Enforcement Principles and Environmental Agencies: Principal-Agent Relationships in a Delegated Environmental Program

Mark Atlas

This article examines whether states shirked enforcement responsibilities in their principal-agent relationship with the federal government when implementing a delegated environmental program. It evaluates determinants of environmental enforcement stringency, particularly whether penalties were less when imposed by states than by the federal government. It analyzes 6,048 hazardous waste administrative penalties across 32 states and all U.S. Environmental Protection Agency Regions over 14 years. It finds that state penalties are typically substantially lower than federal penalties, and that penalty amounts are typically also related to the partisan composition of elected officials and the characteristics of enforcement actions, such as the type, seriousness, and number of violations. Factors such as the influence of organized interest groups, agency sensitivity to economic conditions or the economic importance of regulated industries, and environmentalist preferences of elected officials and the public are typically unrelated to enforcement stringency.

A dominant pattern in implementing U.S. public policy in recent decades is the federal government delegating to states the legal authority to implement and enforce certain federally designed policies, often termed "partial preemption" (Scheberle 1997; Hedge et al. 1991; Crotty 1987). Partial preemption has been used for major environmental, social welfare, occupational safety, and other programs (Scicchitano & Hedge 1993; Conlan 1988). The process of delegating authority to states ordinarily begins with the federal government creating a detailed regulatory program that states can seek authorization, and partial federal funding, to implement if they enact into state law their own programs at least as stringent as the federal program and adequately fund and enforce them (Zimmerman 2005; Hedge et al. 1991; Crotty 1987). States authorized to conduct a program are monitored by the federal government to ensure their compliance with federal requirements, while the federal government directly implements the program itself in unauthorized states (Scheberle 1997; Conlan 1988; Crotty 1987).

The author appreciates the helpful comments of the reviewers, and particularly those of the editor. Please direct correspondence to Mark Atlas, 8633 Kelso Terrace, Gaithersburg, MD 20877; e-mail: mka9@verizon.net.

Law & Society Review, Volume 41, Number 4 (2007)

Among the purported benefits of such a delegation of authority is that it allows states to lead the implementation of important and often controversial public policies in their jurisdictions, with the federal government as their partner, rather than having federal authority imposed directly (Zimmerman 2005; Scicchitano & Hedge 1993; Welborn 1988). Both regulated entities and the general public may be more tolerant of increased government regulation if it is perceived to originate from their state, rather than federal, government (Dwyer 1997; Scicchitano & Hedge 1993). States also have some flexibility in customizing policies to address their specific problems, reflect their priorities, and satisfy their particular political and economic constituencies, as long as federal minimum standards are met (Zimmerman 2005; Dwyer 1997; Scicchitano & Hedge 1993). States also can bring to bear their presumably more intimate knowledge of the regulated entities and problems to implement more effective and efficient programs (Welborn 1988). Furthermore, delegation reduces the need for federal funds and personnel to implement programs in states (Dwyer 1997; Welborn 1988; Crotty 1987).

Along with these potential benefits of delegated programs, however, is the concern over whether states can be trusted to enforce laws as rigorously as the federal government. This concern can be viewed through the perspective of the principal-agent model of bureaucratic control frequently used to examine variations in the development and implementation of regulatory policy (Davis & Davis 1999; Hedge et al. 1991; McCubbins et al. 1987). The principal-agent model assumes that regulatory actors interact in a hierarchically ordered system of relationships. Principals at the top try to control decisions and actions of bureaucratic subordinates lower in the political hierarchy, whose primary responsibility should be faithful implementation of the law. Relationships between principals and agents can be characterized by a divergence of interests and agents' tendency to shirk responsibilities imposed by principals. This can occur as bureaucratic agents develop separate interests through institutionalization, external politics, and "capture" by external groups. Principals try to control agents' behavior through oversight activities, sanctions, and incentives, which agents try to resist through means such as grants of discretion from and information advantages over principals. Principals can try to monitor agents' activities to offset information imbalances, but this can be costly and time-consuming. Whether agents' shirking is prevented is affected by principals' access to and willingness to use control mechanisms, but some slack in the principal-agent relationship is expected. A key issue under principal-agent theory is how principals can overcome agents' shirking tendency.

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

The delegation to states of federal environmental programs can be viewed as a three-tiered principal-agent process. The first tier involves Congress, as the principal, delegating to the U.S. Environmental Protection Agency (EPA), as its agent, responsibility for developing and implementing an environmental program. The second tier involves EPA, now as the principal, delegating to its Regional Offices, as its agents, responsibility for implementing the environmental program in the states in their respective regions. The third tier involves EPA Regional Offices, now as the principals, overseeing authorized states, as their agents, as they implement the environmental program.

Empirical studies have attempted to assess how state environmental standards changed when the federal government supposedly gave states more responsibility for their environmental programs (Millimet 2003; Potoski 2001; List & Gerking 2000, 1996) or how performance measures differed when environmental or occupational safety and health programs were managed by state or federal governments, respectively (Scholz & Wang 2006; Helland 1998; Hedge et al. 1991; Scholz & Wei 1986; Thompson & Scicchitano 1985b; Marvel 1982). These studies reached conflicting conclusions, with states sometimes performing better, worse, or the same as the federal government. An inherent problem in using environmental standards as the basis for testing environmental stringency is that, as with other delegated programs, the federal government sets minimum standards (e.g., pollutant limits or pollution abatement technologies) for states in major areas of environmental regulation. Thus it should be impossible for an authorized state to have laws that are explicitly inadequate.

Consequently, inadequate implementation should only be able to occur through states' enforcement of environmental laws. Inadequate enforcement, however, should be more difficult for the federal government to notice than inadequate laws and could undermine a program even more. Most states have been delegated the authority to implement most major federal environmental programs, so states do the overwhelming share of enforcing those laws (Brown & Green 2001). Concerns have often been expressed by scholars (Mintz 2001; Rabe 2000; Steinzor 2000), federal agencies (U.S. EPA 2001, 1999a, 1999b, 1998e, 1997a; U.S. General Accounting Office [GAO] 2000, 1988), and the news media (Johnson 2002; Polakovic 2001; Edwards 2000; Braile 1999) that states are not enforcing environmental laws as stringently as would the federal government—in effect, state agents are shirking their enforcement responsibilities. Thus evaluators of environmental standards may assume that a state was environmentally conscientious after reviewing its laws, not realizing it was pursuing its own interests, divergent from those of EPA, by lagging in enforcing

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

those laws. The result could be that violators are treated more leniently if prosecuted by states than by the federal government. Due to this concern, some scholars have advocated against delegated programs or for closer federal supervision of such programs (Markell 2000; Steinzor 2000; Kuehn 1996).

Some scholars have argued that the interests of state environmental enforcers have diverged from those of EPA because they are more vulnerable to pressures from elected officials or interest groups, pleas of economic hardship from violators, enforcement budget constraints, and too-close relationships between regulators and regulated entities (Mintz 2001; Kuehn 1996). For example, a state government has an inherent economic interest in creating a hospitable business climate compared to other states. Thus a state might use weaker environmental enforcement to make itself more attractive to industry. Indeed, a primary theoretical rationale for federal environmental regulation is that, without it, states might "race-to-the-bottom" in environmental standards (Engel 1997; Revesz 1997, 1992; Kuehn 1996). "Race-to-the-bottom" refers to a progressive relaxation of state environmental standards, perhaps motivated by interstate competition to attract industry, that reduces social welfare below levels that would exist in the absence of such competition (Saleska & Engel 1998; Engel 1997; Revesz 1997, 1992). One study found that substantial percentages of small survey samples of various government and interest group officials claimed that states imposed, or advocated imposing, smaller penalties on environmental law violators to encourage industries to locate in their states (Engel 1997). An EPA audit (1991c) of some states' environmental enforcement efforts concluded that states were hesitant to take strong enforcement actions against violators for fear of losing business. In addition, EPA stated:

> [A]bsent Federal enforcement capability, some State and local governments would be more susceptible to economic and other pressures from industry that could actually make State and local enforcement less effective than it currently is. . . . [A]bsent a nationwide, Federal enforcement presence, industry would be inclined to build, or move, [pollution] sources to States with the least effective enforcement efforts. Such a possibility would give businesses more leverage over the State governments and could foster a competition among the States to actually relax enforcement efforts (1989b:27277).

Furthermore, examining state enforcement of federally delegated environmental programs offers an especially useful opportunity to assess if shirking occurred in a principal-agent regulatory relationship because, in this situation, the principal was in a particularly disadvantageous position to prevent it. For example, although

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

states must periodically report information to EPA on their enforcement programs (U.S. GAO 1998)—such as numbers of inspections, violations identified, and penalties assessed—this does not eliminate the information imbalance that facilitates state agents' shirking. The thoroughness of inspections matters at least as much as their mere numbers in assessing the quality of enforcement efforts. In addition, the quantities of violations and penalties do not necessarily indicate how many *should* have resulted from adequate enforcement, as low numbers could reflect either lackluster enforcement or stringent enforcement that deterred violators or serious offenses.

EPA also has very limited resources to monitor possible shirking by state enforcers. Under EPA guidelines, only a few percent of state inspections of regulated facilities are followed up annually by EPA inspections of the same facilities to check the accuracy of the state's findings (U.S. GAO 1993, 1987; Cannon 1983:22). In addition, EPA Regional Office enforcement resources always have been scarce (U.S. GAO 1993, 1990, 1988, 1987, 1986, 1985a), so it is unlikely that EPA can thoroughly examine state enforcement actions to evaluate their adequacy.

Even if EPA believed a state agent was shirking its enforcement obligations, EPA would not necessarily have much credibility in complaining. Although many government reports have identified shortfalls in state enforcement efforts, at least as many have criticized EPA for the same problem (U.S. GAO 1996, 1991a, 1991b, 1990, 1988, 1987, 1985b). Consequently, in this situation, the agent could be justifiably uncertain whether the principal's professed instructions actually were to be followed. Thus it is unclear if EPA would be motivated to "call the kettle black" and if a miscreant state agent would assign much weight to the criticism.

Even if EPA wanted to express its dissatisfaction about a state agent's sluggish enforcement efforts, it has few available sanctions. Rather than depending solely upon the state, EPA could initiate enforcement actions itself against violators, even possibly against those who were already penalized by the state but in a way EPA believed was inadequate. Other than perhaps affronting the independence and diligence of state enforcers, however, this inflicts no substantive punishment on the state agent, but rather only on the violators. Furthermore, given the scarcity of EPA enforcement resources, this might be an empty threat. EPA could withdraw the state agent's authorization and implement the environmental program itself, but this would be a drastic step and, given EPA's limited resources, might penalize EPA more than the state and not necessarily result in more aggressive enforcement efforts (Zinn 2002; U.S. GAO 1995). In addition, if EPA tried to punish the state, this principal-agent relationship is atypical in that the agent (the state) could complain about the principal (EPA) to someone (a member of

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

Congress) who is a principal in its own relationship with EPA as the agent. Therefore, the principal might fear repercussions from trying to discipline the agent.

For these reasons, examining if bureaucratic shirking exists in an environmental enforcement context could be especially fruitful. Thus the purpose of this article is to examine a possible weakness of partial preemption by empirically assessing if there is a difference in the stringency of state and federal enforcement in a delegated environmental program. It does so in the context of administrative penalties for hazardous waste law violations. Specifically, it evaluates if federal and state penalties differ, controlling for the characteristics of an enforcement action and of the political environment in which it occurs. Prior research has focused on other environmental or occupational safety and health enforcement indicators, such as inspections or notices of violations (NOVs) (Helland 1998; Hedge et al. 1991; Thompson & Scicchitano 1985b; Marvel 1982), and only one has also examined penalties (Scholz & Wei 1986). This article examines 6,048 environmental penalties in 32 states and all EPA Regions over a period of 14 years to determine whether and why federal and state governments differ in environmental enforcement stringency.

Determinants of Enforcement Stringency

Aside from an inherent tendency for states to shirk enforcement obligations, other theories have been proposed and empirically tested to explain variations in state or federal enforcement stringency. Naturally, enforcement stringency should vary depending on the characteristics of an enforcement action, such as the seriousness and number of violations and past noncompliance. Aside from these characteristics, however, some theorize that enforcement stringency varies due to the political environment of the regulatory regime. These theories, concisely summarized in Kagan (1989), assume that agency behavior might be affected by interest groups and political leaders who seek to impose their preferences and priorities on regulators, and regulators who seek to avoid political trouble by acceding to those pressures.

One theory is that enforcement stringency is related to partisan control of government. Although the executive branch is responsible for law enforcement, the legislative branch could, through control over appropriations for an agency or other tactics, also influence enforcement. This is essentially another aspect of the principal-agent model of government behavior tested in prior studies (McKinney 1998; Hedge et al. 1991; Scholz & Wei 1986). Rather than focusing on the principal-agent relationship between

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

the EPA Region and the state, it focuses on the relationship between elected officials and the environmental agency. Essentially, this theory asserts that agency bureaucrats implement policy in a manner responsive to the preferences of elected officials who control the policy, financial, and oversight levers of government power.

Some prior research concluded that partisan control of government is related to federal or state environmental enforcement activity (Lynch et al. 2004b; Ringquist & Emmert 1999; Ringquist 1998; McKinney 1998; Wood 1992). Democratic Party office holders are perceived to be more aggressive in environmental protection than Republicans. For example, League of Conservation Voters (LCV) ratings of Democratic federal and state legislators' environmental protection voting records typically are much higher than for Republicans.[1] Consequently, partisan control of the executive and legislative branches can be used as a proxy for environmental policy preferences of elected officials. Thus one hypothesis is that enforcement stringency varies depending on which political party controls the executive branch[2] and legislature, respectively, with more stringent enforcement the more the Democratic Party is in control.

Another theory is that pressure from organized interest groups influences agency enforcement. Some prior research concluded that the presence of environmental groups affects environmental enforcement activity (Davis & Davis 1999; Helland 1998; Hamilton 1996). For example, an agency could be motivated to impose larger penalties if it were concerned about adverse public reaction, stoked by environmental groups, to smaller penalties. Although there is no evidence the general public is aware of environmental enforcement actions, because such information is publicly accessible, agencies might be concerned that environmental groups would obtain and publicize it. Thus another hypothesis is that the more environmental group members in an area, the more stringent the enforcement.

Another theory is that regardless of the presence of organized interest group members, the more sentiment in an area toward a particular interest—such as environmentalism—the more actual or potential political pressure agencies might feel for more stringent enforcement to assuage important political interests. Thus the environmentalism that could pressure environmental enforcers

[1] LCV's Web site (http://www.lcv.org/scorecard) provides ratings of legislators. LCV selects some legislative votes each year as indicators of legislators' environmentalism. The LCV rating for a legislator is the percentage of those votes cast in the manner LCV desires.

[2] Agency administrative enforcement actions are analyzed in this article, not court cases. Thus an independently elected state attorney general from a different political party than the governor would not affect which political party controlled the government entity that pursued the enforcement action in question.

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

could be among the general public or among political office holders, or both. If such pressure comes from political office holders, this might somewhat overlap with partisan control of government, as the latter assumes Democratic office holders are more environmentalist than Republicans. Some prior research concluded that environmentalist sentiment of office holders affects environmental enforcement (Scholz & Wang 2006; Davis & Davis 1999; Ringquist & Emmert 1999; Ringquist 1998) or that labor sentiment of office holders or union strength in a state affects occupational safety enforcement (Scholz & Wei 1986; Thompson & Scicchitano 1985a; Marvel 1982). Thus another hypothesis is that the more environmentalist sentiment in an area, the more stringent the enforcement.

Possibly counteracting the influence of group, public, or office holder environmentalism is the theory that the more important to the economy the industries being regulated, the less stringent an agency's enforcement of their operations. The more important such industries are, the more actual or potential political pressure governments might feel to impose less-stringent enforcement to appease important economic interests. Some prior research concluded that the economic importance of an industry is related to environmental enforcement actions against that industry (Decker 2005; Lynch et al. 2004b; Davis & Davis 1999; Ringquist & Emmert 1999; McKinney 1998; Ringquist 1998). In addition, as noted earlier, a study found substantial percentages of samples of government and interest group officials claiming that states impose, or advocate imposing, smaller penalties on environmental law violators to encourage industries to locate in their states (Engel 1997).

Another theorized source of political pressure on enforcers might be economic conditions. Some prior research concluded that the unemployment rate or business climate in an area affects environmental enforcement (Decker 2005; McKinney 1998; Gray & Deily 1996; Wood 1992; Deily & Gray 1991). The more depressed economic conditions are, the more pressure environmental enforcers might feel to lower penalties so as not to further undermine the financial viability of defendants and risk job losses. Thus the hypothesis is that the worse the economic conditions in an area, the less stringent the enforcement.

Finally, another theory is that enforcement is less stringent against "public" (i.e., government or quasi-government) defendants than against businesses (Atlas 2001; Kagan 1989). It is reasonable to assume that enforcers would receive less internal gratification, fewer public relations kudos, and more political pressure from severely penalizing fellow government entities (or even quasi-public defendants such as private hospitals and educational institutions) (Kuehn 1996). For example, EPA favors municipalities

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

under the federal Superfund clean-up program and EPA's Clean Water Act penalty policy, making their penalties less than those for businesses (U.S. EPA 1998d, 1995b), and there have been policies to forgo penalties against small municipalities (U.S. EPA 2004, 1995c). If states act consistent with EPA policies, this relationship also should exist for state enforcement actions. In addition, some studies of EPA enforcement concluded that public entities are penalized less than business defendants (Atlas 2001; Ringquist & Emmert 1999; McKinney 1998; Ringquist 1998).

Hazardous Waste Enforcement

This article evaluates state versus federal enforcement stringency in the context of hazardous waste administrative enforcement actions under the federal Resource Conservation and Recovery Act (RCRA) (1976) and its state law counterparts. Hazardous wastes are industrial process wastes the government designates as dangerous if they are not managed and disposed of with special precautions. A comprehensive regulatory program exists under RCRA to ensure that hazardous waste is properly identified, stored, managed, transported, and disposed of. This includes requirements for generators and transporters of hazardous waste, and treatment, storage, or disposal facilities (TSDFs) managing it. After Congress and EPA create part of the RCRA program, states can be authorized to implement and enforce it, and receive supporting federal grants, if they enact laws consistent with and at least as stringent as federal law (42 U.S.C. §6926). Almost all states are authorized to manage some of the RCRA program, but none yet manages it all.[3]

A state seeking RCRA authorization signs a Memorandum of Agreement (MOA) with the Regional Administrator of whichever of the 10 EPA Regions it is in (40 C.F.R. §271.8 [2005]). MOAs describe the rights and responsibilities of the state and EPA under the authorized program (U.S. EPA 1984c). EPA's Regional Offices oversee authorized states in their Regions and directly enforce RCRA in unauthorized states. Although EPA claims it can pursue RCRA enforcement actions even in authorized states, as a matter of policy it typically does not (U.S. EPA 1996a, 1987). Because of this policy and because almost all states are delegated some of the RCRA program, states conduct the overwhelming majority of RCRA enforcement actions (U.S. EPA 2000b). Indeed, federal appellate courts have split (*Harmon Industries, Inc. v. Browner* 1999;

[3] EPA's Web site at http://www.epa.gov/epaoswer/hazwaste/state/stats/stats.htm lists state authorizations.

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

U.S. v. Power Engineering Company 2002) over whether RCRA allows EPA to pursue an enforcement action against an alleged violator when a state with an authorized RCRA program already initiated its own enforcement action (a practice known as "overfiling").

After identifying a violation, the government might pursue it through a criminal action or a civil administrative or judicial process, although some states lack legal authority to impose administrative penalties (Brown & Green 2001; U.S. GAO 2000, 1995). In an administrative enforcement action, the case is processed and the penalty is imposed by the agency (almost always through a settlement negotiated with the defendant), rather than through a judicial process. More than 90 percent of all "formal" (i.e., serious) state and federal RCRA enforcement actions are handled administratively (U.S. EPA 2000b).

The RCRA statute and regulations provide almost no framework for how RCRA penalties should be determined. Thus EPA developed guidance policies for its staff on how to assign RCRA penalties (U.S. EPA 1990a, 1984b). The enforcement staff is first supposed to select a penalty in a specified range applicable to a violation, based on its gravity (i.e., potential for harm and extent of deviation from RCRA). Each day of noncompliance, up to a limit, constitutes a separate violation that should be penalized. In addition, ordinarily the economic benefit of noncompliance to the defendant must be recovered in EPA cases (U.S. EPA 1993a, 1984b). The penalty can be adjusted, within limits, to reflect the defendant's good faith efforts to comply, degree of willfulness, history of noncompliance, and ability to pay. In addition, a defendant can reduce its penalty by receiving credit for a Supplemental Environmental Project (SEP), which is activity benefiting the environment that is not legally required, such as pollution prevention (U.S. EPA 1998b, 1995a, 1991a, 1990a).

Internal and external reviews of EPA RCRA administrative enforcement actions during the 1980s and 1990s, however, always demonstrated EPA staff's widespread noncompliance with its penalty guidance policies (U.S. EPA 1997a, 1989a; U.S. GAO 1992, 1991a, 1988). As one EPA report concluded, "Regional offices have not closely adhered to the national policies and procedures. . . . Regions had: (i) not considered nor negated the economic benefits of violator noncompliance; (ii) proposed insufficient gravity-based penalties and excessively mitigated them during negotiations . . ." (1989a:3). Another EPA report concluded, "[a] common perception is that the RCRA program does not seek penalties in appropriate cases, or that the penalties proposed or assessed in the RCRA program are low, both when compared to the other major EPA media programs (air and water) and in terms of creating an effective deterrent" (1990b:61).

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

These reviews also always concluded that state RCRA administrative enforcement programs were even less stringent than federal programs. EPA's position is that "state enforcement penalties must be at least equivalent to penalties provided for in RCRA; and state enforcement activities must be equivalent to those performed by EPA" (1998g:1–5). States are not required, however, to have RCRA penalty policies identical to those of EPA (U.S. EPA 1997a, 1993a, 1986).[4] Some states had no written RCRA penalty policies, some adopted at least parts of EPA's policies (though they did not necessarily implement some of those parts), and some developed their own, with varying statutory or regulatory limits on penalties inconsistent with those of EPA (U.S. EPA 2001, 1997a). Just as with RCRA, an outside observer could review a state's hazardous waste statutes and regulations and not know if the state even had a hazardous waste penalty policy, much less its provisions.

Some of these characteristics of the RCRA administrative penalty process would be expected to facilitate shirking by state enforcers. Despite EPA's instructions that state penalties should be at least as stringent as what EPA would impose, there are no legally binding requirements on how to determine penalties. Furthermore, EPA does not even require states to have written policies on how to determine penalties, much less have policies similar to those of EPA. Thus state agents can take advantage of this grant of discretion and by EPA's lack of information on the state's penalty procedures. In addition, because almost all administrative penalties are settled through negotiations between state enforcers and violators, there typically is no public record on how penalty amounts are decided. In addition, EPA's unimpressive experience in adhering to its own RCRA penalty policies and imposing stringent penalties makes it a less credible source of sanctions against state agents for their lackluster enforcement.

RCRA enforcement actions comprised about 10 percent of formal state environmental enforcement actions from the mid-1980s through the 1990s (EPA 2000b) and about 10 and 25 percent of EPA administrative penalty cases and fines, respectively, during the 1990s (U.S. EPA 1991b, 1992, 1993b, 1994, 1995d, 1996b, 1997b, 1998f, 1999d, 2000b). Although it cannot be assured that any differences between federal and state governments in RCRA

[4] EPA's initial RCRA state authorization regulations (40 C.F.R. §123.9[c] [1981]) established specific factors states had to consider in determining penalties, most of which were subsequently embodied in EPA's RCRA civil penalty policies. In a settlement of a lawsuit against those regulations, however, EPA (1982:39615) rescinded those requirements. EPA subsequently provided only guidance to states on determining penalties: "EPA encourages States to develop and use their own State penalty policies or criteria for assessing civil penalties. . . . EPA encourages States to consider EPA's penalty policies as they develop their own penalty policies" (1986:16).

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

enforcement are representative of their other environmental enforcement efforts, it is reasonable to assume that any such differences reflect basic, broadly applicable approaches. Penalties are particularly useful in evaluating the consistency and stringency of enforcement efforts. First, penalties are measured in units—dollars—that have the same meaning everywhere. In contrast, inspections vary in quality (e.g., thoroughness) and NOVs vary in seriousness, making comparisons uncertain. Second, agencies must annually conduct certain numbers of environmental inspections. These federally imposed minima make it more difficult to assess if inspections simply meet required levels or exceed them. In contrast, there are no federal minima for penalties. Third, the penalty imposed should reflect the severity of an enforcement action, whereas the number of inspections or NOVs might at least partly reflect the severity of environmental concerns in an area. Indeed, a low number of enforcement actions might indicate not an agency's laxness, but rather a high level of compliance due to its past stringent enforcement efforts. Consequently, although imperfect, penalty amounts have advantages as a measure of enforcement stringency.

Data

Selection of Enforcement Actions

Data from various sources were used to test these enforcement stringency theories. The RCRA enforcement actions were from EPA's Resource Conservation and Recovery Information System (RCRIS) National Oversight Database (U.S. EPA 2000a). RCRIS is supposed to contain information about every facility that has notified the government that it generates or manages hazardous waste, or both.[5] "Core" data from EPA Regional databases were extracted to create the RCRIS National Oversight Database. Core data include data necessary (as negotiated by states, EPA Regions, and EPA headquarters) for national oversight of the RCRA program (U.S. EPA 1998a). Some of these data are publicly available, including details on RCRA enforcement actions.

Pursuant to EPA procedures and MOAs with states, not all RCRA enforcement actions are in RCRIS. Although reportable enforcement actions might vary, ordinarily they involve the most serious violations. Of my analyses' enforcement actions, 84 percent were categorized by EPA as "Class I" violations, the most serious category. These are

[5] Concerns have been expressed about the completeness and accuracy of RCRIS data (Brown & Green 2001; U.S. EPA 1999a, c). Despite this, RCRIS was the only national source of RCRA-related data, and there is no evidence of systematic errors in RCRIS penalty data.

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

> [d]eviations from regulations, or provisions of compliance orders, consent agreements, consent decrees or permit conditions which could result in a failure to: (a) Assure that hazardous waste is destined for and delivered to authorized treatment, storage, or disposal facilities (TSDFs); or (b) Prevent releases of hazardous waste or constituents, both during the active and any applicable post-closure periods of the facility operation where appropriate; or (c) Assure early detection of such releases; or (d) Perform emergency clean-up operation or other corrective action for releases (U.S. EPA 1998a:12.2.4).

Thus my analyses focus on the more serious enforcement actions. Although this makes these data unrepresentative of all RCRA enforcement actions, those included should be of greatest interest to policy makers and the public. In addition, using these enforcement actions inherently controls for some variation in the severity of violations.

Although RCRIS contains various types of enforcement actions, my analyses included only final compliance orders under RCRA §3008(a) (42 U.S.C. §6928[a]) or its state law equivalent, through which the government can issue an order imposing a civil penalty on, and require immediate compliance by, a facility violating RCRA. These final §3008(a) orders comprised 67 percent of enforcement actions in RCRIS. Most other enforcement actions were initial §3008(a) orders (15 percent), which were largely duplicates of their accompanying final §3008(a) orders; judicial cases (10 percent), the penalties for which were thus not decided by agencies; or informal verbal or written administrative actions (7 percent), most with penalties under $1,000. Consequently, §3008(a) orders encompass the overwhelming majority of all RCRIS enforcement actions and essentially all relevant ones.

Of 6,759 listed §3008(a) enforcement actions, I deleted 367 that ended before 1986 or after 1999. Pre-1986 cases were excluded because EPA issued its formal guidance policy in 1984 requiring that its penalties recover any economic benefit of noncompliance to the defendant (U.S. EPA 1984a). Thus penalties in such cases might be systematically lower than later ones due to this required recapture of economic benefits.

I also excluded 81 enforcement actions whose data were suspect (e.g., likely duplicate records or enforcement actions in which one penalty was listed for violations at multiple facilities). I also excluded enforcement actions that had no penalties (presumably these §3008[a] orders required other actions by defendants), occurred outside of the 50 U.S. states, or were from 16 states in which less than 20 enforcement actions each were listed or from two states whose numbers of enforcement actions combined with the numbers of their applicable EPA Region enforcement actions were less

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

than 100. This left 4,978 state and 1,070 federal enforcement actions for my analyses. Although these comprised only one type of enforcement action, there was wide variation in the typical penalties imposed. The median penalties in states ranged from $2,816 to $43,244, with half the states having median penalties below $10,000, and one-quarter each with median penalties between $10,000 and $20,000 and more than $20,000, respectively. The median penalties in EPA Regions ranged from $13,714 to $54,247.

Dependent Variable

The dependent variable in my analyses is the dollar amount of the penalty imposed in the enforcement action, as reported in RCRIS. This penalty comprises the money paid by the defendant to the government plus, where applicable, the cost to the defendant of an SEP. To measure the severity of each penalty in constant dollars, I transformed the penalties into 1999 dollars by adjusting them consistent with the annual Consumer Price Index (from the U.S. Bureau of Labor Statistics Web site at http://www.bls.gov/cpi). Because the distribution of penalties was significantly skewed, due to relatively few very large penalties, a log transformation was used to produce more normally distributed transformed penalties.

Independent Variables: Political Environment Characteristics

Partisan Control of Government

Dummy variables were used to indicate partisan control of the government (i.e., federal or state) imposing the penalty. Control of the executive branch was indicated by the political party of the governor or president for state or federal actions, respectively. Control of the legislative branch was determined by how many legislative houses were controlled[6] by each party. Thus an EPA case would reflect partisan control of the U.S. presidency, House, and Senate at the time the case ended. A state case would reflect partisan control of the governorship and state legislative houses at the time the case ended.[7]

These dummy variables reflected the following scenarios: (a) Democratic Party controlled executive branch and both legislative houses (*Dem. executive/legislature*), (b) Democratic Party controlled executive branch and one legislative house (*Dem. executive/*

[6] A small number of times, the control of a state legislative house was shared between the parties, as both held the same number of seats. In such cases, I classified control of that entire legislative branch as divided, as neither party had reliable control over the legislative house in question.

[7] Information on partisan control of state governments was primarily obtained from the Council of State Governments' publications (e.g., *Book of the States*), supplemented by other sources.

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

divided legislature), (c) Democratic Party controlled executive branch and neither legislative house (*Dem. executive/Rep. legislature*), (d) Republican Party controlled executive branch and neither legislative house (*Rep. executive/Dem. legislature*), (e) Republican Party controlled executive branch and one legislative house (*Rep. executive/divided legislature*), and (f) Republican Party controlled executive branch and both legislative houses (*Rep. executive/legislature*).

The scenario excluded as the dummy variable reference group in my regression analyses was *Dem. executive/legislature*. Whichever of the remaining dummy variables matched the situation when the penalty was imposed was coded as a one, and the others as zeroes. Thus the sign of the coefficient for each partisan control dummy variable indicates if penalties imposed by that type of government were more or less stringent than penalties from a government completely controlled by Democrats.

Environmental Group Presence

Pressure from organized public interest groups was represented by the percentage of the population that belonged to the Sierra Club in the state in the year the penalty was imposed (*Environmental group members*).[8] The state population estimates for each year from 1986 to 1999 were from the U.S. Census Bureau (http://www.census.gov/popest/estimates.php). Although the Sierra Club provided its membership totals by state, only 1989–1999 were available. To fill the gap from 1986 to 1988, I used time-series analyses to estimate those membership totals.

There was considerable fluctuation in the state membership data from 1989 to 1999, but the 1989–1991 data in each state had a consistent linear pattern. Thus each state's Sierra Club membership from 1986 to 1988 was estimated through a time-series analysis of its 1989–1991 membership data. Though only three data points were in these analyses, each state's time-series equation produced an excellent fit to its 1989–1991 membership data, and thus hopefully to its 1986–1988 data.[9] Therefore, this combination of actual and estimated Sierra Club membership was used and, because this variable's relationship with penalties might be nonlinear, a quadratic form of it was included. As noted later, the

[8] Sierra Club membership figures were used because it was the only major national environmental group that existed during the entire time period in question that possessed and agreed to provide this information. To check how representative these data were of other environmental groups, however, I compared them to the combined state membership data of 10 other widely varying environmental groups in 1993 gathered by another study (Wikle 1995). The resulting correlation of 0.78 indicates that the state distribution of Sierra Club members appears highly consistent with that of other environmental groups.

[9] Of 150 membership estimates (three years of estimates for 50 states), 39.3 percent were within 0.5 percent (not percentage points) of actual membership, 67.3 percent were within 1 percent, and 92.0 percent were within 2 percent.

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

importance of this variable did not meaningfully change if the analyses excluded the 1986–1988 estimated data.

Environmentalism

To represent generalized pressure for more-stringent enforcement from *Environmentalism* sentiment, I used the mean LCV rating of a state's U.S. House of Representatives delegation in the year the penalty was imposed and, because its relationship with penalties might be nonlinear, a quadratic form of it. Although some prior research concluded that congressional LCV ratings are associated with other measures of state environmentalism (Mazur & Welch 1999), this still is an uncertain measure of the latter. LCV ratings should, however, be a meaningful measure of political office holders' environmentalism.[10] Consequently, these officials' environmentalism—rather than or in addition to that of the public—might be influencing environmental enforcers' penalty decisions.

Economic Importance of Hazardous Waste Industries

To represent pressure from the regulated industry, I first determined the industries most involved with hazardous waste. Although the hazardous waste management industry (i.e., hazardous waste transporters and TSDF operators) obviously is involved with hazardous waste, no reliable economic data on it were available until separate categories for it were established in the U.S. Census Bureau's 1997 *Economic Census*. Therefore, the absence of data alone makes it difficult to consider this industry for this analysis. However, the 1997 *Economic Census* also indicates that this industry ordinarily should be of little economic importance to a state. In the entire nation in 1997, only 414 establishments collected hazardous waste, and only 512 treated or disposed of it (U.S. Census Bureau 2001)—a combined average of fewer than 20 per state (and some establishments might have done both). These establishments accounted for an average of only about 500 employees and $80 million in receipts per state.

Consequently, if political influence flows from economic importance, the hazardous waste management industry should add little to the political influence of other hazardous waste facilities—those that generate (and perhaps treat or dispose of their own, but not others') hazardous waste. Although some facilities in probably almost every industry generate hazardous waste, most hazardous

[10] Of course, these LCV ratings are for federal, not state, office holders, and it is uncertain if the environmentalism of the former reflects the latter. Obviously, the environmentalism of the latter would be best when analyzing state enforcement actions. Unfortunately, many state LCV chapters do not publish LCV ratings for state legislators and many of those that do only started fairly recently, thus making state legislative LCV ratings unavailable for this analysis.

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

waste generation is concentrated in a few industries. To identify these industries, EPA's Biennial Reporting System (BRS) data were used. Beginning in 1983, large-quantity generators (LQGs) of hazardous waste (i.e., those generating at least 1,000 kilograms of hazardous waste in at least one month a year) have submitted information about their hazardous waste generation in odd-numbered years (40 C.F.R. §262.41 [2005]), which is made publicly available by EPA in BRS. Although LQGs comprise a small percentage of hazardous waste generators, they account for more than 90 percent of hazardous waste generated annually in the United States (Atlas 2002). Among the information reported by LQGs for each of more than 1.3 million hazardous waste streams from 1991 to 1999 is the Standard Industrial Classification (SIC) code of the industrial process from which the waste came, which indicates an LQG's industry.

Thus for each BRS year from 1991 to 1999, I compiled the unique two-digit SIC code(s) that applied to the hazardous waste stream(s) generated by each LQG. For each BRS year, I determined which two-digit SIC codes appeared most often. Although the legal definition and volume of hazardous waste generated, and BRS reporting requirements, changed substantially over the years, the same four industries were reported most frequently in each BRS year. These industries—Chemicals and Allied Products (SIC code 28), Fabricated Metal Products (SIC code 34), Electronic and Other Electric Equipment (SIC code 36), and Transportation Equipment (SIC code 37)—accounted for 58.4 to 61.2 percent of all SIC codes reported in a BRS year. The percentage accounted for by any one of these SIC codes varied little across the BRS years, and no other SIC code accounted for more than a few percent of SIC codes. Therefore, these data were very stable over time.

I then determined the total value added by manufacturing by these four industries for each state for each year from 1986 to 1999 from U.S. Census Bureau *Annual Surveys of Manufactures* and *Economic Censuses*.[11] Finally, I determined the percentages these amounts were of the gross state products, as reported for each year in each state in the U.S. Bureau of Economic Analysis *Survey of Current Business* reports. This percentage was used to represent the economic importance of hazardous waste industries in the state in

[11] In 1997, the U.S. Census Bureau began reporting data by North American Industrial Classification System (NAICS), not SIC, codes. By comparing industries covered by these two sets of codes, I equated them as follows: SIC code 28 = NAICS code 325; SIC code 34 = NAICS code 332; SIC code 36 = NAICS codes 335, 3342, and 3344; and SIC code 37 = NAICS code 336. In addition, for a small number of industries in some states in some years, the U.S. Census Bureau did not report value added by manufacturing due to the small number of facilities in that industry. In such a situation, I replaced the missing data for that year with the mean of value added by manufacturing for that industry in that state for years in which data were not missing.

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

the year the penalty was imposed (*Industry importance*) and, because its relationship with penalties might be nonlinear, a quadratic form of it was included.

Economic Conditions

To represent pressure for less stringent enforcement when economic conditions are adverse, I used the statewide *Unemployment* rate three months before the penalty was imposed (from U.S. Bureau of Labor Statistics data at http://www.bls.gov/lau/home.htm) and, because its relationship with penalties might be nonlinear, a quadratic form of it. It is uncertain how long before a penalty was formally imposed that the amount was decided upon, but the three-month time lag seems reasonable. I also tried five- and seven-month lagged unemployment, but they were almost perfectly correlated with the three-month figures and thus it makes no meaningful difference which was used.[12]

Business vs. Public Defendant

To represent the bias for less-stringent enforcement against public entities, I reviewed how defendants were categorized in RCRIS (which has a code indicating the owner/operator type) and examined their names to verify the RCRIS categorization. I corrected or, when missing, supplied a few percent of the defendants' categorizations. Public defendants included government agencies, medical facilities, and educational institutions (the latter two even if they were private institutions), and were coded as zeroes for this *Business defendant* dummy variable.

Independent Variables: Enforcement Action Characteristics

Naturally, the characteristics of an enforcement action also should be related to its resulting penalty. Thus in addition to the above-described independent variables representing political environment factors possibly affecting enforcement stringency, variables were included controlling for aspects of the enforcement action that should determine penalty severity.

Seriousness of Violation

I hypothesized that penalties are higher for more serious violations. Some past research concluded that the seriousness of

[12] Some studies examining determinants of enforcement actions used as an independent variable the impact or likelihood of the closure of the facility subject to the enforcement action, on the assumption the latter could lead to the former. Because, however, the median penalty in my analyses was only $10,000 and only 15 percent of all penalties even exceeded $50,000, very few of these enforcement actions likely could have threatened a company's financial existence.

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

environmental violations affects penalty amounts (McKinney 1998; Oljaca et al. 1998; Cohen 1992, 1987). In addition, pursuant to RCRA §3008(a)(3), the government must take into account "the seriousness of the violation" in determining a penalty. EPA's RCRA penalty policies require the seriousness of the violation to be based upon the "potential for harm; and extent of deviation from a statutory or regulatory requirement" and explicitly state that more serious violations should be penalized more severely (U.S. EPA 1990a, 1984b). If states act consistent with EPA policies, this relationship also should exist for state enforcement actions.

The only RCRIS information specifically, though only generally, indicating the overall seriousness of violations is if they were *Class I violations*, which were defined earlier. Thus a dummy variable was included indicating if an enforcement action was so designated.

Number and Type of Violations of Each Law

A violation's seriousness also might be reflected in the specific RCRA requirement violated, as some might inherently pose greater potential harm than others (e.g., EPA's penalty policies recommend considering the risk of exposure to hazardous waste posed by a violation [U.S. EPA 1990a, 1984b]). Some prior research concluded that a key determinant of a penalty is the type of environmental violation (Atlas 2001; Helland 2001; Ringquist & Emmert 1999; Kleit et al. 1998; McKinney 1998; Ringquist 1998; Hamilton 1996).

In addition, I hypothesized that the more violations in an enforcement action, the higher the penalty because the government can penalize each violation. Therefore, as indicated by prior research, more environmental violations should lead to higher penalties (Kleit et al. 1998; Ringquist 1998; Hamilton 1996). In addition, the number of violations might reflect the seriousness of the matter, as more violations likely pose greater potential harm and show more deviation from legal requirements. Consequently, more violations might indicate more-serious offenses, thereby justifying higher penalties.

Thus independent variables were included for the number of violations of each of certain categories of violations in an enforcement action. RCRIS assigns violations to categories, all of which I included if there were any such violations in my selected cases, although I combined similar categories with few violations. The following are the categories included:

1. *Compliance agreement violations:* not fulfilling a prior legal agreement with the government (three RCRIS categories were combined into this category),

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

2. *TSDF combustion violations:* thermal treatment of hazardous waste (seven RCRIS categories were combined into this category),
3. *TSDF closure violations:* actions required to close and, if necessary, clean up a TSDF,
4. *TSDF financial assurance violations:* assuring funds are available to pay for spills or closure activities,
5. *TSDF groundwater monitoring violations:* groundwater monitoring required for land disposal facilities,
6. *TSDF land ban violations:* requirements that hazardous waste be treated before disposal on land,
7. *Other TSDF violations*,
8. *Generator land ban violations:* requirements that hazardous waste be treated before disposal on land,
9. *Other generator violations*,
10. *Transporter violations:* hazardous waste transportation requirements, and
11. *Other violations*.

Thus independent variables were included for the number of violations in each of these categories in an enforcement action. I hypothesized a positive relationship between the number of violations in a category and the penalty.

SEPs

I hypothesized that the penalty is higher if a SEP credit is part of it. This is because both the government and defendants have incentives to exaggerate the expected SEP cost. For a defendant, the higher the claimed SEP cost, the lower (to a limit) its monetary penalty due to the resulting SEP credit. For the government, the higher the claimed SEP cost, the more severe the publicized penalty, which might have some public relations and deterrence value (Dana 1998). Thus a dummy variable was included indicating if the penalty included a *Supplemental Environmental Project*.

Prior Violations

I hypothesized that the more prior violations by a defendant, the higher the penalty in the current enforcement action. Under EPA's RCRA penalty policies, a defendant's prior noncompliance with hazardous waste laws justifies a higher penalty, as it demonstrates that the defendant was undeterred by prior enforcement (U.S. EPA 1990a, 1984b). If states act consistent with EPA policies, this relationship also should exist for state enforcement actions. Some research concluded that a history of prior environmental violations affects subsequent penalties (Lynch et al. 2004a, b; Ringquist & Emmert 1999; McKinney 1998; Oljaca et al. 1998; Ringquist 1998).

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

An independent variable was included for the number of *Prior violations* by a defendant and, because its relationship with penalties might be nonlinear, also a quadratic form of it. A defendant's violations prior to a particular enforcement action were determined through the "violation control number(s)" assigned by EPA to the violation(s) in the enforcement action.[13] Part of that number indicates that violation's sequence within all RCRA violations for that defendant. Thus the number of prior violations was determined by subtracting one from the lowest such sequence number among the violations in the enforcement action in question.[14]

Time

I hypothesized a relationship between penalties and the timing of the enforcement action. EPA has asserted, as supported by its overall enforcement results, that it has been more aggressive in enforcement since the mid-1980s. It is possible states might claim the same. In particular, the number of EPA and state RCRA administrative actions generally increased from the mid-1980s to the early 1990s, then decreased for a few years before increasing again (Zinn 2002; U.S. EPA 2000b). In addition, according to EPA data, its median RCRA administrative penalty increased almost linearly from the early 1980s to at least the early 1990s, unlike penalties in its other programs (U.S. EPA 1993b). Some prior research controlling for other factors concluded that EPA RCRA administrative penalties and EPA civil judicial penalties increased over this time (Atlas 2001; Ringquist & Emmert 1999; Hamilton 1996). Of course, if states are pursuing a race-to-the-bottom in enforcement stringency, one would expect their penalties to decrease over time.

I represented time as the years from 1986 to the date of the enforcement action in question (i.e., number of days divided by 365). Because the relationship between it and penalties might be nonlinear, a quadratic form of it also was included. Because the trend over time might be different for federal and state governments, two sets of time variables were included for federal and state

[13] Only counting prior *enforcement actions*, rather than violations, would grossly underestimate prior violations by a defendant. This is because only a small percentage of violations leads to an enforcement action, much less a §3008(a) order. For example, according to EPA data, although there were environmental law violations at 16 percent of 43,106 facilities examined from 1996 to 1997, enforcement actions occurred at only 2 percent of them (U.S. EPA 1998c).

[14] Sometimes a defendant committed additional violations between the date of the violations in the enforcement action in question and the ultimate date of that enforcement action. Because the violation control number is assigned when a violation is detected, even if the enforcement action occurs later, that number would not reflect violations in the interim. These intervening violations, however, might influence the penalty imposed. Thus to reflect these violations, I also included as *Prior violations* any violations by the defendant detected before the enforcement action in question but after the date(s) on which violations in that action were detected.

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

actions, respectively. Thus, *EPA time* equaled zero if the enforcement action in question was a state action, and equaled the years from 1986 to the date of the enforcement action if it was a federal action. The *State time* variable was calculated in a similar manner.

Table 1 displays the means and standard deviations of the variables in my analyses, separated into the groups of federal and state enforcement actions, respectively.

Analyses

Analytic Approach

To test federal versus state environmental enforcement stringency, as well as the other above-described hypotheses, I began with a separate ordinary least squares regression model for each of

Table 1. Summary Statistics for Variables

	State Actions		Federal Actions	
Variable	Mean	S.D.	Mean	S.D.
Penalty	30718.2	171661.1	104499.5	610822.9
Political Environment Characteristics				
Dem. executive/legislature	0.242	0.428	0.198	0.399
Dem. executive/divided legislature	0.215	0.411	0.000	0.000
Dem. executive/Rep. legislature	0.090	0.287	0.401	0.490
Rep. executive/Dem. legislature	0.245	0.430	0.370	0.483
Rep. executive/divided legislature	0.093	0.290	0.031	0.173
Rep. executive/legislature	0.116	0.320	0.000	0.000
Industry importance	8.339	4.008	9.091	4.186
Environmentalism	49.931	19.329	44.826	23.111
Environmental group members	0.156	0.096	0.160	0.100
Unemployment	5.822	1.540	5.511	1.537
Business defendant	0.942	0.233	0.893	0.309
EPA Region 1	0.084	0.277	0.121	0.326
EPA Region 2	0.171	0.376	0.084	0.278
EPA Region 3	0.073	0.260	0.053	0.225
EPA Region 4	0.379	0.485	0.105	0.306
EPA Region 5	0.078	0.268	0.127	0.333
EPA Region 6	0.126	0.331	0.200	0.400
EPA Region 7	0.007	0.085	0.168	0.374
EPA Region 8	0.027	0.161	0.065	0.247
EPA Region 9	0.019	0.135	0.034	0.180
EPA Region 10	0.037	0.188	0.043	0.203
Enforcement Action Characteristics				
Class I violation	0.851	0.356	0.806	0.396
Prior violations	8.230	19.173	13.068	24.406
SEP	0.044	0.206	0.068	0.252
Time	8.121	3.713	7.767	3.758
Compliance agreement violations	0.033	0.322	0.021	0.172
TSDF combustion violations	0.010	0.208	0.152	0.995
TSDF closure violations	0.062	0.337	0.167	0.457
TSDF financial assurance violations	0.049	0.312	0.118	0.369
TSDF groundwater monitoring violations	0.047	0.379	0.106	0.475
TSDF land ban violations	0.048	0.314	0.131	0.499
Other TSDF violations	0.731	2.476	0.812	1.780
Generator land ban violations	0.167	0.554	0.227	0.547
Other generator violations	2.860	3.691	1.466	2.434
Transporter violations	0.091	0.659	0.023	0.169
Other violations	0.307	2.083	0.198	1.130

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

the 32 states that had more than 20 state enforcement actions and more than 100 combined state and EPA Region actions. It was necessary to compare each state's penalties against federal penalties of the EPA Region it was in because EPA Regional Offices have substantial flexibility in pursuing enforcement actions according to their own priorities and policies, though within constraints imposed by EPA Headquarters (U.S. EPA 1996a, 1987, 1984c). Thus there could be variation between EPA Regions based on the types of RCRA enforcement actions they pursue, the severity of penalties they impose, and the degree of oversight and pressure they bring to bear upon the RCRA-authorized states in their respective Regions. This inter-Region variation, both among EPA Regions and the states within them, has been noted elsewhere (U.S. GAO 2000, 1988; Hamilton 1996; Hunter & Waterman 1992).

Thus to determine if state penalties differ from EPA penalties, it was most appropriate to compare the penalties for each state within an EPA Region against that Regional Office's penalties. That Regional Office is the principal to the state's agent. For example, a state's penalty could be higher than the typical *national* EPA penalty in a comparable enforcement action only because the state was in an EPA Region that pressured states to be more severe in their punishments. Because ordinarily the alternative to a state enforcement action is one by the EPA Regional Office, not EPA headquarters, the former's actions should be used as the benchmark. This prevents differences between EPA Regions' enforcement approaches from biasing the results.

Consequently, each state regression model also included a dummy variable (*State action*) indicating if the state or the EPA Region prosecuted the enforcement action in question. Therefore, the statistical significance and direction of this variable's coefficient indicated if state enforcement actions were more (positive coefficient) or less (negative coefficient) stringent than EPA enforcement actions in the EPA Region in question. The hypothesis was that these *State action* variables would not be statistically significant, as this would indicate no difference in the outcomes of EPA versus state enforcement actions, and thus no shirking by the state agents. Because an EPA Region's enforcement stringency should not vary by state within that Region (other than due to some of the political environment characteristics described earlier), the regression analysis for each state included all of that state's enforcement actions and all of the EPA enforcement actions of the EPA Region it was in, including those EPA pursued in other states in the Region.

To lessen multicollinearity concerns,[15] any quadratic term that was not statistically significant after the initial run of each

[15] One multicollinearity concern was between an independent variable and its quadratic form. To lessen that concern, those independent variable values were converted into

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

regression model was deleted. This eliminated all but 10 of the initial 224 quadratic terms. In addition, any variable that was not statistically significant in subsequent model runs and produced a variance inflation factor score exceeding 10 was deleted, and the model was rerun. This occurred in only 18 of the 32 regression models, with typically only one variable being deleted. Thus these infrequent removals only of variables that were not statistically significant helped lessen multicollinearity concerns without losing any meaningful information.[16] Each model also was tested for heteroskedasticity, and the results used robust standard errors for five states' models in which it was statistically significant.

Table 2 displays a summary of the results of the final regression analysis for each state. Although the full results are available from the author, for purposes of brevity—given the large number of regression models—and to make comparisons across states easier for readers, only the numbers and coefficient signs of the statistically significant variables are reported. The state results are also grouped by EPA Region to facilitate comparisons across Regions.

State versus Federal Enforcement Stringency

The mean r^2 of the 32 models was 0.376, which places them in the upper range of r^2's reported by other studies of environmental penalties (Atlas 2001; Ringquist & Emmert 1999; McKinney 1998; Oljaca et al. 1998; Ringquist 1998; Hamilton 1996; Cohen 1992, 1987). Six of the models produced r^2's over 0.5, which are higher than any prior study of environmental penalties, and nine produced r^2's between 0.4 and 0.5. There were substantial differences in r^2's across EPA Regions, with the state models in Regions 2 and 5 having consistently lower r^2's, as well as the one-state models in Regions 7 and 9. Despite these relatively high r^2's, some of the determinants of penalties clearly were not captured by the models. This is not surprising, as much of the information that should be used in setting penalties (e.g., days of noncompliance, cooperation of defendants, and seriousness of violation) were entirely unavailable or insufficiently specific in the data. The lack of adequately detailed data makes all penalty studies inherently difficult.

differences from the variable's mean for purposes of the regression analyses. Another multicollinearity concern was between the time and partisan control variables, due to Republican Party gains over time during the 1990s.

[16] Through this procedure, no statistically significant variables were deleted from the models. Furthermore, only 32 of the nearly 500 variables across the 18 models changed from statistically significant to not or vice versa once the highly collinear variables were deleted. As would be expected, most (23) of these changes were variables that became statistically significant after highly collinear variables were deleted (11 were initially statistically significant at the 0.10 level). Of the nine variables that became statistically insignificant, six still were statistically significant at the 0.10 level.

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

Table 2. Regression Analyses of State and EPA RCRA Penalties

EPA Region	State	N	R^2	State Action	Partisan Control	Violation Types[b]	Class I Violation	Prior Violations	SEP	Env'd Group	State Time
1	CT	197	0.216	−		4	+		+		
	MA	281	0.522	−		3	+		+		
	ME	228	0.372	−		3			+		
	RI	208	0.471	−		1			+		−
	VT	149	0.401	−		1	+		+		−
2	NJ	453	0.296	−		2	+	+		+	
	NY	576	0.276	−		5		+			
3	PA	224[a]	0.571	−	+	3	+				
	VA	107	0.470	−	−	1			+		+
	WV	203	0.405	−	−	3	+				+
4	AL	235	0.242	−		1	+	+	+		
	FL	1047[a]	0.359	−	−	6	+		+		
	GA	329	0.401	−	−	1		+			
	KY	234[a]	0.539	−	−	2	+	+			
	MS	242	0.459	−	−	1	+	+			+
	NC	173	0.175	+	−	2	+	+		−	
	SC	367[a]	0.373		−	3	+	+			+
	TN	158	0.471	−	−	1		+			+
5	IL	159	0.260		−	2			+	+	−
	IN	258	0.289		−	3	+		+		
	MI	187	0.273			2			+	+	−
	MN	224	0.268	−	−	2			+	+	−
	OH	241	0.235		−	2		+	+	+	
6	AR	342	0.542	−	−,+	6	+	+	+		−
	LA	331[a]	0.395	−	−,+	6	+	+	+		−
	TX	594	0.305			6	+	+	+		
7	KS	216	0.281		−	2			+	−	
8	CO	136	0.483	+	−	2	+	+			−
	UT	137	0.413		−	0	+		+		
9	CA	129	0.070			1					−
10	ID	110	0.597	−	+	1					
	OR	165	0.587	−		3			+		

Notes:
[a]Robust standard errors used to determine statistical significance of independent variables.
[b]Number of violation type coefficients that are statistically significant at $p < 0.05$.
+Coefficient is positive and statistically significant at $p < 0.05$.
−Coefficient is negative and statistically significant at $p < 0.05$.
All R^2's are statistically significant at $p < 0.01$.

Of the 32 state models, 23 produced statistically significant differences in penalties between state and EPA enforcement actions. Thus this indicates that differences exist in state and federal enforcement stringency. Indeed, this variable was statistically significant more often than any other variable. Furthermore, in 14 of the 23 states in which *State action* was statistically significant, the absolute value of its coefficient was the largest of the statistically significant dummy variables, and its coefficient was among the three largest in the other nine states, indicating the importance of its relative effect on penalties. In addition, in 18 of the 23 states in which *State action* was statistically significant, the absolute value of the change in penalty due to the state, instead of EPA, taking the enforcement action was larger than a two standard deviation change in any of the statistically significant continuous variables.

Of the 23 states with statistically significant differences in penalties, 21 had lower penalties than their EPA Regions. Thus this supports concerns about state agents shirking their enforcement obligations. To assess the extent of the difference in federal and state enforcement stringency, I used the final regression model for each state to estimate what the penalty would have been for each state enforcement action if it instead had been prosecuted by the applicable EPA Region. This was done by simply changing the value of the *State action* variable in these cases from one to zero and running the values of it and the other independent variables through the final model equation to predict the estimated EPA penalty in each case. The mean estimated EPA penalty was $80,829, versus the mean actual state penalty of $30,718. So on average, state penalties were 62 percent lower than what the EPA penalty would have been. The difference between median penalties was even larger. The median estimated EPA penalty was $27,399, versus the median actual state penalty of $7,868, a reduction of 71 percent. Consequently, the disparity in environmental stringency is substantial.

Of 11 states that did not have statistically significant lower penalties than EPA, four were in EPA Region 5. Therefore, it appears that something in this EPA Region drew together the states' and EPA's enforcement outcomes. One possibility is that EPA Region 5 imposed more pressure on its states to be consistent with its enforcement policies. As a GAO report noted:

> EPA's [Region 5] Chicago office, for example, has long held a reputation for having an aggressive enforcement program in which the region would act quickly and forcefully if it determined that the state was not performing its responsibilities adequately. A Chicago office official told us that the region believes that it is important to maintain an "enforcement presence" in states as a deterrent to the regulated community, in contrast to other re-

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

> gions that believe having to take an enforcement action is a sign of failure (2000:38).

Thus, EPA Region 5 might have been more aggressive in using monitoring and sanctions to police its principal-agent relationship with states.

It also is notable that EPA's Regional Offices were located in four of the seven states outside Region 5 that did not have statistically significant lower penalties than EPA. Perhaps geographical closeness between state officials and the federal officials monitoring them makes oversight easier by reducing the information imbalance between the principal and agent, thereby promoting more consistency between their enforcement policies. In addition, during at least some of the time period studied, some of the seven states had the explicit statutory authority to include in their environmental penalties the economic benefits defendants gained due to noncompliance. Consequently, this was more consistent with EPA's policy and thus was less likely to lead to lower penalties than from EPA.

Effects of Political Environment Characteristics

For the political environment characteristics, the results indicate that partisan control of government is often related to penalties. At least one partisan control scenario was statistically significant in 20 of 32 state models. Furthermore, 80 percent of the time they were statistically significant, it was in the expected direction—penalties were lower when the Democratic Party did not completely control the executive and legislative branches.[17] I tested another set of models in which the partisan control scenarios were replaced with just a dummy variable for the party controlling the executive branch, which should be most responsible for environmental enforcement. Although a less refined reflection of partisan control, this variable was statistically significant in 13 of the 32 models, all but one of which indicated that Democratic executive branches were associated with higher penalties.

The other independent variables reflecting potential political pressures on environmental enforcers, however, were typically not statistically significant in more than five states each. The one exception was that *Environmental group members* in a state had a statistically significant relationship with penalties in seven states, five of which were in the hypothesized positive direction. Four of those

[17] At a statistical significance level of 0.05 across 32 regression models, one would expect any particular variable to produce about one false result of statistical significance in each direction. Thus it is not unusual that the five partisan control variables contradicted my hypotheses six times.

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

five states are in EPA Region 5, indicating that the effect of environmental group members was typically important in—and only in—Midwestern states. Excluding 1986 to 1988 enforcement actions and their accompanying estimated, rather than actual, Sierra Club membership data, would not change the overall results for this variable.

Effects of Enforcement Action Characteristics

All types of variables representing enforcement action characteristics frequently had statistically significant relationships with penalties, almost always in the hypothesized directions. First, the most serious violations received significantly higher penalties than other violations. A *Class I violation* was statistically significant in 18 of the 32 state models, always with a positive relationship. Second, all but one of the state models produced a statistically significant relationship with one or more types of RCRA violations. There were 81 statistically significant relationships between penalties and violation types across the models, 89 percent of which were in the hypothesized positive direction. Thus the more violations of almost any particular RCRA requirement, the higher the penalties.

Third, there was a statistically significant relationship—always positive—in 14 state models between penalties and *Prior violations* by a defendant. Therefore, as hypothesized, a history of noncompliance was a detriment to defendants. Fourth, the presence of an SEP in a penalty had a statistically significant relationship with penalties in 19 state models, again always in the hypothesized positive direction.

The *State time* variable was statistically significant in 14 state models, nine of which were negative relationships.[18] Therefore, when there was a time trend in state enforcement cases, it most frequently was that penalties were decreasing. Thus not only did state enforcement actions typically produce substantially lower penalties than EPA actions, but state penalties in these nine states also decreased over time. Consequently, some states may be becoming even more lenient in environmental enforcement, consistent with previously cited government reports and the race-to-the-bottom theory. Until the bottom is reached, one would expect an overall trend of declining state penalties over time. Even in the five states with statistically significant positive trends over time, penalties increased from especially low bases. All five states' mean penalties were lower than the mean penalty across all 32 states, with four of these states having mean penalties 35 to more than

[18] The *EPA time* variable was statistically significant in only four state models, always with a positive relationship.

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

50 percent lower, ranking them in the lowest third of all states. These same four states' *State action* coefficients also were in the lowest third of all states, indicating that their penalties were far lower than EPA penalties. Therefore, the increase in penalties over time in these states is not necessarily a strong indication of aggressive enforcement.

Testing EPA Enforcement Stringency

A possible explanation—aside from lax state enforcement—for state penalties typically being substantially lower than EPA penalties is that EPA might typically become involved only in more serious enforcement actions. Thus it might simply be that EPA enforcement actions involve violations more deserving of higher penalties, and if a state were confronted with the same types of violations, its penalties would be comparable to those of EPA. As noted earlier, EPA ordinarily does not pursue an enforcement action in place of a state.[19] EPA generally takes civil enforcement actions in authorized states only under the following circumstances (U.S. EPA 1996a, 1987):

1. state requests EPA's involvement and provides justification based on unique, case-specific information;
2. state has no or limited authority to take action;
3. state fails to take timely and/or appropriate action;
4. case involves issues that could establish a legal precedent, or federal involvement is needed to ensure national consistency;
5. case involves multistate, multiregional "national violators";
6. case involves interstate pollution problems; or
7. case brought to prevent violators from obtaining economic advantage over its competitors.

Some of these factors should—pursuant to EPA's penalty policies—result in a higher penalty. The possibility that EPA's enforcement actions are skewed toward more serious violations than those confronted by states should, to at least some extent, be lessened due to the nature of the enforcement actions and other variables in my analyses. For example, focusing only on §3008(a) enforcement actions excluded the ordinarily less-serious informal administrative actions reported in RCRIS, of which more than 99 percent were pursued by states. Furthermore, 84 percent of my enforcement actions involved Class I violations, the most serious type. In addition, the severity of the violation also should have

[19] Among the data used in these analyses, only 7 percent of the enforcement actions EPA took in authorized states involved violations discovered by state enforcers. Thus this indicates that EPA rarely assumed enforcement responsibility for violations states could have pursued.

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

been controlled for by other independent variables, such as the numbers of prior violations and of different types of violations.

Nevertheless, it is possible that these controls for severity would not entirely capture the hypothesized inherently more serious EPA cases. Thus to try to assess to what extent EPA's more severe penalties might simply reflect its more serious caseload, I took advantage of a natural experiment created by the RCRA state authorization process. When a state has not been authorized to enforce some or all of the RCRA program, EPA has the sole enforcement power in that state for violations of those laws. Therefore, although EPA ordinarily will not interfere with enforcement in authorized states, it is obligated to essentially act as the state environmental agency in unauthorized states. Consequently, although EPA can pick and choose which enforcement actions to pursue in authorized states, perhaps focusing on the most serious violations, one would expect that it—like a state environmental agency—would pursue a less-selective set of violations in unauthorized states.

Thus to assess the extent of any skew toward more serious violations in EPA enforcement actions in authorized states, I divided the 1,070 EPA enforcement actions into two groups: those in which EPA was essentially acting as the state (i.e., only EPA had the legal authority to pursue the violation) and those in which EPA was acting as the federal overseer of the state. I separated the enforcement actions into these two groups by examining the RCRIS information about the type of violation(s) involved in an enforcement action and comparing it against the RCRA provisions for which the state in question was authorized at the time of that action. The latter research made extensive use of EPA's RCRA State Authorization Tracking System publications and databases, and of the Federal Register notices through which RCRA authorization decisions are formalized.

Of the 1,070 EPA-led enforcement actions, I concluded that in 361 only EPA had the authority to pursue the action (a majority from states not authorized for RCRA during all or almost all of the time period studied), and in the remaining 709 it was acting in its oversight capacity for an authorized state. Among the former group of enforcement actions, 25 percent resulted in penalties below $3,522 per violation and 50 percent resulted in penalties below $9,491 per violation. Thus they appeared to include many violations that would not be regarded as especially serious under EPA's penalty policies. Consequently, to test if EPA does tend to pursue inherently more-serious violations in its oversight capacity than if it were a state environmental agency, thereby skewing its penalties upward, I created a dummy variable indicating if a particular EPA enforcement action was due to EPA, in effect, acting as the state by

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

pursuing enforcement in an unauthorized state. I then included this dummy variable in a regression model analyzing only EPA enforcement actions. If this variable were statistically significant, it would indicate a difference between EPA enforcement actions that is not captured by the other independent variables. This difference might reflect the inherently different severity of the violations EPA pursues when it acts as a state versus as a federal agency. The median EPA penalties indicate a slight difference—$29,402 when EPA acts as a federal agency and $26,201 when EPA acts as a state agency—but this does not control for other factors that might affect penalties.

The other independent variables in the model were largely those used in my prior analyses. The primary difference is that this model also used dummy variables to represent EPA Regions, to reflect their possibly varying stringency in approaching enforcement. I also treated each EPA Region as a separate cluster and each enforcement action in a Region as part of a cluster of observations, with the models estimated using robust standard errors (Huber 1967). This was necessary because it can be assumed that enforcement actions in an EPA Region are not independent of each other and comprise only a sample of all §3008(a) orders in the Region. Thus the data should be treated as, in effect, a cluster sample of observations from each of the EPA Regions in the analysis.

Table 3 displays the results of this regression analysis. Similar to the procedure used for the state models, the quadratic variables were eliminated from the final regression analysis because they were all statistically insignificant in the initial model run. With respect to the key variable of interest, the results indicate that when EPA acts as—in effect—a state, rather a federal, enforcer, its penalties are not significantly different. Consequently, this indicates insufficient evidence that any of the difference between state and EPA penalties is because EPA, when it is in its state oversight role, pursues violations that, compared to what states ordinarily pursue, are more serious in a way that is not controlled for by the other independent variables.[20]

The other overall results of this regression analysis are largely similar to most of the state models. With respect to political environment characteristics, *Environmental group members*, *Environmentalism*, *Unemployment*, and *Business defendant* had no statistically

[20] As another way of addressing the possibility that EPA enforcement actions involve inherently more-serious violations, I also reran all of my state models but excluded enforcement actions with the highest 10 percent of penalties, which were disproportionately EPA cases. Five states switched from having statistically significant lower penalties than EPA to no statistically significant differences (though two were still close to statistical significance), and one state switched in the opposite direction. Thus the net result still was that most states had statistically significant lower penalties than EPA.

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

Table 3. Regression Analysis of EPA RCRA Penalties

Political Environment Characteristics	Coeff.	S.E.
Dem. president/Rep. Congress	−0.711**	(0.194)
Rep. president/Dem. Congress	0.163	(0.465)
Rep. president/divided Congress	0.531	(0.714)
Industry importance	−0.028*	(0.012)
Environmentalism	−0.006	(0.004)
Environmental group members	−0.477	(0.742)
Unemployment	0.068	(0.055)
Business defendant	−0.074	(0.176)
EPA Region 1	0.148	(0.276)
EPA Region 2	−0.800**	(0.198)
EPA Region 3	0.432*	(0.157)
EPA Region 4	−0.052	(0.076)
EPA Region 6	−0.513**	(0.145)
EPA Region 7	−0.322	(0.219)
EPA Region 8	−1.486**	(0.312)
EPA Region 9	0.441	(0.287)
EPA Region 10	0.099	(0.193)
Enforcement Action Characteristics		
EPA only	−0.345	(0.236)
Class I violation	0.711	(0.401)
Prior violations	0.006**	(0.001)
SEP	1.481**	(0.159)
Time	0.126	(0.068)
Compliance agreement violations	0.285*	(0.123)
TSDF combustion violations	0.204**	(0.030)
TSDF closure violations	0.090	(0.108)
TSDF financial assurance violations	−0.149	(0.102)
TSDF groundwater monitoring violations	0.153	(0.097)
TSDF land ban violations	0.192*	(0.075)
Other TSDF violations	0.147**	(0.031)
Generator land ban violations	−0.040	(0.071)
Other generator violations	0.046	(0.043)
Transporter violations	0.343	(0.330)
Other violations	0.067	(0.056)
Constant	9.984**	(0.479)
n	1070	
R^2	0.289**	

Robust standard errors in parentheses next to ordinary least squares coefficients. **$p < 0.01$; *$p < 0.05$. Significance tests are two-tailed.

significant relationship with penalty amounts.[21] *Industry importance,* however, had a statistically significant negative relationship with penalties. Thus EPA penalties were lower in states where hazardous waste industries were more economically important. The size of the effect was fairly small, though—EPA's average penalty would decrease only 11 percent if the *Industry importance* in a state was one standard deviation higher than the national average, with all other independent variables held constant at their means.

One political control scenario was statistically significant. Penalties were substantially lower when there was a Democratic president and a Republican Congress. Because the only occurrence of

[21] Excluding the estimated Sierra Club data from 1986 to 1988 did not change this variable's statistical insignificance.

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

this scenario in the time period studied was during the Clinton administration, this indicates that EPA penalties decreased substantially after Republicans took control of Congress in 1994. EPA's average penalty fell 51 percent after that change in party control. These regression results are consistent with median EPA RCRA penalties, which peaked in 1995[22] and declined each year thereafter until they were 58 percent lower in 1999 than in 1995. One of the most contentious targets of the new Republican-controlled Congress was what it considered excessively burdensome federal environmental policies (Mintz 2005; Kraft 2000). In addition, according to EPA enforcement officials at the time, Congress mandated particular budget allocations that had the effect of reducing funds for enforcement activities (Mintz 2005). Thus it is possible that the intense congressional pressure and budget constraints led to less-vigorous enforcement by EPA.

Finally, just as most state models showed statistically significant differences in penalty amounts between state and EPA enforcement actions, four of the nine EPA Regions in the EPA model showed differences. Consequently, this supports the hypothesis that EPA's Regions vary in their enforcement stringency.

The results with respect to the enforcement action characteristics are mostly similar to the state model results. There were statistically significant positive relationships between penalty amounts and enforcement actions involving SEPs and prior violations, respectively. In addition, nine of the 11 types of violations involved in enforcement actions were positively related to penalties, and four of them were statistically significant. Unlike many state models, however, there was not a statistically significant relationship between penalty amounts and *Class I violations*. Like almost all state models, there also was not a statistically significant relationship between penalty amounts and *Time*.

Conclusion

Although delegation of federal programs to state governments has been a dominant pattern of public policy implementation for decades, a potential weakness of this approach is its dependence on states to adequately enforce federal requirements. The possible shirking of obligations is an inherent danger in these principal-agent relationships between the federal and state governments. In probably no other area of public policy has this potential problem attracted more attention than in environmental programs.

[22] The median penalty in the first three years of the Clinton administration was about twice or more of that of any preceding year, except for 1992.

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

Concern about how vigorously states would pursue environmental protection was a prime motivation for the federalization of environmental policy in the 1970s and 1980s. This resulted in many environmental programs in which the federal government established minimum standards but allowed states to implement the programs if they agreed to meet those minima. Although this might ensure that states enact the required standards, the opportunity still exists for states to effectively lower those standards by inadequately enforcing them. Because of the difficulty of detecting and sanctioning such behavior, this could be the most effective way of trying to make a state more attractive to industry seeking less-stringent environmental standards or of satisfying the similar policy preferences of political leaders and the public in the state. The shift in momentum in recent years toward delegating states more responsibility and flexibility might exacerbate these concerns, unless states are adequately monitored and disciplined to prevent a surreptitious lowering of environmental standards.

The results of my analyses provide some substantiation for these concerns and are consistent with the findings of every government study of EPA and state RCRA administrative penalties during the same time period. My analyses indicate that state hazardous waste administrative penalties were on average less than half of what the federal government would impose in similar circumstances. Most states' penalties were lower than those imposed by the EPA Regions they were in. Some factors that cause this differential could indicate conscious decisions by states not to be aggressive in their penalties. For example, the fact that some scenarios of partisan control of government were associated with lower penalties than the scenario assumed to be most in favor of environmental protection indicates that penalty decisions are consistent with political office holders' preferences.

There are other explanations for this differential that focus more on structural factors that might limit state penalties and less on an intent by the state to reduce its penalties. For example, some states do not have explicit legal authority to include in their penalties the amount of the economic benefit of noncompliance to a violator (U.S. GAO 2000). Furthermore, EPA does not require states to have or even seek such legal authority to be authorized for RCRA (U.S. EPA 1993a, 1986). Because such amounts are normally required to be recovered in EPA penalties, this would inherently create a differential with some states.

In addition, the RCRA state authorization regulations require states to only have laws establishing a maximum civil penalty of at least $10,000 per day per violation (40 C.F.R. §271.16[a][3][i] [2005]). In contrast, during most of the time period of my analyses, federal civil penalties were set at a maximum of $25,000 per day

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

per violation (42 U.S.C. §6928). Based on my review of states' statutes, 12 states had lower maximum RCRA penalties than the federal maximum for at least part of my study's time period. Thus for especially serious violations, these varying statutory maxima could produce different penalties.[23] Naturally, however, if states' political office holders wanted their enforcement efforts to be at least as stringent as those of the federal government, they could have enacted laws to do so. EPA's first proposed RCRA state authorization regulations did require state penalty maxima to be the same as EPA's, but it acceded to the "suggestion" of the National Governors Association and "reduced the levels to below those available to EPA based on the large volume of comments from States requesting such relief" (U.S. EPA 1980:33382). Consequently, the existence of such structural factors may again simply reflect the contrasting policy preferences of state versus federal governments. As an EPA report on RCRA administrative penalties recounted:

> An enforcement official in Region 3 agreed that EPA tends to assess higher penalties than the states. She noted that this may be partly attributable to state concerns that if the penalties they assess are too high, companies may move to neighboring states that are more lenient. This official indicated that there may be a need for some type of regulation that would impose minimum standard penalties for particular violations. She added that a number of states agreed that there is a need for minimum standard penalties among states (U.S. EPA 1997a: n.p.).

Although the lower state penalties might be disquieting to both policy makers and the public, my analyses also indicate that some tenets of EPA's penalty policies are being adhered to by both EPA and many states. Penalties are higher for defendants with worse prior records of noncompliance and for violations that are greater in number and that might pose more threat to the public, the environment, and the integrity of the RCRA program. In addition, my analyses typically revealed no favoritism toward public entity defendants or sensitivity to industry, environmentalist, or economic pressures. Furthermore, it is not only the state versus federal penalty differentials that are of concern, but also the differences between EPA Regions. My analyses support earlier findings of inter-Region variation in penalties. Therefore, aside from taking

[23] There was no apparent pattern in whether a state had a lower maximum penalty and its regression model results for whether the state had lower penalties than EPA. Furthermore, during my study's time period only four states changed their maximum penalties, all between 1990 and 1992, leaving few observations in the pre-change period for a before-and-after analysis in those states. Two of the three states that increased maximum penalties, however, were among the five states whose state penalties significantly increased over time.

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

steps to achieve more stringent enforcement by its state agents, it would be desirable for EPA to address the discrepancies within its own organizational structure.

Some of the possible policy prescriptions for addressing concerns about lower state penalties have already been advanced by EPA itself (U.S. EPA 1997a, 1993a, 1986) and indeed were proposed or promulgated as requirements by EPA when the RCRA program was first initiated. Due to states' objections, however, they did not survive as requirements for states to obtain and retain RCRA authorization. For example, requiring that states adopt maximum statutory penalties at least equal to those at the federal level (and to adjust them periodically for inflation) and recover the economic benefits of noncompliance would at least equalize the policies that are supposed to be followed at the federal and state levels. In addition, requiring that states develop detailed, written penalty policies similar to EPA's would better ensure that violations are judged by the same criteria. It also would enhance EPA's ability to review state penalties to determine whether proper decisions were made. In addition, closer and more rigorous EPA oversight of state enforcement efforts might be desirable, so that concerns can be identified and addressed more promptly. Furthermore, given the inter-Region disparities in penalties indicated by my analyses and other studies, additional EPA headquarters oversight may be needed of EPA's Regional practices. Finally, because this study was of just one type of enforcement action under one environmental program, additional studies of other enforcement actions and environmental programs would be useful.

References

Atlas, Mark K. (2001) "Rush to Judgment: An Empirical Analysis of Environmental Equity in U.S. Environmental Protection Agency Enforcement Actions," 35 *Law & Society Rev.* 633–82.

——— (2002) "Few and Far Between? An Environmental Equity Analysis of the Geographic Distribution of Hazardous Waste Generation," 83 *Social Science Q.* 365–78.

Braile, Robert (1999) "EPA finds state regulators lax on environment; Recommends more inspections and larger fines for violators," *Boston Globe,* 16 May, p. 1.

Brown, R. Steven, & Valerie Green (2001) *Report to Congress: State Environmental Agency Contributions to Enforcement and Compliance*. Washington, DC: Environmental Council of the States.

Cannon, Joseph A. (1983) "Compliance Strategy for Stationary Sources of Air Pollution." Memorandum from Joseph A. Cannon, U.S. Environmental Protection Agency Acting Assistant Administrator for Air and Radiation, to Alvin Alm, U.S. Environmental Protection Agency Deputy Administrator.

Cohen, Mark A. (1987) "Optimal Enforcement Strategy to Prevent Oil Spills: An Application of a Principal-Agent Model With Moral Hazard," 30 *J. of Law & Economics* 23–51.

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press

——— (1992) "Legal/Economic Theory and Empirical Evidence on Enforcement of Federal Environmental Statutes," 82 *J. of Criminal Law & Criminology* 1054–108.
Conlan, Timothy (1988) *New Federalism: Intergovernmental Reform from Nixon to Reagan*. Washington, DC: The Brookings Institution.
Crotty, Patricia McGee (1987) "The New Federalism Game: Primacy Implementation of Environmental Policy," 17 *Publius* 53–67.
Dana, David A. (1998) "The Uncertain Merits of Environmental Enforcement Reform: The Case of Supplemental Environmental Projects," 1998 *Wisconsin Law Rev.* 1181–221.
Davis, Charles, & Sandra K. Davis (1999) "State Enforcement of the Federal Hazardous Waste Program," 31 *Polity* 451–68.
Decker, Christopher S. (2005) "Do Regulators Respond to Voluntary Pollution Control Efforts? A Count Data Analysis," 23 *Contemporary Economic Policy* 180–94.
Deily, Mary E., & Wayne B. Gray (1991) "Enforcement of Pollution Regulations in a Declining Industry," 21 *J. of Environmental Economics & Management* 260–74.
Dwyer, John P. (1997) "The Role of State Law in an Era of Federal Preemption: Lessons from Environmental Regulation," 60 *Law and Contemporary Problems* 203–29.
Edwards, Randall (2000) "U.S. Probe Aimed at Ohio EPA Complaints Say Enforcement is Lax," *Columbus Dispatch,* 31 Jan., p. 1A.
Engel, Kirsten E. (1997) "State Environmental Standard-Setting: Is There a 'Race' and Is It 'To the Bottom'?," 48 *Hastings Law J.* 271–376.
Gray, Wayne B., & Mary E. Deily (1996) "Compliance and Enforcement: Air Pollution Regulation in the U.S. Steel Industry," 31 *J. of Environmental Economics & Management* 96–111.
Hamilton, James T. (1996) "Going By the (Informal) Book: The EPA's Use of Informal Rules in Enforcing Hazardous Waste Laws," in G. Libecap, ed., *Advances in the Study of Entrepreneurship, Innovation, and Growth*, Vol. 7. Greenwich, CT: JAI Press.
Hedge, David M., et al. (1991) "The Principal-Agent Model and Regulatory Federalism," 44 *Western Political Q.* 1055–80.
Helland, Eric (1998) "Environmental Protection in the Federalist System: The Political Economy of NPDES Inspections," 36 *Economic Inquiry* 305–19.
——— (2001) "Prosecutorial Discretion at the EPA: Some Evidence on Litigation Strategy," 19 *J. of Regulatory Economics* 271–94.
Huber, Peter J. (1967) "The Behavior of Maximum Likelihood Estimates Under Non-Standard Conditions," in *Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability.* Berkeley, CA: Univ. of California Press.
Hunter, Susan, & Richard Waterman (1992) "Determining an Agency's Regulatory Style: How Does the EPA Water Office Enforce the Law?," 45 *Western Political Q.* 401–17.
Johnson, Annysa (2002) "Report accuses DNR of lax pollution control," *Milwaukee J. Sentinel,* 29 Jan., p. 3B.
Kagan, Robert A. (1989) "Understanding Regulatory Enforcement," 11 *Law & Policy* 89–119.
Kleit, Andrew N., et al. (1998) "Environmental Protection, Agency Motivations, and Rent Extraction: The Regulation of Water Pollution in Louisiana," 13 *J. of Regulatory Economics* 121–37.
Kraft, Michael E. (2000) "Environmental Policy in Congress: From Consensus to Gridlock," in N. Vig & M. Kraft, eds., *Environmental Policy.* Washington, DC: CQ Press.
Kuehn, Robert R. (1996) "The Limits of Devolving Enforcement of Federal Environmental Laws," 70 *Tulane Law Rev.* 2373–95.
List, John A., & Shelby D. Gerking (1996) "Optimal Institutional Arrangements for Pollution Control," 26 *J. of Regional Analysis & Policy* 113–33.
——— (2000) "Regulatory Federalism and Environmental Protection in the United States," 40 *J. of Regional Science* 453–71.

Lynch, Michael J., et al. (2004a) "Slippery Business: Race, Class, and Legal Determinants of Penalties Against Petroleum Refineries," 34 *J. of Black Studies* 421–40.

———, et al. (2004b) "Determinants of Environmental Law Violation Fines Against Petroleum Refineries: Race, Ethnicity, Income, and Aggregation Effects," 17 *Society & Natural Resources* 343–57.

Markell, David L. (2000) "The Role of Deterrence-Based Enforcement in a 'Reinvented' State/Federal Relationship: The Divide Between Theory and Reality," 24 *Harvard Environmental Law Rev.* 1–114.

Marvel, Mary K. (1982) "Implementation and Safety Regulation: Variations in Federal and State Administration Under OSHA," 14 *Administration & Society* 15–33.

Mazur, Allan, & Eric W. Welch (1999) "The geography of American environmentalism," 2 *Environmental Science & Policy* 389–96.

McCubbins, Mathew D., et al. (1987) "Administrative Procedures as Instruments of Political Control," 3 *J. of Law, Economics, and Organization* 243–77.

McKinney, Lucinda K. (1998) "Technical Complexity, Regionalism, and Decision-Making: Case Processing Outcomes in EPA's Toxic Substances Program," 35 *Social Science J.* 377–92.

Millimet, Daniel L. (2003) "Assessing the Empirical Impact of Environmental Federalism," 43 *J. of Regional Science* 711–33.

Mintz, Joel A. (2001) "Scrutinizing Environmental Enforcement: A Comment on a Recent Discussion at the AALS," 17 *J. of Land Use & Environmental Law* 127–48.

——— (2005) "'Neither the Best of Times Nor the Worst of Times': EPA Enforcement During the Clinton Administration," 35 *Environmental Law Reporter* 10390–412.

Oljaca, Neda, et al. (1998) "Penalty Functions for Environmental Violations: Evidence from Water Quality Enforcement," 14 *J. of Regulatory Economics* 255–64.

Polakovic, Gary (2001) "State Analyst Criticizes Air Quality Effort; Pollution: Report Says Poor Oversight And Lax Enforcement Are Hindering Progress Against Smog. Regulatory Officials Say the Study Is Flawed," *Los Angeles Times*, 29 Jan., p. 3.

Potoski, Matthew (2001) "Clean Air Federalism: Do States Race to the Bottom?," 61 *Public Administration Rev.* 335–42.

Rabe, Barry G. (2000) "Power to the States: The Promise and Pitfalls of Decentralization," in N. Vig & M. Kraft, eds., *Environmental Policy*. Washington, DC: CQ Press.

Revesz, Richard L. (1992) "Rehabilitating Interstate Competition: Rethinking the 'Race-to-the-Bottom' Rational for Federal Environmental Regulation," 67 *New York University Law Rev.* 1210–54.

——— (1997) "The Race to the Bottom and Federal Environmental Regulation: A Response to Critics," 82 *Minnesota Law Rev.* 535–64.

Ringquist, Evan J. (1998) "A Question of Justice: Equity in Environmental Litigation, 1974-1991," 60 *J. of Politics* 1148–65.

Ringquist, Evan J., & Craig E. Emmert (1999) "Judicial Policymaking in Published and Unpublished Decisions: The Case of Environmental Civil Litigation," 52 *Political Research Q.* 7–37.

Saleska, Scott R., & Kirsten H. Engel (1998) "'Facts are Stubborn Things': An Empirical Reality Check in the Theoretical Debate Over the Race-to-the-Bottom in State Environmental Standard-Setting," 8 *Cornell J. of Law & Public Policy* 55–88.

Scheberle, Denise (1997) *Federalism and Environmental Policy: Trust and the Politics of Implementation*. Washington, DC: Georgetown Univ. Press.

Scholz, John T., & Cheng-Lung Wang (2006) "Cooptation or Transformation? Local Policy Networks and Federal Regulatory Enforcement," 50 *American J. of Political Science* 81–97.

Scholz, John T., & Feng Heng Wei (1986) "Regulatory Enforcement in a Federalist System," 80 *American Political Science Rev.* 1249–70.

Scicchitano, Michael J., & David M. Hedge (1993) "From Coercion to Partnership in Federal Partial Preemption: SMCRA, RCRA, and OSH Act," 23 *Publius* 107–21.

Steinzor, Rena I. (2000) "Devolution and the Public Health," 24 *Harvard Environmental Law Rev.* 351–463.

Thompson, Frank J., & Michael J. Scicchitano (1985a) "State Implementation Effort and Federal Regulatory Policy: The Case of Occupational Safety and Health," 47 *J. of Politics* 686–703.

——— (1985b) "State Enforcement of Federal Regulatory Policy: The Lessons of OSHA," 13 *Policy Studies J.* 591–8.

U.S. Census Bureau, Economics and Statistics Administration, U.S. Department of Commerce (2001) *1997 Economic Census, Administrative and Support and Waste Management and Remediation Services, Miscellaneous Subject*. Washington, DC: U.S. Department of Commerce.

U.S. Environmental Protection Agency (1980) "Consolidated Permit Regulations: RCRA Hazardous Waste; SDWA Underground Injection Control; CWA National Pollutant Discharge Elimination System; CWA Section 404 Dredge or Fill Programs; and CAA Prevention of Significant Deterioration," 45 *Federal Register* 33290–513.

——— (1982) "Permit Regulations; Revision in Accordance with Settlement," 48 *Federal Register* 39611–23.

——— (1984a) *Civil Penalty Policy*. Washington, DC: U.S. Environmental Protection Agency.

——— (1984b) *Final RCRA Civil Penalty Policy*. Washington, DC: U.S. Environmental Protection Agency.

——— (1984c) *Implementing the State/Federal Partnership in Enforcement: State/Federal Enforcement "Agreements."* Washington, DC: U.S. Environmental Protection Agency.

——— (1986) *Policy Framework for State/EPA Enforcement Agreements*. Washington, DC: U.S. Environmental Protection Agency.

——— (1987) *Enforcement Response Policy*. Washington, DC: U.S. Environmental Protection Agency.

——— (1989a) *Consolidated Report on Review of EPA's Controls Over Administrative Penalties Under the RCRA Enforcement Program*. Washington, DC: U.S. Environmental Protection Agency.

——— (1989b) "Requirements for the Preparation, Adoption and Submittal of Implementation Plans; Approval and Promulgation of Implementation Plans," 54 *Federal Register* 27274–86.

——— (1990a) *RCRA Civil Penalty Policy*. Washington, DC: U.S. Environmental Protection Agency.

——— (1990b) *The Nation's Hazardous Waste Management Program at a Crossroads: The RCRA Implementation Study*. Washington, DC: U.S. Environmental Protection Agency.

——— (1991a) *Policy on the Use of Supplemental Environmental Projects in EPA Settlements*. Washington, DC: U.S. Environmental Protection Agency.

——— (1991b) *Enforcement Accomplishments Report: FY 1990*. Washington, DC: U.S. Environmental Protection Agency.

——— (1991c) *Region 8's Administration of State Resource Conservation and Recovery Act Enforcement Activities*. Washington, DC: U.S. Environmental Protection Agency.

——— (1992) *FY 1991 Enforcement Accomplishments Report*. Washington, DC: U.S. Environmental Protection Agency.

——— (1993a) *Oversight of State and Local Penalty Assessments: Revisions to the Policy Framework for State/EPA Enforcement Agreements*. Washington, DC: U.S. Environmental Protection Agency.

——— (1993b) *Enforcement Accomplishments Report: FY 1992*. Washington, DC: U.S. Environmental Protection Agency.

——— (1994) *Enforcement Accomplishments Report: FY 1993*. Washington, DC: U.S. Environmental Protection Agency.

——— (1995a) *Interim Revised Supplemental Environmental Projects Policy*. Washington, DC: U.S. Environmental Protection Agency.
——— (1995b) *Revised Interim Clean Water Act Settlement Policy*. Washington, DC: U.S. Environmental Protection Agency.
——— (1995c) *Policy on Flexible State Enforcement Responses to Small Community Violations*. Washington, DC: U.S. Environmental Protection Agency.
——— (1995d) *FY 1994 Enforcement and Compliance Assurance Accomplishments Report*. Washington, DC: U.S. Environmental Protection Agency.
——— (1996a) *Hazardous Waste Civil Enforcement Response Policy*. Washington, DC: U.S. Environmental Protection Agency.
——— (1996b) *FY 1995 Enforcement and Compliance Assurance Accomplishments Report*. Washington, DC: U.S. Environmental Protection Agency.
——— (1997a) *Further Improvements Needed in the Administration of RCRA Civil Penalties*. Washington, DC: U.S. Environmental Protection Agency.
——— (1997b) *FY 1996 Enforcement and Compliance Assurance Accomplishments Report*. Washington, DC: U.S. Environmental Protection Agency.
——— (1998a) *Resource Conservation and Recovery Information System (RCRIS) Data Element Dictionary (v.7.0.0)*. Washington, DC: U.S. Environmental Protection Agency.
——— (1998b) "Final EPA Supplemental Projects Policy Issued," 63 *Federal Register* 24796–804.
——— (1998c) *EPA Office of Compliance Sector Notebook Project: Sector Notebook Data Refresh–1997*. Washington, DC: U.S. Environmental Protection Agency.
——— (1998d) "Announcement and Publication of the Policy for Municipality and Municipal Solid Waste; CERCLA Settlements at NPL Co-Disposal Sites," 63 *Federal Register* 8197–201.
——— (1998e) *Consolidated Report on OECA's Oversight of Regional and State Air Enforcement Programs*. Washington, DC: U.S. Environmental Protection Agency.
——— (1998f) *Enforcement and Compliance Assurance Accomplishments Report: FY 1997*. Washington, DC: U.S. Environmental Protection Agency.
——— (1998g) *Revised RCRA Inspection Manual (November 1998 Revision)*. Washington, DC: U.S. Environmental Protection Agency.
——— (1999a) *Identification and Enforcement of RCRA Significant Non-Compliers by EPA Region III and the Virginia Department of Environmental Quality*. Washington, DC: U.S. Environmental Protection Agency.
——— (1999b) *RCRA Significant Non-Complier Identification and Enforcement by the Rhode Island Department of Environmental Management*. Washington, DC: U.S. Environmental Protection Agency.
——— (1999c) *RCRA Enforcement: Region 2's Enforcement of the Resource Conservation and Recovery Act (RCRA)*. Washington, DC: U.S. Environmental Protection Agency.
——— (1999d) *Enforcement and Compliance Assurance: FY98 Accomplishments Report*. Washington, DC: U.S. Environmental Protection Agency.
——— (2000a) *Resource Conservation and Recovery Information (RCRIS)*. Washington, DC: U.S. Environmental Protection Agency.
——— (2000b) *Annual Report on Enforcement and Compliance Assurance Accomplishments in 1999*. Washington, DC: U.S. Environmental Protection Agency.
——— (2001) *Appropriate Violator Classifications and Timely Initial Enforcement Actions Would Strengthen Montana's RCRA Enforcement Program*. Washington, DC: U.S. Environmental Protection Agency.
——— (2004) "Agency Policy and Guidance: Small Local Governments Compliance Assistance Policy," 69 *Federal Register* 31277–86.
U.S. General Accounting Office (1985a) *Assessment of EPA's Hazardous Waste Enforcement Strategy*. Washington, DC: U.S. General Accounting Office.
——— (1985b) *Air Pollution: Environmental Protection Agency's Inspections of Stationary Sources*. Washington, DC: U.S. General Accounting Office.

——— (1986) *Hazardous Waste: Adequacy of EPA Attorney Resource Levels*. Washington, DC: U.S. General Accounting Office.
——— (1987) *Hazardous Waste: Facility Inspections Are Not Thorough and Complete*. Washington, DC: U.S. General Accounting Office.
——— (1988) *Hazardous Waste: Many Enforcement Actions Do Not Meet EPA Standards*. Washington, DC: U.S. General Accounting Office.
——— (1990) *Air Pollution: Improvements Needed in Detecting and Preventing Violations*. Washington, DC: U.S. General Accounting Office.
——— (1991a) *Environmental Enforcement: Penalties May Not Recover Economic Benefits Gained by Violators*. Washington, DC: U.S. General Accounting Office.
——— (1991b) *Observations on EPA and State Enforcement Under the Clean Water Act*. Washington, DC: U.S. General Accounting Office.
——— (1992) *Hazardous Waste: Impediments Delay Timely Closing and Cleanup of Facilities*. Washington, DC: U.S. General Accounting Office.
——— (1993) *Environmental Enforcement: EPA Cannot Ensure the Accuracy of Self-Reported Compliance Monitoring*. Washington, DC: U.S. General Accounting Office.
——— (1995) *EPA and the States: Environmental Challenges Require a Better Working Relationship*. Washington, DC: U.S. General Accounting Office.
——— (1996) *Water Pollution: Many Violations Have Not Received Appropriate Enforcement Attention*. Washington, DC: U.S. General Accounting Office.
——— (1998) *Environmental Protection: EPA's and States' Efforts to Focus State Enforcement Programs on Results*. Washington, DC: U.S. General Accounting Office.
——— (2000) *Environmental Protection: More Consistency Needed Among EPA Regions in Approach to Enforcement*. Washington, DC: U.S. General Accounting Office.
Welborn, David M. (1988) "Conjoint Federalism and Environmental Regulation in the United States," 18 *Publius* 27–43.
Wikle, Thomas A. (1995) "Geographical Patterns of Membership in U.S. Environmental Organizations," 47 *Professional Geographer* 41–8.
Wood, B. Dan (1992) "Modeling Federal Implementation as a System: The Clean Air Case," 36 *American J. of Political Science* 40–67.
Zimmerman, Joseph F. (2005) *Congressional Preemption: Regulatory Federalism*. Albany, NY: State Univ. of New York Press.
Zinn, Matthew D. (2002) "Policing Environmental Regulatory Enforcement: Cooperation, Capture, and Citizen Suits," 21 *Stanford Environmental Law J.* 81–174.

Cases Cited

Harmon Industries, Inc. v. Browner, 191 F. 3d 894-904 (8th Cir. 1999).
U.S. v. Power Engineering Company, 303 F. 3d 1232-35 (10th Cir. 2002).

Statutes Cited

42 U.S.C. §6928 (2000) (concerning federal enforcement of hazardous waste management laws).
42 U.S.C. § 6928(a) (2000) (concerning federal compliance orders for hazardous waste management).
42 U.S.C. § 6928(a)(3) (2000) (concerning maximum penalty under federal compliance orders for hazardous waste management).
"Agency Policy and Guidance: Small Local Governments Compliance Assistance Policy," 69 *Federal Register* 31277–86.

"Announcement and Publication of the Policy for Municipality and Municipal Solid Waste; CERCLA Settlements at NPL Co-Disposal Sites," 63 *Federal Register* 8197–201 (1998).

Biennial report, 40 C.F.R. § 262.41 (2005).

"Consolidated Permit Regulations: RCRA Hazardous Waste; SDWA Underground Injection Control; CWA National Pollutant Discharge Elimination System; CWA Section 404 Dredge or Fill Programs; and CAA Prevention of Significant Deterioration," 45 *Federal Register* 33290–513 (1980).

"Final EPA Supplemental Projects Policy Issued," 63 *Federal Register* 24796–804 (1998)

Memorandum of Agreement with the Regional Administrator, 40 C.F.R. § 271.8 (2005).

"Permit Regulations; Revision in Accordance with Settlement," 48 *Federal Register* 39611–23 (1983).

Requirements for enforcement authority, initial RCRA state authorization regulations, 40 C.F.R. § 123.9(c) (1981).

Requirements for enforcement authority, 40 C.F.R. § 271.16(a)(3)(i) (2005).

"Requirements for the Preparation, Adoption and Submittal of Implementation Plans; Approval and Promulgation of Implementation Plans," 54 *Federal Register* 27274–86 (1989).

Resource Conservation and Recovery Act, 42 U.S.C. §§ 6901-6992k (2000).

Mark Atlas *is a consultant in environmental law and policy empirical research. In his nearly 25 years as an environmental attorney, he assisted the U.S. Environmental Protection Agency and other federal agencies in environmental policy development and enforcement, was in a law firm advising businesses and trade associations, taught environmental law and policy in academia, and consulted in environmental and toxic tort litigation.*

https://doi.org/10.1111/j.1540-5893.2007.00330.x Published online by Cambridge University Press