Constraints on Information as a Regulatory Device:

The Policy Design of Trade Secret Protections in the

Emergency Planning and Community Right to Know Act

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Abstract

The recent upsurge in hydraulic fracturing use by the natural gas industry has dramatically raised the salience of environmental policies concerned with information disclosure and the protection of business information. Although policy changes are already underway and both scholars and policy activists have called for further tightening restrictions on protected information, we argue that a more careful examination of the structures and underlying logics of existing policies is necessary before proposing revised or completely new policies. We apply policy design theory, and the institutional grammar tool derived from the institutional analysis and development framework, to the trade secret protections in the Emergency Planning and Community Right-to-Know Act (EPCRA) to demonstrate one approach to such analysis. We find strong support for several hypotheses derived from policy design theory regarding the strong statute character of the EPCRA trade secret provisions. We find only tentative support for several hypotheses about the implementation of the EPCRA trade secret protections because of data limitations. Although in its very early stages, the research reported here shows promise for advancing both policy theory generally, and policy practice specifically with respect to the use and protection of information in regulating environmental quality.

Key words: policy design; environmental policy; trade secret; confidential business information; institutional grammar tool; administrative discretion; information disclosure

Introduction

On March 21, 2013, the district court for the seventh judicial district of Wyoming ruled against petitioners seeking "all information," including "identifying information about individual chemical ingredients in products, including Chemical Abstract Service (CAS) numbers," that the Wyoming Oil and Gas Conservation Commission "had received about the chemical formulations owners and operators . . . of wells were using to stimulate their wells or, in other words, conduct hydraulic fracturing operations" (Powder River Basin Resource Council, et al. v. Wyoming Oil and Gas Commission, Civil Action No. 94650-C, 1). The court ruled that the commission had properly followed both Wyoming law and the Uniform Trade Secrets Act in protecting as trade secrets the information petitioners sought. The Wyoming Supreme Court reversed and remanded the case on March 12, 2014, instructing the district court "to determine as a matter of fact on evidence presented to it whether the information sought is a trade secret, and not whether the Supervisor acted arbitrarily or capriciously under the deferential administrative standards applied in the original proceedings. The district court will have to review the disputed information on a case-by-case, record-by-record, or perhaps even on an operator-by-operator basis, applying the definition of trade secrets set forth in this opinion [following that of the federal Freedom of Information Act] and making particularized findings which independently explain the basis of its ruling for each" (44 ELR 20050, 18).

This case is one among many legal skirmishes that are part of the emerging policy debates taking place in many U.S. states in response to the dramatic upsurge in the use of hydraulic fracturing (aka fracking) to access major natural gas deposits discovered in large shale formations that exist in North America. The fracking phenomenon has shed new light on the protections against public access to information provided in various state and federal laws

through provisions allowing such information to be claimed as trade secrets or confidential business information (CBI). The problem, in the view of those concerned with environmental quality and public health, is that such protected information may carry clues about the environmental risks posed by substances, products, or processes afforded protection from public scrutiny. The Wyoming Supreme Court decision is a bit of a surprise, indicating as it does that the courts, at least in Wyoming, intend to insert themselves into the policy-specific decisions about what constitutes a trade secret, decisions largely delegated to administrative action in most state and federal law. It was a question on which the Wyoming district court had demurred, stating "the Court feels these competing [policy] concerns are best addressed through legislative action, or further rule promulgation and are not properly within the Court's purview" (Powder River Basin Resource Council, et al. v. Wyoming Oil and Gas Commission, 17).

Although the law and policy of trade secrets and CBI are not new objects of scholarly attention, the controversies surrounding fracking and the legally-sanctioned blocking of public access to information about potential environmental and public health impacts has generated additional scholarly attention. Both legal scholars and political scientists have entered the fray, with most taking a policy analytic perspective by considering the adequacies or inadequacies of current policy, the variations in stringency of requirements that must be met to successfully make a trade secret or CBI claim, and what policy changes may be necessary to ensure greater compatibility between the goals associated with environmental and public health protections through the use of transparency and information disclosure and the economic efficiency advantages of protecting business information (see, for example, Bunger 2012, Centner 2013, Fisk 2013, Hall 2013, Lyndon 2011, Wiseman 2011).

In this paper, we take a different tack. We start from the perspective that, especially in the environmental quality and public health policy arenas, making judgments about the adequacy of current policy or the need for refinements is premature before securing a more thorough understanding of the architecture of law and policy protecting business information, especially in its most stringent form of the trade secret, and the assumptions and logic that undergird that architecture. We thus focus the lenses of policy theory on the subject.

Our aims are two-fold. First, we seek to reveal the structure and logic of public policy formulated to protect business information by dissecting the design of the trade secret provisions in a major federal environmental law to determine their characteristics with respect to the assumptions, rules, tools, agents, and targets that policy design theory highlights as the primary elements of public policy designs. This analysis provides scholars with a more precise sense of the design intents and potential effects of protecting trade secrets in environmental and public health policy specifically fashioned to use transparency and information revelation as a regulatory device. Second, we intend to refine policy design theory incrementally by focusing on the aspect of policy design given relatively limited attention in theory development and empirical research to date: the behavior of agents, especially with respect to the constraints imposed on the discretion of agents in comparison with those imposed on policy targets. Our initial foray into trade secret policy in pursuit of these research objectives is admittedly quite modest in this paper, in part because of obstacles encountered in our attempts to acquire data needed to test some of our hypotheses, and in part because of our need to carefully build our experience and skills in applying the latest developments in policy design theory and methods.

Our substantive focus is the Emergency Planning and Community Right-to-Know Act (EPCRA). We begin by setting the policy context with a brief account of the legislative history

and structure of EPCRA and its trade secret protections in particular. We then review the policy design theory literature, concentrating on its core attention to policy logic and structure rather than on the social construction of target populations and implications for democracy where most of the scholarship has coalesced. From this review of the scholarship and the legislative history of EPCRA's trade secret protections, we derive several hypotheses about the design characteristics of the relevant sections of the statute. Using the institutional grammar tool (IGT) as recently modified, we test the policy design hypotheses. Following this analysis, we then propose additional hypotheses about the behavior of agents and targets with respect to implementation of the trade secret provisions in EPCRA. Because of data access limitations, we present only a preliminary test of the hypotheses about implementation outcomes. We discuss the implications of our findings and conclude with additional research questions and identify next steps for our investigation.

EPCRA History and Structure

President Ronald Reagan signed the Emergency Planning and Community Right-to-Know Act into law on October 17, 1986. Although a free-standing statute in the United States Code (42 USC, Chapter 116), Congress actually incorporated the act into the Superfund Amendments and Reauthorization Act of 1986 as Title III of SARA. The impetus for EPCRA was the chemical release disaster at the Union Carbide facility in Bhopal, India in December 1984, and the release of similar chemicals from a Union Carbide facility in Institute, West Virginia that occurred the following August. Beyond the horrifying effects of the Bhopal disaster and the unnerving repeat in West Virginia (albeit with no loss of life), the events revealed the absence of emergency planning for such events and the utter lack of information available to the

public, particularly in the surrounding communities, about the chemicals and production processes present at the plants. EPCRA's designers sought to use information disclosure not just to satisfy the outcry about the need and right to know, but also as a regulatory device to reduce the public health risks from business operations and products, and to encourage citizens to demand action to reduce the risks further. A central problem for the designers was that the protection of business information generally and trade secrets specifically was already well established in common law and statute, including the Occupational Safety and Health Act.

The debates about how to balance the public's right to know about chemical hazards and the industry's right to protection of information about innovations that provide a competitive advantage show that even the most ardent advocates of broad transparency and information revelation readily accepted that "legitimate" trade secrets must be provided adequate protection. The central question in the debate became one of how much burden to place on companies to document and justify trade secret claims so as to establish that legitimacy. This question was important to industry because the reporting requirements that were taking shape in the proposed legislation already appeared sweepingly burdensome since the vast majority of chemicals could not be claimed as trade secrets even under common law. The question was important to environmental advocates, as relatively loose restrictions on trade secret claims could invite wholesale exemptions from the general reporting requirements, making information revelation as a regulatory device largely useless. The question was important to the U.S. Environmental Protection Agency, which would administer the law, because whether loose or tight, criteria for evaluating trade secrets would place the agency in the uncomfortable position of ultimately determining what constitutes the right balance between transparency and secrecy, that is,

between public health, safety, and the environmental quality on one hand, and economic advantage and efficiency on the other.

The House and Senate fashioned legislation that was dissimilar enough, with the House generally more restrictive on trade secret provisions, that a conference committee was required to sort out the differences and find the right compromises. In introducing the conference substitute on the floors of the House and Senate, the managers of the legislation argued that the right balance was struck. As Rep. Al Swift (D-WA), one of the principal authors of EPCRA, in advocating passage of the conference substitute, declared that the legislation represented "a very balanced and useful goal between the rights of entrepreneurs and the rights of the community to know what is going on in its community, and the ability of the health professionals in that community to be able to see that they are taking care of the health and safety of all of the citizens" (131 *Congressional Record* H 11069). The conference committee report entered into the Congressional Record explained the trade secret provisions in detail, but largely by repeating the legislative language verbatim. A brief review of the provisions positions us to analyze the institutional structure the provisions created, which illuminate the underlying logic of overall intentions, and impacts on the intended targets (agency implementers, companies claiming trade secrets, and citizens) in the context of policy maker claims about balance in intention and effect.

EPCRA Structure and Trade Secret Provisions

EPCRA's unique focus on the public's right to know, the scope of its data collection mandates under the Toxic Release Inventory and emergency planning notification requirements, and its separate, explicit provisions for trade secret protection make it a prime candidate for the study of environmental trade secret policy. In fact, its trade secret provisions have been put forth

as a model for overhauling the EPA's more general trade secret policies under 40 C.F.R. part 2, subpart B (Lewis 2000).

EPCRA is divided into three subchapters, the first addressing emergency planning and release notification (sections 301-305), the second involved with reporting requirements to local and state emergency planning commissions, as well as to the EPA itself through the Toxic Release Inventory (TRI) (sections 311-313), and the third dealing with the general provisions of trade secrets, citizen action, and enforcement of the regulations (sections 321-330) (Wolf 1996, 222).

The general trade secret provisions are laid out in section 322 (42 U.S.C. § 11042). Trade secret claims are in relation to a specific chemical identity—that is, a facility may withhold the specific identifying chemical characteristics and simply submit the generic chemical class (42 U.S.C. § 11042(a)(1)). The submitting facility cannot have submitted the specific chemical identity to another entity, must have taken "reasonable measures" to ensure confidentiality, and must show that public release of the specific chemical identity would cause a competitive disadvantage (42 U.S.C. § 11042(b)(1) and (3)). In addition, the information cannot be required for submittal under any other federal or state law, and cannot be "readily discoverable through reverse engineering" (42 U.S.C. § 11042(b)(2) and (4)). The specific regulations promulgated by the EPA are to align with the Occupational Safety and Health Administration's trade secret provisions (42 U.S.C. § 11042(c)). This is a prominent design feature throughout EPCRA, as the emphasis on the public's right to know about hazardous chemicals is modeled on the previously-established worker right to know under the Occupational Safety and Health Act of 1970 (Wolf 1996, 225). Further provisions in the section lay out procedures for reviews (42 U.S.C. § 11042(d)), and exceptions for information given to health professionals (42 U.S.C. § 11042(e))

and the release of adverse effects of chemicals (42 U.S.C. § 11042(h)). Penalties for frivolous claims (42 U.S.C. § 11045(d)(1)) and for disclosure of trade secret information (42 U.S.C. § 11045(d)(2) are also included: $25,000 for the former and $20,000 and/or up to a year imprisonment for the latter.

Although it is the last subchapter that deals explicitly with trade secret provisions, it is the interaction with the requirements of the first two subsections that generate submissions that require the use of these provisions. Sections 303(d)(2), 303(d)(3), 311, 312, and 313 all require submissions that contain specific chemical identities that can be withheld as trade secrets (EPA 2012, 1). Section 303 addresses submissions to the State Emergency Response Commissions (SERC) and Local Emergency Planning Commissions (LEPC) required by section 301, information required to create and update emergency plans (42 U.S.C. § 11003-11004). Sections 311 and 312 require submission of the Material Safety Data Sheets required for each chemical by OSHA, and an inventory list of those chemicals, to those same commissions, as well as to local fire departments (42 U.S.C. § 11021-11022). The information collected under these sections fall primarily under the emergency planning goal of EPCRA, and the decentralized structure for implementation of this section make it difficult to obtain or study the relevant information.

Section 313, however, which creates the Toxic Release Inventory (TRI), which requires submission to EPA of the amounts and chemicals manufactured and processed above a certain volume threshold (42 U.S.C. § 11023). The centralized, public nature of this database addresses the public right-to-know aims of EPCRA. There is evidence that the information provided to the public under TRI has had a positive effect in curbing emissions (e.g., Khanna, et al. 1998, Konar and Cohen 1997). However, the question of the precise effects of EPCRA on public health and safety, and environmental quality, requires a more thorough understanding of the scope and

stringency of requirements for claiming a trade secret to determine how much information on chemicals and the hazards they pose is ultimately hidden from public view by successful trade secret claims. This understanding is in turn contingent on the impact of EPCRA's design on the behavior of implementing agents and policy targets, and the relative discretion these two sets of actors are provided in determining what information eventually becomes protected as trade secrets. We turn now to the policy design theory literature to help us develop this more thorough understanding of the structure, intent, and impact of EPCRA's trade secret protections.

Policy Design Theory and the Behavior of Agents

In the most basic terms, policy design is the "field of policy studies devoted to the systematic examination of the substantive content of policy" (Smith and Larimer 2009, 181). The field rests on the perspective that public policies possess an architectural design, or framework, of ideas and implementation tools to be identified and examined (Fischer, Miller, and Sidney 2007). It seeks to examine the roots of problem definitions, to analyze competing values that assign meaning to problems, to observe the values that drive solutions or goals to solve problems, to identify how reality is constructed in the context of policymaking, to uncover the political power that guides the policy process and its components, the agents, implementation structures, target groups, tools, rules, rationales, and assumptions that together constitute a policy solution (Ingram, et al. 2007; Schneider and Ingram 2009; Schneider and Sidney 2009; Smith and Larimer 2009). It is applied as a stand-alone framework or in conjunction with other theories of the policy process (Ingram, et al. 2007; Schneider and Sidney 2009).

The framework asserts that the policy process is guided (or manipulated) by values and based on reality as constructed by those in political power (Smith and Larimer 2009). Those

working with the framework have gravitated toward such questions as: “Whose values are sanctioned by the coercive powers of the state?” (Smith & Larimer 2009, 181); “Why are some treated so well by policy and others so poorly, when all are equal before the law?” (Schneider and Ingram 2009, 2); and “In what ways are policy designs implicated in inequality (in participation, in opportunities, in resources, in equality of life)?” (Schneider and Ingram 2009, 2). However, the origins of the conceptual components of policy design theory concern the structure and underlying logic and informational base of statutory and regulatory design, and the impacts of design elements on implementation and on policy outcomes vis-à-vis the policy goals articulated in a particular statute or regulation.

Schneider and Ingram (1988, 1990) emphasized that public policies generally attempt to motivate groups to do things they might not otherwise do. They proposed that tools, rules, and assumptions (or implicit theories) link implementation agencies, target populations and objectives or goals of statutes together into unique designs, or blueprints (Ingram and Schneider 1990). Policy designs thus motivate implementing agencies and target groups to make decisions and take action to influence behavior relative to policy goals (Ingram and Schneider 1990; Schneider and Ingram 1988, 1990).

While a significant number of applications of policy design theory exist, most are focused on the social construction of reality by policymakers and the resulting social construction of target populations (Ingram, et al. 2007; Pierce et al. 2014; Schneider and Sidney 2009), rather than questions related to the design-driven behavior of implementing agents and targets within the rationality created by the logic of a policy design. We are particularly interested in expanding application of the theory to the agents designated in policy, and to compare the behavioral assumptions about and rules, tools, and rationales directed toward agents with those directed

toward policy targets. Through the policy design and social construction theory lens, what are the behavioral assumptions underlying policy designs regarding agent behavior? What kinds of tools, rules, and rationales directed toward agents appear in policy designs as a result of those assumptions? How does the behavior of agents reflect those policy design assumptions and components? How does this behavior affect policy implementation with respect to policy outcomes intended by the goals of policy design? How are agents constrained or enabled relative to the constraints (or lack thereof) imposed on targets?

Policy designs vary in detail by restricting or allocating discretion to implementing agencies, which in turn, may prompt or discourage agents to "add value" to the statutory design during the implementation process through their discretion (Ingram and Schneider 1990). Ingram and Schneider (1990, 74-82) identify four prominent schools of thought regarding the patterns of statutory discretion provided to agents, and they describe the assumptions of each approach as it relates to the context of implementation:

1) ***Strong Statute Approach:*** In theoretical terms, a strong statute sets clear, reliable and precise goals and objectives. It specifies the tools, rules, assumptions and processes. It provides distinct directives for the structural links between agencies and targets. It leaves little, if any, discretion to agents. It assumes that ambiguity or inconsistencies may lead to disagreements among the agencies and/or the targets leading to unintended effects. The strong statute approach assumes that compliance is the measure of successful policy outcomes.
2) ***Wilsonian Perspective:*** The Wilsonian perspective, like the strong statute approach, sets clear, reliable and precise goals and objectives. Yet, "it grants wide discretion to administrative agencies on other matters, including organizational structure,

specification of target populations, rules, tools, and selection of causal theories" (77). The statute holds agents accountable for successful implementation of goals, yet it keeps agencies separated from the politics of policy. It assumes that agencies are motivated to provide the particulars over the means to achieve the goals. It also assumes that agency accountability is the measure of successful policy outcomes.

3) ***Grass Roots Approach:*** The grass roots approach to statutes purposefully leaves goals and objectives broad and vague with significant levels of ambiguity. Discretion is delegated to the lowest level agency (may be a local level agency) or even to the target population itself. The design allows local level agencies and/or target populations latitude to adapt the tools, rules, and processes to uniquely respond to local circumstances. The perspective assumes that local goal achievement is the measure of successful policy outcomes, rather than statute compliance or higher-level agency accountability.

4) ***Support Building Approach:*** The support building approach to statutes emphasizes rules of participation for negotiation and resolution of conflict, or consensus-building, rather than emphasis on instrumental goal achievement. Discretion is not necessarily based on hierarchy, but more widely allocated to various agent levels in mixed patterns in a way that motivates participation (for both opposition and support) and leadership to facilitate and coordinate agreement. The process is not normally specified. The perspective assumes that political consensus is the measure of successful policy outcomes, rather than compliance, accountability, or goal achievement.

Schneider and Ingram (1997, 91) later identified a fifth approach or design, called the ***Privatized Implementation Design***, which allows various levels of government to contract with private-sector organizations for some or all of operational implementation. Allocation of discretion varies among these arrangements dependent upon what is permitted by the statute and the scope of service delivery by the private organization.

Although these statutory design types are highly generalized, they nevertheless offer enough guidance for scholars to derive hypotheses about the effects of a particular design type with respect to the behavior of implementing agents, and the behavior of policy targets vis-à-vis the agents. For example, scholars might test the proposition that a policy reflects a Wilsonian design by predicting that the implementing agent has issued rules that are devoted extensively to defining what or who is a relevant policy target. A further hypothesis following the proposition of a Wilsonian design is that the implementing agent will have designed rules that require target eligibility in an evidentiary process on the record, providing the agent accountability the Wilsonian design seeks. We now turn to discussing the hypotheses we have derived about the policy design of EPCRA's trade secret provisions, based on policy design theory and the EPCRA legislative history.

The Strong Statute Design of EPCRA's Trade Secret Requirements

Based on the definitions above, we propose that EPCRA's trade secret provisions constitute a strong statute policy design. This proposition is supported by the evidence in the legislative history and by a plain reading of the statutory provisions, which are highly detailed and specific about what constitutes a trade secret and how a trade secret claim must be structured, presented, and processed. There are also several specific options for further review

imposed on the EPA's decisions with respect to trade secret claims. As Rep. Swift argued in presenting the conference report to the House before EPCRA's passage, "This legislation lays out carefully what the parameters are. It is not just a case of anyone being able to assert that there is a trade secret. There are specific provisions which must be met so that it in fact is a legitimate trade secret" (131 *Congressional Record* H 11069). As Sen. Robert Stafford (D-VT) explained in presenting the conference report to the Senate, "The showings the [trade secret] claimant must make at the time the trade secrecy claim is submitted are set out clearly in the statute. The Environmental Protection Agency must determine whether the submitted justification for the claim, assuming its veracity, meets the substantiation requirements of section 319(b)" (132 *Congressional Record* S 14895).

What, however, would one specifically expect to see in the language of the statute, especially with respect to the language aimed at controlling the behavior of agents and targets, that would be consistent with a strong statute structure? Following the description in the literature, we propose the following statutory design hypotheses (SDH):

SDH1: The statute restricts the discretion of the implementing agent through more frequent directive language relative to permissive language.

SDH2: The statute severely limits agent judgment about the validity of trade secret claims.

SDH3: The statute severely restricts the discretion of targets with respect to the information content in trade secret claims.

SDH4: The design and content of the implementing regulations closely follows the design and content of the statutory language.

We could test these hypotheses with a careful reading and presentation of the statutory text. However, drilling beneath the surface of the language to reveal the "institutional grammar" of the statute provides a way to organize and analyze the evidence in a manner that increases confidence in the results of the hypothesis tests. We next present our procedures for the use of the institutional grammar tool and the results of using this analytical method.

The Institutional Grammar of EPCRA's Trade Secret Provisions

The concept of institutional grammar emerged from the work of Elinor Ostrom and her colleagues in their development of the institutional analysis and development (IAD) framework. The IAD framework represents an effort to theorize about the nature of collective action and the governance structures that emerge from the efforts of groups and communities to organize for collective action, and the institutional interdependencies that can be found in those emergent governance structures. Crawford and Ostrom (1995, 2005) developed the institutional grammar tool "to unravel the minute components—analogous to genetic codes in living cells—of formal institutions, such as policies, laws, legislation, and regulations" (Siddiki, et al. 2011, 81), with the policy analytic aim of understanding how institutions of collective action structure the behavior of individuals and ultimately why some institutions perform better than others. The tool is applied to "institutional statements," which may be "spoken, written, or tacitly understood in a form intelligible to actors" engaged in collective action. Such statements may take the form of strategies, norms, or rules, with each having a distinctive grammatical structure based on five core elements: "The Attribute [or agent] (A), Deontic (D), aIm (I), Condition (C), and the Or else (O) [the penalty or consequence]" (Siddiki, et al. 2011, 81 citing Crawford & Ostrom, 1995, 584).

Although Crawford and Ostrom distinguished strategies from norms, and both from rules, with strategies having an AIC structure, norms ADIC, and rules ADICO, Siddiki, et al. argue that for the analysis of formal policies, all institutional statements are likely to take the form of rules because most legislative language is essentially prescriptive, that is, "assumed to be enforceable (i.e., have an Or else) by some agents within the policy process" (Siddiki, et al. 2011, 82). Furthermore, Siddiki, et al. (2011, 2012) introduced an additional element to the five-component IGT structure, the oBject, "defined as the inanimate or animate part of a statement that is the receiver of the action described in the aIm and executed by the agent in the Attribute" (Siddiki, et al. 2011, 85). Introduction of the oBject is consistent with basic grammar and sentence structure in that there is often a second noun that is the receiver rather the initiator of the verb's action. Hence, the oBject code "helps distinguish the actor (Attribute) from what the actor is acting upon (object)" (85). It is also useful for distinguishing between two animate actors in a statement to determine which one is the Attribute (86).

To reiterate, our principal aim in undertaking an institutional analysis of the trade secret provisions in EPCRA is to gain a better understanding of the policy's structure and operational logic and thus provide a firmer foundation for analysis of such policies that have such high current salience and thus have sparked the search for possible refinements and alternatives. This is consistent with the contentions of Crawford and Ostrom in developing the institutional grammar tool, that "clear categorization of the basic elements that constitute policies is necessary for sound policy analysis" (Siddiki, et al. 2011, 81). The use of the IGT also allows us to test the efficacy of policy design theory to guide the institutional analysis that should ensure a more robust policy analysis.

Coding Methodology

We generally followed Siddiki, et al. (2011) in coding the EPCRA trade secret provisions, using their ABDICO formulation of the institutional grammar tool (83). Specifically, the Attribute represents the animate actor that is expected to execute the aIm of the statement, and includes all relevant descriptors (84). The oBject receives the action carried out by the Attribute, typically the direct object in a general grammatical dissection of a statement (85). The oBject, too, is coded including all relevant descriptors. The Deontic ranges from permissive to prescriptive, determining whether the aIm is permitted, obliged, or forbidden, i.e., "may," "shall," or "shall not" (84). The aIm is the goal or action to which the Deontic refers, and does not include qualifiers, as all qualifiers of the aIm are coded under Conditions (84). Conditions may not include all relevant conditional portions of the statement, as many of these may fall under the oBject or Attribute—only those conditional statements referring directly to the aIm are coded as conditions. Finally, the Or else element states the punitive action that is to be taken if the rule given by the Deontic and aIm is not followed (85).

Coding was carried out in four distinct steps. First, the relevant sections of EPCRA governing trade secrets (42 U.S.C. § 11042, 11043, 11045, and 11046) were broken down into a set of 47 statements for coding. Essentially, as suggested by Siddiki, et al. (2011), units of observation were created by identifying all sections, subsections, and headers, and were then subdivided into, generally, single-sentence units for coding (88). Then, each author independently coded each identified statement, to establish inter-coder reliability (89). After all statements had been coded, we discussed each statement to reach a consensus coding. Finally, we compiled the results, looking at the elements present in each statement (including those

elements that were determined to be implied by the statement), and identifying the Attribute and accompanying oBject, Deontic, aIm, and Or else.

General Results and Tests of Statutory Design Hypotheses

The descriptive results of the coding can be found in Table 1, which follows the convention for presenting IGT descriptive data in Siddiki et al (2011, 95, table 4).[1] As Table 1 shows, and remarkably similar to the findings in the Siddiki, et al. (2011) analysis of a Colorado state statute regulating aquaculture, the vast majority of the statements in the EPCRA trade secret provisions are of the ABDI/ABDIC construction, that is, prescriptive statements without an explicit "Or else," or penalty clause. The only statements with explicit penalties are associated with statements regarding trade secret claimants submitting false or misleading information as part of a trade secret claim, and those statements prohibiting the intentional disclosure of information entitled to trade secret protection outside the permissible paths for disclosure (e.g., health professionals in an emergency).

As the lower half of Table 1 shows, these rule-structured statements are primarily aimed at the actions of the EPA, although combined statements with the other two major types of Attributes outnumber those with the EPA Administrator as the agent. Furthermore, almost twice as many of the statements are prescriptive as are permissive or discretionary. Finally, and not surprising for the type of regulatory scheme ECPRA created, the primary object of the rule statements in the trade secret provisions is information, in most cases about chemical identities. Trade secret claimants make up only a small number of the objects in the trade secret provisions, reinforcing that it is how actors handle information that is the primary aim of EPCRA regulation.

1. Raw coding results are available from the lead author.

TABLE 1
Summary of Institutional Statements

STATEMENTS	**42 USC 11042, 1-14**	**42 USC 11042,15-28**	**42 USC 11043, 45, 46**	**TOTALS**
ADIC/ABDI/ABDIC	14	14	17	45
ADICO/ABDICO			2	2
TOTAL	14	14	19	47
Modal Attribute	Person [with info] (7) Administrator (6) Petitioner (1)	Administrator (8) Trade secret claimant (4) Governor/State Com (2) Person (1)	Owner/Operator (8) Administrator (3) Person (4) TS Claimant (1)	Administrator (17) Owner/Operator/Claimant (12) Person/Any person (11)
Deontics	May (7) Shall/shall no (6)	Shall (10) May (3) Must(1)	Shall/shall not (11) May (7)	Shall/shall not/must (28) May (17)
Modal oBjects	Information (7) Regulations (2) TS claimant (2) Judicial review (1)	Information (10) TS claimant (2) Admin determination (1) Procedures (1) Judicial review (1)	Information (6) Confid agrmt (3) Action/remedy (3) Penalties (2) Jurisdiction (1)	Information (23) Reg/legal actions (8) TS Claimant(4) Procedures/regs (4) Confid agrmt (3)

These very basic descriptive results are not particularly surprising, but they do give a good first approximation of the design character of the trade secret provisions in EPCRA. To dig deeper into the design structure requires a more cross-cutting analysis, however, and we now turn to the statutory design hypotheses derived from policy design theory and the EPCRA legislative history. The data in Table 2, which is a contingency analysis of the most prominent Attributes (agents) cross-tabulated with the Deontic terms as a rough approximation of the discretion afforded the agents, provide evidence for rejecting the null hypotheses associated with SDH1, SDH2, and SDH3, and thus support for all three hypotheses. The contingent relationship between Attribute and Deontic in the table is moderately strong and statistically significant at the $p < .01$ level. As Table 2 shows, in the statutory provisions in which the EPA Administrator is the active agent, the agency is given very little latitude. The only instances in which the EPA has discretion involve initiating a determination, in the absence of a filing or citizen petition, concerning whether withheld information constitutes a trade secret, and whether to impose a penalty for frivolous trade secret claims administratively or by taking the offending party to court. In affirmation of SDH1, then, the statute restricts the discretion of the implementing agent through far more frequent directive language relative to permissive language.

With respect to SDH2, the high proportion of prescriptive statements directed at the EPA include all of the statements regarding what criteria to apply to assess the validity of trade secret claims. There is no language in the statute suggesting that the agency has the leeway to add further criteria or modify the criteria specified in the statute. EPA's most prominent discretion in the entire statute pertains to the list of chemicals subject to reporting requirements, although even this list was initially dictated by the statute.

The results in Table 2 in conjunction with a further examination of the coded statements also support SDH3. For statutory statements in which facility owner/operators and trade secret claimants, essentially the same entities, are the agents, somewhat greater latitude is provided in

TABLE 2
Discretion Afforded Primary Agents

	DEONTIC		
ATTRIBUTE	Shall/not/must	May/May Not	Total
Administrator	14 (82%)	3 (18%)	17 (100%)
Owner/Op/Claimant	8 (61%)	5 (39%)	13 (100%)
Person/Health Prof	3 (23%)	10 (77%)	13 (100%)
Total	25 (58%)	18 (42%)	43 (100%)

Chi-square = 10.72
Correlation = 0.47
P-value = 0.005
Freeman-Halton extension of Fisher's exact test = .0045 (two-tailed test)

the statute in comparison with the discretion afforded the implementing agency. However, all these more permissive statements have to do with the decision to initiate a trade secret claim. Once the decision is made to file a claim, these agents are subject to very prescriptive language regarding the processes and contents of the filing.

Finally, to test SDH4, additional data are required. Appendix 1 provides a side-by-side comparison of the statutory language designating the criteria for establishing a valid trade secret claim compared with the content of the EPA's Trade Secret Substantiation Form. The full complement of EPA regulations implementing the trade secret provisions in EPCRA follow

closely the statutory language. Appendix 1 is the best illustration of this close correspondence. With this evidence, we can reject the null hypothesis and affirm the likely validity of SDH4.

Tests of Implementation Hypotheses

Analyzing the trade secret provisions in EPCRA using the institutional grammar tool has generated considerable support for the strong statute proposition. One of the prominent features of that strong statute design is the highly specific criteria for what constitutes a legitimate trade secret, and the highly structured process for submission and evaluation of trade secret claims. On the basis of policy design theory and the findings so far, we derived three hypotheses about the implementation of EPCRA's trade secret protections.

ImH1: The number and frequency of trade secret claims has been very low.

ImH2: Most trade secret claims have been approved.

ImH3: The EPA has exercised limited discretion in evaluating and approving or denying trade secret claims.

We experienced considerable difficulty in obtaining current data from the EPA regarding the number of trade secret claims and the internal processes for evaluating and deciding on the claims. Indeed, as recently as 2006 the EPA did not itself have a complete accounting of EPCRA trade secret claims. In a statement to the Office of Management and Budget supporting renewal of its "Information Collection Procedure for EPCRA Trade Secret Regulations" the agency stated that the number of claims it was reporting for EPCRA sections 303 to 312 "may not accurately reflect the actual number of claims" because it had "not conducted any review of claims submitted under EPCRA sections 303 to 312 to determine if each package is complete" (EPA 2012, 12). Although we worked extensively with EPA headquarters staff to obtain the data

we needed, we could not complete negotiations in time to obtain the data for this paper. However, the data in EPA's information collection renewal request (ICR) does shed some light on the implementation of EPCRA's trade secret provisions.

EPA's 2012 ICR shows an estimated 991 trade secret claims over Reporting Years (RY) 2009-2011 for EPCRA sections 303, 311, 312, and 313, the sections which make allowances for trade secret requests (EPA 2012, 14). The highest number of claims, 913 of that 991, came under section 312, which requires submission of Emergency and Hazardous Chemical Inventory Forms to state and local emergency response officials. Because these forms are submitted to state and local officials, EPA's report contains only an estimate, and a thorough study of the number of these claims submitted and accepted by EPA officials is beyond the scope of the data we have thus far been able to collect. Similarly, section 311 requires the submission of Material Safety Data Sheets, as required by OSHA, and are beyond what we have been able to gain access to. For Section 303, relating primarily to Local Emergency Planning Commission submissions of emergency plans and facility plans, EPA reported no trade secret claims over the reporting period.

Section 313 data provide more opportunity for analysis, given the central collection of data by the EPA and its public nature via the Toxic Release Inventory (TRI). As Table 3 shows, in RY 2009, there were 9 trade secret claims made by 3 facilities (EPA 2012, 13). The TRI database shows 9 trade secret reports by 3 facilities, so all claims were accepted (EPA 2009). For RY 2010, there were 6 claims by 2 facilities, all of which were accepted, again (EPA 2012, 13; EPA 2010). For RY 2011, there were 4 claims by 1 facility, with all accepted, as well (EPA 2012, 13; EPA 2011).

Table 4
Section 313 Trade Secret Claims as a Percentage of Total Reports*

Year	Total Reports	Total Facilities	Number of Trade Secret Claims	Number of Facilities Filing Claims	Number of Claims Accepted	Percentage of Reports Claimed to be Trade Secret	Percentage of Facilities Filing Trade Secret Claims
2006	90,795	23,870	11	3	11	0.0121%	0.0125%
2007	88,879	23,354	9**	4	10**	0.0101%	0.0171%
2008	86,608	22,726	9**	4	8**	0.0104%	0.0176%
2009	90,912	21,688	9	3	9	0.0099%	0.0138%
2010	81,053	21,458	6	2	6	0.0074%	0.0093%
2011	80,787	21,329	4	1	4	0.0050%	0.0047%

* Data from EPA 2009b, EPA 20012, and EPA TRI Database, http://www2.epa.gov/toxics-release-inventory-tri-program/tri-basic-data-files-calendar-years-1987-2012
***It is likely that EPA accounted for one of the claims listed under TRI in 2007 as a 2008 claim, given that there are more reported to be accepted in 2007 than were reported to be claimed*

Although the EPA did not reject any claims over this three-year period, it should be noted how few trade secret claims were filed. This stands in contrast to the number of claims estimated to have been filed under Sections 311 and 312, the emergency response reporting requirements, which rely on the MSDS. The contrast is best explained by the differences in reporting requirements between the two sections. The threshold after which chemicals used at a facility must be reported under TRI, section 313, is 10,000 pounds, and is 25,000 pounds for chemicals manufactured or processed at a facility (42 USC § 11023(f)(1)). The threshold for reporting chemicals through MSDS under sections 311 and 312, however, is 500 pounds (or less, in select cases) for Extremely Hazardous Substances, and 10,000 pounds for other hazardous chemicals (based on regulations promulgated by the Administrator under direction of the statute but not contained in the statute). Given the more stringent reporting requirements, and the higher volume of reports that accompanies these requirements, it is unsurprising that there would be many more trade secret claims under the latter two sections. It is also possible that many chemicals that

require trade secret protection are in a more experimental stage, rather than in wide production within the facility, and so are kept in lesser quantities, leading to a higher volume of trade secret claims even among the greater reporting numbers.

Our suspicions on this score are reinforced by the data. In RY 2009, there were 90,912 reports filed by 21,688 facilities, with only 9 trade secret claims by 3 facilities (EPA 2009). In addition, in RY 2009, no facility that submitted a trade secret claim among multiple chemical reports claimed only trade secrets. In other words, facilities did not simply claim trade secrets on all chemical reports as a matter of course, but rather selected which specific chemical identities they would protect. The same patterns held for RY 2010 and 2011, as well. The only discrepancies between number of claims filed and number accepted came in 2007-2008. In 2007, the EPA recognized 9 claims filed and 10 accepted, while in 2008 it showed 9 claims filed and 8 accepted. It is likely that one of the claims listed under 2007 in the TRI data was counted under 2008 by EPA, and so from 2006-2011, it appears that all claims filed were accepted. It should also be noted that the same companies tended to make claims year after year. Therefore, there was a lesser likelihood of a facility filing a claim that was unsubstantiated given that essentially the same claim had been made the year before.

Although the limited data do not support any judgments about the appropriateness of the claims made and accepted, and even less so about the appropriateness of claims foregone (i.e., whether trade secret laws under EPCRA are so strict as to inhibit what may be legitimate claims), these data at least suggest that trade secret claims are being made parsimoniously. With respect to our implementation hypotheses, therefore, the data suggest support for ImH1, but without an accounting of the total number of Emergency and Hazardous Chemical Inventory Forms submitted to state and local emergency response officials, full confirmation of this

likelihood with respect to the 900+ trade secret claims filed under EPCRA Section 312 is beyond our reach presently. EPA approved all trade secret claims under EPCRA Section 313, but it is such a small number, and the time frame is so limited that confirmation of ImH2 remains speculative as well. Finally, a test of ImH3 is beyond the reach of the current stage of this research as we have not yet been given access to EPA internal documents or to staff in a manner that would allow us to interview them about procedures and decisions.

Discussion and Implications

Our analysis of the trade secret provisions in EPCRA strongly suggest that these provisions were designed stringently and that their implementation has so far been in close conformance with that stringency, although much more data and analysis are needed to confirm this conclusion.

From the perspective of policy analysis and policy prescription, we believe our application of the theory and tools of policy design theory and the institutional analysis and development framework shows enough promise for illuminating the deep structure of trade secret protections that scholars and activists ought to pursue expanding their application to the existing and newly developed state laws and regulations regarding information disclosure and trade secret protections associated with the burgeoning use of hydraulic fracturing to access natural gas deposits. This effort would fit nicely into the policy agenda taking shape in the wake of broader questions raised about the effectiveness of information disclosure as a regulatory strategy.

From a theoretical perspective, our research suggests promise for pushing forward the development of the dimension of policy design theory that has received comparatively less

attention from policy scholars. A particularly fruitful path, we suspect, is to match variations in policy design types with the degree of control imposed on agents and target populations, as depicted in Table 4. By drawing upon the four most common patterns of statutory discretion provided to agents identified by Ingram and Schneider (1990), we propose organizing assumptions about agent behavior related to policy design theory along a continuum of high versus low levels of discretion, and about target populations' behavior related to policy design theory along a continuum of high versus low levels of discretion. We propose that these two dimensions form the four common patterns of statutory discretion provided to agents *and* target populations. By adding the continuum of target population discretion, we may begin to investigate the type and amount of value added to the statutory design, with respect to desired outcomes, not only by the implementing agents, but also by the target populations. The four patterns of levels of discretion assigned to agents and target populations by a statute for further investigation are:

1) ***Strong Statute Approach:*** A pattern of relatively low level of discretion would be provided by the statute to both agents and target populations.
2) ***Wilsonian Perspective:*** A pattern of relatively high agent discretion and relatively low target population discretion would be delegated by the statute.
3) ***Grassroots Approach:*** A pattern of relatively low agent discretion and relatively high target population discretion would be delegated by the statute.
4) ***Support Building Approach:*** A pattern of relatively high levels of discretion would be provided by the statute to both agents and target populations.

With further development, these ideas may provide sufficient foundation for empirical testing across a wide spectrum of policy arenas and specific policy designs.

TABLE 4
Policy Design Types and Control of Discretion

	High Target Discretion	Low Target Discretion
High Agent Discretion	Support building	Wilsonian
Low Agent Discretion	Grassroots	Strong statute

Conclusion and Further Research

For scholars interested in the further development of policy theories and the methods and tools for testing them, this is an exciting time, as there is work underway across a broad front, with important advances appearing regularly in peer reviewed outlets. Likewise, scholars motivated to investigate questions raised about the use of and control over information in the regulation of fracking, or in environmental, health, and safety protection more broadly, the time is ripe to undertake research that is both theoretically well-informed and policy relevant. Our own research at the intersection of these two trends is in its early stages. Clearly, we must first complete our data collection on trade secret claim submissions under EPCRA and the decision process EPA uses to evaluate and reach final dispositions on such claims. A formal Freedom of Information Act request may be required in this regard. Also, we intend to complete an IGT analysis of the EPA regulations promulgated under the trade secret provisions in EPCRA and compare the results with our analysis of the statute.

In addition, although we examined the effects of statutory design on the discretion of both agents and targets, and found EPCRA to be of strong statute design relative to both, it may

be useful to further subdivide the targets between problem-affecting and problem-affected, here represented by facilities handling toxic chemicals, and the general public and health professionals, respectively. We may so describe them because they are on opposite sides of the problematic situation the statute is attempting to resolve. The language pertaining to the latter is significantly less restrictive than that pertaining to the former. We may propose for future research that the relative restrictiveness of language relating to the behavior of problem-affecting actors increases as policy makers perceive the conditions in more dire terms. Given the focusing events of Bhopal and Institute, West Virginia, the strong statute design giving greater discretion to the problem-affected and greatly restricting the problem-affecting is not surprising, and it would be valuable to analyze statutory design characteristics across a broad sample of policies with respect to the relative dramatic impact of the focusing events.

Beyond these possibilities for the forward progress of our research, we intend to expand the scope by applying our analysis to all the state laws and regulations related to information disclosure and trade secret protection. This kind of cross-state comparative analysis may also be expanded to cross-national analysis, beginning with Canada and Australia, and moving on to the European Union. Situating this research in the larger context of trade secrecy law, policy, and scholarship might also be a fruitful future avenue for our research. It is undeniable in any case that questions about information control and disclosure will remain high on policy agendas and thus ripe for scholarly investigation for some time to come.

Appendix 1
Comparison of Trade Secret Substantiation Requirements:
Statutory Language vs. EPA Regulations and Forms

U.S.C. § 11042 Substantiation Requirements	**EPA Substantiation Form Requirements**
Such person has not disclosed the information to any other person, other than a member of a local emergency planning committee, an officer or employee of the United States or a State or local government, an employee of such person, or a person who is bound by a confidentiality agreement, and such person has taken reasonable measures to protect the confidentiality of such information and intends to continue to take such measures.	Describe the specific measures you have taken to safeguard the confidentiality of the chemical identity claimed as a trade secret, and indicate whether these measures will continue in the future.
	Have you disclosed the information claimed as a trade secret to any other person (other than a member of local emergency planning committee, officer, or employee of the United States or a State or local government, or your employee) who is not bound by a confidentiality agreement to refrain from disclosing the trade secret information to others?
	Has your company or facility identity been linked to the specific chemical identity claimed as a trade secret in a patent, or in publications or other information sources available to the public or your competitors (of which you are aware)?
	To what extent is the chemical claimed as a trade secret available to the public or your competitors in products, articles, or environmental releases?
The information is not required to be disclosed, or otherwise made available, to the public under any other Federal or State law.	List all local, State, and Federal government entities to which you have disclosed the specific chemical identity. For each, indicate whether you asserted a confidentiality claim for the chemical identity and whether the government entity denied that claim.
Disclosure of the information is likely to cause substantial harm to the competitive position of such person.	Explain why your use of the chemical claimed as a trade secret would be valuable information to your competitors.
	Indicate the nature of the harm to your competitive position that would likely result from disclosure of the specific chemical

	identity, and indicate why such harm would be substantial.
The chemical identity is not readily discoverable through reverse engineering.	If this use of the chemical claimed as a trade secret is unknown outside your company, explain how your competitors could deduce this use from disclosure of the chemical identity together with other information on the Title III submittal form.
	Describe the factors which influence the cost of determining the identity of the chemical claimed as trade secret by chemical analysis of the product, article, or waste which contains the chemical (e.g., whether the chemical is in pure form or mixed with other substances).

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