-reporting are greatest for violations for which the gravity penalty is the major component of the total penalty. As argued below, fines for reporting and recording violations are likely to have a large gravity component.

Consider a violation with total fine F, a 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 percent 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 $pF > F(1 - x)$, i.e. when $x > (1 - p)$. Thus, the firm self-reports when the gravity portion of the fine exceeds the chance of going undetected. The overall fine F has no independent effect on the firm's decision of whether to self-report (a feature consistent with our dissatisfaction with the "bad deal" hypothesis presented above).

It seems plausible that the gravity portion of total fines is relatively large for violations that involve the failure to report or record information. The economic benefits of noncompliance in this case consist mainly of savings in monitoring costs, clerical costs, and legal fees, which are likely to be less significant than the cost savings from ignoring actual emissions (i.e., from not replacing pollution control equipment, not properly treating waste water before releasing it into a nearby estuary, or not taking costly precautions in handling of hazardous substances). Further, the factors EPA uses to determine the gravity component include several factors that do not increase in proportion to the severity of the violation. These factors include: the size of the violator, the extent to which the violator fell short of the requirement, the presence of compliance problems in the region, and whether "the violator already has instituted expeditious remedies to the identified violations prior to the commencement of litigation" (EPA, 1984, 30001, 30002, 30007). Additionally, EPA policy calls for the routine imposition of a "non-trivial" gravity component on top of economic benefits to insure deterrence. For less severe violations, these "fixed cost" elements of the fine could make the gravity component relatively large.

The available data do not permit systematic testing of these hypotheses. But what evidence there is on the linkage between self-reporting, the relative size of the gravity component, and the seriousness of violations is consistent with the story just laid out. In the GTE case, for example, the economic-benefit component of the fine for failing to report the sulfuric acid–filled batteries was only $52,264, while the gravity component from which GTE was excused as a result of self-reporting was $2.38 million, or 98 percent of the total fine (EPA, 1998). Similarly, in five of the seven other audit cases for which we know the economic-benefit component of the fine, this component was 2 percent or less of the total. (The other two were about one-third and two-thirds of the total.)

Structure of Auditing Costs: While the above focused on differences across violation types in benefits from auditing and reporting, we stress self-auditing's costs (Pfaff and Sanchirico, 2000). These too could differ across violations, and specifically it is possible that detecting reporting violations is cheaper than detecting emissions violations. Although we do not have specific information concerning a cost difference, the search for an explanation for our audit/disclosure results must consider not only benefits but also costs.

Absolute Numbers versus Percentages: We showed that in disclosures to EPA only a small fraction are severe violations as compared to the same fraction for the standard docket. But what about a comparison of the absolute numbers? If more total violations came to light via self-audits, the absolute number of severe violations could be higher than that found by standard enforcement methods. However, with fewer than 4000 audit violations and in excess of 20,000 standard violations, this is clearly not the case for the years studied.

Nonetheless, it is still possible that self-audits find many more violations per audit than do standard EPA audits. Despite the relatively low incidence of severe violations in the audit docket, in terms of both absolute numbers and percentages, it could still be the case that the absolute number of severe violations per audit is higher than for standard EPA audits. This would tend to indicate that self-audits are relatively efficient. We cannot formally evaluate this hypothesis given our data. It is possible, perhaps likely, that many self-audits are not disclosed to EPA. Without knowing the total number of self-audits we can ascertain neither the relative nor absolute "efficiency" of self-auditing in finding more severe violations.

Superfluous Disclosure Requirement: The possibility that many self-audits are not disclosed to EPA raises the question of what role disclosure plays in this policy. What if a firm self-audits, corrects the problems it finds, but does not disclose anything to EPA? This might well be regarded as a regulatory success. Yet EPA's Audit Policy requires disclosure. It therefore does not lower fines when an audit, even though undisclosed, helps it to uncover violations.

Pfaff and Sanchirico (2000) show that requiring disclosure is not necessary for effective fine reduction. An effective audit policy could address disincentives simply by reducing fines to the extent that a firm's self-investigation aided in the detection of a known violation. The important feature of the policy is that expected fines—taking into account any increased probability of detection resulting from self-auditing—remain roughly constant whether or not a firm has self-audited. When this is the case firms have nothing to lose from systematically investigating all potential violations, not just those that they are willing to admit to EPA.

Indeed, given the possibility that their disclosures to EPA may be used against firms in private suits (a possibility not explicitly modeled in Pfaff and Sanchirico [2000]), the disclosure requirement could itself be biasing audit cases towards reporting and record keeping violations. Many environmental statutes allow "citi-

zen suits" against a violator in certain circumstances. The law in this area is complex and unsettled, and its review is well beyond the scope of this article (see Stubbs, 2000/2001). In rough outline, however, it would appear that a reporting violation (especially under EPCRA, which accounts for nearly three-quarters of the audit docket violations) that is corrected and disclosed cannot generally form the basis of a subsequent private suit. On the other hand, if a firm corrects and discloses illegal emissions under, for example, the Clean Water Act (which accounts for a plurality of the administrative docket), any harm caused by these emission is more likely to support a claim for recovery by private plaintiffs.

Given these hypotheses for why Audit Policy outcomes differ starkly from standard EPA outcomes, the next step is to gather empirical evidence on their viability. To test the red herring story, the EPA could experiment in selected jurisdictions with announcing an explicitly independent inspection probability rule in a manner that would convince firms that disclosure under the policy will not affect their chance of being the object of a standard audit. With regard to the structure of fines story, this could be tested with field data, were that data collected and made available by EPA. Lastly, EPA could experiment with a self-audit policy that did not require firm disclosure, but rather reduced fines when there was evidence that the firm's self-auditing facilitated EPA's detection of the violation.[19]

In closing, it should be noted that resolving the question of why the Audit Policy has been so skewed in application is only necessary and not sufficient for comprehensive evaluation of the policy. Under several of the answers to this question that we have proposed, one might still argue that the policy serves a good purpose. When a firm turns in a minor violation, one might assert, it saves EPA resources to pursue major violations. And yet, the opposite effect is also possible, as EPA may be obliged to deal with these minor violations. Just as a prosecutor may have less time to investigate serious crimes if she must respond to every confession that is brought to her attention, the cases that result from the policy could in principle cause a less than beneficial reallocation of regulatory funds. Thus, the magnitude of resource savings and the extent of resource diversion are also important questions for further research, ones that might be resolved on the basis of EPA budget and management data.

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[19] For more detail on how this alternative to disclosure might work, see the discussion of the first proposed solution in Pfaff and Sanchirico (2000).

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APPENDIX

Acronyms

ACC	Accreditation
ACORD	CERCLA 104E Access order/case
ARSN	Arsenic
ASB	Asbestos
CLO	Closure & post-closure plan
CON	Container
DSP	Disposal
EFF	Effluent
EMIS	Emissions
FIFRA	FIFRA
FIN	Financial responsibility
GFR	General facility requirements
GRANT	P.L. 92-500 facility
GWM	Groundwater monitoring
IMP	Imports
IND	Industrial source
INFO	CAA/114 (Info)
IP	Interim prohibition violation
LBAN	Land ban
LDT	Land disposal & treatment
MPRSA	Marine Protection Research and Sanctuary Act
N/A	Not applicable
NESHAP	National Emission Standard for Hazardous Air Pollutant
NODMR	Failure to submit a Discharge Monitoring Report
NONOTE	Failure to notify
NOPRMT	Discharge without a permit
NORPTG	No reporting or monitoring
NSPS	New Source Performance Standard
NSR	New Source Review
OP	Opacity
PCB	Polychlorinated Biphenyl
PM	Particulate matter
PMN	Pre-manufacturing notice
PRETMT	Pretreatment
PRMTVL	Permit violation
PSD	Prevention of significant deterioration
PWSM/R	PWS monitoring/reporting
PWSMCL	PWS maximum containment level
PWSNP	PWS notification to public
PWSSA	PWS sampling & analyzing

REC	Required records maintenance
REP	Reporting violations
SIP	State implementation plan
SIPA1	SIP - A1 Source
SIPA2	SIP - A2 Source
SIPB	SIP - B Source
SLUDGE	Sludge
SPILL	Spill
STR	Storage
TRI	Toxic release inventory (Section 313)
TRT	Treatment
UIC	Underground Injection Control (SDWA)
UICCAC	UIC Casing and cementing
UICMFL	Fluid movement in underground source of drinking water
UICMIN	Mechanical integrity
UICMON	Monitoring
UICNPA	No approved plugging and abandonment plan
UICOIN	Injection between outermost casing
UICPRS	Injection beyond authorized pressure
UICUNI	Unauthorized injection
UICUNO	Unauthorized operation of a Class IV well
UICVPA	Compliance with plugging & abandonment plan
UST	Leaking underground storage tank
VHAP	Volatile hazardous air pollutants
VOC	Volatile organic compound
WKPR	Work practices (Asbestos D/R)
WRP	Worker Protection
404PMT	Wetlands Protection (404/CWA)