Corporate Environmental Behavior and the Effectiveness of Government Interventions

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SESSION II: COMPLIANCE ISSUES

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Corporate Self-Policing and the Environment: Factors Predicting Self-Disclosure of Clean Air Act Violations under the Environmental Protection Agency's Audit Policy*

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Abstract

The Environmental Protection Agency's self-policing or audit policy waives or reduces penalties when regulated entities voluntarily discover, disclose, and correct environmental violations. This study uses a case-control design to determine if specific deterrence, general deterrence and compliance assistance are associated with the odds of disclosing a Clean Air Act (CAA) violation under that policy. The event group consists of all 59 companies that disclosed a CAA violation under the Audit Policy between October 1, 1998 and September 30, 2000. The control group consists of a simple random sample of 59 companies that did not use the Audit Policy but were discovered to have violated the CAA during the same time period. The results of this research suggest that specific deterrence and compliance incentives are not related to Audit Policy use. However, companies with facilities operating in an industry where regional inspection rates are high are more likely to use the Audit Policy than companies with facilities operating in an industry where regional inspection rates are low. Also important is the finding that company size is a strong positive predictor of Audit Policy use.

Introduction

The Environmental Protection Agency (EPA) issued a policy entitled "Incentives for Self-Policing: Discovery, Disclosure, Correction, and Prevention of Violations" [Audit Policy] in 1995. The Audit Policy is a compliance incentive that waives or reduces penalties for regulated entities that voluntarily discover, promptly disclose, and correct violations of federal environmental requirements. There are several requirements for implementing the Audit Policy. First, a company must disclose the violation to the EPA within 21 days of the discovery of that violation. Second, the discovery cannot be the result of a legally required monitoring, sampling or auditing procedure. Third, the company must correct the discovered violation within 60 days of its discovery. Repeat violations (e.g., similar violations that have occurred at the same facility within the past 3 years or similar violations that have occurred as part of a pattern of violations at other facilities over the past 5 years) and violations that result in serious actual harm are not eligible.

Although the Audit Policy has been in existence for nearly nine years, researchers know little about what factors may actually predict whether a company will disclose a violation under the policy. The purpose of this study is to determine whether deterrence and compliance incentives by the EPA encourage companies to disclose violations of the Clean Air Act (CAA) under the Audit Policy.

Prior Research

Many regulatory personnel tend to view corporate offenders as rational actors who break the law to maximize profit (see Kagan and Scholz 1983). This view of corporate actors can be traced back to the materialist approaches of corporate behavior (see Edelman and Suchman 1997). Such a view has led to the popularity of corporate deterrence research in the social science literature (Braithwaite and Makkai 1991; Makkai and Braithwaite 1994; Russell and Gilbert 1999;

Stafford 2003). The basic idea behind deterrence is that behavior is influenced by negative consequences. Specific deterrence focuses on the future behavior of those actors that have already experienced negative consequences. General deterrence focuses on the future behavior of those actors that may or may not have experienced negative consequences, but believe that those consequences exist because they have seen others experience them (Gibbs 1974; Reiss 1984; Tittle and Paternoster 2000; Warr and Stafford 1993; Zimring and Hawkins 1973).

Research on specific deterrence is inconsistent (Doob and Webster 2003) and research on corporate deterrence is no exception. For instance, some corporate specific deterrence research shows strong positive effect while other research shows no (or even a negative) effect (May and Winter 1999). Simpson and Koper (1992:367) found that "among a group of prior offenders, formal-sanction severity is a strong inhibitor of re-offending." However, Block, Nold, and Sidak (1981) found that civil penalties were more likely to have a deterrent impact than more severe criminal penalties. Braithwaite and Makkai (1991) found evidence that sanction severity does not appear to have a deterrent effect in the regulation of nursing homes in Australia.

Sanctions against corporations may also have a general deterrent effect when they are administered to "make an example out of the violator and send the clear message to others who might violate laws and regulations" (see Cohen 1998). Research on corporate general deterrence has received much less attention in the literature than research on specific deterrence. However, unlike specific deterrence studies, some evidence suggests that general deterrence may have an effect on corporate behavior. For instance, Block, Nold, & Sidak (1981) studied the impact of antitrust enforcement on price markups in the white bread industry and found that bakers in neighboring areas reduced their prices after a price fixing case is brought in a nearby city.

Certainty of detection has also been shown to be a strong predictor of corporate behavior. In a study of the effectiveness of enforcement and compliance on agro-environmental policy in Denmark, May and Winter (1999) found that the frequency of inspections were viewed as highly effective at gaining corporate compliance of environmental regulations. May and Winter (1999:645) suggest that "smart enforcement consists of frequent inspections targeted toward important items." Braithwaite and Makkai (1991) also found that certainty of detection was an important predictor of compliance in the nursing home industry. Other researchers studying detection certainty assert that inspections are likely to be related to corporate compliance (Sholz 1991; Scholz and Gray 1997).

The EPA's Audit Policy is a compliance-oriented policy. Compliance-oriented policies are increasing in significance and focus on education, persuasion, and cooperation rather than detection and deterrence to improve corporate behavior (Parker 2000; Reiss 1984). According to Parker (2000:530) the shift toward compliance-oriented policy represents the "new regulatory state, which uses enforced self-regulation and incentives for voluntary compliance to steer corporate conduct toward public goals without interfering too greatly with corporate autonomy and profit" (see also Braithwaite 2000). Clarke (1987) suggests that compliance assistance efforts are more effective than deterrence efforts (see also Stone 1975). The EPA has initiated several special programs that provide compliance assistance to companies in order to encourage and facilitate disclosure of environmental violations (Office of Regulatory Enforcement, EPA 1999). Moreover, regulated entities that have received relief under the EPA's Audit Policy suggest that compliance assistance, rather than deterrence itself, has increased their reporting of environmental violations (EPA 1999).

Friedrichs (1996) argues that regulatory agencies often confront the "choice between emphasizing compliance or deterrence." However, it is also suggested that deterrent strategies

combined with compliance strategies are likely to be more effective than deterrence or compliance alone (see May and Winter 1999; Simpson and Koper 1992). Thus, it may be argued that it is rational for regulated entities to take advantage of incentives provided in the compliance-oriented Audit Policy if there is a perceived or real likelihood that a regulatory agency would soon discover the violation and impose a sanction. While research on corporate compliance is pervasive, there is still a relative lack of information on corporate self-reporting. The purpose of this research, then, is to determine if specific deterrence, general deterrence, detection certainty, and compliance assistance efforts are associated with the odds of disclosing a violation under the EPA's Audit Policy. This is an important question since the Audit Policy is relatively unstudied policy and because it falls under the type of regulatory effort that Parker (2000) describes as part of the "new regulatory state."

Data and Methods

The unit of analysis in this study is company. The decision to study companies rather than facilities or geographic areas such as states or counties is largely based on theoretical and practical concerns. First, from a policy standpoint, the study of companies is desirable because they are the entities that make the decision to disclose environmental violations under the Audit Policy (Rebovich 1998). The Audit Policy implies a rationality that is typically associated with company-level decisions. As Simpson (1986:860) observed, companies are "economic entities that are rationally constructed, chartered, and owned by stockholders. Their overriding goals are economic, i.e., profitability and market share expansion." From this point of view, the self-disclosure of environmental violations may best be explained in terms of deterrence, incentives and factors that are both internal and external to the company (see Kramer 1982; Shover and Bryant 1993).

Second, many studies of organizational compliance are focused on the company. Several interesting covariates to be included in the proposed study are based upon the findings of previous company-level studies conducted in various industries (e.g., the nursing home industry, agricultural industry, chemical industry, liquor industry, auto industry, pharmaceutical industry, and securities industry). Third, many of the variables that are thought to be important in the study of corporate behavior are readily available for companies, but not available for geographic areas or facilities (e.g., corporate financial performance).

Sample

In order to assess whether sanction certainty, sanction severity and compliance incentives appear to influence the decision to self-disclose a violation of the Clean Air Act (CAA) under the Audit Policy it is necessary to compare companies that report CAA violations to companies that violate the CAA but do not report those violations. Unfortunately, it is not possible to identify every company that violates the CAA because some are never detected. However, investigations uncover over one-thousand violations of the CAA each year (Scalia 1999). Companies known by the Environmental Protection Agency to violate the CAA and not report that violation under the Policy can be compared to companies that violate the CAA and report it under the Audit Policy. In the proposed study, a case control design is used to make that comparison.

In general, case-control designs are used to identify factors that help differentiate cases that experience an event from cases that do not experience an event. In the proposed case-control study, the event group is composed of all companies that reported a CAA violation under the Audit Policy during the 1999 and 2000 Fiscal Years (October 1, 1998 – September 30, 2000). The event group in the proposed study is a complete enumeration and will consist of all 59 companies that were granted relief for violating the CAA under the Audit Policy. A list of those companies was made

available to the researcher by the EPA's Office of Regulatory Enforcement. Companies that violated Section 211 of the CAA (mis-fueling violations) are excluded because those cases were handled by EPA Headquarters and because the nature of the cases was so different from most EPA regional CAA cases. The control group is the same size as the event group and also consists of 59 companies obtained by means of a simple random sample of all companies that were discovered by the EPA to have violated the CAA during the same time period as the event group. This study is mainly interested in making comparisons between companies that did use the Audit Policy to companies that could have used the Audit Policy had their violation not been discovered. Thus, companies charged with a criminal violation of the CAA are excluded from the control group sampling frame for the simple reason that these violations are ones that are likely to be judged by the EPA as resulting in "real harm" and would therefore are likely not be Audit Policy eligible (and not be reported under the Audit Policy even if discovered by the company).

The sampling frame needed to select the controls was easily constructed from the EPA's Integrated Data for Enforcement Analysis (IDEA) system. The IDEA system was developed by the EPA in response to a need for integrated data on facilities that were potentially involved in enforcement or compliance actions. The IDEA database has information on nearly all regulated facilities for the purposes of facilitating enforcement case screening, enforcement/inspection targeting, and management decision making. Because the IDEA system collects information at the facility level, and companies are the unit of study in the proposed investigation, it is important to make sure that facilities are linked to companies to ensure that companies with multiple facilities are not over-represented in the control group. This was accomplished by first linking facilities to companies and then taking the sample of companies.

Dependent Variable

The dependent variable is dummy coded and indicates whether a company self-disclosed or was discovered to have violated the CAA. If a company disclosed an environmental violation to the EPA under the Audit Policy at any facility between January 1999 and December 2000 it was given a score of "1." If a company was investigated and found to have violated an environmental law between January 1999 and December 2000 it is assigned the score of "0."

Variables measuring specific deterrence

Prior to discussing the creation of variables that measure specific deterrence it is important to point out a problem inherent in studying enforcement and inspection rates. It was not a problem when a company only had one facility as enforcement data could easily be collected for that company's facility. However, several of the companies in this dataset were linked to more than one facility. For those companies that operated more than ten facilities it was not possible—given limited resources—to collect enforcement data on all company facilities. Therefore, enforcement and inspection rates had to be estimated from a simple random sample of 10 facilities for 13 companies in this sample.

In order to measure specific deterrence related to past enforcement at the facility, IDEA is used to construct a variable that measures past enforcement as the average number of enforcement actions by the EPA across company facilities two years prior to the discovery or disclosure of a CAA violation. Two types of enforcement actions were counted: civil judicial and administrative (both formal and informal). There were no criminal enforcement actions initiated or settled against the companies in this sample during the time period under investigation. Since state regulatory agencies often take the lead in environmental enforcement matters, those enforcement actions were also counted as part of the total number of enforcement actions. One potential problem with calculating enforcement actions using IDEA is that some types of enforcement actions are linked to

more than one company facility. For example, in one case a civil judicial enforcement action covered violations at ten facilities. In order to avoid counting one enforcement action several times for one company, an action that appears at more than one facility is only counted once.

As noted in the literature review, previous research on the sanction severity is mixed. For instance, Block, Nold, and Sidak (1981) found that civil penalties were more likely to have a deterrent impact than criminal penalties. Simpson and Koper (1992:367), however, found that "among a group of prior offenders, formal-sanction severity is a stronger inhibitor of future compliance than are measures of sanction certainty." Sanction severity is measured by variations in case outcomes on Audit Policy disclosure. Following Simpson and Koper's (1992:374) well known work on antitrust violations, an effort will be made to determine whether more serious cases are more likely to encourage self-disclosure. It should be noted, "what may be costly to one company may be relatively insignificant to another" (Simpson and Koper 1992:355). Nevertheless, it is reasonable to rank in order "how much of a problem particular outcomes appear to be" (Simpson and Koper 1992:355 see also Clinard 1983; Cullen and Dubeck 1985; Frank and Lombness 1988). IDEA is used to create two variables that indicate whether or not a civil or administrative penalty was imposed against a company two years prior to disclosing or being caught for an environmental violation. These variables are dummy coded (yes=1 and no=0) to indicate whether an environmental violation occurred and resulted in: (1) a civil penalty or (2) an administrative penalty. If sanction severity is related to the disclosure of environmental violations, companies that have experienced the most serious case initiations (e.g., civil penalties) should have greater odds of disclosing an environmental violation under the Audit Policy than companies with less serious outcomes (e.g., administrative penalties).

In the proposed study it is hypothesized that the effectiveness of the Audit Policy can be enhanced through targeted inspections. That is, the more certain it is that a violation will be discovered by a regulatory agency the more likely it is that a company will conduct an environmental audit and then disclose any environmental violations that are discovered as a result (see also Scholz 1991; Scholz and Gray 1997). One measure of detection certainty is the rate of CAA inspections at company facilities two years prior to the disclosure or discovery of a CAA violation. The rate of company inspections by state or federal regulatory agencies is derived from IDEA and calculated by dividing the number of inspections at company facilities by the number of company facilities that are eligible for inspection. This variable, then, represents the average number of inspection across company facilities 2 years prior to the discovery or disclosure of a CAA violation. It is hypothesized that a company with a high regulatory inspection rate should have greater odds of disclosure under the Audit Policy than a company with a low regulatory inspection rate.

Variables measuring general deterrence

In order to determine if general deterrence is related to reporting under the Audit Policy three different variables are created. To examine the hypothesis that the odds of disclosure under the Audit Policy are greater for companies with facilities situated in geographic areas where enforcement actions are more common than for companies situated in geographic areas where enforcement actions are less common, the rate (per 1000 facilities) of criminal cases, civil cases, and administrative cases that are initiated are computed (using IDEA) for the state or states in which the company's facilities operate. These rates of enforcement are calculated for two years prior to the disclosure or discovery of CAA violation. The rate of enforcement actions is calculated by dividing the number of environmental enforcement actions in that state by the number of

facilities in that state. In cases where company facilities are located in multiple states, those rates of enforcement are averaged together to come up with an overall enforcement for all company facilities.

Certainty of detection and punishment is also likely to have a "within industry" effect since some industries are more likely to be targeted for inspections and enforcement by the EPA and state agencies. Thus, two variables are created that indicate percent of inspections and enforcement actions that occur within the same Standard Industrial Classification (SIC) in the EPA Region in which the company's facilities operate for two years prior to the company's disclosure or discovery of a CAA violation. For companies that have more than one facility operating in more than one region, these inspection and enforcement rates are averaged across regions. The percent of SIC regional enforcement actions can be estimated by taking the total number of SIC regional facilities where an enforcement action occurred divided by the total number of SIC regulated facilities in that region. The percent of SIC regional inspections can be estimated by taking the total number of SIC regional regulated facilities that have been inspected divided by the total number of regional SIC facilities operating in that SIC code. It is hypothesized that the odds of disclosure under the Audit Policy are greater for companies that operate within industries that have a high percentage of enforcement actions and/or inspections than for companies that operate in industries that have a low rate of enforcement actions and/or inspections.

Variables measuring compliance assistance

Regulatory agencies have run several special programs that provide compliance incentives to companies in order to facilitate disclosure of environmental violations under the Audit Policy (Office of Regulatory Enforcement 1999). Corporate feedback on compliance assistance is largely positive. Regulated entities that have received relief under the Policy suggest that compliance

incentives have increased their self-reporting of environmental violations (EPA 1999). This assertion, however, has yet to be empirically examined. To examine the extent to which disclosure of environmental violations under the Audit Policy are related to regulatory assistance, one variable is created that indicates whether the company is likely to have received information concerning a compliance incentive (e.g., a letter providing the company with important incentives related to the Audit Policy including information that the EPA is about to target that industry for environmental violations). That variable is dummy coded with a score of "0" if the company is not likely to have received any Audit Policy assistance in the year prior to disclosure or discovery and "1" if the company is likely to have received assistance one year prior to disclosure or discovery. The list of industries targeted for compliance incentives is published in the EPA's Audit Policy Update.

Variables measuring corporate size

Size of corporations has also been identified as an important variable in corporate performance. It has been argued that the larger and more decentralized the company, the greater the likelihood of non-compliance (Coleman 1992; Shover and Bryant 1993). Other research has indicated, however, that larger corporate size may actually increase environmental compliance because large corporations have the ability and resources to minimize environmental harm (Florida 1996). To measure the size and decentralization of companies, three variables are created. The first variable represents the number of company facilities. The second variable represents the number of employees in the entire company. The third variable represents total company sales (in millions of dollars). These variables are constructed from information available in the Dun and Bradstreet database. Since data is not available in Dun and Bradstreet for all facilities, information is also taken from Standard and Poor's Corporate Descriptions. Bivariate correlations suggest that

branches, sales, and employees are highly correlated. Moreover, these variables are theoretically similar in that they all, to some extent, measure some aspect of company size. Therefore, branches, sales and employees are combined together to create a company size factor, which is the principal component index of the three variables. This size component was highly consistent and all component loadings exceeded .8.

Analysis

Three questions are addressed in this analysis. First, do variables related to specific deterrence influence whether or not a company will disclose a CAA violation under the Audit Policy? Second, do variables related to general deterrence influence whether or not a company will disclose a CAA violation under the Audit Policy? Third, do variables that measure compliance incentives influence whether a company will disclose a CAA violation under the Audit Policy? Table 1 begins to address these questions.

[Table 1 about here]

Table 1 reports the mean values for the variables used in this analysis, broken down by Audit Policy use. All specific deterrence variables have higher means for companies that disclosed a CAA violation to the EPA than for companies that were discovered by the EPA to have violated the CAA. Only one of those differences is statistically significant however. In the case of administrative actions, only 1 in 20 companies discovered to have violated an environmental law used the audit policy while nearly 1 in 5 companies who reported a violation under the Audit policy had an administrative action against them two years prior to discovery or disclosure.

In the case of general deterrence, all means were higher for companies that disclosed a CAA violation to the EPA than companies that were discovered by the EPA to have violated the CAA. Except in the case of civil enforcement, companies that were located in states where civil

enforcement rates were lower, on average, were more likely to disclose a violation of the CAA. Two general deterrence variables were statistically significant. Both SIC inspections and SIC enforcements within EPA region appear to be positively related to Audit Policy use. In the case of inspections, companies that had their violations discovered operated facilities in a region in which 23.1 percent of similar industrial operations were inspected. In contrast, companies that reported their violations to the EPA under the Audit Policy operated facilities in a region in which 34.6 percent of similar industrial operations were inspected. In the case of formal and informal enforcement patterns, companies that had their violations discovered operated facilities in a region in which 5.79 percent of similar industrial operations had an enforcement action. In contrast, companies that reported their violations to the EPA under the Audit Policy operated facilities in a region in which 8.90 percent of similar industrial operations had an enforcement action.

Again only in the case of compliance incentives, companies that used the Audit Policy, on average, are much more likely to have been targeted by a compliance initiative. Finally, according to the company size factor larger companies tend to use the Audit Policy.

Table 2 reports the odds ratios (OR) which are estimated from logistic regression predicting whether or not a company used the Audit Policy. Since EPA regional variations are not controlled for in this analysis, but may be important, fixed-effects logistic regression is also used to estimate odds ratios (StataCorp, 2001). Fixed-effects logistic regression enables the examination of the possibility that apparent effect of specific deterrence, general deterrence, and compliance incentive variables reflect the effects of a network of variables correlated with EPA region. Since regional enforcement patterns vary greatly it could be argued that what appear as effects of variables in the model could in fact be the effects of EPA regional enforcement patterns or practices (U.S. GAO 2000: 7). One drawback with using fixed-effects logistic regression is that the procedure relies on

variation within the matched sets (i.e., variation on Audit Policy reporting within each EPA region). Regions with no variation on the dependent variable are then uninformative and are thus discarded. For this reason the sample sizes for the fixed effects analysis is 107 rather than 118 as it only represents the number of cases in informative regions, not the total number of cases.

[Table 2 about here]

As Table 2 demonstrates, when controlling for company size, none of the specific deterrence variables are related to Audit Policy use. This null finding is consistent with the corporate deterrence literature. The same null finding occurs for general deterrence variables, except in the case of the regional inspection rate within the industry. In that case the odds ratio is 1.03 ($p<.05$) and a one-standard deviation increase in the inspection rate for a particular industry within EPA region (e.g., an increase of 19.4 inspections per 100 SIC facilities in the region) increases the odds that a company will disclose a CAA violation under the Audit Policy by a factor of 2.2 (95% CI; 1.09, 4.14). While it must be pointed out that disclosing a CAA violation under the Audit Policy is a relatively rare event, it is also true that a modest one-standard deviation increase in the EPA inspection rate within region and industry more than doubles the odds of disclosure under the Audit Policy. In addition, the effect of SIC regional inspection rates on CAA disclosure is replicated in the fixed-effects logistic regression model (95% CI; 1.29, 7.00) suggesting that replication of the ordinary logistic regression results across EPA regions.

The compliance incentive variable is not statistically significant when controlling for company size suggesting that incentives by the EPA do not increase the odds of disclosing a CAA violation under the Audit Policy. What is clearly important in each of these models estimated is the relationship between Audit Policy use and company size. Larger companies are much more likely to report CAA violations under the Audit Policy than smaller companies. This provides evidence in

support of the position that organizational size influences environmental compliance to the extent that larger companies are more likely to report a CAA violation under the Audit Policy. This finding is also consistent with the theoretical position that large organizations have more resources to take advantage of self-policing environmental policies. For example, Florida (1996) found that the number of employees in an organization was positively related to the number green practices adopted by that organization. Moreover, the literature on organizational size suggests that larger organizations have more resources to discover violations through self-audits and also have, on staff, personnel able to successfully negotiate and use the Audit Policy.

Conclusion

This study is the first to examine company predictors of Audit Policy use. Specifically, this research has examined the association between variables that measure specific deterrence, general deterrence, compliance incentives, and company size to determine if they are associated with the odds of disclosing a CAA violation under the Audit Policy.

The findings of this research add to the corporate behavior literature and are surprisingly consistent with other studies that find that specific deterrence does not appear to be related to levels of corporate compliance. Moreover, while not statistically significant, three of the four specific deterrence variables actually appear to suggest that specific deterrence could possibly decrease the odds that a company will disclose a violation under the Audit Policy when controlling for company size. Under this potential scenario Audit Policy use may reflect corporate actor estimates of sanction certainty in such a way that actors with more past environmental violations believe they are less likely to be caught and punished for a violation of the CAA in the future. This effect is referred to in the literature as the "positive punishment effect" (Pogarsky and Piquero 2003). While these results cannot be used to provide evidence of the positive punishment effect since results are

not statistically significant, they also cannot be used to provide evidence that specific deterrence makes corporate actors more likely to use the Audit Policy. It may be that both the positive and negative effects of specific deterrence are occurring simultaneously in this sample of companies and that other corporate characteristics not accounted for in this study may help explain this finding though an interaction effect. At this point, however, such conjecture is merely speculative and more research needs to be focused on this finding.

Also consistent with previous research is the finding that industry inspection rates increase the odds of disclosure under the audit policy. Thus, efforts aimed at increasing the number of inspections among an industry may improve the odds that companies in that industry will disclose a violation of the CAA under the Audit Policy. This is an important policy finding since there is an increasing emphasis on environmental compliance though self-policing efforts.

Finally, this research suggests that company size is an important determinant of Audit Policy. Past research clearly suggests that size matters in the case of corporate environmental performance such that larger companies pollute at a greater rate than smaller companies (Grant, Jones and Bergesen 2002). This research builds on those previous findings and suggests that while corporate size may increase the rate of polluting, it may also increase the rate at which companies are willing to disclose violations under self-policing efforts. In short, larger companies have more resources than small companies that allow them to take advantage of the Audit Policy to mitigate potential negative consequence that may result from being caught for a CAA violation. This apparent large company advantage may be the result of compliance personnel who are actually on staff and work for the company and whose job it is to know how to mitigate company liability. Indeed, it is primarily large companies and industries that represent large companies who have responded to a request for comments by the EPA about the Audit Policy. Thus, it appears that

company size may be a much more important predictor in determining why companies use the Audit Policy than variables measuring specific deterrence.

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Table 1 Means for Variables, by Discovery or Disclosure of CAA Violation

	Violation Discovered by EPA	Violation Disclosed to EPA
Specific Deterrence Variables		
Past Enforcement	.603	.700
Administrative Penalty	**.050**	**.200**
Civil Penalty	.002	.003
Past CAA Inspections	.899	1.23
General Deterrence Variables		
Criminal Enforcement	.500	.422
Civil Enforcement	.429	.423
Administrative Enforcement	10.2	14.0
SIC Regional Inspection Rate	**23.1**	**34.6**
SIC Regional Enforcement Rate	**5.79**	**8.90**
Compliance Incentive Variables		
SIC Incentive	**.080**	**.340**
Organization Variables		
Facility Size Factor	**–.590**	**.590**

Note: Bolded values indicate a statistically significant ($p<.05$) difference between discovery and disclosure. Results were derived from Difference of Means Tests and Mann-Whitney U Tests. In both instances results were nearly identical for all variables.

Table 2 Logistic Regression of Audit Policy Use

	OR (95% Confidence Interval) [Fixed Effects OR (95% Confidence Interval)]		
Specific Deterrence Variables			
Past Enforcement	.904 (.550, 1.49) [.873 (.528, 1.44)]		
Administrative Penalty	1.50 (.281, 8.04) [1.11 (.192, 6.41)]		
Civil Penalty	.495 (.030, 8.26) [.437 (.017, 10.7)]		
Past CAA Inspections	.793 (.539, 1.17) [.730 (.473, 1.13)]		
General Deterrence Variables			
Criminal Enforcement		.986 (.146, 6.67) [.295 (.015, 5.52)]	
Civil Enforcement		1.207 (.224, 6.50) [1.04 (.052, 21.1)]	
Administrative Enforcement		1.03 (.980, 1.07) [1.07 (.992, 1.17)]	
SIC Regional Inspection Rate		1.03 (1.01, 1.07)* [1.04 (1.00, 1.09)]*	
SIC Regional Enforcement Rate		.964 (.893, 1.04) [.931 (.836, 1.04)]	
Compliance Incentive Variables			
SIC Incentive			2.13 (.600, 7.57) 1.20 (.211, 6.86)
Organization Variables			
Facility Size Factor	5.35 (2.87, 9.96)* [4.22 (2.18, 8.18)]*	4.22 (2.42, 7.37)* [3.13 (1.69, 5.83)]*	4.01 (2.37. 6.81)* [2.99 (1.69, 5.27)]*
Constant	1.31	.184	–.154
-2 Log Likelihood	114 [81.0]	107 [78.2]	116 [85.5]
Sample Size	118 [107]	118 [107]	118 [107]

Note: OR = odds Ratios calculated from logistic regression and fixed effects logistic regression.

* $p<.05$

Regulation and Compliance Motivations:
Marine Facilities and Water Quality

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Regulation and Compliance Motivations: Marine Facilities and Water Quality

ABSTRACT

This research examines how traditional regulatory and voluntary approaches affect motivations for addressing potential harms to water quality. The traditional approach consists of governmental enforcement of mandatory requirements. The voluntary approach consists of government calling attention to potential harms and facilitating actions to address them. These approaches are best thought of as endpoints for an array of regulatory forms, rather than as the sole choices in regulatory approach. Three sets of findings emerge from the research. One, not surprisingly, is that traditional regulation is more effective than is the voluntary approach alone in enhancing attention to water quality issues. A second shows that deterrent fears and sense of duty to comply are important motivations for action in addressing water quality. A third concerns factors that account for the variation in each motivation for which inspections, peer reputation, and attitudes toward government are shown to be important considerations.

These findings suggest a greater need for attention to regulatory arrangements and how those arrangements shape affirmative considerations for the attainment of regulatory goals. Traditional regulation establishes one set of arrangements that this research shows affect both deterrent fears and civic duty. Requiring permits is a powerful tool for gaining attention to potential problems and for setting forth expectations as to what constitutes the civic duty to comply. Yet, simply requiring permits is not sufficient to motivate action. Technical and financial assistance is often necessary for facilitating and directing actions to alleviate potential harms. These findings therefore confirm what is well known about the importance of building commitment and capacity to take action.

The willingness of facilities that are subject to voluntary regulation, as with marinas in this research, to take action rests largely on their good will and their civic intent. Threats of stronger regulation or regulatory actions loom in the background making such regulation "quasi-voluntary." Showcase actions are important in underscoring this backdrop. But, the central issue is how to enhance the commitment to protect water quality. The challenge is to create a stronger sense of civic duty in forming what might be considered a societal contract for protecting water quality. Actions to address water quality are stronger when facility operators view water quality harms as a shared problem that they have a civic duty to address. Social influences are a key to enhancing civic commitment and shared obligations to protect water quality. These can be enhanced by strengthening associational ties (i.e., among trade groups), by facilitating the emergence of strong industry leaders, and by providing credible evidence that action is appropriate.

Introduction

Despite bringing about substantial improvements in environmental quality since the early 1970s, environmental regulations have been criticized in many quarters for having unreasonable requirements and for engendering heavy-handed enforcement. These criticisms and the realization that the environmental problems of today are different than those of thirty years ago have spawned a search for viable alternatives to traditional forms of environmental regulation. Discussion of alternative regulatory approaches has occurred in a number of books and articles (e.g., Andrews 1999; Fiorino 1995, 2001; Gunningham and Grabosky 1998; Kettl 2002) as well as in various advisory reports (e.g., National Academy of Public Administration 1995). The search for alternatives has brought attention to two broad classes of regulatory approaches that have been labeled cooperative and voluntary regulation.

Cooperative regulatory approaches entail collaboration between regulatory authorities and regulated entities either in negotiating requirements (Marcus et al. 2002; Kerwin 1999) or shared agreements for monitoring performance and obtaining compliance (Harrison 1999; Sparrow 2000). The voluntary approach entails a governmental role in calling attention to a potential harm and in facilitating voluntary actions by relevant firms or industry associations to address the potential harms (Coglianese and Nash 2001; Lyon and Maxwell 2001; Potoski and Prakash 2002). While there are many variants for each of these approaches, a basic distinction between them and traditional regulation is the degree to which government compels actions to address environmental harms. Of particular interest for this research is the difference between mandatory regulation that involves a central role for government and voluntary approaches that entail a much more limited governmental role.

The notion that firms would voluntarily undertake actions to reduce pollution or go beyond minimum requirements is contrary to the image of profit-seeking firms that ignore the external impacts of their operations. However, experience with a diverse set of voluntary programs demonstrates that at least some firms are motivated to act out of a combination of a sense of civic duty, good public relations, market differentiation, and a fear of more stringent governmental regulation (Arora and Carson 1996; Prakash 2000; Segerson and Miceli 1998). At the same time, the limitations of these programs has been demonstrated by related research that shows participation by firms is uneven, the gains in pollution prevention are sometimes limited, and the programs are difficult to sustain and expand beyond a core group of committed entities (Andrews et al. 2001; King and Lenox 2000; Napier and Johnson 1998; Welch et al. 2000). Taken together, these diverse studies suggest that voluntary programs have promise but are not a panacea.

The promise is especially important to consider because in some circumstances voluntary programs may be the only realistic alternative. Mandatory regulation is more feasible when harms are visible and firms concentrated so as not to overwhelm enforcement capacity. Under such circumstances, pollution levels can be directly measured and monitored, the responsible parties are relatively easy to identify, and enforcement can be accomplished on a regular basis if there is sufficient number of enforcement staff. In contrast, voluntary approaches may be the only practical alternative when the sources of harms are widely dispersed and the cost of inspection, relative to the potential harm, is high. For example, many forms of nonpoint sources of water pollution involve widely distributed sources of harm for which it is often not practical to enforce regulations on a case-by-case basis other than by exception (i.e., when large spills occur). Given this, the relevant question is not whether voluntary programs are more effective than traditional regulation, but how can voluntary programs be improved?

Understanding the motivations of firms to address potential harms is important for gauging the promise and limitations of different regulatory approaches. If firms are motivated by a sense of duty and concerns about potential harms, the voluntary approach has promise. If these motivations are lacking, more coercive approaches may be necessary. As such, regulation and motivations go hand-in-hand. The form of regulation is predicated upon assumptions about willingness to act. And, the willingness to act is affected by the form of regulation. In getting at this interplay, the basic issues for this research are

whether motivations and willingness to act are different under mandatory and voluntary approaches to regulation.

This research considers these by examining the influence of different regulatory approaches upon actions taken by marine facilities to address water quality as well as upon their motivations to take action. A natural experiment is provided by the fact that boatyards are typically subject to traditional regulation while marinas are typically subject to voluntary approaches. As explained in what follows, boatyards entail point sources of water pollution. Marinas are typically addressed as non-point sources of water pollution. By examining the role of alternative approaches and other factors in shaping actions and motivations to address potential harms to water quality by these facilities, this research provides insights about both the efficacy of alternative regulatory forms and potential steps to improve voluntary approaches.

Mandatory and voluntary approaches

Mandatory regulations constitute the traditional toolkit for motivating action to address potential harms and to protect public welfare (see May 2002). Compliance with regulatory requirements is compelled through enforcement actions and imposition of sanctions for those found to be out of compliance. The basic logic of this approach is a criminal law model of deterrence as examined in the seminal work of Becker (1968; also see Ehrlich 1972). From this perspective, individuals and firms comply because they fear the consequences of being found in violation of regulatory requirements. Inherent in this approach is the presumption that regulated entities are unwilling to take necessary actions to comply with regulations and therefore they must be compelled to do so. Obtaining greater compliance is brought about by reinforcing deterrent fears.

The voluntary approach involves a very different governmental role and different assumptions about the willingness of relevant entities to address potential harms. The governmental approach is non-coercive for which the key policy instruments are exhortation and various forms of assistance (Grabosky 1995; Harrison 1999; Wilms 1982). Rather than mandating action, government promulgates guidelines for best management practices and encourages adherence to them as a means of achieving desired outcomes.[1] Desired actions are encouraged through education, financial assistance, technical assistance, and other inducements. The assumption is that those entities that contribute to environmental harms are willing to address the harms but they fail to do so because of various complications (Brehm and Hamilton 1996; Coombs 1980; Kagan and Scholz 1984). Their failure to do so is either because they do not recognize the existence of a problem (requiring information), do not understand what can be done to address the problem (requiring education), or they do not have the capacity to take desired actions (requiring financial or technical assistance).

Mandatory and voluntary approaches are perhaps best thought of as endpoints for an array of regulatory forms, rather than as the sole choices in regulatory approach. Stated differently, variants of the mandatory approach can involve efforts to educate regulated entities about appropriate actions and can make available different forms of technical and financial assistance to facilitate compliance. There is always the possibility of legal action against those who contribute to specific harms under the voluntary approach. When pursued, these actions push the voluntary approach along the continuum toward that of traditional regulation. In the case of water pollution, for example, harmful acts can be pursued through the broader water-quality provisions of federal and state water quality acts. In addition, the voluntary approach at least implicitly holds the threat of switching to traditional forms of regulation if harms are not sufficiently addressed. For these reasons, it is perhaps better to think of this type of voluntary regulation as "quasi-voluntary." This form of regulation is labeled voluntary in the discussion that follows for ease of communication while keeping in mind the coercive backstop to such regulation.

> H1: The mandatory approach is more effective than the voluntary approach in gaining commitment to address potential harms by those entities that potentially contribute to those harms.

This hypothesis follows from the preceding discussion. Both mandatory and voluntary approaches are expected to positively influence the actions that are undertaken to address potential environmental harms. The mandatory approach is expected to be more effective in enhancing actions because it compels compliance. However, the effectiveness of the approach will be undermined if regulations are not taken seriously or if enforcement is lax. The voluntary approach is expected to engender actions by those firms that are predisposed to act by virtue of having a higher degree of concern about potential harms, stronger capabilities to act, or stronger fears of future regulation. However, the voluntary approach may fall short in failing to address recalcitrant entities. Commitment to address environmental harms can be gauged by the importance that relevant entities attach to their actions to address the harms.

Motivations to act

Consideration of the motivations of entities to take action in addressing potential harms is important for understanding the viability of different approaches. Most of the regulatory literature on the subject is concerned with the reasons why firms or individuals comply with regulations (see Winter and May 2001). Less attention has been paid to motivations in the absence of formal regulations, as with the voluntary approach, although the literature addressing the willingness of firms to voluntarily adhere to industry-developed guidelines is relevant (see Arora and Carson 1996; Prakash 2000; Segerson and Miceli 1998; Welch et al. 2000). Two sets of motivations that are involved are considered in what follows. One, deterrent fears, concerns the consequences of failing to address potential harms. A second, duty to comply, is a sense of obligation to address a potential harm.

Deterrent fears and regulatory approaches

A primary motivation for addressing potential harms is the deterrent fears associated with the negative consequences of failing to act. As discussed by Reiss (1984), such fears are potentially activated either through actions aimed at particular firms or individuals (specific deterrence) or through more general warnings (general deterrence). Specific deterrence is brought about by targeting individual entities for inspection, citations of violations of rules, and sanctions if firms fail to rectify those violations. A number of studies (Braithwaite and Makkai 1991; Burby and Paterson 1993; Gray and Scholz 1993; Helland 1998) reinforce the importance of inspections for compelling compliance, but vary in their findings with respect to the influence of sanctions once violations are detected. General deterrence, which serves to warn potential violators that negative consequences can follow from failing to act, is brought about by more diffuse actions that include showcase actions against violators and publicity about the consequences of failing to act. Potential shame or embarrassment of being caught violating rules has also been shown to be an important component of deterrence (Grasmick and Bursik 1990; Grasmick et al. 1991).

> H2: The mandatory approach activates a stronger sense of deterrent fears than does the voluntary approach.

This hypothesis follows from differences in the way that the two approaches potentially activate deterrent fears. As discussed above, the mandatory approach is based on compelling compliance by activating deterrent fears of the negative consequences of failing to comply. This is accomplished through specific deterrent actions involving enforcement and sanctions, and through general deterrent actions involving showcase enforcement actions.

Specific deterrence is not relevant to the voluntary approach because there are no mandatory rules or regulations to enforce. However, aspects of general deterrence do potentially apply. Embarrassment might be relevant if an entity is shown to be a laggard in addressing potential harms. This is the logic of posting "top 10 wanted lists" of environmental polluters that have been issued by environmental organizations. A second potential fear is that a firm may be found liable for harms that, although not specifically regulated, are subject to broader prohibitions. This fear is potentially activated by showcase lawsuits. A third potential fear that failure to act will result in stronger governmental regulation.

In sum, both approaches are expected to engender deterrent fears that serve as one key set of motivations for taking action to address potential harms. The mechanisms in fostering deterrent fears differ somewhat between the two approaches. The mandatory approach relies on both specific and general deterrence, while only general deterrence is relevant to the voluntary approach. Because of the greater arsenal of tools for engendering deterrent fears with specific deterrence, the mandatory approach is expected to be stronger in activating such fears. Evidence for stronger deterrent fears consists of the degree of concern that entities display of potential consequences for failing to act to address potential harms.

Duty to comply and regulatory approaches

An important foundation for any form of regulation is that citizens and firms acknowledge their responsibilities in preventing harms. Even when rules exist and are enforced, as with the mandatory regulatory approach, there is a strong presumption that the vast majority will obey their sense of duty to adhere to the rules. As noted by Tyler (1990), without such quasi-voluntary compliance there would be a need for a much stronger enforcement apparatus. This duty is based on a combined sense of moral obligation and agreement with the need and approach for addressing a given problem (McGraw and Scholz 1991; Scholz and Pinney 1995; Winter and May 2001). As verified with findings from this research, the sense of duty to comply can be thought of as independent of the deterrent fears discussed in the previous section.

The more basic aspects of duty to comply relate to the moral sense of obligation to obey laws and general ideological values. The more immediate aspects of this duty relate to the value of addressing a given problem and acceptance of the regulatory approach to it. Such acceptance has been shown to depend on the reasonableness of rules or guidelines, degree of trust in the agencies that promulgate them, and the extent to which other affected entities are believed to be doing their part in addressing the problem (Bardach and Kagan 1982; Kagan and Skolnick 1993, Levi 1988; Scholz and Lubell 1998; Tyler 1990).

> H3: The voluntary approach activates a stronger sense of duty to comply than does the mandatory approach.

This hypothesis follows from the preceding discussion. Both approaches are expected to invoke a sense of duty to comply. However, the mandatory approach is expected to be less effective in this regard because aspects of it potentially undermine the trust in regulatory authorities that is essential for instilling a sense of duty to comply. The voluntary approach potentially activates a sense of duty to comply through at least two means. One means is direct appeals to address potential harms through informational efforts telling how actions of affected entities potentially contribute to the harms. Implicit, if not explicit, is an appeal to the shared obligation to do one's part. A second means is more direct, one-on-one technical assistance to help educate affected entities about harms and steps to address them. This has the added potential benefit of gaining acceptance of the legitimacy of the recommended actions. Such acceptance has been shown by Winter and May (2002) to depend on the extent to which those providing advice are viewed as being competent and can be trusted. If these are lacking, the voluntary approach loses its effectiveness and the sense of obligation to comply is not enhanced.

Because the mandatory regulatory approach also typically entails provision of information and technical assistance, it also can be expected to activate a sense of duty to comply. Information and assistance is provided both as part of general publicity about regulations and when facilities are inspected. As with the voluntary approach, the trust that regulated entities place in regulatory agencies and the perceived competence of regulatory officials are important considerations. Yet, additional considerations also come into play. The style with which inspectors interact with regulated entities—whether inspectors are formal or facilitative—has been shown to affect motivations for compliance and the understanding of rules by regulated entities (Winter and May 2001). If enforcement of regulations is viewed as unreasonable, the essential trust in regulatory authorities and sense of duty to comply will be undermined.

Because of this potential, the mandatory approach is expected to at least partially undermine the sense of duty to comply.

In sum, both approaches are expected to engender a sense of duty to comply that serve as a second key set of motivations for taking action to address potential harms. The mechanisms for this are the same for both approaches. However, the mandatory approach has the potential for a backlash against what might be perceived as heavy-handed enforcement that in turn undermines trust in regulatory authorities and the sense of obligation to comply. Because of this potential, the mandatory path is hypothesized as being less effective in activating a sense of duty to comply.

The regulatory setting: Marine facilities and water quality

The setting for this research concerns marine facilities and their impacts on water quality. Marine facilities have been shown in several studies to be sources of water pollution for estuarine areas and bays for which there is little natural flushing (National Research Council 2000; U.S. EPA 1994, 1997). These impacts include point sources of water pollutants—toxic metals, oils, sediments—and potential releases of hazardous materials and toxic spills into water. Also relevant are non-point impacts from boats of raw or untreated sewage and fuel spills. A variety of consequences can follow that include increased toxicity, turbidity, and lower oxygen content of water. These in turn contribute to changes in the food chain in the marine environment, altered marine life, contaminated fish, increased algae growth, and generally unhealthy water quality.

The contamination of water is regulated by the federal government under several laws. Point sources are addressed under provisions regarding industrial discharge under provisions of the Clean Water Act (section 402(p)) that establish among other things the National Pollution Discharge Elimination System (NPDES) permit system. Non-point sources of pollution are addressed in the 1987 amendments to the Clean Water Act (section 319), and under coastal non-point sources of pollution provisions (section 6217) of the Coastal Zone Management Act Reauthorization Amendments of 1990. These federal laws assign key responsibilities to states for enforcement of discharge permit programs and for development of plans for management of pollution sources.

The data for this research address behaviors of operators of boatyards and of marinas in coastal and estuarine areas of California and Washington states. The contrast between the regulatory approaches for each set of facilities provides a natural experiment for examining the interplay of approaches and motivations to address harms. Boatyards are working marine facilities for repair and maintenance of pleasure and smaller commercial vessels. These are fixed point sources of pollution from boat haul-outs, hull pressure washing, sanding and painting, and repair operations. Boatyards are subject to mandatory regulations and permit requirements under the NPDES program as delegated to the states.

Marinas are basins with slips for boats, usually defined as having 10 or more slips, which may or may not provide fueling and other shore services. These have limited point sources (fueling and boat launching areas) and more extensive non-point sources of pollution relating to potential spills from boats of sewage, bilge, fuel, and cleaning materials. Marinas, with some exceptions, are not subject to regulatory requirements other than the broad prohibitions of federal and state water quality acts against impairing water quality.[2] Instead, marinas are subject to voluntary approaches for which states have encouraged, through education efforts and limited funding, adherence to best practices guidelines for marine facilities promulgated by the U.S. Environmental Protection Agency (1993, 2001). State efforts in this regard include information provision about best management practices, technical assistance, and small grant programs aimed at fostering voluntary action by marinas (see Washington State Department of Ecology 1999a).

Interviews with enforcement officials in each of the relevant regional offices of the states within which facilities for this study are located help set the context. Neither type of facility is high priority for enforcement actions. Because boatyards are required to have permits, they are monitored more

extensively than are marinas. This typically consists of monitoring the filing of required, self-reported periodic analyses of water quality samples. In most regions, field inspections of boatyards are undertaken only every few years or less. Marinas generally fall "under the radar scope" of enforcement officials unless there is a complaint or a spill that draws attention to problems. It is difficult to assess compliance for either type of facility in that there is no systematic collection of reporting of field inspections other than inspection reports filed away in regional offices. Only more serious notices of violations or fines make it into centralized reporting. For the period January 2000 to July 2002, California state enforcement data indicate issuance of formal sanctions for 11 boatyards and two marinas, and Washington state enforcement data indicate formal sanctions being issued for 10 boatyards and two marinas. These numbers correspond to the self-reporting of facilities in the survey for this study of 9 percent of the facilities having actions taken against them for non-compliance with either reporting requirements or other provisions.

Several aspects of marine facilities are important to consider in setting the context for this research. Of particular concern are the comparability of the two types of facilities and the potential for systematic motivational differences between them. The rationale for mandatory regulation of boatyards are the greater potential harm to water quality posed by activities at boatyards and the greater ease with which point sources of harm can be regulated. The former might suggest that boatyard operators would be more motivated to take action but that is vitiated by the larger costs for boatyards to address potential harms. Capital expenditures for equipment addressing environmental issues by boatyards in this study were on average 30 percent higher than those expended by marinas. As such, it is unclear that boatyards are inherently more motivated to act than are marinas. This potential selection bias is controlled in the analyses that follow by introducing statistical controls concerning measures of the extent of water quality problems and constraints upon action.

A different potential bias is that one type of facility has greater capacity to act than another. There is no systematic evidence for this. Both types of marine businesses tend to be relatively small operations. Among the sample for this study, the median number of full-time employees is 14 for boatyards and 3 for marinas. Thirty percent of the marinas and 10 percent of boatyards have owners who operate more than one facility, which is indicative of a larger scale of operations. Most boatyards, comprising 92 percent in this sample, are privately owned while marinas have a wider mix of ownership, comprised of 30 percent that are publicly owned facilities. Potential selection biases stemming from differences in capacity are controlled in the analyses that follow by introducing statistical controls measuring the capacity of facilities to address potential harms to water quality.

Operators of marine facilities are as a group conflicted in their views about addressing harmful water quality impacts. Many are in the business because they enjoy boating and value clean water, but many also question the need for governmental regulation. Among the study sample, 31 percent of marina operators and 43 percent of boatyard operators moderately to strongly agree that government intrudes too much on business and that preserving property rights is more important than protecting water quality. Facility operators also share a perception that their efforts to address water quality pale in comparison to what they typically view as much more harmful impacts by such sources as municipal storm water outfalls and industrial discharges. In our interviews, boatyard operators in particular felt that their businesses were being singled out for attention when far greater sources of potential harm were being ignored.

Data and measures

The data were collected from a mail-out survey of marine facilities in California and Washington. Listings of 281 marinas and 140 boatyards in coastal and estuarine areas of the two states were identified from various publications and governmental permit listings. Questionnaires were mailed in late January 2002 with two rounds of follow-up lasting into March 2002. Valid responses were received from 144 marinas (51 percent response rate) and from 61 boatyards (44 percent response rate) for an overall

response rate of 49 percent. Data collected from a preliminary phone contact with all facilities were used to gauge potential response biases. No statistically significant differences were found for marinas with respect to the number of slips or type of marina ownership, and none were found for boatyards with respect to number of employees or type of boatyard ownership. Although this non-response assessment is limited in scope, it suggests that the mail-out survey responses are representative of a range of marinas and boatyards in the two states. The unit of analysis is the individual marine facility. The data are weighted to take into account differences in response rates among the two types of facilities and among different geographic regions.[3]

The measures for this research relate to testing hypotheses concerning the role of regulatory approaches and other factors in influencing deterrent fears and sense of duty to comply among marine facility operators. All measures are drawn from the survey results. The key distinction is between the mandatory and voluntary approaches as reflected in the different treatment of boatyards (mandatory regulation) and marinas (voluntary approach). The differences in approach for the two sets of facilities are verified in analyses that follow.

The two sets of motivations are central considerations. Each is measured as a dichotomous variable for which a contrast is drawn between those facilities that score high on the motivation and the remaining facilities that score lower. This coding overcomes the statistical limitations of working with the ordinal measures for each set of motivations that were contained in the surveys of facilities. Deterrent fears are measured by respondents' rating of the fear of legal liability if harm occurred, fear of fines or other governmental action, concern that new requirements will be imposed if actions are not taken on their own, and avoidance of embarrassing media coverage.[4] The sense of duty to comply is measured by respondent agreement with two statements: "Regardless of the extent of the problem, marinas (boatyards) have a civic duty to address water quality issues," and "Marinas (boatyards) have a civic duty to report accidents or spills affecting water quality to relevant authorities."[5]

The commitment of marine facilities to address water quality problems is measured in three different ways. The first is the percentage of best management practices that are undertaken by each facility.[6] As detailed in the methodological appendix, these include installation of physical devices, use of appropriate equipment, restrictions on activities at the facility, and management practices that encourage appropriate actions by facility operators and boat owners. Standardizing this measure by computing the percentage of best practices makes it possible to compare marinas and boatyards with respect to actions undertaken. A second measure is respondent self-identification of the priority for their actions along a five-point scale that ranges from "not an issue that has really affected the facility" to "a top priority—a key consideration for facility upgrade." A third measure is the respondent's rating of efforts to address water quality in comparison to other facilities on a five-point scale from "less attention than most" to "we are a leader."

Several factors are potentially relevant for explaining variation in deterrent fears and sense of duty to comply. These include various attributes of each regulatory approach, attitudes toward governmental agencies and their handing of water quality issues, social influences, and the capacity to and constraints upon the ability to act. The regulatory attributes include specific deterrent enforcement practices (inspection within the past five years, whether or not sanctions were imposed, and awareness of showcase actions) and whether different types of assistance were provided (general information or education, technical assistance, and financial assistance).

Relevant attitudes about government include ideological perspectives, the perceived reasonableness of water quality regulations, and the perceived competence of governmental regulators. The ideological perspective about appropriate roles of government is measured as an index of mean agreement on a five-point scale with two statements: "In general, governmental agencies and regulations intrude too much on businesses," and "Preserving property rights is more important than protecting water quality."[7] The perceived reasonableness of governmental water quality regulations is gauged by agreement on a five-point scale with the statement: "The existing governmental rules concerning boatyards (marinas) and

water quality are reasonable." Perceptions of the competence of government agencies are gauged by agreement on a five-point scale with the statement that facility managers "can rely on governmental agencies for advice about dealing with potential water quality impacts."

The perceived importance of peer reputation is the primary social influence for which information was obtained. This is measured as the mean score on a five-point scale of the extent to which respondents agree that their reputation with each of the other facilities, boaters, and governmental agencies is "an important consideration for how we do business."[8]

The final set of potentially relevant considerations are various aspects of the capacity of and constraints upon actions that facilities take to address water quality. The size of the facility, measured as the percentile of facility size relative to other facilities, serves as a proxy for both capacity to act and the costs of taking action. An index of perceived constraints is measured as the mean of respondent ratings on a five-point scale of the extent to which four factors "make it difficult to address water quality."[9] Two measures serve as proxies for the extent of water quality problems. One is respondent perceptions on a ten-point scale of water quality at their location five years ago. The second proxy is the amount of waterfront that is adjacent to the facility.

Findings

The findings are presented in several stages. The attributes of the mandatory regulatory and voluntary approaches are first discussed. The comparative impacts of the two approaches upon the willingness of marine operators to act in addressing potential harms to water quality are next considered. This leads to empirical examination of differences in deterrent fears and sense of duty to comply for the two approaches. Finally, multivariate analyses that explain variation in each set of motivations are reported.

Regulation of marine facilities

Table 1 shows systematic differences in provisions for marine facilities under the mandatory and voluntary approaches.[10] The greatest differences are the permit provisions and inspection of regulated facilities with a smaller difference in the application of sanctions. Permits are the central regulatory tools that specify the conditions for facility operation. Fines, warnings, or other actions are more infrequent with the typical action being a warning about boatyard practices or a fine for failure to submit a required report on time. More extreme sanctions include orders to remove contaminated soil and mandated upgrading of catch basins. Regulated facilities also receive information and education assistance as part of inspections and, to a lesser extent, technical assistance is sought from third parties. Very few regulated facilities received governmental financial assistance.

Various forms of assistance were provided marinas that are subject to the voluntary approach. A majority of marina operators report receiving information or educational assistance while fewer operators report receiving technical assistance or funding. Financial assistance was mainly in the form of grants for installation of sewage pump-out stations. A small percentage of marinas were also subject to sanctions that resulted from spills or other harms to water quality. The sanctions included small fines for spills of oil or fuel, a $13,000 fine for allowing vessel repair in the water, and warnings for leaking sewage and fuel systems.

Overall, the major difference between the mandatory and voluntary approaches as applied to these facilities is the use of coercive measures to compel compliance under the mandatory approach that are not present under the voluntary approach. Both approaches employ various forms of assistance. However, assistance is used in different ways for the two approaches. Under the mandatory approach, assistance is a mechanism for facilitating compliance. Under the voluntary approach, assistance is a mechanism for both gaining attention to potential problems and for facilitating action.

Table 1. Regulation of marine facilities

Characteristics	All Facilities	Mandatory	Voluntary	P-value [a]
	(Percentages [b])			
Regulatory Provisions				
NPDES permit [c]	38	100	0	<.01
Inspected in past 5 years	30	91	0	<.01
Fine, warning, other action	11	19	6	.02
Assistance Provided				
Information or educational assistance	68	76	63	.08
Technical assistance	32	43	25	.03
Financial assistance	20	2	31	<.01
Number of respondents [c]	157	53	104	--

Notes:
[a] P-value for t-test of differences for independent samples (two-tailed) for any given row between the percentages for regulated and non-regulated facilities. Facilities subject to mandatory regulation are those boatyards with required permits. Facilities subject to voluntary approaches are those marinas without permits.
[b] Cell entries are weighted percentage of respondents for each category.
[c] Un-weighted number of respondents for each category.

Actions to address water quality

Water quality programs seek to do two things whether they employ mandatory or voluntary approaches. They seek to gain attention to potential problems so that affected entities take action in addressing them. In addition, they seek to guide the actions that are undertaken by either mandating or recommending specific actions. Both of these are reflected by the adoption of best management practices as well as by the degree of effort that facilities put into addressing water quality. These issues are addressed in Table 2.

The mandatory approach is expected to be more effective than the voluntary approach in stimulating adoption of best practices (H1). As hypothesized, those facilities that are regulated report higher levels of action than those facilities subject to voluntary provisions. Yet, as evidenced by the results for the unregulated facilities, the voluntary approach appears to have had a notable impact in encouraging best practices and to a lesser extent in encouraging stronger efforts to address potential harms to water quality. Those facilities that are subject to the voluntary approach undertake on average 82 percent of actions undertaken by regulated facilities. As would be expected, the adoption of best practices is greater for marinas reporting receiving information and education than those that did not ($p < .05$). However, no statistical differences are detected between these groups for the other effort measures shown in Table 2.

Table 2. Actions to address water quality

	All Facilities	Mandatory	Voluntary	P-value [a]
	(Percentages [b])			
Actions / Effort				
Mean percentage of Best Management Practices undertaken [c]	69	78	64	<.01
Rate water quality as top priority [d]	23	31	18	.06
Leader in Efforts [e]	17	25	12	.05
Perceived Impact				
Substantial impact in reducing potential problems [f]	65	79	57	<.01
Number of respondents [g]	157	53	104	--

Notes:
[a] P-value for t-test of differences for independent samples (two-tailed) for any given row between the percentages for regulated and non-regulated facilities. Facilities subject to mandatory regulation are those boatyards with required permits. Facilities subject to voluntary approaches are those marinas without permits.
[b] Weighted percentage of respondents.
[c] Percentage of relevant practices for addressing water quality that are undertaken by a facility.
[d] Percentage of respondents that rate the priority for action as a "top priority – key consideration for upgrade."
[e] Percentage of respondents that rate efforts to address water quality, relative to other facilities, with the response that "we are a leader."
[f] Percentage of respondents providing a rating of 7 or greater on 10 point scale of "effect of actions in reducing potential harmful impacts on water quality."
[g] Un-weighted number of respondents for each category.

The lower part of Table 2 shows the perceptions of the impacts that marine facilities have had upon reducing harms to water quality. Consistent with the findings concerning levels of effort, a much greater percentage of regulated facility operators report substantial impacts in reducing potential harms than do unregulated facility operators. Taken together, these findings suggest that the mandatory approach has a greater influence on commitment to addressing harms than does the voluntary approach alone. These findings are expected and are not especially remarkable. The finding that the voluntary approach appears to have had an influence for a sizeable number of unregulated facilities is notable.

Other analyses of the data from this research provide insights concerning factors that explain variation in the extent of adoption of best practices by regulated and unregulated facilities (see May 2003).[11] Two aspects of the multivariate findings are of relevant for the present discussion. One relevant finding is that permits, and associated deterrent fears, are noteworthy influences on adoption of best practices. On average, when controlling for a variety other factors, facilities with permits have a 17 percentage point higher score in the actions that are undertaken than those that are not regulated. A second relevant finding is that civic duty is also shown to affect the adoption of best practices. The average effect upon best practices of increased amounts of civic duty is a 5.4 percentage point increase,

when calculated as moving from the lowest quartile of civic duty to the highest quartile among the data. Note, however, that civic duty was found to have a stronger effect on best practices for regulated facilities than for unregulated facilities. This may seem counter intuitive. But, the finding suggests that regulations (and permits) play an important role in signaling what is desired and what constitutes civic duty. In the absence of regulations with which to comply, the understanding of what constitutes civic duty is more amorphous.

The findings reported in May (2003) also show that the willingness of marine facilities to address water quality is constrained by several factors. Regardless of the approach, facility operators complain about the complexity of rules governing water quality. As would be expected, this complexity is perceived as more constraining by those facilities that are subject to traditional regulation. The cost of devices to address water quality is also viewed as an impediment to taking action. An overarching consideration is the belief on the part of nearly a majority of facility operators that there is too much uncertainty about the impacts of marine facilities upon water quality to justify actions on their part. This belief when coupled with the fact that more than one-third of the facility operators are skeptical of governmental regulation constrains the acceptance of the need for actions to address water quality.

Motivations to act

One way of beginning to disentangle the effects of the mandatory and voluntary approaches is to consider their impacts upon motivations to act. Table 3 presents a comparison of various aspects of deterrent fears and sense of duty to comply. The findings show that deterrent fears and sense of duty to comply are relevant considerations for both types of facilities. The data further suggest that deterrent fears are more strongly activated by the mandatory approach, while the sense of duty to comply is comparable between the two approaches.[12]

The top part of the table addresses deterrent fears. The hypothesis (H2) is that the mandatory approach activates a stronger sense of deterrent fears than does the voluntary approach. Consistent with this hypothesis, these findings show that most aspects of deterrent fears are higher for regulated facilities than for those that are subject to the voluntary approach. The exception is the failure to statistically detect a difference between facilities in avoidance of embarrassing media coverage.

The more interesting aspect of these findings about deterrent fears is evidence of a notable percentage of unregulated facilities expressing deterrent fears. Nearly one-fifth of unregulated marinas express fears of legal liability and of fines or governmental actions. This reflects the fact that marinas are not truly unregulated, as they are subject to broader laws that prohibit harms to water quality. The lower percentage of marinas reporting concerns about future regulatory actions than boatyards likely reflects differences in the salience of water quality issues for the two types of facilities. The fear of embarrassing media attention evidenced by some operators reflects the importance of reputation to marine facility operators.

The bottom part of Table 3 addresses duty to comply. The hypothesis (H3) is that the voluntary approach activates a stronger sense of obligation than does the mandatory approach. This hypothesis is not supported by these data. The difference between the regulated and unregulated facilities with respect to each of the measures of duty to comply is not statistically significant. Nonetheless, with the exception of regulated facilities' sense of civic duty to report spills, majorities of marine facilities report various aspects of duty to comply as a strong motivation for their actions to address water quality. The larger percentage of unregulated marinas reporting a strong civic duty to report spills than that of boatyards, while not statistically significant, likely reflects the fact that educational efforts targeted at marinas have emphasized the importance of spill prevention and reporting to assist emergency clean up.

Table 3. Motivations to address water quality

Consideration	All Facilities	Mandatory	Voluntary	P-value [a]
	(Percent rating very strong consideration [b])			
Deterrent fears [c]	29	45	19	<.01
Fear of legal liability if harm occurred	33	54	21	<.01
Concern new requirements will be imposed if actions are not taken on own	32	46	23	<.01
Fear of fines or other governmental action	27	43	17	<.01
Avoidance of embarrassing media coverage	25	32	21	.15
Duty to Comply [d]	63	63	62	.88
Civic duty to address water quality	51	54	50	.66
Civic duty to report spills	55	49	58	.29
Number of respondents [e]	157	53	104	

Notes:
[a] P-value for t-test of differences for independent samples (two-tailed) for any given row between the percentages for regulated and non-regulated facilities. Facilities subject to mandatory regulation are those boatyards with required permits. Facilities subject to voluntary approaches are those marinas without permits.
[b] Weighted percentage of respondents rating each consideration as 4.5 or greater on a scale of 1 to 5.
[c] Score of 4.5 or greater for the mean of items that follow, each rated on a scale of 1 to 5.
[d] Score of 4.5 or greater for the mean of items that follow, each rated on a scale of 1 to 5.
[e] Un-weighted number of respondents for each category.

Explaining variation in motivations

Table 4 presents multivariate results for explaining variation in deterrent fears and sense of duty to comply. The dependent variables are whether or not a given facility scores high relative to other facilities for each motivation. Because each variable is dichotomous, logistic regression analyses were undertaken.[13] The t-tests of the coefficients provide an assessment of whether a given variable can statistically be detected as having an effect on motivations for these data. The sign of each coefficient can be used to tell whether a given factor has a positive or negative effect on the likelihood of a facility scoring high on each motivation. The magnitude of the effects of variables for logistic models is not linear and thus cannot be directly gauged from the size of the coefficients. Assessments of the magnitude of the impacts of relevant variables on the likelihood that facilities score high on each motivation are reported in what follows.

Table 4. Explaining differing motivations

	Logistic Analyses [a]	
	Deterrent Fears [b]	**Duty to Comply [c]**
Regulatory Approach		
Mandatory (versus voluntary) Approach [d]	1.68 **	.67
	(.80)	(.77)
Deterrent Enforcement Practices		
Inspected within past 5 years	[1.58] [e] **	[.61] [e]
	(.91)	(.83)
Sanction imposed for water quality problems	.02	-2.10 ***
	(1.10)	(.90)
Awareness of showcase enforcement actions	.71 **	-.24
	(.33)	(.27)
Assistance Provided		
General information or education	.50	.52
	(.64)	(.66)
Technical assistance	-1.81 **	.47
	(.80)	(.62)
Financial assistance	-.55	-1.09
	(.97)	(.84)
Attitudes Concerning Government		
Conservative ideology	.54 *	-1.27 ***
	(.35)	(.38)
Water quality standards are reasonable	-.46 **	.27
	(.26)	(.25)
Perceived competence of government regulators	.32	.17
	(.27)	(.27)
Social Influences		
Importance of reputation with others	-.23	2.46 ***
	(.59)	(.61)
Facility Capacity and Constraints		
Facility size relative to industry	-.01	.01
	(.01)	(.01)
Implementation constraints	.59 **	-.30
	(.36)	(.32)
Amount of water frontage (ln)	.17 *	.04
	(.11)	(.10)
Perceived water quality as of five years ago	.24 **	-.09
	(.13)	(.14)
Constant	-8.42	-6.43 **
	(3.75)	(3.35)
Model Statistics		
Number of observations	101	123
Pseudo-R^2 [f]	.26	.40
Chi-square GOF for model (p-value)	29.70 (<.01)	55.21 (<.01)
Percent correctly classified	84.8	82.6

Table 4 (con't)

Notes:
*** p < .01 ** p < .05 * p < .10 (one-tailed asymptotic t-tests).
[a] Cell entries are logit coefficients from binary logistic modeling with the standard error in parentheses.
[b] Contrast between those facilities that score high (scores of 4.5 or greater) and remaining facilities for items concerning deterrent fears shown in Table 3.
[c] Contrast between those facilities that score high (scores of 4.5 or greater) and remaining facilities for items concerning duty to comply shown in Table 3.
[d] Facilities subject to mandatory regulation are those boatyards with required permits. Facilities subject to voluntary approaches are those marinas without permits.
[e] Results from a separate logistic modeling for this variable when substituted for the regulatory approach variable. Because only regulated facilities were inspected, the form of regulation and inspection cannot be entered into the same model.
[f] Cox and Snell Pseudo R Square.

Regulatory approach. The first row of both models concerns the influence of regulatory approach upon the two sets of motivations. The coefficient for deterrent fears clearly shows that the mandatory regulation has a stronger influence on deterrent fears than does the voluntary approach. The multivariate findings show that regulated facilities, when other factors are taken into account, have a 36 percent greater likelihood of having high deterrent fears than do unregulated facilities.[14] This difference is as hypothesized and reaffirms the zero-order comparisons of Table 3.

The coefficient for sense of duty to comply is not statistically significant and thus fails to show the hypothesized greater effect of the voluntary approach upon that motivation. The lack of a difference in approach for duty to comply might be explained by the fact that the two approaches do not substantially differ in their levels of assistance as was shown in Table 1. In addition, inspections under the mandatory approach may not have the off-putting effect that was hypothesized as the reason why that approach would have a lesser effect on sense of duty to comply. The multivariate findings rules out the possibility that the lack of a difference in sense of duty to comply is an artifact of other differences among marine facilities.

Enforcement practices. The items of Table 4 concerning enforcement practices show that inspections and showcase actions contribute to deterrent fears. Inspections are central aspects of specific deterrence while showcase actions are important components of general deterrence. Inspected facilities, all of which are regulated boatyards, have a 35 percent greater likelihood of having high deterrent fears. Regulated boatyard operators with high awareness of showcase actions have a 17 percent greater likelihood of having high deterrent fears. The corresponding value for marina operators is 10 percent greater likelihood. The failure to find an effect of sanctions on deterrent fears is consistent with findings in the regulatory literature that inspections are a more important predictor of compliance than are sanctions (see Braithwaite and Makkai 1991; Burby and Paterson 1993; Gray and Scholz 1993; Helland 1998).

More surprising is the negative impact of sanctions on sense of duty to comply. Although the imposition of sanctions is relatively rare (see Table 1), these results suggest that sanctions undermine the sense of duty to comply. Indeed, regulated facilities subject to sanctions have 43 percent lower likelihood of having a high sense of duty to comply and unregulated facilities subject to sanctions have a corresponding 48 percent lower likelihood. This is perhaps because, as found by May and Winter (1999), imposition of sanctions are viewed by some entities as overly harsh responses.[15]

Assistance. The findings concerning the effects of various forms of assistance upon motivations, with the exception of technical assistance and deterrent fears, fail to show an effect on either set of motivations. The failure to detect more substantial impacts of assistance upon either set of motivations is

puzzling. Information and technical assistance are important ingredients of the voluntary approach for which an effect on sense of duty to comply was expected. It may be that education efforts have been too general and technical assistance too specific to have an impact on more basic feelings of civic obligations. The negative effect of technical assistance upon deterrent fears can be explained by the observation that such assistance, involving consultation by third-parties about how to comply, facilitates compliance and thus eases fears of being deemed out of compliance. This facilitation is confirmed by the earlier analyses of variation in adoption of best practices (see May 2003). The multivariate results showed that provision of information and technical assistance had a substantial impact on the number of practices that were adopted by regulated facilities. (The fact that information and assistance did not have an effect on the number of practices adopted by unregulated facilities could reflect the generality of that information.) Those analyses also showed that financial assistance had a positive impact on adoption of best practices by both types of facilities.

Attitudes concerning government. The findings concerning the influence of different attitudes upon motivations to comply are dominated by the influence of ideology. Those facility operators with more conservative attitudes about government are more likely to have high deterrent fears and less likely to have a strong sense of duty to comply. More conservative boatyard facility operators are on average are 13 percent more likely to have high deterrent fears and 16 percent less likely to have a strong sense of duty to comply. The corresponding values for more conservative marina operators are 8 percent greater likelihood of deterrent fears and 23 percent lower likelihood of sense of duty to comply. The increased deterrent fears are likely related to the lower sense of trust in government associated with conservative ideology (Scholz and Lubell 1998) while the negative effect on sense of duty to comply is likely related to the lower sense of agreement of the value of regulations (Levi 1988; Tyler 1990).

Social influences. The presumption of social influence, addressed by Kagan and Skolnick (1993) and by Winter and May (2001), is that entities take action in order to earn the approval of others. This expectation is borne out by the findings concerning social influences and sense of duty to comply. In particular, those boatyard operators who are concerned about reputation have a 32 percent greater likelihood of having a strong sense of duty to comply while the corresponding value for marina operators is 44 percent. This influence may be especially relevant in industries like marine facilities for which trade associations are relatively strong and facility operators tend to know each other.

Conclusions

This research examines traditional regulatory and voluntary approaches for addressing potential harms to water quality. The traditional approach consists of governmental enforcement of mandatory requirements. The voluntary approach consists of government calling attention to potential harms and facilitating actions to address them. These approaches are perhaps best thought of as ends of a continuum, rather than as the sole choices in regulatory approach. In examining these, this research takes advantage of a natural experiment in contrasting actions undertaken by boatyards subject to traditional regulation with that of marinas subject to the voluntary approach. Hypotheses have been examined about the role of these approaches and other factors in shaping two key motivations—deterrent fears and sense of duty to comply—that are bases for actions to address potential harms.

Three sets of findings stand out from this research. One set concerns the impact of different approaches on the actions that have been taken to address potential harms. The findings clearly demonstrate that traditional regulation is more effective than is the voluntary approach alone. This is expected and in itself is not particularly noteworthy. More striking is that the voluntary approach does have substantial impacts for which the added gain in actions taken under mandatory regulation, when controlling for other factors, is on average 17 percent. As such, voluntary approaches of the type employed with marine facilities cannot be written off as wholly ineffective.

A second set of noteworthy findings concern the role of deterrent fears and sense of duty to comply as motivations for action. Both sets of motivations are evident for the facilities in this study. As expected,

deterrent fears are stronger for those facilities that are subject to mandatory regulation than for those subject to voluntary approaches. The sense of duty to comply does not differ between the two types of facilities. Taken together, the findings about motivations are consistent with the stronger impacts of mandatory regulation upon actions to address potential harms.

A third set of findings concern factors that account for the variation in each set of motivations. The multivariate findings that explain variation in deterrent fears are consistent with prior findings about the importance of inspections in shaping specific deterrence (e.g. Burby and Paterson 1993; Gray and Scholz 1993; Helland 1998). But, deterrence is not limited to one-on-one enforcement. The findings that showcase actions add to increase deterrent fears, along with the fact that three quarters of marine facility operators report moderate to high awareness of large fines or other notable regulatory actions imposed on other facilities, underscore the value of general deterrence brought about through showcase actions. These put facilities on notice even when actions to address harms are not mandated.

Two other factors that differ from the traditional regulatory tools stand out as relevant considerations. One is the role of reputation among peers as a positive influence on a sense of duty to comply. A second factor is the role of attitudes toward government in shaping predispositions to take action. In particular, those facility operators with more conservative attitudes about government are shown to be more likely to have high deterrent fears and less likely to have a strong sense of duty to comply. These are important findings because they suggest that the willingness (and reluctance) to address harms is related to more basic predispositions.

Policy implications

Regulatory scholars have conducted fairly extensive research about regulatory instruments and, as with this research, increasing amounts of research about compliance motivations. These findings suggest a greater need for attention to regulatory arrangements and how those arrangements shape the relevance of normative and social considerations for the attainment of regulatory goals. The importance of context is reinforced by the various studies that I have conducted, often with others, regarding motivations. These studies address compliance motivations for Danish farmers (May and Winter 1999, Winter and May 2001), for homebuilders in western Washington (May and Wood 2003), and for marine facilities with this research. Concluding that the regulatory framework is important in explaining influences upon compliance motivations is unsatisfying to those who seek general prescriptions about regulatory enforcement and compliance. However, the findings across the various studies suggest that how regulatory situations are framed affects the role of different regulatory tools and the relevance of normative and social considerations.

The situation for boatyard operators in California and Washington mirror more typical regulatory arrangements in the United States that do not ferment shared norms or expectations. Regulators and regulated entities operate at arms-length with very limited interaction. As a consequence, there is little leeway or occasion for negotiation over the terms of compliance. Instead, the rules constitute fairly standardized conditions for permit adherence. Much of the enforcement rests on self-reporting of water-quality analyses and only occasional on-site inspections. Enforcement matters since fines are issued and sanctions for notable violations are publicized. However, this regulatory framework falls short of a social contract in that the relationship is one-sided with regulatory authorities dictating the terms of the permit. Given the lack of reciprocity for the relationship between regulators and boatyard operators, the arrangement is more coercive than contractual.

Regulations serve a variety of functions in this context. Requiring permits is a powerful tool for gaining attention to potential problems. Moreover, the conditions established with permits are important in setting forth expectations as to what specifically constitutes the civic duty to comply. Yet, simply requiring permits is not sufficient to motivate action. Technical and financial assistance is often necessary for facilitating and directing actions to alleviate potential harms. These findings therefore confirm what is well known about the importance of building commitment and capacity to take action.

Deterrent fears are reinforced through publicizing of showcase actions to provide a general deterrent effect, and through conducing inspections of facilities to provide a specific deterrent effect while also educating regulated entities about compliance steps.

The situation for marina operators in California and Washington presents a challenge in fostering actions to protect water quality when facilities such as boats within marinas are distributed sources of water pollution, the costs of facility-specific inspection are relatively high, and there is much uncertainty about the efficacy about different actions. The willingness to take action rests largely on the good will and civic intent of marina facility operators and their tenants. Threats of stronger regulation or regulatory actions loom in the background for which showcase actions are important in underscoring this backdrop. But, the central issue is how to enhance the commitment to protect water quality.

The challenge is to create a stronger sense of civic duty in forming what might be considered a societal contract for protecting water quality. Facility operators and boat owners, as with any source of nonpoint water pollution, need to recognize that individual actions matter in the stewardship of the environment. The findings of this study show that powerful drags on this civic commitment are distrust of government (i.e., conservative ideology) and concerns that actions will have minimal effects on water quality. Offsetting these somewhat is the belief among some facility operators that there is a serious problem with water quality. Actions to address water quality are stronger when facility operators view water quality harms as a shared problem that they have a civic duty to address.

Social influences are a key to enhancing civic commitment and shared obligations to protect water quality. The sense of civic duty of marina facility operators is enhanced by their concern for reputation. Facility operators are more willing to take action when they believe other facilities are doing their part. Both of these sets of findings reflect the dynamics of a collective sense of obligation to take action. Figuring out how to bring this about is of course a key challenge. While not directly addressed in this research, other findings (May 2003) suggest that shared commitment is enhanced by associational ties (i.e., among trade groups), the emergence of strong industry leaders, and credible evidence that action is appropriate. The evidence from the research reported here suggests that public recognition of facilities for their leadership, such as environmental stewardship awards, has a potentially useful role in this equation.

The findings of this study more generally point to the duality of deterrent fears and civic intentions as motivations to address potential environmental harms. Given the limitations of the voluntary approach, deterrence must serve at least as a backstop to it. Yet, fostering deterrence need not entail an elaborate enforcement regime since steps can be taken to instill a general deterrent effect. At the same time, individual facilities' sense of duty to address harms can be enhanced by fostering a greater collective sense of a need for action.

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Endnotes

[1] Not considered here are voluntary codes developed by industry associations that serve as complements to mandatory regulations by encouraging firms to go beyond required minimum compliance levels (see Potoski and Prakash 2002).

[2] The exceptions are those marinas that have repair or other facilities that are considered potential point sources of pollution and thus are subject to permit requirements.

[3] The weighting scheme established a stratification of boatyards and marinas in Washington, northern California, and southern California. The data were weighted so that representation of boatyards and marinas in each stratum reflected the appropriate population values for the stratum.

[4] Each item was originally measured on a scale of 1 (low) to 5 (high) for which an index was computed as the mean of the four items. Firms with strong deterrent fears are selected as those scoring 4.5 or greater on the combined index.

[5] Each item was originally measured on a scale of 1 (strong disagreement) to 5 (strong agreement) for which an index was computed as the mean of the two items. Firms with strong sense of duty to comply are selected as those scoring 4.5 or greater on the combined index.

[6] Because not all practices are relevant to a particular facility, the index of best management practices for each facility is based on the percentage of relevant best management practices for a given facility.

[7] The Cronbach alpha reliability measure for this index is .63.

[8] The Cronbach alpha reliability measure for this index is .67.

[9] The four factors are lack of information about appropriate measures, uncertain effectiveness of water quality measures, lack of standards or requirements, and difficulty in maintaining water quality measures. The Cronbach alpha reliability coefficient for this index is .80.

[10] In order to maximize the contrast between those facilities that are regulated and those that are not, the data exclude 7 percent of boatyards without permits and 8 percent of marinas with permits. This excludes boatyards that fall under the minimum thresholds for permits and marinas that have permits because they also undertake repairs. As a consequence of these deletions, all regulated facilities are boatyards and all non-regulated facilities are marinas.

[11] The findings reported in May (2003) differ in minor ways from those reported here in Tables 1 and 2. Those differences are explained by the fact that the present analyses exclude marinas with permits and boatyards without permits, whereas the earlier publication included each of these. As discussed in note 10, the exclusion of these facilities provides for a stronger contrast between regulated and unregulated facilities.

[12] No statistically significant differences are found for the measures reported in Table 3 between those unregulated marinas that received information and education and those that did not.

[13] Separate OLS regression modeling that use measures for each dependent variable based on five-point scales and the same explanatory variables as the logistic regressions were also undertaken. The findings from the OLS models were very similar with those reported here, but because of the restricted range of the dependent variables the logistic modeling is preferred. The only differences were for the deterrent fear modeling for which under the OLS models sanctions had a statistically significant positive effect and facility size had a statistically significant negative effect; neither was statistically significant in the logistic model. A Chow F-test for pooled data undertaken as part of the OLS modeling shows that it is appropriate to pool the data for the two types of facilities when modeling variation in each set of motivations.

[14] This is the percentage point difference between the predicted likelihoods of high deterrent fears for regulated and unregulated facilities. The predictions for these and other effect analyses reported in the discussion that follows are based on the logistic models of Table 4. For each of the effect analyses a comparison is made between predictions for changes in the variable of interest. These predictions are based on mean values for other explanatory variables except for assistance and sanctions. The values for those variables are set to correspond to a typical facility (i.e., values of one for general information, zero for other forms of assistance, and zero for sanctions.) Where appropriate in what follows, effects are separately reported for regulated boatyards and unregulated marinas.

[15] Separate analyses show a stronger negative effect of sanctions upon sense of duty to comply for unregulated marinas than for regulated boatyards. This difference is consistent with the backlash explanation since marinas would be more likely to view sanctions as unwarranted than would boatyards, given that marinas are not subject to mandatory regulations. An alternative explanation that could not be examined with these data is that facilities with lower sense of duty to comply are more likely to commit infractions and thus have sanctions imposed.

Methodological Appendix

Table A1. Marine facilities "Best Management Practices"

Boatyards	Marinas
Use of vegetation or other natural buffers to limit surface water runoff into marine waters.	Use of vegetation or other natural buffers to limit surface water runoff into marine waters.
Use of catch basins, diversion or filtration systems to control surface water runoff other than hull cleaning areas.	Installation of catch basins, diversion or filtration systems to control surface water runoff.
Designated hull cleaning area with concrete pad that diverts waste water away from marine waters.	Marina fuel dock/station spill containment and recovery equipment.
Catch basins/sediment trap for hull cleaning waste water.	Marina fuel back-pressure/automatic shutoff on fuel nozzles.
Recycling and filtration of hull cleaning waste water.	Posted prohibitions on discharge of used oil, antifreeze, and paint solvents into dumpsters.
Use of tarps under boats when sanding hulls or other surfaces.	Installation of receptacles for disposal or recycling of waste oil.
Use of dustless sanders for sanding operations.	Installation of receptacles for disposal and treatment of bilgewater.
Use of a sanding vacuum recovery system for recovery of sanding dust and particles.	Installation of sewage pump-out facilities at the marina.
Dedicated, enclosed paint spraying area.	Regular maintenance of pump-out facilities by marina staff or third parties.
Use of high pressure, low volume paint spraying equipment.	Notification of marina tenants of third-party pumpout and oil waste collection services.
Designated receptacles for disposal of oil, paint, solvents, or used boat cleaning materials.	Established fish-cleaning areas with receptacles for cleaning waste.
Third-party pickup and disposal of used oil, paint, solvents, or used boat cleaning materials.	Restrictions on boat maintenance/cleaning to above the waterline.
Posted prohibitions on discharge of oil, paint, solvents, or used boat cleaning materials into general waste dumpsters.	Designated areas for maintenance/cleaning of hull areas with grids for collection of waste materials.
Use of environmental friendly cleaning materials.	Distribution of educational materials to marina tenants about marine environmental practices.
Storm water management written plan.	Periodic marina-sponsored recycling or waste disposal events for disposal of oil, solvents, batteries or other waste.
A plan to put in place additional measures to address potential environmental harms.	Use of environmental friendly cleaning materials.
Regular monitoring and testing of water quality at boatyard.	Storm water management written plan.
Prohibition on do-it-yourself work at the boatyard.	An established plan to put in place additional measures to address potential water quality impacts.
Requirements for written acknowledgment of environmental regulations by third party vendors or for do-it-yourself work.	Regular testing of water quality at the marina.
Use of vegetation or other natural buffers to limit surface water runoff into marine waters.	Training or education for marina employees concerning water quality issues and control measures.
	Written prohibitions concerning waste disposal (sewage, oil, bilge) into waters as part of marina tenant agreements.
Source: Compiled from US EPA (1993, 1994) and Washington State Department of Ecology (1999a, b).	

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Session II: Compliance Issues

Discussant No. 1: Jon Silberman, U.S. EPA, OECA/NCEI

COMMENTS ON:

Corporate Self-Policing and the Environment: Factors Predicting Self-Disclosure of Clean Air Act Violations Under the EPA's Audit Policy

Paul Stretesky
Colorado State University

April 26, 2004

Introduction:

- **Introduce self:**
  – 20 years experience with EPA, 17 of them in enforcement, including experience amending and implementing EPA's Audit Policy.

- **Thank you's**:
  Audit Policy article: – Bert Frey, Deputy Regional Counsel, R3 – 312-886-1308
  – Phil Milton, Audit Policy Coordinator, ORE-SLAP, 564-5029
  Marine Facilities article: – Cheryl Hawkins, OPEI - Office of Business & Comm. Innov.
  – Larry Wells, R1-Off. Env. Steward. - Assistance & P2

- **Opening statement**: "What data does – and all it does – is tell you where you've been. It's experience, insight, & intuition that tells you what's going to happen next."

- **My perspective in reviewing and commenting** on the two papers is:

  – this is all about enhancing environmental performance by improving how and when the government intervenes to address pollution;

  – all comments are intended constructively/"for your consideration" as you revise papers.

- **Key ???**: Is the study protocol fair and appropriate?

  - does the researcher ask the "right questions?"
  - does the data appear accurate/reliable/complete?
  - do we agree with the factual conclusions drawn from the data?
  - do we agree with the policy recommendations derived from the factual conclusions?
  - how can the study (which is a draft, interim product) be improved?

- **Emphasis on practical application of the results**:

  – How might EPA use the study results to actually improve our policies or programs?

  – Do the data/conclusions augment, reinforce, contradict, or alter existing assumptions/ approaches?

  – Should EPA do: more of the same?; less of the same; different things? or simply get (or stay) out of the way?

WE'VE ALL HEARD THE COMMON APHORISM:

"You can **lead** a **horse** to **water** but can't make him **drink**."

- Unfortunately, for some of us – including those of us who work with the Audit Policy – our job description is to figure out how to get those horses to drink!

- Assume, for the moment, leader = EPA; horses = regulated community; water = AP;, drinking = using it, & my objective is encourage drinking. What are my options?

  -1- **make sure it's really "water" and it's potable.** Maybe the horse isn't drinking because "he's asking for water and you're giving him gasoline" (like a B.B. King song").

  4 AP examples of "sweetening the water:

  3 May 2000 AP amendments to: (1) increase disclosure period from 10 days to 21 days; (2) clarify "repeat violations" condition for company-wide disclosures; (3) address mergers and acquisitions;

  (4) end of FY '99: ORE issues guidance: "Reduced Penalties for Disclosures of Certain CAA Violations" (addresses Title V-related disclosures to allow more of them to qualify)."

  Also in May 2000: EPA amended Small Business Compliance Policy to make more attractive.

  -2- **revisit your "leadership"**:

  - leadership ≠ simply pouring water into a bucket and leaving it there, hoping horses will somehow "stumble onto it";

- ensure the water is visible and immediately apparent as such to horses (now we're talking "outreach and communication" ... especially important for small businesses).

-3- **make sure you've got the right "horse"**

– Essentially a targeting issue; can also be a resource/capacity-building or timing issue;

– Maybe you should drop the horse you're struggling with now, deal with him some other time or way/try to find others that are likely to be more cooperative.

-4- **make sure your horses are "thirsty"**

– Also be a targeting issue ... but equally often, it's a "conditions" issue;

– **consideration 1**: **timing**. "sequencing" issues for "integrated strategies": wait until the timing is better from the horse's perspective;

– **consideration 2**: **thirstiness**: find a way to intervene somehow to make the horse "thirstier!"

– This is where considerations of the issue of type and scope of government interventions to change existing conditions in order to impact behavior and performance – the focus of this conference – comes to the forefront.

Overview of **EPA AP "lessons learned"**:

- **Summary of everything EPA has learned** over the past 8 years about AP use in one sentence:
  - "The AP works best, and is used much more often, when we employ it in the context of an integrated compliance strategy that includes targeting a sector with known compliance issues and then employing interventions to give firms – usually within the same sector – the choice of "voluntary auditing and disclosure" -or- "inspections and enforcement."
- **Corollary**: the AP does not/hasn't produced significant results when we've simply "thrown it out there" and waited for firms to knock at our doors.

– This has pretty much held true no matter what the firm-specific or overall Regional inspection and enforcement numbers have been.

- **Other long-held Agency views of AP use** based on our 8 years of experience:

  – **Large firms with resources** -and- auditing & EMS capacity and experience are more likely to use the AP specifically for those reasons.

  – **Small businesses** are unlikely (= "virtually never happens") to use the Small Business Compliance Policy absent EPA or State interventions to ***both*** -1- build **capacity**, and -2- build **trust**, e.g., by coupling non-inspection site visits with technical assistance ("non-enforcement options).

- **Key *resource-related* lesson learned:**

  "The best scenarios for increased AP use require the fewest possible numbers of inspections and enforcement actions for the involved sectors, companies, or firms."

  "Ideally, our strategies should produce significant self-disclosures with **just one or even *no* associated inspections or enforcement** because site visits and lawsuits are resource-intensive to all concerned parties.

  "That's why so many of our Compliance Incentive Programs (CIPs) rely solely on invitation letters with just a small number of (or 1) high-profile enf. actions. This = "**leveraging**" our resources and impacts."

Illustrative examples of **integrated strategies** including AP use:

- "Carrots appear tastier when backed with a stick" – **EPA Region 1's ongoing compliance work with its colleges and universities**:

  - 1999: R1 identified negative compliance trends at these schools;

  - Regional compliance assistance staff's initial step was to schedule a compliance assistance workshop for colleges and universities.

- When R1 first advertised the workshop, out of 350+ colleges and universities in New England, fewer than 40 individuals responded, many from the same college.

- The Region then issued an administrative penalty action against the University of New Hampshire, at the same time contacting the president of each school by letter to highlight the action and encourage attendance at the seminar.
- Response to the post-enforcement action letter was overwhelming; over 330 requests were received to attend the compliance assistance workshop, which attracted a capacity audience; a second workshop had to be scheduled.

- As part of that process, the AP was explained and info. provided on how to work with EPA to develop auditing agreements ➜ self-auditing and disclosures.

- Today, nearly half of New England's colleges and universities have taken part in the New England Colleges and Universities Audit Initiative.

- "Walk before you run" AKA "build capacity" – **R2, Patterson, NJ Refrigeration Repair/Geographic Initiative**:

  - Best way to promote small business use of the AP is to combine it with on-site, compliance assistance visits ("mock inspections" that aren't inspections) together with a credible fear of enforcement for nonparticipants.

  - Standard practice of sending "notice letter of upcoming inspections if you don't self-disclose" didn't work with these small businesses – Region got 1 taker who turned out to be in compliance.

  - In response, Region developed on-site compliance assistance visit program ➜ auditing and disclosures.

  - **#1 lesson**: These small businesses wouldn't/couldn't self-audit (low knowledge and resource levels) even after receiving the Region's compliance incentive letters. But site visits/technical assistance obtained their involvement.

- "Clean up now ... before we catch you" – **National Iron & Steel Minimill Compliance Incentive Program**

- In August 2000, EPA sent letters to 41 minimills inviting them to participate in a voluntary multimedia audit program where violations disclosed within six months could be self-disclosed under the Audit Policy.

- After the letters were sent, EPA met with the Steel Manufacturers Association and member companies to discuss the initiative and answer questions.
- Of the 41 minimills receiving letters, 28 minimills responded; EPA also received letters from 10 minimills that did not even receive invitation letters but wanted to participate.

- 24 companies ended up disclosing violations at 38 minimills. Responses included cleaning up spilled hazardous electric arc furnace dust, repaired cracked secondary containment around storage tanks, etc.

• "Your colleague's in violation so you probably are, too!" – **Telecommunications Industry Compliance Incentive Program**

- In January 1998, GTE voluntarily disclosed CWA and EPCRA violations to EPA. EPA and the co. developed a company-wide settlement, including auditing, resolving violations at 314 facilities.

- Afterwards, EPA sent letters to the rest of the telecom industry explaining our knowledge of their likely compliance issues and offering the opportunity to self-audit and disclose.

- As a result, including the GTE settlement, more than 3,500 telecommunications facilities came into compliance with four environmental laws (CAA, CWA, RCRA, and EPCRA) through 25 civil settlements, 24 of them attributable to the use of EPA's Audit Policy.

<u>Research/nomenclature tips to researcher to improve paper</u>:

• **Understand what EPA and the States are actually doing** with the AP today, and why:

- Empirical studies that confirm preexisting assumptions, experiences, and programs are OK ... but the ones that raise the discussion to "the next level" of potential policy and strategic improvements are better.

- **Know what has worked ... and what hasn't**:

  E.g., 1 big, well-publicized case can have an order-of-magnitude larger deterrence impact than 20 "pin-prick" cases when it comes to Audit Policy use (we develop our integrated strategies and initiatives with that in mind).

- CAA violations, especially on the part of the larger companies, often involve huge delayed or avoided EBN and/or result from differences in regulatory interpretation, not ignorance (i.e., AP unlikely to be a "solution").

- Paper is devoid of recognition of historical AP "lessons learned" and uses – that's why I used most of my presentation today talking about what EPA already knows and how we're acting on it/integrated strategies.

• Be careful to **employ terms of art accurately** ... 2 examples:

- # of enf. actions alone, or inspections alone, is a component of deterrence but is not = "deterrence."

  – Also, can't tell from the data sets whether enf. actions under *other* statutes are also influential – they might be key factors in prompting AP use;

  – Whenever possible, be holistic/synergistic/integrated & systems-oriented, rather than reductionist – "look at the big picture."

- "**Whether the co. received information concerning a compliance incentive**, e.g., a letter providing AP-related incentives, including info. that EPA may target insp's." ≠ "compliance assistance" ... that's ***specific deterrence***!

- Make sure you get your dependent variables correct, e.g.:

  – Pg. 15: "The findings of this research add to the corporate behavior literature and are surprisingly consistent with other studies that find that specific deterrence does not appear to be related to levels of corporate **compliance** ." ... NO!!! The dependent variable here is NOT "compliance" – it's Audit Policy use.

– Also:

* Can produce compliance with or without AP use.
* Or can promote increased self-auditing and correction of violations without self-disclosure ... also leading to increased compliance.

- **Summary/in general**: say what the data actually shows (e.g., CIP program letters work well in spurring AP use) in lieu of applying broad labels ("deterrence"; "compliance") that aren't strictly accurate.

- **Tell us why you chose just the CAA, & FY '99-'00** (e.g., manageable data set)?

  – How might this affect the **transferability** of your results across sectors, programs, and years?

  – Would a **breakdown of the violations by *type*** (e.g., emissions limit violations versus failure to install required capital equipment versus reporting/ recordkeeping) be helpful in this regard?

- **Re-check your numbers**:

  - ORE data pull for this paper ID'd nearly 100 CAA self-disclosures for same time researcher found 59 (taking CAA Section 211 mis-fueling violations/HQ handled these) into account;

  - Did you ask that your data run also include the Small Business Compliance Policy?

  - What about impact of acquisitions & mergers (not discussed at all in paper)?

  - Preexisting strong positive relationship between facility size, inspection frequency, & likelihood of enf. ... how does this impact your statistical analysis?

- **Consider the possibility of behavioral and/or "AP-content-related" explanations for results contradicting your hypotheses**:

- **Behavioral example:** what researcher calls "specific deterrence" – finding that ##s of co.-specific enforcement actions or inspections are not significantly associated with increased audit policy use ... **considerations I'd look at include**:

  – causality issue of whether what really happening is specific deterrence not working to promote AP use, or that actors who attract inspections and enforcement are simply least open to using compliance incentives?

  – e.g., are the same characteristics that lead bad actors to be more likely to be sued the ones leading them to be unlikely to use incentive programs proactively?

  ☞ Such companies might be, up-front, more recalcitrant and less civic duty-oriented and thus less likely to voluntarily audit, correct, and disclose violations.

- **"Audit Policy content" is important too, as the Policy has been specifically configured to promote disclosures by persons who have not yet been inspected or enforced against.** Examples:

  – persons with "repeat violations" get bumped by AP Cond. 7;

  – Persons inspected or notified of insp's get "bumped" by AP Cond. 4 (independent disclosure);

  – persons sued may get settlements which include self-auditing as injunctive relief; making it harder to qualify under AP in future;

  ☞ Perhaps, when you take these factors into account, the better hypothesis is to expect the odds of self-disclosure to be *lower* for someone who has, in the past, been regularly inspected and enforced against!

- And finally ... general suggestion:

  - Tease behavioral observations and policy recommendations from the research (don't "just present the data ...").

<u>Concluding comments</u>:

- You can “lead a horse to water” when you take the time to understand the horse, ensure it’s thirsty, and offer it attractive water.”

- Tell us, in your final report, based on the data & analysis, what are your recommendations or considerations for how best to achieve these goals?

Session II: Compliance Issues
Discussant No. 1: Jon Silberman, U.S. EPA, OECA/NCEI
COMMENTS ON:

Regulation and Compliance Motivations: Marine Facilities and Water Quality

Peter May
University of Washington

April 26, 2004

Introduction:

- Before I say anything else about this paper, I must ask Prof. May about a specific finding in his paper:
  - In the section on "ATTITUDES TOWARDS GOVERNMENT," you write:

    "Those facility operators with more conservative attitudes about government are more likely to have high deterrent fears and less likely to have a strong sense of duty to comply. These are important findings because they suggest that the willingness (and reluctance) to address harms is related to more basic predispositions."

  - My question is: could you please be specific, in your final report, as to what new policies and programs you recommend the Bush Administration sponsor to address this finding? :)

- Prof. May has put his finger squarely on **two key issues facing us all today**:
  - (1) "How to enhance the commitment to protect water quality by creating a stronger sense of civic duty – [what Prof. May calls] a 'societal contract for protecting water quality.' "
  - (2) Not whether voluntary programs are more effective than traditional regulation [per se], but [rather] how can voluntary programs be improved?" [and better complement regulatory programs?]

This **study is extremely timely** for the C&E program – I'd like to briefly mention 2 reasons:

- (1) Current strong EPA focus on environmental performance through **voluntary programs**:

– Voluntary programs are designed to motivate people and organizations to take actions not required by regulation by going beyond compliance or achieving regulatory objectives in more effective and efficient ways.

– In general, voluntary programs use partnerships, market forces, and incentives, rather than mandatory regulations, to achieve environmental results.

– EPA is currently home to more than seventy voluntary programs dealing with a diverse set of issues, from climate change and waste reduction to innovative technologies.

– The Deputy Administrator has asked EPA's Innovation Action Council to determine how to enhance the effectiveness of our voluntary programs to make them more customer-focused and results-oriented ... this research can help.

- (2) OC and others are interested in making better use of so-called **"social marketing"** to enhance peoples' sense of civic duty:

  – Social marketing is based on the premise that, "Things don't just happen – people have to want to make them happen."

  – In his slides for last week's presentation to the National Environmental Assistance Summit on "performance-based compliance assistance," Office of Compliance Director Mike Stahl described it as a " blend of two ideas: performance-based management and social marketing."

  – "Social marketing" means employing commercial marketing techniques in outreach and assistance, not just to inform, but to actually change behavior.

  (1) define problem in behavioral terms;
  (2) engage stakeholders in market research;
  (3) identify perceived obstacles, benefits of behavior;
  (4) segment & target audience based on their specific characteristics;
  (5) tailor messages to audience segments;
  (6) feedback loop – monitor & adjust the message.

  - Tools include: -1- education to increase awareness;
    -2- social marketing to increase openness to change & incentives;
    -3- enf. & deterrence to address resistant to change & compliance.

  - Challenges to performance-based marketing include:
    – compliance assistance initiative require more upfront planning & analysis;
    – tailored assistance makes generalizing from results ("transferability") more difficult.

- But the results of studies like this one, and Prof. Kagan's "Tracking Deterrent Messages in Environmental Enforcement" study, can really help.

General reaction to May report by myself and my Regional and HQ contacts:

- Overall, it's a through examination with logical findings:

  – Our experience agrees with Prof. May's findings in many respects (I'll cite just a few examples):

  ☞ traditional regulation is critical to continued progress in protecting and improving water quality (and potentially more effective than the voluntary approach alone):

  – **Myth**: EPA has already harvested the "low hanging" environmental protection fruit.

  – Fact: Approx. 25% of NPDES permittees still experience *significant noncompliance* with their permit limits each year.

  ☞ ... but, voluntary approaches can be quite effective, too;

  ☞ Both deterrent fears and sense of duty to comply are important motivators;

  ☞ Actions to address water quality are stronger when facility operators view water quality harms as a shared problem that they have a civic duty to address;

  ☞ Civic duty can have a stronger impact on regulated than unregulated facilities, perhaps because regs and permits signal what is desired by society.

  ☞ Mandatory-approach inspections may not have the off-putting effect on the sense of duty to comply as some hypothesize.

  ☞ But imposing sanctions can be off-putting when the recipients view them as overly harsh.

  ☞ Regulators should consider, when crafting regulatory goals and strategies, how performance is affected by variable such as inspections, reputation, and attitudes toward government.

  ☞ Building commitment and capacity to take action is important to increase compliance and performance, particularly by small businesses.

Summary of EPA reactions to draft report:

- Everyone with whom I discussed this report's conclusion agreed essentially with its findings.

- The report adds to our knowledge of the impacts of regulatory and voluntary programs, though more along the lines of buttressing what we already know (as opposed to providing startling new insights).

- It would be helpful to us, Prof. May, if you could beef up discussion of potential policy changes, or new assistance, enforcement, and/or integrated strategies you believe your findings suggest for improving marine facilities' awareness, compliance, and stewardship.

- Do this through added holistic analysis of your factual findings, your general understanding of the relevant compliance & motivational literature, and most importantly, your personal in-depth interactions with the marine facilities sector, "on the ground," in the course of preparing this report.

- You may also want to look at what other Regions and States are doing in the area of improving the marine facilities' environmental performance, e.g., Regions 1, 2, 3, and 4, Connecticut, Florida, and Maine.

- **We especially would benefit from analysis and development of these types of finding:**

- (Pg. 17) Social influences to enhance civic commitment/shared obligations to protect water quality include:

- "Social influences are a key to enhancing civic commitment and shared obligations to protect water quality and can be enhanced by, e.g.:

  – strengthening associational ties (i.e., among trade groups);
  – facilitating the emergence of strong industry leaders;
  – providing stakeholders with credible evidence that action is appropriate."
  – increasing facilities' concerns for their reputations;
  – inspiring the dynamics of a collective sense of action;
  – leveraging associational ties, e.g., among trade groups;
  – supporting the emergence of strong industry leaders;
  – sharing credible evidence/information that action is appropriate;
  – providing public recognition of leadership facilities, e.g., env. stewardship awards.

  - Don't stop with general recommendations. Use your knowledge of this sector and the compliance/behavioral literature generally to take us to the next level of understanding as to how, specifically, EPA, States, and other stakeholders can leverage these types of social influences to improve compliance and performance in this and other sectors.

  - There are many folks here at the Agency who will consider carefully and use what you produce.

– SELECTED COMMENTS ON RESEARCH PROTOCOL AND TRANSFERABILITY OF RESULTS–

Dearth of environmental indicator and/or actual performance information may affect reliability of results:

- Example 1: commitment of marine facilities to address water quality problems is measured in 3 ways:
  (1) % of BMPs undertaken;
  (2) self-ID of level of priority to facility of env. protective actions;
  (3) self-rating of their efforts from "less attention than most" to "we are a leader."

- Example 2: Two measures serve as proxies for the extent of water quality problems:
  (4) respondent perceptions, on a ten-point scale, of water quality at their location five years ago;
  (5) amount of waterfront that is adjacent to the facility.

- Typical reactions to these measures from EPA personnel:

  (1) "All BMPs are not created equal" – e.g., distributing env. literature versus developing and implementation a formal Stormwater Management Plan;

  (2) No actual water quality measures are developed/considered at all! Perceptions can be wrong/some QA/QC of the opinion/perception-based survey responses (= "blunt tools") would be helpful.

Potential Limits on the Transferability of Results:

- **Inherent problem exist in analyzing voluntary programs, generally:**

  - Because voluntary programs are by nature so diverse, it can be difficult to generalize/transfer results from one type of program and sector to another.

  - It would be helpful to add some discussion of this issue – with observations and recommendations – to the paper.

- **Geographic factors**: There may also be significant issues associated with generalizing from Washington State marine facilities to those in other areas, e.g., New England.

  - **Example:** ***Distinction between "regulated" and "unregulated" may be less black & white than the paper suggests***:

    – R1: Boatyards differ from marinas in that their ***primary*** function is boat maintenance, repair, and storage. Marinas, however, also conduct a significant amount of repair, maintenance and equipment cleaning.

– Consequently, marinas are, in fact, subject to many regulations (i.e., they're not "unregulated").

– E.g., Region 1 has determined, through site assessment visits, that approximately 70% of the marinas visited were required by law to have storm water permits.

– Many of the activities described under the BMP table (pg. 20) appear interchangeable between marinas and boatyards.

The paper may present a more "black and white" approach to regulatory versus voluntary programs than is justified:

- Comment of an EPA reviewer with significant voluntary programs experience: "While the paper asserts that mandatory and voluntary approaches are not strictly either/or propositions, they are then pitted against each other through hypotheses such as, 'the mandatory approach is more effective than the voluntary approach in gaining commitment to address potential harms by those entities that potentially contribute to these harms.' "

  - "EPA views voluntary programs less as a *replacement* for regulations, more as an *adjunct* means to fill regulatory voids where there are no rules or where we can ask people to voluntarily go above and beyond the regulatory requirements to be good corporate citizens in the communities in which they reside."

Expanded discussion of "role of stakeholders":

- Region 1 comment: "Our experiences have shown that local governments and local organizations (including some local organizations with authority in certain areas), NGOs, and customers play a role in affecting compliance. These stakeholder impacts do not appear to be addressed in the report. In addition, the report does not distinguish among federal, state, and local authorities regarding regulations."

- **Recommendation: expand discussion of research on how to enhance civic commitment and shared obligations to protect water quality.**

  - Comment of an EPA reviewer with significant voluntary programs experience: "Researcher makes brief mention, only, of the value of strengthening organizational ties (i.e. among trade groups), fostering the emergence of strong industry leaders, and providing credible evidence that action is appropriate. More extensive discussion of these topics would have been useful for us as policy-makers and regulators."

Role of technical and financial assistance:

- Region 1 comment: "The conclusion that technical and financial assistance is often very important to facilitate and direct actions is a significant one to keep in mind, especially for the NPDES individual permit requirement for pressure wash discharging."

- Question for researcher: Are there other specific areas you want to recommend as a focus for government efforts to target technical and financial assistance to this sector?

CONCLUDING THOUGHTS:

- **EPA STRONG LY AGREES:** Pg. 17: "Given the limitations of the voluntary approach, deterrence must serve at least as a backstop to it. Yet, fostering deterrence need not entail an elaborate enforcement regime since steps can be taken to instil a general deterrent effect."

- This is good news for resource-strapped regulators who are open to thinking creatively and innovatively.

- "Everyone talks about wanting to be able to tell the federal government where to go and what to do. Here's your chance to do so and you're being paid to do it. So be specific in your recommendations!

Session II: Compliance Issues
Discussant No. 2: John Horowitz, University of Maryland
COMMENTS ON:

Corporate Self-Policing and the Environment: Factors Predicting Self-Disclosure of Clean Air Act Violations under the EPA's Audit Policy

Paul Stretesky
Colorado State University

and

Regulation and Compliance Motivations: Marine Facilities and Water Quality

Peter May
University of Maryland

April 26, 2004

By John K. Horowitz, University of Maryland, College Park, horowitz@arec.umd.edu

Stretesky's paper examines the characteristics of firms that disclosed a Clean Air Act (CAA) violation during a period in which EPA had a policy that appeared to reward self-disclosure of violations. To conduct this research, he must examine both self-disclosed violations and violations that were uncovered by EPA but not disclosed. My comments are most technical (although they go to the heart of the inferences that can be made from these data.). In contrast, Jon Silberman raised issues about the nature of CAA violations and of EPA's policy.

To study the effect of the EPA's policy, Stretesky uses a statistical technique labeled case control design. This approach entails taking a random sample of non-disclosers (that is, violations that were uncovered by the EPA) and comparing this to the full sample of disclosers. The population ratio of non-disclosers is about 95 percent; only 5 percent of violations were self-disclosed. Under the case control design method, where only a sample of non-disclosers is analyzed, the data set's ratio of non-disclosers is 50 percent. It is easy to see why he might like to do this. When the true probability of a dichotomous (yes-or-no) variable is 50-50, the power of his statistical tests is maximized. When the true probability is much more skewed, as it is with these data, the statistical power is much lower. Of course, these claims apply to data that is naturally distributed 50-50, not to data that is simply selected to be distributed so.

I have serious reservations about this method. At a minimum, Stretesky should explain this statistical technique further. I think it likely that the method is flawed, probably because the standard errors of the estimates are biased downward. My intuition is simple: Under this technique, the author has thrown out information. This will raise

the standard errors. Since he does not correct for this problem in calculating his standard errors, the standard errors reported in the paper are surely too small.

There is also, of course, a severe sample selection problem: Even if all of the non-disclosed violations are analyzed, they will represent only those non-disclosed violations that were detected. If the characteristics that lead to a violation being detected are correlated with the characteristics that determine whether a violator will disclose or not, then his coefficient estimates are again biased. This correlation surely exists. There is probably little the author can do about it, although he knows the data and circumstances better than I and may have some ideas. Even if he cannot solve the sample selection problem, he needs to discuss it and its ramifications.

My comments about May's paper revolve around the nature of the question he is addressing. This paper looks at difference in the environmental behavior and attitudes of marinas and boatyards. For short-hand, he labels marina behavior "voluntary," because most of them are not required to have NPDES permits, and boatyard behavior "mandatory." May recognizes that these labels are mere short-hand for describing a complex situation. I would argue that they have greatly obscured the issue he is addressing, and may have led to errors in the analysis.

First, since the main difference underlying his analysis is whether a facility has an NPDES permit, it seems odd for the author to have thrown out data points in which the boatyards did not have NPDES permits or the marinas did have such permits.

May recognizes that marinas are not completely unregulated, and argues that the true characterization is a continuum in which marinas are "less regulated" and boatyards are "more regulated." But is even this characterization valid? Several pieces of evidence suggest that at least some marinas face substantial regulation; see Table 3 on p. 12 or p. 16. This evidence suggests that a continuum may not be the right metaphor. Marinas may simply face *different* regulations. The interpretation of the results is thereby called into question.

I suspect May is correct in claiming that marinas bear a less onerous regulatory burden than boatyards. I suggest that he document this more fully, rather than relying on the NPDES distinction.

Finally, I want to note the problems of treating the sentiment of "duty to comply" as a socially desirable aspect of regulation. This seems to send us into a house of mirrors in which people comply more when they don't have to and comply less when they have to. Perceived "fairness" – of the law, of the enforcement of the law, and of the penalties – may be a better measure of what May is trying to understand.

Summary of the Q&A Discussion Following Session II

Joanne Berman (U.S. EPA, Office of Enforcement and Compliance Assurance)
Ms. Berman commended both the presenters for including compliance assistance in the presentations, but said she "was a little befuddled" by how they were using the term. She cited the "official" description of "compliance assistance is to help the regulated community understand and comply with the laws." Saying that she appreciated their going on the University of Pennsylvania website, she apologized for the dearth of material saying, "that's in part because for *federal* folks compliance assistance is something new and we're trapped in the measurement of it—we're in the process of trying to find ways to track and then measure it. This may not help for your 1990-2000 data, but from my perspective compliance assistance is *not* the audit policy itself but what we did ancillary to the providing the audit policy. For example, if you were using the audit policy and re-developed audit protocols, then what we do a lot of times in these initiatives you spoke of is—the development of the protocol and the distribution of it is where we would find out whether compliance assistance had a value in using the audit policy, and I wasn't sure you knew that—I see you shaking your head that you did, but it wasn't clear to me from your presentation."

In addressing Peter May's presentation, Ms. Berman noted that sometimes "folks kind of clump compliance assistance with voluntary programs," and she said in her work "that's *not* the case because the definition says that there has to be a connection *between* compliance assistance and the work that we do." She went on to add that "in the initiatives you spoke about . . . when we do compliance assistance, we've learned that it needs to be an integrated approach, and I could give you a laundry list of how we do it with inspections, how we do it with enforcement, how we do it with the audit policy." She concluded by encouraging the researchers to "think of compliance assistance in conjunction with *all* these other tools." She also said that as we move toward the concept of social marketing, EPA would really benefit from any data concerning whether compliance assistance actually has an impact on changing behavior.

(Note: Neither of the presenters responded to Ms. Berman's comments.)

Pete Andrews (UNC-Chapel Hill, Department of Public Policy)
Addressing Peter May, Dr. Andrews questioned how valid it is to generalize based on data from "two segments of the marine industry," which he sees as "a somewhat unique industry." Assuming that the focus was on smaller boat yards as opposed to big shipyards, Dr. Andrews characterized the clientele as "recreational boaters—fairly affluent Americans who care about the environment as well." He added that, "as a monopoly, [smaller boat yards] can just keep raising their price because nobody can take the business away from them—at least I don't see a lot of opportunities for that on the East Coast." He wondered how the research would play out in looking at dairy farmers, or school systems, or "other kinds of *players* who are sort of below the radar in important segments in terms of environmental performance."

Peter May (University of Washington, Center for American Politics and Public Policy)
Dr. May responded by first asserting that he believes the marine facilities they surveyed have a more "heterogeneous clientele" than Dr. Andrews indicated. Addressing "the broader question of where does this fit in?" Dr. May continued by asserting that the way this type of research is conducted today "it's hard to really come up with clear patterns across all these different settings," and he said he thinks "the way we're thinking about these things is wrong. We're tending to think about it too much on a sector basis, or too much on a size basis. There has to be some other way of thinking about these kinds of things. . . We're thinking about it as too much of the attributes of the industry and not enough about the attributes of the regulatory context broadly defined. We *need* to think about that regulatory context, and this is why I like the work that Bob and Neil [Kagan and Gunningham] . . .and others are doing . . . is that it brings in that context more, in terms of how reputation plays in, and a variety of these more elusive kinds of things."

He continued, saying, "To me, the generalizability isn't a question of [categorizing industries and finding similarities]—I'd rather think about regulatory *regimes* and a particular *kind*, and this particular kind of regulatory regime is voluntary by the firms that aren't paid a lot of attention, but where reputational influences are important."

Conceding that he was still searching for "the answer," Dr. May re-asserted that "it's not a question of the industry—it's a question of some of these other kinds of economic and social influences. That's why I said whatever this typology is that's not there anymore has to come into play." He closed by characterizing his response as "a non-response," or "a long essay that says I don't know."

Jon Silberman (U.S. EPA, Office of Enforcement and Compliance Assurance)—a follow-up response
"One of the reasons why I encourage Professor May to milk as much as he can out of the work that he actually did with the marine facility sector is so that even if there are transferability limitations on the work, we'll still get a very valuable product out of his research."

Matthew Clark (U.S. EPA, Office of Research and Development)
"Jon, I just wanted you to define what "social marketing" means."

Jon Silberman
"I just happen to have a definition. It means: employing commercial marketing techniques and outreach and assistance not just to inform but to actually *change* behavior. If it were used in an integrated context, you would combine it with education to increase awareness. You would use social marketing to increase openness and change and use of incentives, and [you would use] enforcement and deterrence to address resistance to change or non-compliance issues."

Robert Kagan (University of California at Berkeley)
Dr. Kagan stated that he was "troubled by the notion that a violation is not a violation," or, to be more precise, the notion that "some are *serious* and some are *less* serious," and he said he believed this was Jon's point as well. He wondered whether the data set would allow the researchers to break the violations down by, for example, "those that carry big fines versus those that carry small fines" or some other way of distinguishing "that's more technical" as opposed to just "those that result in some significant harm."

Jon Silberman
Mr. Silberman responded that "for better or worse, every EPA program has a definition of a term called "significant non-compliance," which actually makes value judgments in distinguishing between compliance considered to be more significant and compliance considered to be less significant," and he acknowledged that there are always differing views about where that line should be drawn. He went on to clarify that the classification is used in many different ways, including "choosing between facilities to target, choosing the enforcement response—the response to the non-compliance, etc."

Irene Xiarchos (West Virginia University, Division of Resource Management)
Ms. Xiarchos began by commenting, "I'm very grateful that this is happening—at least for me it's a big deal." She went on to ask whether social marketing is targeted more to non-point source pollution or whether it is also directed toward point source pollution, where there are already some regulatory controls set up.

Jon Silberman
Mr. Silberman deferred to Joanne Berman for an answer because she is "working more directly with it."

Joanne Berman
Ms. Berman answered by saying, "Social marketing really is taking commercial marketing concepts and applying them to a social environment . . . It's a process you go through in order to understand your audience and then find the best approach to change that behavior." She reiterated that the process is "designed for *any* audience, to understand the early adopters and then go all the way to the laggards. So, what we would do with social marketing is do some research on your audience, understand *why* there are early adopters and *why* they're early adopting—focus your attention and resources on *those*." She continued to explain that after identifying your partners and your audience, you would work on "spreading the word, so eventually compliance and beyond compliance—whatever behavior you would like to [foster]—gradually increases and moves forward." Ms. Berman also clarified that enforcement becomes part of the process of dealing with laggards, "because you'll never get some folks to change their behavior." She concluded by summarizing, "So, generally, the process is to get them to change their behavior, and then when the hammer comes in, it would be your last resort," but social marketing "could be used in any context."