

Final Report

Assessing Compliance Burden from Implementation Of Title V Permitting Rules and Regulations: Impact on the Adoption of Innovative Pollution Prevention Technologies

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I. Project Overview

Title V of the Clean Air Act Amendments of 1990 greatly extended permitting requirements among businesses emitting substantial amounts of any of nearly 200 pollutants. The law's potential for strengthening environmental protection via enhanced monitoring and increased accountability is significant, as is the potential for administrative burden from additional informational requirements. Title V may also motivate firms to adopt innovative environmental technologies, by allowing them to trade emission restrictions for a simpler permitting process than that required by Title V. This project, funded under the Environmental Technology Initiative of the U.S. Environmental Protection Agency, assesses industry's Title V compliance costs, as well as the benefits of Title V as perceived by industry and states. These assessments are the first step in evaluating the degree of administrative burden generated by the law. The research also intends to identify the effects of Title V on the adoption of innovative technologies.

A. Background

1. Pathway to a National Permitting Program

Prior to the 1990 Clean Air Act Amendments, industry compliance with air quality regulations was characterized by confusion and ambiguity over standards, negotiated compliance agreements between industry and regulators that sometimes informally rewrote state plans, and lack of political will by the states for pursuing aggressive enforcement. Companies and even state regulators were sometimes confused about or ignorant of the air quality regulations to which sources were subject.¹ This confusion often stemmed, in large part, from

¹ According to a lawyer with EPA's Office of General Counsel, "You might think it reasonable to assume that sources know their compliance requirements, but they just don't. Many sources have never had a reason to take a comprehensive look at their emissions. Those that did take that look were frustrated by having to go through dozens of notebooks (the SIP)." (Personal interview, anonymous official, April 1996).

the complexity and inaccessibility of state implementation plans (SIP). The SIP -- the state's blueprint for how it will achieve federal air quality standards --- detailed hundreds of regulations, some facility specific, to which industrial sources were subject. Determining applicable requirements was a challenge because states rarely distributed their SIPs and, even if they could, applicable requirements were nonobvious and buried in hundreds of pages of regulatory detail.

Particularly before 1977, difficulties in determining a company's applicable requirements from the SIP contributed to the proliferation of compliance agreements negotiated by sources, the state, and EPA. These agreements sometimes informally rewrote state plans (Landy, et al, 1994, p. 205). While the 1977 Clean Air Act Amendments addressed this problem by specifying technology standards for new and existing sources in nonattainment areas, informally negotiated compliance agreements did not disappear completely.²

Flaws in enforcement of stationary source regulations, together with the continued failure of SIPs to attain federal air quality standards, led the Bush Administration to include a national permit program in its proposal package of sweeping reforms that later became the basis for the 1990 Clean Air Act Amendments. The proposed permit provision ultimately became Title V of the Clean Air Act Amendments of 1990.

2. Title V Overview

Title V begins by directing EPA to establish regulations within one year of the Act's passage that outline the minimum elements to be contained in state operating permit programs, including permit application requirements, monitoring and reporting requirements, and a permitting fee structure (§7661(a)b). States, in turn, must propose their permit programs based on those regulations in a written plan to EPA within three years of the Act's passage (§ 7661(a)d). The legislation empowers states to collect fees for permits, the moneys from which go directly to administering the new permit programs §7661(a)b). The law also specifies that

² An air permit expert with a leading U.S. environmental engineering firm noted that, "Currently, some states have a good-old boy relationship with the regulated community, which has led to a lax enforcement of the regulations." (Personal interview with anonymous informant, March 1996).

states submitting inadequate plans or failing to administer approved plans may face loss of federal highway funding or restrictions on industrial growth (§7509(b)).

While much of the Title V language directs EPA and the states, the provision also specifies requirements that directly impact permitted sources. Major sources of air pollution, defined in the Act as companies emitting certain amounts and types of pollution (§7412), must submit a compliance plan and application for an operating permit to the state. The deadline for this submission is 12 months after the state permitting program has been approved by EPA (§ 7661(b)c). Facility permits must detail all regulations with which the source must comply, include a minimum six-month reporting requirement, and specify inspection, monitoring, and certification approaches (§7661(c)a). EPA is empowered to veto those permits that do not conform with the Act or with the state implementation plan (§7661(d)b).

The Act's citizen suit and criminal penalty provisions, while not part of Title V, are integrally linked to permit enforcement. Title III enables citizens to sue states or EPA in U.S. District Court to enforce specific permit requirements applicable to individual sources (§ 7604(a)). Citizen groups have traditionally faced difficulty filing suits against sources because monitoring data was scarce and a source's applicable requirements were often difficult to identify (Bryner 1995, p.182). Title V rectifies these problems by centralizing a source's requirements in one publicly available document and by providing for the collection of compliance data. Citizens can seek civil penalties against noncomplying sources, the proceeds of which go to "beneficial mitigation projects which are consistent with this chapter and enhance the public health or the environment" (§7604(g)). Furthermore, citizen groups can recoup the costs of litigation required to bring enforcement action to the court (§7604(d)).

The Act also criminalizes certain violations associated with Title V permitting. Sources that knowingly violate their permit conditions face fines and imprisonment up to five years (§ 7413(c)1). Deliberate failure to report, misrepresentation of permit or monitoring information, and tampering of monitoring equipment may induce a fine or two years imprisonment (§ 7413(c)2). Knowing failure to pay permit fees can result in either fines or a maximum one-year prison sentence (§7413(c)3). EPA also has the option to issue an administrative order imposing a civil penalty of up to \$25,000 for each day of violation (§7413).

3. Title V Implementation

Title V implementation has been a controversial, dynamic process. The first step required EPA to promulgate regulations for state operating permit program design. As required by the regulatory review process, EPA first submitted draft regulations to the Office of Management and Budget. This draft was reviewed by the President's Council on Competitiveness, established as part of the regulatory review process during the Reagan administration to reduce regulatory burden on industry. The Council proposed over 100 changes to the draft regulations, including provisions to allow minor permit modifications with simple notification to the state and to exempt permit revisions from public review (Bryner 1995, p. 196). Congressional staffers intimately familiar with the original legislation regarded the proposed rule changes as "substantially weaker than those mandated by Congress" (House Subcommittee on Health and the Environment 1991, p. 2).

The dispute between the Council, EPA and the original drafters of the Title V statute dragged on until 1992, when President Bush ordered EPA to make the changes sought by the Council. As a result, EPA proposed the rules for public comment on May 10, 1991, and issued the final rules on July 21, 1992. The final rules are a complex body of fine print occupying 63 pages in the federal register codified in the new Part 70 of Title 40 in the Code of Federal Regulations.

The controversy over Title V implementation has continued well past the final rule publishing. Industry, state and environmental groups have sued EPA over nearly 60 parts of the final rules (Novello 1995, p 1). EPA has responded by reproposing the most controversial aspects of the final rules, dealing with operational flexibility³ at facilities, with subsequent reproposals forthcoming (Federal Register 1994, 44460). In addition, the agency has released two "white papers," non-binding and non-regulatory guidance documents that increase the flexibility with which states implement their operating permit program requirements (EPA 1995 and EPA 1996). And while most states have succeeded in securing interim approval for their programs, many individual states have conflicted with EPA on specific issues that threaten their

³³ Operational flexibility describes the degree to which companies can make operational changes at a facility without noting those changes in a revision to their air emissions permit. The greater the permit's operational flexibility, the more changes can be made without a permit revision.

program's final approval. These issues range from citizen participation in permitting (Inside EPA, April 1996, p. 1) to the treatment of self-discovered permit violations (Inside EPA, May 1996, p. 2).

B. Research Approach

Title V sought to achieve many policy goals: to facilitate compliance, strengthen enforcement, and aid in emissions budgeting, among others. If Title V has little or no success in achieving these goals, then its associated compliance costs becomes compliance burden and the regulation itself is red tape. This project generates the first piece of information, compliance costs to industry, in making this assessment. The second piece of information – the goals achieved by Title V – is measured only indirectly, through the perception of benefits by industry representatives and state Title V officials, as well as preliminary inspection and enforcement projections by state officials. A more concrete evaluation of Title V achievements must be reserved for later, when state programs have been fully implemented and inspection and enforcement data are available.

The information required for Title V permits is considerable and includes general facility information, a description of processes and products, emissions information, air pollution control requirements, a compliance plan and compliance certification. Consequently, we expected the administrative requirements of obtaining a Title V permit to motivate some firms to restrict their potential emissions below Title V threshold levels in exchange for the simpler Synthetic Minor permitting process. We also anticipated that some firms would choose to restrict emissions through innovative environmental technologies.

To test these hypotheses, we conducted mail surveys with representatives of Title V regulated firms in Georgia, Oregon, South Carolina, and Wisconsin. The research also involved intensive onsite case studies with these states' air agency officials and a national mail survey of state and local Title V officials. The industry surveys encompassed questions on cost estimates for Title V compliance, the benefits of Title V, barriers to application, and -- for synthetic minor applicants -- emission reduction strategies. The OR, WI, and SC agency case studies and the national state and local agencies survey

focused on organizational structure, technology information dissemination, and pre- and post-Title V permitting processes.

C. Survey Questionnaires

The industry survey was distributed to 1614 companies in OR, SC, WI, and GA. The survey sample was generated from databases of Title V and Synthetic Minor sources, which the state agencies provided. From these databases, we drew a random sample of companies, for which we verified contact names and addresses. The random sampling process yielded 498 GA companies, 261 OR companies, 414 SC companies, and 441 WI companies. An alert letter conveying the research goals and inviting survey participation was distributed to target firms one week prior to the first survey mailing. Nonrespondents were sent another survey package one month after the first mailing. One month after this second mailing, the remaining nonrespondents were sent a cover letter enabling them to decline participation by calling a member of the research team. They were also alerted that we would follow up by phone to encourage their participation. These telephone calls marked the end of the survey process.

Table I. Title V Survey Responses

	State	SC	WI	OR	GA
Sample Size	253	414	441	261	498
Returns	8	8	4	21	13
Completed Surveys	90	173	136	74	159
Response Rate [Completed/(Sample Size>Returns)]	37%	43%	31%	31%	33%
Declines	56	25	84	26	19

Response rates were calculated by dividing the number of completed surveys by the adjusted sample size, which excludes surveys returned due to a bad address. This response ranged from 31 percent (WI and OR) to 43 percent (SC). Declines also varied by

state, with WI having the highest decline rate (19 percent), followed by OR (10 percent) , SC (6 percent) and Georgia (4 percent).

The national survey of Title V officials was conducted using the same process, with one exception: the research team generated the sampling frame. Using general information available from the Air and Waste Management Association, the research team contacted 118 state and local air agencies and asked for the names of the key staff involved in implementing their Title V program. The Title V officials identified by that process comprised the survey sampling frame. Fifty-nine percent of these officials responded to the solicitation, 37 percent with completed surveys and 22 percent with declines to participate. Completed surveys represent information from 64 air agencies, representing 54 percent of the 118 organizations contacted.

The survey results are discussed in two sections of this report. The first section details the responses of GA, OR, SC, and WI firms to questions about Title V compliance. In this section, we describe the respondents, their compliance costs, levels of resulting technology adoption, and their perceptions of benefits and barriers to Title V compliance. The second section summarizes the responses of state and local agencies across the nation regarding the programmatic transition to Title V. This section characterizes the responding agencies and their pre- and post permitting programs; agency's implementation costs; and their estimates regarding technology adoption rates resulting from Title V. Individual respondents' perceptions of Title V benefits and EPA-state interactions are also reported. The third section discusses the implications of both surveys' results for Title V administrative costs and technology adoption effects. The fourth section outlines the resulting conclusions.

II. Results for Industry Survey

The reporting of the data is organized according to the fundamental research questions addressed. The initial foci of the study were the effects of Title V on industry innovation and the compliance burden created by Title V. During the course of the study, additional research questions were added, including questions pertaining to industry's perceived benefits of Title V, factors facilitating or hindering companies' ability to comply with Title V, use of consultants in assisting with Title V applications, and the sources of information regarding Title V. The data are analyzed in aggregate, except for one section summarizing the differences among states.

Before turning to the research questions, some information about the responding companies will be provided. Among other data, we examine number of employees, sales, and number of employees involved in environmental management.

A. Profile of Responding Companies

As one might expect, there is wide variance in the size of responding companies. As Table 2 shows, the average number of total employees (for a site, the unit of response) is 567, but this masks considerable variation. About ten percent of the sites include less than 25 employees and, at the other extreme, some sites have as many as 27,000 employees. Similarly, the survey tapped some of the nation's largest companies (400,000 employees) as well as many quite small ones. As we shall see as the analysis unfolds, the size of companies says much about their views and behaviors with respect to Title V.

Table II: Number of Employees for Responding Sites⁴

Total Employees at Site		Total for all Sites in State		Total for U.S.	
(Mean)	(Range)	(Mean)	(Range)	(Mean)	(Range)
566	1-27,000	1,036	2-45,000	9,782	3-400,000

The study includes companies with enormous total sales receipts and those with quite modest sales. The mean for 1994 total sales was \$109,878,094 and, for 1995, \$120,965,647. The study also gathered information of companies' profitability and this variable is used subsequently in the analysis of Title V behaviors and perceptions. Just as there is considerable variance in total number of employees, companies vary a great deal in the total number of employees devoted to environmental management.⁵ While a few companies have as many as 350 employees involved at least half time in environmental management, the average is 5 and the mode is only 1.

B. Research Questions

With this respondent profile as a backdrop, we turn to the analysis of the research questions. Each of the questions considered here is straightforward but in many cases the pattern of results is complex. While the primary purposes in this report are descriptive in nature, in some of the particularly important research questions we also seek to explain causes of observed patterns of variation. We begin with companies' perceptions of benefit from Title V.

⁴ In this table, as well as all tables where the value of interest is expressed in hundreds or greater, no decimals are presented.

⁵ Q26: "How many of your company's employees (in facilities located in this state) are involved at least half time in environmental management?"

Research Question: “*What are the perceived benefits to companies of Title V?*”⁶

Respondents were asked to respond to a Likert-Scale⁷ item listing a number of possible benefits from Title V. The list of potential benefits was developed after a series of interviews with persons knowledgeable about Title V (see Bozeman and DeHart-Davis, 1999). Each of the categories of benefit received some noteworthy support from respondents. Among the nine benefit categories, none received less than 100 (or less than 39%) favorable responses (defined as aggregation of “very important” and “important”). Given that all benefits merited some support, the more interesting question is which ones were most likely to be perceived as “not a benefit.” In no case did the majority perceive any category as not beneficial, but 140 (27%) viewed “leveling the market competition between complying and previously non-complying sources” as not a benefit (and less than a majority provided a favorable response). It is not possible to determine from the results whether respondents were not particularly interested in “leveling the market competition” or whether they simply believed that Title V is not a likely instrument for doing so. (From our interviews, we suspect the latter is the case [Bozeman and DeHart-Davis, 1999]).

The benefit most widely held is “operational flexibility that allows my company to make process modifications without permit review” with 394 (77%) favorable responses; this seems a strong indication that companies have dim view of extant permit review procedures. Nearly as attractive [379 (73%)] is the prospect that the application shield will protect the company from citizen’s suits.

⁶ Q5: “Please identify whether you would consider the following aspects of Title V to be a benefit to your company.” Code: Very important benefit; Important benefit, Somewhat a benefit, Not a benefit

⁷ Likert scales are question responses corresponding to a numbered continuum, such a strongly agree=1, agree=2, ... strongly disagree=5.

In sum, despite the costs of Title V (considered below in some detail), the companies do, indeed, perceive that there are important benefits to be obtained *by their company*, apart from policy and social goals realized by Title V.

Table III: Companies' Perceived Benefits for Title V*

Benefit	<i>Very Important</i>	<i>Important</i>	<i>Somewhat Benefit</i>	<i>Not a Benefit</i>
The application shield that protects my company from citizen's suits	226	153	107	35
The permit shield that specifies requirements from which my company is exempt	137	204	123	45
Operational flexibility that allows my company to make process modifications without permit review	244	150	69	51
The elimination of conflicting requirements	186	177	86	60
Leveling market competition between complying and previously noncomplying sources	89	111	174	140
Improving our emissions inventory to assist in future permitting	76	177	176	91
Reducing the time required to get construction permits	149	125	120	114
Cleansing permits of unnecessary permit conditions	162	153	119	79
Identifying and resolving noncompliance problems	105	185	136	91

*The total respondents vary by question because not all respondents answered each question.

Research Question: “What are companies’ direct costs of Title V?”

This study includes a considerable number of cost indicators, but let us begin by examining companies’ reports of the direct costs of Title V. Respondents were asked (in question no. 7) “in considering your company’s response to Title V permitting requirements, which types of costs- other than permitting fees- *have you already incurred?*⁸ It is important to note the exact wording of the question because it embodies a -off in the analysis. Since there was no possibility of surveying companies only at the s were, essentially, a set of “moving targets” and that statistical adjustment could be made activities. But if one is reluctant to impose statistical adjustments, there is another way of -test of companies in the state of Georgia and a series of interviews, six capture most of the direct costs of companies expenses for hiring consultants, hiring administrative personnel, hiring scientific and technical personnel, diverting work activity, and changing administrative systems. Table

⁸ questionnaire asked respondents to estimate expected costs, but the researchers were not confident that such estimates would have sufficient validity to warrant inclusion.

Table IV: Companies' Direct Expenses for Title V

Cost Category	Costs (Mean)
Hiring consultants for assistance in the application process	\$35,996
Hiring new administrative, accounting or record-personnel	\$2,721
Hiring new scientific and technical personnel to deal with the	
pollution control requirements	\$2,696
Diverting work activity of existing personnel	
ive systems (e.g. record-management information systems, software)	\$6,631

expenditures incurred for Title V. The results indicate that the costliest item consultants (mean: \$35,996 diverting the work activity of existing personnel (\$). Interestingly, hiring new administrative personnel seems a 2,721).

Due to the “moving target” problem, these data must be taken with great care. le amount of missing data and zeroes in cases where there would ultimately be expenses. However, the the highest expense category. In subsequent analysis, the hiring of consultants is an companies are the ones most likely to hire consultants. Moreover, it is instructive in this case (as in other research questions) to break down re dealing with a large or a small business. We have set the threshold for delineating

company size at 500 employees (the official break point of the Bureau of Census and the ≤ 500 employees group) to determine the costs and percentage of total costs according to whether the respondent is a small or large (>499) business. For the 62 small businesses, the mean spent on consultants is \$34,826, whereas for the 2 large businesses the mean is \$48,041. Large businesses are only 78% likely to have incurred consultant expenses (70% of the total costs), we gathered detailed data on those sources hiring consultants. While 20% of respondents did not hire consultants to help with Title V, 80% did. Those hiring consultants were asked whether they hired consultants for “turn key” services (i.e. full permit preparation) or only part of the permit. Results are reported in Table Five.

Table V: Companies’ Expenditures on Consultants

	Average Employees	Consultant Expenditures	Per Capita
		\$	\$
Turn Key	603	\$49,305	\$81.76

The respondents (80% of all survey participants) who used consultants for turn key services spent an average of \$49,305 on consulting services, whereas those hiring consultants for part permit preparation spent an average of \$34,826. One might expect that the turn key group would spend more than those having consultants preparing only part of their permit. One possibility is that the turn key group is smaller (603 employees) compared to the part permit group (1,000 employees). This means, of course, that the turnkey group has a somewhat higher per capita expenditure.

A Methodological Note on Measuring Compliance Burden

Applied to consultant expenditures, employee-based per capita expenditure is an unusual statistic. The reason it is of interest is that per capita expenditures on turn key permit services is a possible estimate of the compliance burden required of Title V. Arguably, the market is a useful indicator of the cost of Title V compliance. If we assume that the amount spent on consultants' turn key permitting services captures most of the cost of compliance (adding in costs of just a few additional factors reflecting the fact that companies activities cannot be completely unaffected by permitting requirements), then the methodological problem is to extrapolate those companies using turn key services to those not using them. This is perhaps best accomplished beginning with the per capita costs of those using turn key services (\$81.76 per employee) and then adjusting for the costs of employees' work with consultants (\$18,734 [\$31 per capita] for companies using turn key consultants). Using this measure, the costs of Title V are estimated at about \$113 per employee. This measure can be refined to include such factors as: the companies' employee costs as a percentage of business costs; scale effects for company size; per capita consultant costs at various scale thresholds.

Research Question: *“What are the characteristics of Synthetic Minor sources? What are the production impacts of Title V?”*

To qualify as a synthetic minor (conditional major) source, facilities must have a strategy for emissions reduction or a plan to limit production. Indeed, one of the more significant issues in Title V is the impact on emissions reduction of sources' pursuit of synthetic minor status. Which sources decide to become synthetic minors? How do they achieve that status? To what effect do they achieve that status?

Among respondents, 168 (43.9%) filed (or were in the process of filing) as synthetic minors. An important question, given the emissions reduction pay-offs from synthetic minor status, is the difference between those sources filing as synthetic minors and those filing as majors. Table VI compares various characteristics of sources filing as synthetic minors.

The sources filing as synthetic minors have fewer employees at all three levels, , the synthetic minors are 40 percent smaller on average, indicating perhaps that synthetic minor applicants are profitable (although not significantly so) than majors, at least for the year examined. In diverting work activity of existing personnel (majors: \$19,021, synthetic minors: \$8,840), hiring new technical personnel (\$5,563 consulting services (\$50,489 vs. \$14,780). The fact that majors' consulting costs are ⁹ In other motives, structure and behaviors of synthetic minors are very much the same as majors.

Significant also in a statistical sense: F test for differences of means significant at .0001 level.

Nearly all the variables in the data set were examined for differences in means and very few significant differences emerged. Table Six focuses on the significant differences.

Table VI: Comparing Characteristics of Majors and Synthetic Minors

Attribute Variable	Mean for Major Sources	Mean for Synthetic Minor Sources
Total employees: Site*	731	441
Total employees: All facilities in state	1,513	928
Total employees: Nation	11,754	7,236
Number employees involved in Title V permitting activity (site)**	9	5
Company total sales, 1995**	\$128,076,191	\$94,491,902
Profitability in 1995	11	24
Company's total expenditures complying with all environmental regulations	\$1,406,588	\$1,959,727
Number permit applications required	5	2

[Key: differences of means F test significant at *=.10 level, **=.05 level.]

One of the questionnaire items asked companies to indicate the steps taken to limit emissions to conditional levels. Table VII provides the results.

Table VII: Approaches to Reaching Synthetic Minor Status

Approach to Synthetic	Companies Taking Approach
Limited production levels	112 (47.9%) ¹²
Added pollution control equipment	61 (26.2%)
Changed production processes or products	50 (21.4%)
Changed raw materials used in production	57 (24.4%)
Other	39 (16.7%)

Limiting production levels is the most common way to ensure status as a synthetic minor (47.9% pursuing this option).¹³ However, 74 percent added pollution control equipment, changed products or process, or substitute raw materials. These strategies – all of which can be categorized as technological remedies -- are of particular interest since one of the motivations of the present study was to determine if, in fact, Title V permitting requirements would have an effect on companies' technology adoption. It is not accurate to say that Title V actually *caused* more than three-quarters of the sources to adopt technology strategies; in some cases it is likely that Title V *accompanied* decisions already made or simply formalized limitations that were already in place. Nevertheless, the results provide some indication of Title V impacts on technology adoption. Thus, it is useful to

¹¹ Q6: "If your company has filed an application with (the state environmental agency) to become a synthetic minor source, please check all the step(s) that your company has taken, or has proposed taking, to limit its emissions to synthetic minor levels."

¹² Percentages relate only to the 241 companies filed (230) or determined but not yet filed as synthetic minor (11).

¹³ The approaches add up to more than 100% because some companies use more than one approach.

understand the characteristics of companies attaining synthetic minor status by these methods.

Comparing the companies choosing only pollution prevention technology versus production limitations, we see that the technology group is characterized by:

- Higher profits (6.44% for the technology group vs. 5.2% for the production limiters),
- More employees (369 vs. 335),
- Different Title V costs, including:
 1. less for consultants (\$16,974 vs. 47,660),
 2. more for employing new scientists and technicians (\$3,542 vs. \$2,500),
 3. less for company employees working with consultants (\$8,969 vs. \$36,908).¹⁴

Perhaps the chief conclusion is that pursuit of technological innovation is most likely for companies having more unrestricted resources at their disposal, a finding that echoes other studies of innovation adoption and company expansion.

Research Question: “*What factors hindered or facilitated Title V permitting?*”

Companies were asked to assess factors hindering or facilitating their Title V activities.¹⁵ Table XIII gives those factors hindering Title V permitting activities. Table IX gives those factors facilitating.

¹⁴ These comparisons separate synthetic minor applicants choosing production limits as their sole qualification method versus those undertaking a combination of technological activities to limit production.

¹⁵ Q8: “Regardless of the stage of your company’s Title V activities, which factors (if any) have hindered your company’s ability to meet its Title V permit application requirements?” Q9: “Regardless of the stage of your company’s Title V activities, which factors (if any) have facilitated your company’s ability to meet its Title V permit application requirements?”

**Table VIII: Industry’s Assessment of
Factors *Hindering* Title V**

Hindering Factor	Percent Responding (n=542)
High cost of activity required for Title V application	31%
Interactions with [state environmental agency] personnel	13%
Company’s limited knowledge of Title V procedures	37%
Our company personnel’s limited technical knowledge	26%
Company’s lack of previous permitting experience	20%
“Red tape” at [state environmental agency]	26%
“Red tape” at USEPA	16%
“Red tape” in this company	5%
Lack of adequate company-level rules and procedures dealing with air emissions	14%
Other	14%

Table VIII indicates that relatively few factors have been important in hindering companies' Title V activities. Among the more important are the costs of permit application processes (31%) and the companies' limited knowledge of Title V (37%). By contrast, a number of factors seem to have facilitated Title V, especially interactions with state agencies and consultants' expertise (both 38%). While 38% report the consultants' expertise as a facilitating factor, one must recall that about ¼ of companies did not use consultants and, thus, the relative importance of consultants is quite significant.

**Table IX: Industry's Assessment of
Factors *Facilitating* Title V**

Facilitating Factor	Percent Responding
Interactions with [state agency personnel]	38% (n=366)
Company's knowledge of Title V procedures	16% (n=266)
Our company personnel's technical knowledge	24% (n=294)
Company's previous permitting experience	22% (n=294)
Consultant's permitting expertise	38% (n=366)
[State agency] printed materials about Title V, including application forms and instruction booklets	27% (n=294)
Ability to file an electronic permit application	8% (n=294)
Workshops on Title V	30% (n=294)
Other	4% (n=366)

We turn next to a related question, companies' sources of information about Title V.¹⁶ Let us consider information sources in four groups: the state agency, professional

¹⁶Q4: "In gathering information about Title V permitting, which of the following sources of information

associations, USEPA, and other (including consulting firms, the internet, and universities).

Table X provides the results.

Table X: Sources of Information for Title V

Information Source	Percent Using Source
State Agency: informal communications	69%
State Agency: meetings or workshops	63%
State Agency: printed material	71%
Professional Assoc.: informal communications	35%
Professional Assoc.: meetings or workshops	40%
Professional Assoc.: printed material	36%
USEPA: informal communications	12%
USEPA: meetings or workshops	13%
USEPA: printed material	38%
Consulting firms	72%
Internet, web site, bulletin board	12%
University personnel	5%
Vendors	22%

Table X shows that while companies employed a wide variety of information

has your company used?"

sources and media, state agencies and consulting firms are the most commonly used sources. Among state agencies, all major media -- informal communications, meetings and workshops, and printed matter -- have apparently had wide coverage. Other data indicate that person-to-person contacts have been frequent. Respondents were asked how many times state agency personnel contacted them and how many times they contacted state agency personnel regarding Title V information. Results indicated that companies contacted state agencies an average of 9.49 times and state agencies initiated contact 6.12 times. Thus, it appears that Title V has provided for considerable direct communication between state agencies and their regulated sources. The USEPA role, by contrast, is much more one of providing formal information through printed matter. Interestingly, the electronic age has not dawned with respect to air quality permitting with only 12% of companies using the Internet and bulletin boards, this despite some state agencies' and USEPA's considerable investment in electronic resources for information sharing.

Research Question: *“How do Title V Costs Compare to Previous Permit Costs?”*

In order to determine the relative costs of Title V permitting, a series of questions developed data about previous permitting activity and costs. Fifty respondents had **not** had a previous permit and, thus, were outside state permit systems prior to Title V. This itself is an important issue since there is a view that one of the advantages of Title V is bringing more companies into permitting systems. These results indicate that about 13% of the companies brought into Title V are new to permitting.

Among those companies reporting they had filed for a permit, data were gathered about the most recent permit. This was used as a comparative base because (1) it was expected that a question about the “most recent” permit would be a good surrogate estimate for the proportion of permitting activity devoted to various categories and (2) the respondent would have greater recall and more readily accessible data concerning the most recent permit. Most recent permits were for permit renewal (136), new facilities (76),

expansion of an existing facility (128), replacing equipment in an existing facility (69), alteration of equipment (38), and process modification (73).

Respondents were asked to provide data about costs of the most recent permit, both in dollars and person hours. On average 287 total person hours were devoted to the permitting process.¹⁷ On average, the costs were as follows:

- Labor for company employees: \$ 31,158;
- Consultants: \$ 53,279;
- Non-personnel administration (e.g. informations systems, record keeping): \$1,072

These costs are, on average, quite a lot lower than Title V costs. A more detailed comparison considers costs related to the nature of the permit. Table XI gives the costs according to type of permit.

¹⁷ Q17: “Regarding this most recent (pre-Title V) permit, what is your estimate of the amount of time spent by your company’s personnel in completing the requirements for the permit (i.e. gathering information, communicating with government officials, filling in forms, recording information, responding to requests for information)?”

Table XI: Comparing Permitting Costs

Permit Type	Labor Costs	Consulting Costs	Admin Costs	Employees at Site
Title V	\$24,786	\$35,996	\$6,631	566
New Facility	\$4,451	\$5,905	\$1,307	507
Renewing Operating Permit	\$10,847	\$5,548	\$1,131	578
Expanding Existing Facility	\$11,705	\$11,267	\$1,267	593
Replacing Equipment	\$4,155	\$5,173	\$283	852
Altering Equipment	\$3,853	\$5,422	\$247	468
Modifying Process	\$6,016	\$4,607	\$324	481

Table Eleven shows that the costs of a Title V permit are closest to those for a permit to expand a facility and renew a previous operating permit. Not surprisingly, the costs of the original operating permit are less because (1) the permit may have been established several years ago; (2) the permit is less likely to have been filed when the source reached its peak growth; (3) it is “biased” toward smaller companies (i.e. those who have not expanded or set up new facilities would have had their last permit be their original operating permit).

Research Question: “*How Do Title V Costs Relate to Company Administrative Efficiency?*”

To measure the administrative efficiency (red tape) of companies, respondents were asked to provide information about the amount of time, in weeks, taken to complete certain core tasks common to organizations, including hiring new employees, firing, buying low cost equipment (<\$10,000), buying more expensive equipment (>\$10,000), reorganizing a department or unit, starting a minor new project, or starting a major new project.¹⁸ These are items that have been validated in a number of previous studies of administrative efficiency and red tape (e.g. Rainey, Pandey and Bozeman, 1996; Bozeman, et al., 1992; Bozeman and Bretschneider, 1995; Bozeman and Kingsley, 1997). Table XII shows the mean amount of time taken for these core tasks.

¹⁸ Q28: “Please indicate, for each activity listed below, how much time (in weeks) is typically required between a request made by a unit within your company and the actual approval of the request. [Note: If no approval is necessary for the activity, write “NA;” if there is never a request for a particular activity, write “NR.”]”

Table XII: Administrative Efficiency

Activity	Weeks Required
Hiring full-time employee	4.60
Firing full-time employee	3.05
Buying low cost equipment (under \$10,000)	3.18
Buying more expensive equipment (over \$10,000)	7.41
Reorganizing a department or unit	7.68
Starting a minor new project	3.00
Starting a major new project	12.81

The question of relationship between administrative efficiency (red tape) and Title V costs can be ascertained by examining an aggregate measure of administrative efficiency (an additive index consisting of the total of each of the individual measures) correlated with the total Title V permitting costs (labor, administration, consultants). As seen from Table XIII, a good deal of variance (beta: .17, $p < .003$) in Title V costs can, indeed, be explained by the administrative efficiency of the company. Nor is the relationship explained away by controlling for number of employees.

**Table XIII: Company Administrative Efficiency
and Title V Costs**

	Unstandardized Coeff	Std. Error	Std Coeff	t	Sig (t)
(Constant)	-35,129	32,075		-1.10	.274
TOTEMP1	2.94	6.21	.026	0.47	.637
RANKTOT	766.43	257.46	.166	2.98	.003

Dependent Variable: Total Title V Costs

TOTEMP1: Number of Employees at Site

RANKTOT: Sum of company's ranking across red tape measures

Research Question: *“How Do Title V Costs Relate to State?”*

One might also look to the respondent's state as an explanation in variance of Title V costs. To be sure, state of site enfolds a great many factors since states vary not only by government administration but also by industry type and concentration. Table XIV relates Title V costs by state.

Table XIV. Total Title V Costs by State

<i>Survey State</i>	<i>Mean</i>	<i>Median</i>	<i>n</i>
GA	\$77,189	\$25,000	136
OR	\$92,245	\$47,000	57
SC	\$51,854	\$25,000	155
WI	\$48,052	\$20,000	115
All States	\$63,324	\$25,000	463

The results indicate that the average costs of Title V permit vary somewhat by state, with a median (appropriate for relatively small sub-samples) of \$47,000 in Oregon, \$20,000 in Wisconsin, \$25,000 in South Carolina and \$25,000 in Georgia.

III. Results of State Survey

Next, we discuss the results of a national mail survey of state and local officials charged with implementing Title V. Implementers were included in the study to determine how Title V changed their permitting operations, to estimate Title V's influence on technology innovation nationally, and to determine their perceptions of Title V benefits. This section summarizes their responses on these topics.

A. Profile of the Respondents

Ninety Title V officials responded to the survey, representing a 37 percent response rate. Responding officials hail from 65 environmental agencies ranging from two to 5000 employees. The typical environmental agency employs 350 people, with a median employment of 80. The air divisions of these agencies range in size from one to 300 employees and average 63 staffers. Fifty percent have more than 23 employees. These organizations expect to permit, on average, 117 sources. Thus responding organizations comprise a mixture of small and large organizations with varying permitting workloads.

The respondent's previous operating permit programs covered between zero and 8000 sources. These programs averaged 600 sources, with half those programs covering more than 267 emission sources. While these statistics indicate a tremendous range of permitting experiences, the fact that sixty-two percent of the divisions had not issued a single Title V permit suggests respondents are lacking in Title V experience. Consequently, it is possible that some of these questions – particularly on perceptions of Title V benefits and EPA-state interactions – may change with time. Nonetheless, because most of the survey questions covered Title V implementation (start-up costs, distribution of employees, the size of the Title V regulated community), we believe that agencies were well-qualified to respond.

B. Research Questions

This section summarizes and interprets the respondents' answers to three questions, pertaining to technology adoption, perceived benefits of Title V, and changes in permitting processes resulting from Title V implementation.

Research Question: “*Did Title V Influence Technology Adoption?*”

To supplement technology adoption information from the industry survey, we asked state and local officials for their opinion on Title V-influenced technology adoption rates. Specifically, participants were asked to indicate their level of agreement with Title V's influence on environmental technology and pollution prevention, the use of pollution prevention for attaining synthetic minor status, and the overall influence of Title V on technology adoption.

Respondents agreed two-to-one that Title V has had no significant influence on technological innovation. Sixty-eight percent disputed the statement that more than 10 percent of the regulated community has adopted environmental technologies due to Title V. Sixty-four percent disagreed that Title V has resulted in more than ten percent of companies adopting pollution prevention programs. A slightly higher percentage (69 percent) disagreed that more than ten percent of the synthetic minor permit applicants have used pollution prevention technology to restrict potential emissions.

These responses are puzzling given the level of effort devoted to pollution prevention within responding agencies and their Title V staff. Sixty-eight percent of the air quality divisions and fifty percent of the Title V groups had at least one staff member promoting pollution prevention. Assuming that these employees made reasonable attempts at promotion, the figures indicate that Title V's failure to result in higher pollution prevention rates – as anticipated in EPA's preamble to the proposed Part 70 regulations – is not attributable to a lack of resources, but other potential issues such as economic unfeasibility or institutional barriers within regulated companies.

Table XV. The Impact of Title V on Technology Adoption

STATEMENT	Strongly Agree	Agree	Disagree	Strongly Disagree
As a result of Title V, more than 10% of the agency's regulated community have adopted innovations in environmental technologies (n= 87)	6.9%	25.3%	49.4%	18.4%
As a result of Title V, more than 10% of the agency's regulated community have adopted pollution prevention programs. (n= 86)	4.7%	31.4%	48.8%	15.1%
More than 10% of those qualifying for Synthetic Minor permit have adopted new pollution control technology to meet permit requirements(n= 83)	9.6%	21.7%	53.0%	15.7%
In general, the Title V program has had no significant effect in the adoption of technological innovations among this state's regulated community(n= 85)	25.9%	38.8%	29.4%	5.9%

Research Question: *“How Do State and Local Officials Perceive Title V Benefits?”*

Presumably, public officials charged with implementing Title V have the best perspective from which to judge benefits, given their responsibility to protect the environment and ensure compliance with environmental laws. Most officials interviewed included these goals as an integral part of their agency's mission statements. With this perspective in mind, we asked state

and local Title V officials to assess the level of benefit (major, some, none) associated with nine potential Title V outcomes.

Table XVI. Perceived Benefits of Title V

OBJECTIVE	Major Benefit	Some Benefit	No Benefit
Improve environmental compliance	35.2%	48.9%	15.9%
Provide information to facilitate enforcement	37.5%	43.2%	19.3%
Facilitate enforcement of permit conditions	40.9%	37.5%	21.6%
Generate revenues to strengthen state air quality programs	21.8%	46.0%	32.2%
Reduce red tape in environmental rules and regulations	9.2%	23.0%	67.8%
Reduce red tape in this agency's internal operating rules and procedure	7.1%	16.5%	76.5%
Level the playing field between non-complying and complying sources	21.8%	37.9%	40.2%
Improve the accuracy of emissions inventories	26.4%	47.1%	25.3%
Reconcile conflicting regulations	25.3%	47.1%	26.4%

The results indicate that survey respondents perceive stronger compliance and enforcement as the major benefits of Title V. Respondents also saw at least some benefit in improving the accuracy of emission inventories and reconciling conflicting regulations. Title V

was expected by the officials to produce no benefit from reducing internal or external red tape.

Table XVII. EPA-State Interactions

	Strongly Agree	Agree	Disagree	Strongly Disagree
A strong working relationship with the EPA regional office is critical in Title V implementation (n=85)	47.1%	50.6%	2.4%	0%
In general my agency's working relationship with EPA is positive (n=87)	23.0%	69.0%	5.7%	2.3%
EPA's review of draft Title V permits is beneficial to the permit process. (n=77)	22.1%	57.1%	15.6%	5.2%

Given the possibility that agency perceptions of Title V benefits may be colored by their relationship with the EPA regional office in charge of reviewing and approving their Title V plan, we examined responses to three questions about this relationship. The first question sought to establish the respondent's belief in the link between successful Title V implementation and a good working relationship with the EPA Region. The lion's share of respondents (97%+) agreed. Next, the survey asked agency officials whether the relationship with the EPA region was generally positive, to which 92 percent responded in the affirmative. Finally, the survey asked about the value of EPA review and approval of draft permit issuances. Only twenty-one percent of the respondents disagreed that EPA review is beneficial.

Research Question: “*How Did Title V Change State Permit Processes?*”

At a minimum, Title V required states to change some aspects of their permitting routines. For some states, Title V overhauled their permitting systems completely. One objective of this survey was to characterize this change in terms of implementation costs, budget changes, and impact on compliance inspections. The latter impact may be particularly important, given that improved compliance and enforcement are primary goals of Title V.

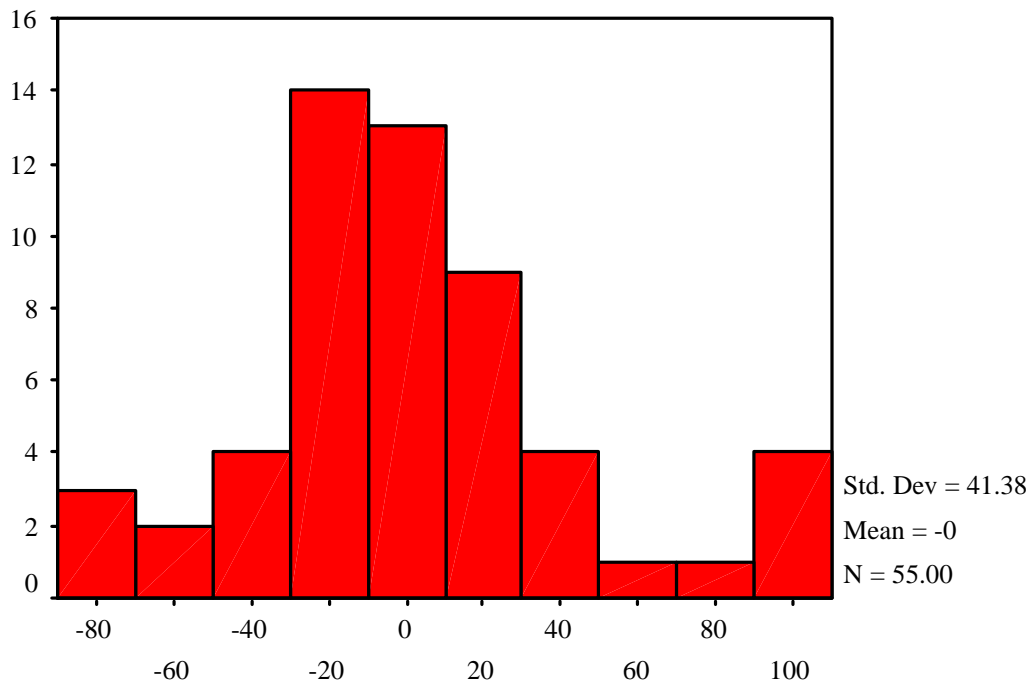
Table XVIII reports average and median costs of Title V implementation in six categories. Of the sixty organizations responding to the survey, only 20 provided consistent answers to this question (conflicting figures from the same organizations were excluded). Zero was the median for all cost categories, with the exception of the cost of diverting work activities of existing personnel to Title V, with a median value of \$10,000. Diverted work activities also had the highest mean cost (\$69,862). Hiring new clerical or administrative staff was the lowest cost category (\$4,952).

Table XVIII:
Estimated State Costs of Title V Implementation

Cost Category	Total Costs Incurred in FY '96 Mean (Median)
Hiring consultants or contractors for assistance in Title V activities	\$8,829 (\$0)
Hiring new scientific and technical personnel in connection with Title V	\$21,857 (\$0)
Hiring new clerical or administrative staff	\$4,952 (\$0)
Diverting work activity of existing personnel from usual duties to Title V-related duties	\$69,862 (\$10,000)
Purchasing or leasing new computers, computer systems, or software	\$13,397 (\$0)
Changing administrative systems (e.g. record-keeping, filing, management information systems)	\$12,399 (\$0)
Costs other than above categories (please specify in this box): _____ _____	\$34,522 (\$0)

State and local Title V officials were also asked about the proportion of their pre- and post-Title V budgets derived from permitting fees. These questions sought to assess Title V's significance (or insignificance) to these programs' operating budgets. Figure 1, which displays a histogram of the difference between these two percentages for 55 organizations, indicates that the mean difference hovers near 0, with both higher and lower percentages reported¹⁹. A positive difference indicates that the proportion increased with Title V implementation; a negative difference indicates that it decreased. A little more than 50 percent of the organizations reported increases, versus 40 percent reporting decreases.

Fig 1. Budget % From Permitting Fees
Before vs. After Title V



We expected Title V implementation to result either in no change in proportion (as would be the case with higher permitting fees within a proportionally bigger budget) or an increased proportion, as higher fees comprise a greater percentage of the same sized budget. The decline in proportion is more difficult to explain, but plausible if fees increased by a smaller margin than the overall budget. It is more difficult to envision a second alternative, that air permitting fees would decrease under Title V, given the importance to EPA of states demonstrating adequate implementation resources, a proof that usually required a fee hike. It is also possible that non-Title V events, e.g., a reorganization or political turmoil, have impacted the budget shares from permitting fees.

State and local officials were also asked to estimate the number of announced and unannounced inspections before and after Title V implementation. Seventy-eight percent of officials predicted no change in *announced inspections*; 14 percent anticipated an increase and

¹⁹ Contradictory and duplicate responses from officials within the same agency were eliminated.

seven percent anticipated a decrease. Seventy-nine percent of respondents predicted no change in *unannounced inspections*, while 13 percent projected an increase and eight percent predicted a decrease. While this result is somewhat surprising --we expected an increase in inspections due to the legislation's goal of improved compliance – in hindsight it is not necessarily significant. Title V was designed to generate better information for enforcement and compliance purposes, a goal which doesn't necessarily required more inspections. On the contrary, better information could lead to fewer inspections by providing evidence of compliance and thus reducing the need to conduct in-person checks. The original hypothesis, that higher-quality compliance information could raise more flags and thus trigger more inspections, is not supported by these estimations.

If we were to consider only the information presented thus far, it would appear that Title V has had little effect on agencies' permitting operations. Most organizations spent little or no money on implementation. The proportion of budgets derived from permit fees did not seem to significantly increase. And most officials predict no change in the number of inspections that will be conducted prior to Title V. However, this information is limited and doesn't capture the more subtle forms of organizational change. Our extensive case study interviews, to be released at a later date, portray a different story, one not captured by raw numbers or descriptive statistics.

IV. Discussion of Survey Results

The political discourse over Title V that occurred late in the 1990 Clean Air Act amendment process provides an interesting contrast to the survey responses. At that time, industrial firms feared that Title V permits would limit production flexibility by requiring sources to revise their permits as they changed processes and materials. Cost was another major corporate issue, with warnings that Title V compliance would be costly and complicated even for smaller facilities. States and local regulators also feared a transformed permit process that could include EPA review and veto (Bryner, 1995, p. 180). In general, both regulators and company officials expressed major doubts in background interviews for this project that Title V would improve on existing permit processes.

As is often the case in life, prediction and reality can be two different things. Company

representatives *do* see benefits in Title V, most notably operational flexibility (their biggest pre-legislation fear) and the application shield that protects companies from enforcement actions while their permit is being processed. Furthermore, the lion's share of state agency officials (80 percent-plus) named compliance and enforcement as benefits of Title V, a significant result given that these are the law's overarching goals. And state officials seem far less anxious over EPA participation, as suggested by the positive characterizations of their relationships with the EPA Regions and the majority who believe EPA review and input to be beneficial to the process.

So why are post-implementation views of Title V so different than from those espoused – on both sides of the regulatory fence -- when the legislation was being crafted? Significant changes in Title V implementation, the timing of the discussions, and whose doing the talking all play a role. Concerns over operational flexibility were later resolved by EPA White Papers clarifying that states could exempt minor process modifications from further permit review. Once operational flexibility was ensured by the Title V process, it transformed from a major sticking point to a perceived benefit.

As for whose doing the talking, it could be that survey respondents are a biased lot given their position as environmental guardians of the corporate fortress. These are largely middle environmental managers whose missions and corporate standings rely on the existence of regulations and who, therefore, may be more likely to say positive things about the rules with which they ensure compliance. Their views are easily distinguishable from the voices heard in early political debates over Title V formulation, the government affairs specialists and corporate lobbyists charged with fighting additional requirements for their industries. Thus, the differences in commentary may also be attributable to the nature and timing of the discussions – political rhetoric during policy formulation versus cursory reflection after policy implementation.

Title V compliance cost is another area in which the survey results shed some light on the political discourse. The estimated per capita costs, based on the survey responses, is \$113 per employee. This figure translates to \$63,958 for a company with 566 employees (the average facility size), an estimation in the middle of National Association of Manufacturers' cost estimates of \$30,000 to \$85,000 for a medium-size firm with multiple sources. The survey results also contrast with a projection, recently supplied by the Clean Air Implementation

Project, that the 20,000 Title V facilities spent \$100,000 on average to complete permit applications (Clean Air Implementation Project, 1999, p. 7). While these comparisons are problematic – our estimates may not represent final application costs and the basis for the Clean Air Implementation Project is unclear – they suggest that actual Title V costs are somewhat lower than anticipated

The survey information also yielded some interesting insights into Title V's potential achievements, beyond mental calculations of benefit and cost. We say potential because many Title V programs are still in the implementation stage, with permits just being issued. Determining Title V's ultimate achievements, in terms of the legislation's initial goals of improving compliance and enforcement, will require additional time for states to figure out how to use more and arguably better quality permit information. Nonetheless, the survey results told us three things about Title V. First, the law has stimulated communications between state agencies and regulated companies. Second, Title V has a questionable influence on environmental technology adoption. And third, most states anticipate little change in inspection numbers as a result of the new information.

The survey results suggest that, if nothing else, Title V has stimulated talk between regulators and regulatees. On average, responding companies contacted their state agency on average 10 times; the states, in turn, initiated contact on average 6 times. Furthermore, companies indicated that interaction with agency officials made the compliance process easier. While EPA did not name improved industry-state communications as a Title V goal, the task was implicit: facilitating corporate compliance and state enforcement requires a better information flow between the regulated and the regulator. Thus, we have evidence that there is a new information flow; it's too early to determine whether it's a higher-quality flow.

The role of expanded permit information in enforcement is also unclear from the survey results. The average agency anticipated no change in the number of inspections conducted after Title V. This result is an issue only if better enforcement requires more inspections, a relationship which is far from certain. Title V was based on the assumption that states lacked compliance data on which to base enforcement. It is not clear whether crafters of the legislation hypothesized that (1) more permit information would trigger more audits; (2) more permit information would trigger the same number of audits, but of a higher quality; or (3) more permit

information would make the inspection process more efficient by generating better information for a reduced number of audits. If policymakers sought to spur inspections, the data suggests that Title V programs may fall short. However, if policymakers envisioned better-quality inspections in the same or fewer visits, then state plans for Title V programs appear consistent with projections.

Title V's influence on technology adoption is even harder to assess. Agency officials were pessimistic in their beliefs, with the vast majority disagreeing that Title V had no significant influence on technology adoption. However, sixty-eight percent of the 129 companies applying for synthetic minor permits had employed, at least in part, a technological fix to restrict emissions. Finding the truth in these results is difficult. The industry survey results could be biased towards assertive companies who were more likely to innovate in their quest for synthetic minor status. On the other hand, these corporate responses may be more reliable than the opinions of state permit officials, who may not be well-placed to know the true impacts on innovation.

V. Conclusions

This study sought three goals in examining implementation of Title V of the 1990 Clean Air Act Amendments: to estimate average Title V compliance costs, to tap perceived benefits of Title V implementation by regulators and regulatees, and to test for technology adoption effects. Information for these research tasks was gathered via mail surveys to industry representatives and state agency officials. The survey results suggest that Title V compliance costs – on average \$113 per employee – are lower than current industry projections. Both regulated firms and regulating agencies perceived Title V to be beneficial, albeit in different ways: company officials cited operational flexibility and the application shield as key benefits whereas state agencies named stronger compliance with and enforcement of air quality regulations. Title V's influence on technology adoption is less clear: the vast majority of agency officials asserted that Title V had no significant influence on technology adoption, whereas 68 percent of 129 companies applying for synthetic minor permits had employed some technological fix to restrict emissions. These conflicting results may be attributable to a survey sample biased towards innovators,

underestimates by state agency officials, or permitting that simply formalized technologies already in place.

References

Air Pollution Control Act of 1955, ch. 360, 69 Stat. 322

Air Quality Act of 1967, Public Law 90-148

Bozeman, Barry and Leisha DeHart-Davis

1999 “Red Tape and Clean Air: Title V Air Pollution Permitting Implementation as a Test Bed for Theory Development” *Journal of Public Administration Research and Theory* Vol 9, No. 1

Bryner, Gary C.

1993 *Blue Skies Green Politics: The Clean Air Act of 1990 and Its Implementation. 2nd ed.* Washington, DC: CQ Press.

Clean Air Act of 1963, 42 USC Ch. 85, 1857-18571, 1964

Clean Air Act of 1970, 42 U.S.C. 7401a, 1970

Clean Air Act of 1977, 42 U.S.C. 7401b, 1977

Clean Air Act of 1990, 42 U.S.C. Ch. 85, 1990

Clean Air Implementation Project. *Getting the Title V Program on Track: Will EPA Make the Necessary Changes to its Policies? First Annual Title V Report* April 1999.

Congressional Record, S. 3163, March 26, 1990

Federal Register, Vol. 57, no. 140, July 21, 1992: 32251

Federal Register, Vol. 57, no. 215, November 5, 1992: 52951

Federal Register, Vol. 40, August 19, 1994: 44460

House Subcommittee on Health and the Environment, *The Vice President's Initiative to Undermine the Clean Air Act*, 102nd Cong., 1st sess, May 1, 1991

Inside EPA's Air Permit Report. “Part 70 Reproposal ‘White Paper’ to have Dramatic Impact on Oregon.” 3:1

Inside EPA's Air Permit Report. “Virginia Loses Title V Program Appeal; Changes to Legal Standing Eyed.” 3:4

Inside EPA's Air Permit Report. “Audit Law Threatens South Carolina Full Title V Approval.” 3:5

Landy, Mark K.; Roberts, M.J.; and Thomas, S.R.

1994 *The Environmental Protection Agency: Asking all the Wrong Questions, from Nixon to Clinton..* New York: Oxford University Press.

Motor Vehicle Act of 1960, 74 Stat. 162 (1960)

Motor Vehicle Air Pollution Control Act of 1965

Nickel, N. "The Race to Regulate" *1991 Environmental Forum* 18-22 (Jan.-Feb 91)

Novello, David; Hoffnagle, G.F.; McCutchen, G.D.; and Weiss, K.N.

1994 *Clean Air Operating Permits: A Practical Guide.* Pittsburgh, PA: Air & Waste Management Association.

Percival, Robert; Miller, A.S.; Schroeder, C.H.; and Leape, J.P.

1991 *Environmental Regulation: Law, Science, and Policy.* Canada: Little, Brown & Company.

U.S. Environmental Protection Agency.

1991 "The New Clean Air Act: What it Means to You." *EPA Journal.* 17:1,2.

U.S. Environmental Protection Agency.

"Regulatory Impact Analysis and Regulatory Flexibility Act Screening for Operating Permit Regulations." Office of Air Quality Planning and Standards, EPA-450/2-91-011, June 1992.

U.S. Environmental Protection Agency.

"White Paper for Streamlined Development of Part 70 Permit Applications" Lydia Wegman Memorandum. June 10, 1995.

U.S. Environmental Protection Agency.

"White Paper #2 for Improved Implementation of Part 70 Operating Permits Program" Lydia Wegman Memorandum. March 5, 1995.