Duke Law Journal

VOLUME 53 APRIL 2004 NUMBER 6

COMMONS IGNORANCE: THE FAILURE OF ENVIRONMENTAL LAW TO PRODUCE NEEDED INFORMATION ON HEALTH AND THE ENVIRONMENT

WENDY E. WAGNER†

ABSTRACT

One of the most significant problems facing environmental law is the dearth of scientific information available to assess the impact of industrial activities on public health and the environment. After documenting the significant gaps in existing information, this Article argues that existing laws both exacerbate and perpetuate this problem. By failing to require actors to assess the potential harm from their activities, and by penalizing them with additional regulation when they do, existing laws fail to counteract actors' natural inclination to remain silent about the harms that they might be causing. Both theory and practice confirm that when the stakes are high, actors not only will resist producing potentially incriminating information but will invest in discrediting public research that suggests their activities are harmful. The Article concludes with specific recommendations about how these perverse incentives for ignorance can be reversed.

† Joe A. Worsham Centennial Professor, University of Texas School of Law. I am very grateful to Mary Graham, Doug Lacock, Dick Markovits, Tom McGarity, and Michael Walker and to participants at faculty workshops at the Arizona State University College of Law and the University of Arizona James E. Rogers College of Law for exceedingly helpful comments. Many thanks also to Brad Areheart, Natalie Asturtium, Katrin Flechsig, and Mark Holman for invaluable research assistance and technical support.

TABLE OF CONTENTS

> "Picture a pasture open to all."[1] In contrast to Professor Hardin's simple scenario, this commons has cows, but the land managers are not sure whether the cows number 12 or 120, and they do not know where or how much they graze. They are also not sure how much waste the cows produce, or how much of their grazing, waste, and traffic the land and surrounding surface waters can tolerate. Cattle owners, who have the best information about these questions, are disinclined to share it, much less invest resources in developing a more accurate measure of the damage that their cattle inflict on common property. In fact, these owners maintain that their cattle are not damaging the pasture but fertilizing it and discredit all information to the contrary. Now, how should one characterize the "tragedy of the commons"?

INTRODUCTION

Rational choice theory and the large body of laws premised on it understand that those who inflict invisible and costly harms on others are disinclined to document the problems, much less take responsibility for them.[2] Indeed, rational choice theory predicts that if wrongdoers are going to invest in research at all, they will dedicate resources to concealing and contesting incriminating information and producing exculpatory excuses and alibis. The criminal justice system is certainly familiar with this natural reaction to culpability.[3] Yet, for some reason, environmental law has largely failed to come to grips with this inescapable feature of human nature. Instead, environmental law innocently assumes that information linking actors to resulting invisible harms will arise serendipitously, and, even more surprising, that the actors will either volunteer or accept this

1. Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243, 1244 (1968).

2. *See, e.g.*, JOSEPH J. SENNA & LARRY J. SIEGEL, INTRODUCTION TO CRIMINAL JUSTICE 85–90 (6th ed. 1993) (discussing rational choice theory, which underlies criminal law's commitment to both general and specific deterrence); *see also* Part I.A. *infra*.

3. In fact, there is a facet of criminal law that focuses specifically on issues arising from the use of alibis. *See, e.g.*, Jack P. Friedman, Note, *Criminal Procedure—Alibi Instructions and Due Process of Law*, 20 W. NEW ENG. L. REV. 343, 351 (1998) (discussing whether the Due Process clause requires the trial court to provide jury instructions on the burden of proof for an alibi defense).

incriminating information without fuss or fanfare.[4] Perhaps most remarkable, leading theorists in environmental law often repeat these same errors, ignoring the problems that incomplete and contested information about the causes of environmental harm present to their idyllic assumptions.[5]

The inattention of environmental law and its scholars to the large gaps in information and regulated actors' incentives to perpetuate these gaps has been a costly oversight. Despite the enormous growth in environmental law and regulation since the 1970s, much of the scientific information needed to ensure environmental protection is

---

4. *See infra* Parts II–III.

5. Many of our nation's most prominent scholars, including Professors Cass Sunstein, Bruce Ackerman, and Richard Stewart, as well as many of the nation's leading environmental economists, presume that much of the information needed to set regulations is readily available and fail to consider the possibility that those engaging in externalities might enjoy superior information and have reasons to conceal it. *See infra* Part IV.A. Professor Garrett Hardin's classic article, "The Tragedy of the Commons," similarly assumes that the needed information on externalities is readily available and makes no mention of the inclination of his herders, polluters, and despoilers of public lands to cover and contest this incriminating evidence. *See* Hardin, *supra* note 1, at 1244–45. Hardin's classic is excerpted in the introductory chapter of every leading environmental law casebook and treatise in the United States. *See, e.g.*, ROGER W. FINDLEY & DANIEL A. FARBER, CASES AND MATERIALS ON ENVIRONMENTAL LAW 42–44 (5th ed. 1999); ROBERT V. PERCIVAL ET AL., ENVIRONMENTAL REGULATION: LAW, SCIENCE, AND POLICY 58–60 (3d ed. 2000); THOMAS J. SCHOENBAUM & RONALD H. ROSENBERG, ENVIRONMENTAL POLICY AND LAW: PROBLEMS, CASES, AND READINGS 46–50 (3d ed. 1996).

Even the Coase theorem, a model widely used to understand externalities regulation, erroneously assumes that any missing information can be discovered easily or at least with some investment, and this investment is simply counted as a cost of negotiation. *See* R. H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1, 15 (1960) (arguing that a frictionless market produces perfect outcomes, but lumping all information costs in the category of "transaction costs"); Joseph Farrell, *Information and the Coase Theorem*, 1 ECON. PERSP. 113, 117 (1987) (arguing that "[p]roperty rights and negotiation will not yield first-best outcomes when there is important private information, and that case is the one that should be examined"); Pierre Schlag, *The Problem of Transaction Costs*, 62 S. CAL. L. REV. 1661, 1664 (1989) (arguing that Professor Coase's "concept of transaction costs does not have the sort of theoretical intelligibility and operational applicability necessary to make the market-based transaction cost approach plausible"). If critical information on externalities resists discovery because it is known only to actors and remains stubbornly undiscoverable to others even with incentives and payments, or if the information is essential to initiate bargaining (because an externality is invisible and a party does not even know it is harmed), then categorizing incomplete information as simply a transaction cost is fatally oversimplistic. However, to the extent that Coase intended to show that information problems *are* one of the challenges to determining the appropriate point for government intervention, and that assuming them away makes all institutions work perfectly, the fact that some information resists discovery may be partly what Coase hoped to convey with his theory. *See* NEIL K. KOMESAR, IMPERFECT ALTERNATIVES: CHOOSING INSTITUTIONS IN LAW, ECONOMICS, AND PUBLIC POLICY 109–10 (1994) (taking this position with regard to Coase's intended argument).

still missing.[6] The quality of most air, water, and land in the U.S. is unknown, even though the country has devoted hundreds of pages of laws to regulating activities that threaten the environment. No one knows when industrial and manmade activities stress ecosystems beyond the breaking point or how to help the ecosystems recover, even though the effectiveness of some federal programs depends on this information. Scientific knowledge is insufficient to identify, much less test for, a variety of invisible hazards associated with household products, pesticides, food additives, and biotechnology products. Ignorance prevails in spite of elaborate licensing requirements that purport to protect the public health and environment from these hazards.[7]

This void in scientific knowledge is not inevitable. Science cannot answer all of the questions put to it, but modest investments in environmental monitoring and basic scientific research can make headway in isolating environmental and health problems that need attention. For example, research could determine the extent to which an oil refinery is polluting the air or a paper mill is polluting a river and the possible consequences of that pollution. Yet objective, reliable information vital to informing regulatory policy is generally unavailable.

These significant deficiencies in scientific knowledge result in large part from the failure of the environmental laws to require the production of basic information about the harms caused by polluting activities and hazardous products. Regulated actors, despite creating most of the need for this information, are excused under most environmental laws from providing any more than a partial inventory of their activities and are not required to track the resulting impact on public health and the environment.[8] In fact, in many circumstances

---

6. These problems are elaborated in notes 10–24 and accompanying text, *infra*.

7. *See infra* Part II.A.

8. Contrary to what currently occurs, responsibility for producing information on externalities should fall on the very actors who create and profit from externalities. *See infra* notes 31–33 and accompanying text. The notion that wrongdoers can best calculate the social costs of their accidents (or externalities) and decide whether to bear them through increased liability in light of private benefits is also a fundamental premise of Professor (now Judge) Calabresi's well-known theoretical analysis of tort liability. *See* GUIDO CALABRESI, THE COSTS OF ACCIDENTS: A LEGAL AND ECONOMIC ANALYSIS 166–73 (1970) (discussing the wisdom of placing accident costs on the cheapest cost avoider in product-related accidents).

This Article sidesteps the philosophical question of who originates an externality by assuming that the party who engages in polluting or manufacturing insufficiently tested toxic products imposes a nonreciprocal risk and is thus the party responsible for the externality. *See*

the laws actually deter regulated parties from volunteering information on the adverse effects of their activities. Regulators are more likely to greet such information with fines and increased restrictions than with regulatory rewards and letters of commendation.[9]

This Article documents the pivotal role that responsible actors play in perpetuating the scientific uncertainty that impedes the progress of environmental law. The Article begins in Part I by providing a considerable body of theory and practical evidence that identifies a number of remediable gaps in the body of scientific knowledge needed for regulation, but that also reveals that actors will actively conceal and contest the information necessary for regulation when it is in their interest. Part II then identifies multiple ways that the environmental laws fail to address remediable scientific uncertainties or require regulated actors to produce information within their superior control. Part III uncovers even more legal dysfunction, documenting the ways in which the laws not only excuse actors from responsibility for producing information regarding their activities, but actually provide wrongdoers with added legal opportunities for concealing adverse information and contesting the information produced by others. Part IV concludes by offering a series of reforms that could begin to counteract some of the most unnecessary problems in the current legal approach to addressing the information deficiencies that afflict environmental law.

I. THE IGNORANCE EQUILIBRIUM

Virtually every prominent expert panel convened to consider the effects of industrial activities on health and the environment expresses alarm at the dearth of research and basic information.[10] At

George P. Fletcher, *Fairness and Utility in Tort Theory*, 85 HARV. L. REV. 537, 543–51 (1972) ("[U]nexcused nonreciprocity of risk is the unifying feature of a broad spectrum of cases imposing liability under rubrics of both negligence and strict liability."). This assumption is fully consistent with the environmental laws' intention to assign responsibility for assessing the harm produced by activities on the actor. *See infra* notes 154–55 and accompanying text.

9. *See infra* Part III.A.

10. *See, e.g.*, COMM. ON ENVTL. RESEARCH, NAT'L RESEARCH COUNCIL, RESEARCH TO PROTECT, RESTORE, AND MANAGE THE ENVIRONMENT (1993); COMM. ON GRAND CHALLENGES IN ENVTL. SCIS., NAT'L RESEARCH COUNCIL, GRAND CHALLENGES IN ENVIRONMENTAL SCIENCE (2001); COMM. ON RESEARCH OPPORTUNITIES AND PRIORITIES FOR EPA, NAT'L RESEARCH COUNCIL, BUILDING A FOUNDATION FOR SOUND ENVIRONMENTAL DECISIONS (1997) [hereinafter NRC, BUILDING A FOUNDATION]; COMM. TO REVIEW THE EPA'S ENVTL. MONITORING AND ASSESSMENT PROGRAMS, NAT'L RESEARCH

present, only rudimentary models are available to estimate the effects of large-scale pollution on ecosystems,[11] and the validity of these models is only sporadically evaluated—if at all—using actual data.[12] Although scientists have progressed in developing a mechanistic

---

COUNCIL, REVIEW OF EPA'S ENVIRONMENTAL MONITORING AND ASSESSMENT PROGRAM: OVERALL EVALUATION (1995) [hereinafter NRC, ENVIRONMENTAL MONITORING AND ASSESSMENT PROGRAM]; 1998 WORKSHOP ON EMERGING DRINKING WATER CONTAMINANTS, NAT'L RESEARCH COUNCIL, IDENTIFYING FUTURE DRINKING WATER CONTAMINANTS (1999); STEERING COMM. ON IDENTIFICATION OF TOXIC AND POTENTIALLY TOXIC CHEMS. FOR CONSIDERATION BY THE NAT'L TOXICOLOGY PROGRAM, NAT'L RESEARCH COUNCIL, TOXICITY TESTING: STRATEGIES TO DETERMINE NEEDS AND PRIORITIES (1984) [hereinafter NRC, TOXICITY TESTING]. The National Science Foundation has recognized the dramatic undersupply and undersupport of environmental research relative to needs. *See generally* NAT'L SCI. BD., NAT'L SCI. FOUND., ENVIRONMENTAL SCIENCE AND ENGINEERING FOR THE 21ST CENTURY: THE ROLE OF THE NATIONAL SCIENCE FOUNDATION (2000), *available at* http://www.nsf.gov/pubs/2000/nsb0022/reports/nsb0022.pdf. The General Accounting Office (GAO) has produced narrower reports highlighting the substantial deficiencies in the available information on various environmental externalities. *See generally* U.S. GEN. ACCT. OFFICE, TOXIC SUBSTANCES: EPA'S CHEMICAL TESTING PROGRAM HAS MADE LITTLE PROGRESS (1990); U.S. GEN. ACCT. OFFICE, MAJOR MANAGEMENT CHALLENGES AND PROGRAM RISKS (2001). The president of the American Association for the Advancement of Science has bemoaned the rampant ignorance surrounding anthropogenic effects on health and the environment and, in her presidential address, called upon fellow scientists to assist in conducting desperately needed research on human impacts on the environment. *See* Jane Lubchenco, *Entering the Century of the Environment: A New Social Contract for Science*, 279 SCIENCE 491, 495 (1998) (urging fellow scientists to contribute to "the urgent need for improved understanding, monitoring, and evaluation to protect, manage, and restore the environment").

11. *See* Guidelines for Ecological Risk Assessment, 63 Fed. Reg. 26,846, 26,851 (May 14, 1998) (presenting an expanded flowchart of the EPA's ecological risk assessment framework that illustrates the simplistic state of environmental modeling). The EPA's struggle to develop an environmental monitoring and assessment program highlights parallel problems that arise in scientists' efforts to identify basic features of ecosystems, like indicators and endpoints, that can be used to understand the larger system. *See* NRC, ENVIRONMENTAL MONITORING AND ASSESSMENT PROGRAM, *supra* note 10, at 31 (questioning whether the monitoring program's primary goal—to be able to detect a 20 percent change in a ten-year period—has any scientific or policy relevance). One of the National Academy of Sciences' reports details the gaps in understanding for specific areas of environmental research, including research on the movement of contamination through soil, NRC, BUILDING A FOUNDATION, *supra* note 10, at 20, the effect of particulates on public health, *id.* at 22, balancing the risks in disinfecting drinking water, *id*. at 44, climate change, *id*. at 24, the ozone hole, *id*. at 42, synergies between large-scale environmental problems, *id.* at 56, and coastal waters, *id.* at 38.

12. *See* K. H. Reckhow & S. C. Chapra, *Modeling Excessive Nutrient Loading in the Environment*, 100 ENVTL. POLLUTION 197, 206 (1999) (discussing problems in water quality modeling, much of which stem from inadequate data, and concluding that "it should not be surprising that theoretically based improvements in a model often cannot be supported with the limited available observational data"); *see also* NRC, ENVIRONMENTAL MONITORING AND ASSESSMENT PROGRAM, *supra* note 10, at 64 (expressing "very serious doubts" as to whether the EPA's data collection system is "an appropriate solution to the long-term data and information processing requirements" for environmental assessments).

understanding of cancer, they have made only limited progress in determining how to assess, much less screen, hazardous substances for other harms, such as reproductive, neurological, hormonal, and developmental effects,[13] or how to account for variability in human susceptibility.[14] Regulators essentially cross their fingers and hope that current primitive carcinogenic assessments protect against these other harms, while toxicologists struggle to develop tests for amorphous changes in neurological and endocrine function.[15]

---

13. *See infra* notes 202–06 and accompanying text. Two of the largest barriers to assessing these types of risks are the lack of understanding of the mechanism of action for many of these effects, *see, e.g.*, COMM. ON HORMONALLY ACTIVE AGENTS IN THE ENV'T, NAT'L RESEARCH COUNCIL, HORMONALLY ACTIVE AGENTS IN THE ENVIRONMENT (2000) (identifying great scientific unknowns for hormonally active agents, including mechanisms of action, and identifying several major areas for needed future research), and scientists' continuing struggle to identify appropriate endpoints (specific types of harms or changes) to measure in experiments and studies, *see, e.g.*, John Ashby et al., *The Challenge Posed by Endocrine-disrupting Chemicals*, 105 ENVTL. HEALTH PERSP. 164, 165 (1997) (observing considerable confusion among scientists in defining an "endocrine disrupter," a definition that is obviously an essential first step to identifying appropriate testing strategies).

The EPA has promulgated guidelines for assessing neurotoxicity, Guidelines for Neurotoxicity Risk Assessment, 63 Fed. Reg. 26,926 (May 14, 1998), developmental toxicity, Guidelines for Developmental Toxicity Risk Assessment, 56 Fed. Reg. 63,798 (Dec. 5, 1991), and reproductive toxicity, Guidelines for Reproductive Toxicity Risk Assessment, 61 Fed. Reg. 56,274 (Oct. 31, 1996), but even a nonscientist will quickly appreciate that these guidelines are only a starting point for assessing those harms. For example, after noting the preliminary nature of the guidance for neurotoxicity assessments, the EPA closes by noting the guidance's basic assumptions and some of the more substantial areas in need of research:

> Research to improve the risk assessment process is needed in a number of areas. For example, research is needed to delineate the mechanisms of neurotoxicity and pathogenesis, . . . develop improved animal models to examine the neurotoxic effects of exposure during the premating and early postmating periods and in neonates, further evaluate the relationship between maternal and developmental toxicity, provide insight into the concept of threshold, develop approaches for improved mathematical modeling of neurotoxic effects, improve animal models for examining the effects of agents given by various routes of exposure, determine the effects of recurrent exposures over prolonged periods of time, and address the synergistic or antagonistic effects of mixed exposures and neurotoxic response.

Guidelines for Neurotoxicity Risk Assessment, 63 Fed. Reg. at 26,950. The EPA is still struggling to develop tests for assessing endocrine disrupters. *See* ENVTL. PROT. AGENCY, 2000 ENDOCRINE DISRUPTER SCREENING PROGRAM REPORT TO CONGRESS 1 (discussing the EPA's continuing struggle to develop screening tests for endocrine disrupters), *available at* http://www.epa.gov/scipoly/oscpendo/docs/reporttocongress0800.pdf.

14. *See* NRC, BUILDING A FOUNDATION, *supra* note 10, at 28–29 (discussing the substantial variability in susceptibility and observing that "[u]sually there are no data on human variability in toxic response to regulated chemicals, and a one-size-fits-all default value is used instead").

15. *See* ENVTL. PROT. AGENCY, *supra* note 13, at 4 (noting that although some industrial chemicals and many pesticides "may have already undergone extensive toxicological testing, conventional toxicity tests may be inadequate to determine whether these substances interact

Even if scientists had a strong theoretical understanding of how hazardous substances impact health and the environment, available information is insufficient to apply these theories to assess ecosystem and human health.[16] As of 1996, water quality testing had been conducted on only 19 percent of all water miles in the United States,[17] and only a fraction of this data was collected by reliable methods.[18]

---

with specific components of the endocrine system and whether additional testing is needed for the EPA to assess and characterize more fully their impact on both human and ecological health"); Thomas O. McGarity, *Politics by Other Means: Law, Science, and Policy in EPA's Implementation of the Food Quality Protection Act*, 53 ADMIN. L. REV. 103, 142–43 (2001) (discussing how the EPA requires neurotoxicity testing only on a subset of pesticides because of the expense of these types of tests); *infra* notes 198–205 and accompanying text; *cf.* MARK R. POWELL, SCIENCE AT EPA: INFORMATION IN THE REGULATORY PROCESS 30 (1999) (reporting that "[a]ccording to a former senior EPA official, the pesticides program is the only regulatory area that routinely considers noncancer health effects"); *Status of Administration's Response to NAS Recommendations Released to NACA*, Daily Env't Rep. (BNA) No. 209, at A-8 (Nov. 1, 1993) (reporting that a National Academy of Science committee found the EPA's toxicity testing guidelines for pesticides inadequate in some areas, including with regard to assessing effects of pesticides on neonate and adolescent animals).

16. *See* NRC, BUILDING A FOUNDATION, *supra* note 10, at 34 ("While in the past the federal government has monitored human disease outbreaks and has collected data on the weather, stream flow, and tides as basic information needed for societal planning, no similar data collection effort has ever been implemented and funded to monitor the condition of the broader environment."); *see also id.* at 25, 31 (discussing in concrete terms the drastic need for basic monitoring and citing other EPA and NRC studies similarly concluding that there is a need for better environmental monitoring). Insufficient data on basic features of environmental quality, in turn, prevent scientists from evaluating the accuracy of their theories and models and from developing new ones.

17. NAT'L ADVISORY COUNCIL FOR ENVTL. POLICY & TECH., REPORT OF THE FEDERAL ADVISORY COMMITTEE ON THE TOTAL MAXIMUM DAILY LOAD (TMDL) PROGRAM 3 (1998) (citing the EPA's Final National Water Quality Inventory Report to Congress for 1996), *available at* http://www.epa.gov/owow/tmdl/faca/facaall.pdf; *see also* ROBERT W. ADLER ET AL., THE CLEAN WATER ACT 20 YEARS LATER 33 (1993) (observing that the "[l]ack of federal leadership has resulted in the complete absence of monitoring in some states and in substantial variations in testing methods and closure standards" and noting that "[o]nly four states use EPA's recommended testing method."); U.S. GEN. ACCT. OFFICE, NATIONAL WATER QUALITY ASSESSMENT: GEOLOGICAL SURVEY FACES FORMIDABLE DATA MANAGEMENT CHALLENGES 1 (1993) (describing the difficulties of developing a national assessment because "efforts to collect, analyze, and store data are expensive and labor-intensive"); Katharine Q. Seelye, *U.S. Report Faults Efforts to Track Water Pollution*, N.Y. TIMES, May 27, 2003, at A1 (reporting that an EPA inspector general harshly criticized the EPA for using a computer system that was "obsolete, full of faulty data and [did] not take into account thousands of significant pollution sources" needed to track and control water pollution).

18. *See* PUB. EMPLOYEES FOR ENVTL. RESPONSIBILITY, MURKY WATERS: OFFICIAL WATER QUALITY REPORTS ARE ALL WET (1999) (concluding in an executive summary that "an unfortunate mix of politics, bureaucratic inertia and bad science means that conflicting, erroneous and manipulated sets of water quality data containing little accurate information on the actual condition of the nation's rivers and streams are routinely reported by States and dutifully compiled by EPA for presentation to Congress and the public"), *available at*

Air is monitored for eight general pollutants, but the remaining 189 toxic air pollutants are rarely monitored regularly and in many areas, including industrial centers, have never been monitored at all.[19] Federal law requires testing of groundwater only as a condition for operating active municipal dumps or hazardous waste sites, or when groundwater is a source of public drinking water.[20] Otherwise groundwater contamination is discovered purely by accident.[21] Land is rarely sampled, even when it is routinely covered with pesticides, fertilizers and other wastes; generally, this sort of sampling occurs

---

http://www.peer.org/execsum.html; Oliver A. Houck, *TMDLs IV: The Final Frontier*, 29 Envtl. L. Rep. (Envtl. L. Inst.) 10,469, 10,475–76 (1999) (discussing the problem of inconsistent techniques in water quality monitoring and citing Office of Technology Assessment (OTA) and GAO studies that make these same observations). The National Research Council review of the EPA's monitoring program provides some important guidelines (again based on the EPA's own errors) on how to ensure that monitoring data is collected in a representative and helpful way. *See* NRC, ENVIRONMENTAL MONITORING AND ASSESSMENT PROGRAM, *supra* note 10, at 32–35 (discussing the problems of summarizing the EPA data by regions).

19. *See* Lynn Blais et al., Enforcement Against Concentrations of Toxic Air Pollution in Texas: A Report to the Texas Commission on Environmental Quality and United States Environmental Protection Agency 12 (Aug. 5, 2003) (unpublished manuscript, on file with the *Duke Law Journal*) ("[C]urrent laws rarely require facilities to directly monitor the hazardous air pollutants that are emitted from their facility or to contribute resources to this important effort."). The information picture is still more bleak if one is concerned with *useable* information. A considerable amount of the baseline data that have been collected as described above is not in electronic form and remains effectively inaccessible to all but the most determined analysts. *Cf.* U.S. GEN. ACCT. OFFICE, AIR POLLUTION: NATIONAL AIR MONITORING NETWORK IS INADEQUATE 2 (1989) (discussing impediments to implementing a national air monitoring network, including insufficient funding at national, state, and local levels).

20. *See* 42 U.S.C. § 300g-7 (2000) (laying out general requirements for monitoring public drinking water under the Safe Drinking Water Act; to the extent the source of drinking water is groundwater, the required monitoring thus provides some information on the quality of that groundwater); 42 U.S.C. § 6924(p) (2000) (generally requiring groundwater monitoring for operation of treatment, storage, and disposal units under the Resource Conservation and Recovery Act (RCRA)); Solid Waste Disposal Facility Criteria, 56 Fed. Reg. 50,978, 51,009 (Oct. 9, 1991) (to be codified at 40 C.F.R. pts. 257–58) (requiring regular groundwater monitoring for active solid waste landfills by 1996).

21. *See, e.g.*, JONATHAN HARR, A CIVIL ACTION (1995) (recounting a neighborhood group's discovery of contaminated groundwater in their effort to understand the cause of an unusually high number of leukemia cases in neighborhood children). In Austin, for example, the unexplained decline of an endangered salamander in Barton Springs, which has historically also been used as a spring-fed, municipal swimming pool, led to water quality testing of the pool sediments, which then led to the discovery of contaminated subsurface waters suspected to enter the public pool from land contamination. *See* Kevin Carmody, *City Didn't Provide All Data Needed to Assess Pool Risks*, AUSTIN AM. STATESMAN, Feb. 4, 2003, at A1 (reporting that an inquiry began when a city biologist got a rash after being immersed in Barton Springs while looking for sick salamanders).

only when there is a suspected hazardous waste disposal site.[22] As of 1984, *no* toxicity testing existed for more than 38,000, or eighty percent, of all toxic substances used in commerce.[23] As of 1998, at least one third of the toxic chemicals produced in the highest volumes failed to satisfy minimal testing standards recommended by an international expert commission.[24] Of course, it is naive to expect comprehensive information, but existing information falls far short of what one would reasonably expect, even after factoring in the costs of producing it.

So, what accounts for this pervasive commons ignorance in the United States? The complexity of the systems is an important

---

22. The EPA will typically conduct or require soil sampling if cleanup is needed at an active hazardous waste disposal facility, 42 U.S.C. § 6924(u)–(v) (2000), or sometimes when the site has been reported to the National Response Center under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) reporting provision, 42 U.S.C. §§ 9603 and 9604 (2000). State laws might require the sampling as a condition to land transfer, although concern about CERLCA liability produces strong incentives for voluntary sampling by purchasers of land suspected of containing significant hazardous waste contamination. *See* Brownfields Revitalization and Environmental Restoration Act of 2001, Pub. L. No. 107-118, § 223, 115 Stat. 2360, 2372–74 (2002) (amending 42 U.S.C. § 9601) (providing immunity from Superfund liability for "innocent landowners" who make "all appropriate inquiries" into potential contamination at a site). At the same time, Superfund liability may cause current owners who suspect high levels of contamination to retain the land and remain ignorant of possible contamination in the hopes that the problem will not be discovered.

23. Considerably more baseline toxicity information is available on other potentially toxic substances such as drugs, food additives, and pesticides, although data gaps remain even for these much more heavily regulated substances. NRC, TOXICITY TESTING, *supra* note 10, at 118. Particularly significant data gaps exist for products in existence prior to passage of these regulatory statutes (products that were "grandfathered" into the much more rigorous licensing schemes). Thus, there remains a dearth of baseline toxicity data for pesticides in use prior to 1976. As of the NRC's report in 1984, for example, there was still no toxicity information available for 38 percent of available pesticides, and toxicity testing was complete for only 10 percent of the universe of pesticide products. *Id.*

24. The one-third estimate is the lowest estimate produced in three separate efforts to estimate the percentage of untested chemicals. This low estimate was produced by a trade association, the Chemical Manufacturers Association. *See* ENVTL. DEFENSE FUND, TOXIC IGNORANCE 15 (1997) (concluding that 71 percent of the high production volume chemicals in commerce did not have toxicity data available in the major databases that met the minimum data requirements set by the Organisation for Economic Cooperation and Development (OECD)); Office of Pollution Prevention & Toxics, Envtl. Prot. Agency, *What Do We Really Know About the Safety of High Production Volume Chemicals?*, 22 Chem. Reg. Rep. (BNA) 261 (May 1, 1998) (concluding that basic safety information is unavailable for roughly half of the chemicals produced in the highest amounts); *CMA More Optimistic than EDF On Lack of Data for 100 Chemicals*, Daily Env't Rep. (BNA) No. 230, at A-4 (Dec. 1, 1997) (reporting that thirty-three out of one hundred of the Chemical Manufacturer Association's chemical samples had insufficient screening data).

impediment to producing better information.[25] But this is not the whole explanation. Research in other fields is also complex, and yet discoveries in health care and technology greatly outpace the minimal advancements in assessing man's impact on health and the environment.[26]

Much of the blame belongs to industry's rational and vigorous resistance to producing information about the damage that it may cause to the commons. In other areas of scientific inquiry, private actors contribute substantially to advancements in public knowledge because the research promises to provide simultaneous private gains.[27] No equivalent benefit attaches to research on the adverse effects of human activities on health or the environment. Rather than presenting the opportunity for private profit, these questions pose the opposite equation for private actors generating externalities.[28] These actors vastly prefer ignorance over research because most documentation of externalities will ultimately affect them negatively.[29]

---

25. *See, e.g.*, NRC, BUILDING A FOUNDATION, *supra* note 10, at 6–10 (discussing the vast complexity of studying natural systems).

26. Federal spending on medical sciences, through the National Institutes of Health, increased 33 percent from 1993 to 1999, reaching a total almost thirty times the research budget of the EPA. BD. ON SCI., TECH., AND ECON. POLICY, NAT'L RESEARCH COUNCIL, TRENDS IN FEDERAL SUPPORT OF RESEARCH AND GRADUATE EDUCATION 122–23 tbl.B-1 (2001) [hereinafter NRC, TRENDS IN FEDERAL SUPPORT] (NIH's budget in 1999 was about $13 billion; the EPA's was about $500 million). In terms of end products, contrast also the rapid developments in genetics (including cloning), aerospace, and computer technologies with the developments in ecological modeling and basic toxicity testing discussed above.

27. *See id.* at 4 (noting that "data show that corporations' spending on research has been increasing but is concentrated in a few sectors such as the pharmaceutical industry and the information technology sector," and observing that within this funding "only a small fraction . . . is basic research"). In fact, the private sector's increasing reliance on academic researchers has created a crisis in diverting the resources for basic science towards the advancement of technological innovations that can produce a profit. *See* Eyal Press & Jennifer Washburn, *The Kept University*, *in* AAAS SCIENCE AND TECHNOLOGY POLICY YEARBOOK 293 (Albert H. Teich et al. eds., 2001) (commenting that a major concern is that "as university-industry ties grow more intimate, less commercially oriented areas of science will languish"), *available at* http://www.aaas.org/spp/rd/ch26.pdf.

28. *See infra* Parts I–III. Amazingly, however, this simple strategic incentive for ignorance has generally been missed in both economic and legal scholarship on the regulation of externalities. *See infra* Part IV.A. For example, in surveying the justifications for introducing regulation to correct problems of inadequate information, Justice (then Professor) Breyer provides four separate rationales, none of which consider the perverse incentives for ignorance that attach to externalities. Instead, he focuses on public good problems and the costs associated with individual policing of fraud. *See* STEPHEN BREYER, REGULATION AND ITS REFORM 26–28 (1982).

29. *See infra* Part I.A.1.

Thus, rather than contribute to enlightenment, actors seem more willing to contribute to, and even invest in, the perpetuation of ignorance.[30]

Although it is rarely noticed, ignorance regarding the harm that private actors are causing health and the environment is just another external cost of their activities that they are able to pass on to society.[31] The common law courts have sometimes appreciated this, requiring actors to disprove that they caused harm when they are best situated to know how their activities might affect others.[32] Similarly, externality theory supports requiring actors to internalize the costs of researching an externality, because these costs are imposed on society by the actor's conduct.[33] As long as there are predictable, nonobvious

---

30. It can be argued that the public should not bear any of the burden of financing assessments of the harm caused by private activities; rather, actors should be required to fund this research themselves. Nevertheless, there is general recognition that government testing will be needed to fill in the gaps. Ironically, though, the federal government dedicates more than nine times the funding to the medical sciences, a field in which the private sector is already contributing a great deal of resources, than to environmental biology, where there is no indication that the private sector contributes in any meaningful way. NRC, TRENDS IN FEDERAL SUPPORT, *supra* note 26, at 129 tbl.C-2. The computer sciences, another industry enjoying an influx of significant private research and development funding, enjoys twice the federal funding of environmental biology. *Id.*; *see also id*. at 144–45 tbls. F-1, F-3 (providing tables of nonfederal and corporate spending).

31. In the economics literature, externalities are broadly defined as those activities in which an actor does not "bear all of the consequences of his or her action." TOM TIETENBERG, ENVIRONMENTAL AND NATURAL RESOURCE ECONOMICS 45 (2d ed. 1988); *see also* Mary L. Lyndon, *Information Economics and Chemical Toxicity: Designing Laws to Produce and Use Data*, 87 MICH. L. REV. 1795, 1799 (1989) (recommending that "public research costs" of testing hazardous chemicals should be linked to their "private economic origins").

32. *See generally* Fleming James, Jr., *Burdens of Proof*, 47 VA. L. REV. 51, 66 (1961) (arguing that "[a]ccess to evidence is often the basis for creating [such] a presumption" on grounds of convenience, fairness, and public policy). Specifically, common law courts shift the burden of proving negligence under the res ipsa loquitur doctrine, in part when defendants have superior information regarding their conduct. Stephen A. Spitz, *From* Res Ipsa Loquitur *to Diethylstilbestrol: The Unidentifiable Tortfeasor in California*, 65 IND. L.J. 591, 599 (1990). Courts also shift the burden of proof to disprove specific causation to defendants under limited circumstances, based again in part on their superior access to information. *See, e.g.*, Summers v. Tice, 199 P.2d 1, 4 (Cal. 1948) (shifting the burden to the defendant hunters to disprove causation of harm to the plaintiff's eye, in part because the defendants enjoyed information over the cause of the injury). Finally, courts shift the burden of proof for both causation and negligence to a defendant when the defendant has negligently or intentionally destroyed medical records or other evidence central to a plaintiff's case. *See, e.g.*, Sweet v. Sisters of Providence, 895 P.2d 484, 491–92 (Alaska 1995).

33. Although theorists appear not to have identified separate categories of externality-related social costs, one can imagine at least three separate categories of social costs that arise sequentially from an action that creates an externality. First are the costs and related harms of identifying and measuring the externality (costs most theorists ignore by assuming perfect

harms that flow from an activity, it is the actors' duty to investigate and disclose these harms before taking action. Otherwise, the externatility and the ignorance surrounding it will be self-perpetuating.

This Part explores, at a preliminary level, the reasons why actors who produce significant amounts of pollution or potentially dangerous products are unlikely to assist in documenting the adverse effects of their activities. In many cases, the disincentives created by the marketplace and tort law may cause actors to be content simply to avoid documenting the harm. In a more limited set of cases, however, it might be in an actor's financial interest to actively discredit and obfuscate damaging information. Thus, even when the public is willing to subsidize research on the harms that various externalities impose on society, the research may be subject to unwarranted challenge. Public research becomes both more expensive and less fruitful when powerful actors profit from ignorance.

A. Actors Will Generally Resist Documenting the Adverse Consequences of Their Activities and Products

Actors do not generally welcome information about the adverse effects of their activities and products on public health and the

---

information). Second are the damages to society resulting from the externality. Third are the costs needed for society to engage in collective action to address the problem, often referred to as "administrative" costs. Each of these three categories of costs results from the externality. Society would not incur any of them if the externality did not exist. To internalize the costs of an activity in a pure sense, one would need to add these three categories of costs up, subtract any positive spillovers that an activity might produce, and require actors to internalize the remainder.

In considering what actors should internalize, however, both academics and regulators traditionally focus only on the second category of costs that flow from an externality. *Cf.* Richard O. Zerbe Jr. & Howard McCurdy, *The End of Market Failure*, REG., Summer 2000, at 10, 13 (arguing implicitly that the transaction costs involved in responding to externalities—when the social benefits are less than the social costs of a polluting activity—are a collective responsibility and should not also be assigned to the actor engaged in the externality). Yet in ignoring the other two categories, especially the first, one misses a large set of external costs. As long as rational actors pay for the reasonable radius of external costs that they impose on society, including the costs of developing information, they will identify the socially optimal type and level of activity to undertake. Assigning the costs of information production to actors gives them a more complete accounting of the harm that their activity causes and improves their decisionmaking in this regard. *See, e.g.*, John S. Applegate, *The Perils of Unreasonable Risk: Information, Regulatory Policy, and Toxic Substances Control*, 91 COLUM. L. REV. 261, 317 (1991) ("Indeed, one justification given for data call-ins [a regulatory demand for more testing of pesticides and chemical substances] is that owners of marginally useful registrations will discontinue the product rather than pay for expensive research.").

environment. Economic theory reinforces this simple intuition: it suggests that producing new information will be optimal only if its expected value is greater than the costs of its production.[34] For actors whose activities or products create externalities, conducting research on potential harms is not only costly but may yield bad news.[35]

1. *Reasons to Remain Ignorant about Negative Externalities.* In Professor Mary Lyndon's classic article about the lack of safety research on toxic products, she details the ways in which the market discourages manufacturers from conducting research on the long-term safety of potentially toxic products.[36] Professor Lyndon's analysis reveals that the market penalizes, rather than rewards, actors who document the negative effects of their products when the effects are neither obvious nor visible and immediate.[37] Although Professor Lyndon focuses on the disincentives for manufacturers to research long-term product safety, her analysis applies even more forcefully to actors who discharge pollution, whose responsibility for downstream effects is even more difficult to discern.

According to Professor Lyndon, there are at least three reasons that actors will not find it in their interest to document the potential harm from their products or polluting activities.[38] First, the out-of-pocket (direct) costs associated with conducting safety research are

34. *See* Steven Shavell, *Liability and the Incentive to Obtain Information About Risk*, 21 J. LEGAL. STUD. 259, 263 (1992).

35. Mass toxic tort cases provide the most dramatic illustration of when companies learn this lesson the hard way. In several cases, corporations voluntarily undertook safety research, only to have that research produce bad news. Rather than recall the products and risk liability, however, the corporations decided to conceal adverse testing. *See, e.g.*, Tetuan v. A.H. Robins Co., 738 P.2d 1210, 1240 (Kan. 1987) (awarding punitive damages based on corporate misconduct, including evidence that A.H. Robins "commissioned studies on the Dalkon Shield which it dropped or concealed when the results were unfavorable" and "consigned hundreds of documents to the furnace"); PAUL BRODEUR, OUTRAGEOUS MISCONDUCT: THE ASBESTOS INDUSTRY ON TRIAL 145 (1985) (chronicling a number of concealment efforts by the asbestos industry, including executive decisions to develop "a corporate policy of not informing sick employees of the precise nature of their health problems for fear of workmen's-compensation claims and lawsuits"); PHILIP J. HILTS, SMOKESCREEN: THE TRUTH BEHIND THE TOBACCO INDUSTRY COVER-UP 10–11, 20–22, 23–41, 129 (1996) (documenting, in an early exposé, the tobacco industry's concealment of adverse, in-house health studies).

36. *See* Lyndon, *supra* note 31, at 1813–17 ("Ignorance will tend to prevail.").

37. *See id.* at 1813 ("As long as no way exists for buyers to identify the toxic effects of specific chemicals, there is no commercial incentive for chemical producers to identify and publicize them. Sellers will not willingly reveal negative characteristics of their products." (citations omitted)).

38. *Id.* at 1810–17.

not only expensive but also may not produce definitive results. Indeed, even after protracted testing, the results generally cannot completely exonerate a product or activity, nor do they enable the manufacturer to quantify risks in a definitive way.[39] Given the lack of inexpensive screening tests, actors will rarely be able to obtain information about the harms created by their product or activity at low cost.[40] Thus, financial realities and lack of research efficacy combine to explain why long-term safety testing is generally not an attractive investment for actors.

Second, virtually no market benefits accrue to actors who produce research on the long-term safety of products or activities. Professor Lyndon demonstrates that when safety representations cannot be easily validated or compared, consumers are unlikely to make purchasing or investment decisions based upon a manufacturer's self-serving statements about safety.[41] Moreover, given that the results are rarely determinative, even thorough safety research will seldom provide a clear market signal of "safety."[42] Even if research results were definitive and comparable between different products and activities, advertising that a product or activity did not cause cancer in animals might not impress consumers or be received positively in the marketplace.

---

39. The most extreme example is the cost of safety and efficacy testing for drugs under the Food, Drug, and Cosmetic Act. Testing a single drug was estimated to cost $231 million in the early 1990s. Veronica Henry, *Problems with Pharmaceutical Regulation in the United States: Drug Lag and Orphan Drugs*, 14 J. LEGAL MED. 617, 617 (1993). At the same time, a recent study reports that 20 percent of all new drugs are found to have serious or life-threatening adverse effects within the first twenty-five years of use that were either unknown or undisclosed at the time of drug approval. Karen E. Lasser et al., *Timing of New Black Box Warnings and Withdrawals for Prescription Medications*, 287 JAMA 2215, 2216 (2002).

40. In critiquing tort reform proposals designed to incentivize greater safety testing, Professor Pierce emphasizes false positives resulting from early screening tests and expresses the concern that "there is no finite limit on the amount of testing that can enhance our understanding of the potential risks that are posed by a substance." Richard J. Pierce, Jr., *Causation in Government Regulation and Toxic Torts*, 76 WASH. U. L.Q. 1307, 1324–25 (1998).

41. *See* Lyndon, *supra* note 31, at 1816 (discussing how information on chemical safety produced voluntarily by manufacturers might be discounted because of its commercial context); *see also id.* at 1813–14 ("Comprehensive and accessible toxicity rating systems would support affirmative advertising, but without a developed information context, there is no incentive to study a chemical: the long-term health effects remain invisible for one's own products and for those of one's competitors."); John Leland, *Is Organic Shampoo Chemistry or Botany?*, N.Y. TIMES, May 18, 2003, at 9-1 (discussing the enormous variability in products that use the "organic" label and the lack of federal oversight to ensure uniformity in labeling for consumers).

42. *See supra* note 39.

Third, for toxicity and safety testing, there are few guarantees about what the testing will reveal.[43] Any possible good news, moreover, is always tempered by looming uncertainties. Most screening tests produce false positives by design.[44] Yet even when "no effect" is observed in a toxicity study, the testing cannot ensure that the product is safe—only that it did not cause a few types of adverse effects (e.g., cancer) in one exposure setting (e.g., ingestion by rats).[45] On the other hand, a bad result is almost always definitive in the following sense: When a substance does cause cancer in laboratory animals, uncertainty about how those results could or should be extrapolated to humans does not materially diminish the impact of the adverse result.[46] The best that can be said is that bad news encourages more testing to refine and improve the outlook for the product or activity.[47]

Beyond the lack of market incentives for developing information on externalities, actors also have legitimate concerns about increased

---

43. One of the most recent surprises is research by a Berkeley biologist who discovered that low levels of atrazine, a widely used herbicide, are associated with a statistically significant increase in the percentage of hermaphroditic frogs. Tyrone B. Hayes et al., *Hermaphroditic, Demasculinized Frogs After Exposure to the Herbicide Atrazine at Low Ecologically Relevant Doses*, 99 PROC. NATL. ACAD. SCIENCE 5476, 5476 (2002). This discovery led the manufacturer of atrazine to contest the use of the findings in the risk assessment for the herbicide, *see* Center for Regulatory Effectiveness et al., Request for Correction of Information Contained in the Atrazine Environmental Risk Assessment, Docket No. OPP-34237A (Nov. 25, 2002) [hereinafter Center for Regulatory Effectiveness, Request for Correction], *available at* http://www.thecre.com/pdf/petition-atrazine2B.pdf, and to fund other scientists to conduct reanalyses of the study, *see* James A. Carr et al., *Response of Larval* Xenopus Laevis *to Atrazine: Assessment of Growth, Metamorphosis, and Gonadal and Laryngeal Morphology*, 22 ENVTL. TOX. & CHEM. 396, 404 (2003) (acknowledging that the authors are funded by atrazine's manufacturer, Syngenta). *See also* NRC, BUILDING A FOUNDATION, *supra* note 10, at 10 (discussing the inevitability of surprises in environmental research as a "consequence of the complexity of environmental systems" and underscoring the need to limit these surprises with additional research).

44. *See* Pierce, *supra* note 40, at 1323–24 (discussing the combined false positive rate of the simple Salmonella assay and the rodent carcinogenicity test).

45. *See supra* note 13 (discussing the limited endpoints capable of being studied in toxicity testing).

46. *See* David Roe, *Toxic Chemical Control Policy: Three Unabsorbed Facts*, 32 Envtl. L. Rep. (Envtl. L. Inst.) 10,232, 10,232 (2002) (using empirical evidence to argue that the additional disclosures required by Proposition 65 in California, which requires industries to disclose chemicals in their products and polluting activities that cause cancer in animals, led California industries to reduce these carcinogens significantly relative to the rest of the country).

47. Although actors can attempt to secret away bad news to prevent its dissemination (in other words, disseminate only the good and hide the bad), history suggests that "this strategy is risky." *See supra* note 35 (listing some case studies that surfaced through toxic tort litigation).

tort liability that could result from producing incriminating information about the harms caused by their products or activities. Common law tort liability is generally imposed only after injured parties prove that the defendant's activity caused their harm.[48] Producing and publicizing internal research on such harms is, therefore, a risky proposition. Once plaintiffs' attorneys seize on a firm's internal research suggesting that harm may result from the firm's products or activities, catastrophic liability may follow.[49] Under such information-triggered common law regimes, actors benefit from knowing nothing, in part because it deprives plaintiffs of the evidence that they need to bring their case.[50]

That remaining ignorant about the impact of their products and activities is an effective strategy is evident in practice. Industries do not volunteer information on the long-term safety of their products and activities, and they lobby against laws requiring them to share even basic internal information.[51] The dearth of information available

48. *See* PROSSER AND KEETON ON THE LAW OF TORTS § 41, at 270 (W. Page Keeton et al. eds., 5th ed. 1984) (discussing that, when proving causation, a "plaintiff must introduce evidence which affords a reasonable basis for the conclusion that it is more likely than not that the conduct of the defendant was a cause in fact of the result").

49. *See, e.g.*, Robert F. Blomquist, *Emerging Themes and Dilemmas in American Toxic Tort Law, 1988-91: A Legal-Historical and Philosophical Exegesis*, 18 S. ILL. U. L.J. 1, 43 (1993) (noting that one of a toxic tort plaintiff's obstacles was "inadequate toxicological information . . . and the enormous expense of trying to gather whatever information or expertise is available"); Frank J. Macchiarola, *The Manville Personal Injury Settlement Trust: Lessons for the Future*, 17 CARDOZO L. REV. 583, 583–84 (1996) (describing the Manville Trust, established as a result of Johns-Manville Corporation's bankruptcy, which was caused by asbestos liability); Francine Schwadel, *Robins and Plaintiffs Face Uncertain Future*, WALL ST. J., Aug. 23, 1985, at 1-4 (reporting that Robins filed for Chapter 11 bankruptcy because of plaintiffs' claims in Dalkon Shield litigation).

50. *See* Margaret A. Berger, *Eliminating General Causation: Notes Towards a New Theory of Justice and Toxic Torts*, 97 COLUM. L. REV. 2117, 2135–40 (1997) (arguing that the current common law causation standard provides perverse incentives for defendants to remain ignorant); Heidi Li Feldman, *Science and Uncertainty in Mass Exposure Litigation*, 74 TEX. L. REV. 1, 41 (1995) (arguing that underdeterrence will occur under current toxic tort liability rules because "placing the burden of proof on the plaintiff creates a perverse incentive for actors to foster strong uncertainty about general causation"); Wendy E. Wagner, *Choosing Ignorance in the Manufacture of Toxic Products*, 82 CORNELL L. REV. 773, 796 (1997) ("The common law requirement that plaintiffs assume the entire burden of proving causation in toxic tort cases . . . creates inappropriate incentives for long-term safety research . . . ."); *see also* Pierce, *supra* note 40, at 1308–10 (agreeing that the common law requirements present a problem but disagreeing with the Berger and Wagner proposals for reform).

51. *See* Addition of Reporting Elements; Toxic Chemical Release Reporting; Community Right-To-Know, 61 Fed. Reg. 51,322, 51,326 (Oct. 1, 1996) (to be codified at 40 C.F.R. pt. 372) (recounting and responding to industry's objections to an addition to the toxic release inventory requiring an accounting of materials to the toxic release inventory); Roe, *supra* note 46, at

on environmental quality, waste streams, and the safety of products speaks volumes about the disincentives to producing this information.[52] But case studies reveal that ignorance is not merely a byproduct of a market system that fails to offer incentives to provide this information; ignorance actually represents a willful, strategic choice. Makers of the Dalkon Shield,[53] high-absorbency tampons,[54]

10,234 (discussing industries' consistent opposition to Proposition 65 (a California law requiring additional toxicity labeling on products)); Sidney M. Wolf, *Fear and Loathing About the Public Right to Know: The Surprising Success of the Emergency Planning and Community Right-To-Know Act*, 11 J. LAND USE & ENVTL. L. 217, 220 (1996) (discussing strong industry opposition to passage of Environmental Planning and Community Right-To-Know Act (EPCRA)). Some of the opposition is based on trade secret concerns, although this does not explain all of the opposition.

52. *See supra* notes 10–24 and accompanying text.

53. A.H. Robins Company manufactured the Dalkon Shield, an intrauterine birth control device (IUD), and its own corporate scientists bemoaned the inadequate state of the company's safety testing on the IUD. *See* MORTON MINTZ, AT ANY COST: CORPORATE GREED, WOMEN, AND THE DALKON SHIELD 123 (1985) (quoting a memo by Dr. Robert Murphey, the director of scientific development and international research for the company, stating that "we possess inadequate support data from animal studies as to long-term safety of the current Dalkon Shield"); *id.* at 133 (quoting a memo of Dr. Oscar Klioze, the director of pharmaceutical research and analytical services, warning that the string on Dalkon Shield "has not been subjected to any formal stability testing"); *id.* at 134 (quoting a memo by Kenneth Moore, Dalkon Shield Project Coordinator, warning that "[c]onsidering that we have been marketing the device for going on three years . . . it is about time that data are collected on the effect of the uterine environment"); *see also* Hilliard v. A.H. Robins Co., 196 Cal. Rptr. 117, 132 n.21 (Ct. App. 1983) (observing that "plaintiff presented substantial evidence of a conscious decision by defendant Robins not to test the IUD device prior to or during marketing"). *See generally* SHELDON ENGELMAYER & ROBERT WAGMAN, LORD'S JUSTICE 28, 36–38 (1985) (describing the inadequate safety testing of the Dalkon Shield); MINTZ, *supra*, at 131–48 (describing the considerable amount of information that Robins ignored when it delayed and avoided safety testing of the string on the Dalkon Shield).

54. In 1980, when the Center for Disease Control (CDC) became aware of a virtual epidemic of Toxic Shock Syndrome (TSS) among women, it conducted an epidemiology study that correlated the disease with the recent use of tampons. West v. Johnson & Johnson Prods., Inc., 220 Cal. Rptr. 437, 442–43 (Ct. App. 1985). The CDC then requested safety research from tampon manufacturers but received almost no information. *Id.* at 443. As a result of the considerable scientific uncertainty, CDC conducted a second study and within three to four weeks had isolated the cause of TSS as a potentially fatal bacteria present in a small percentage of women that thrived as a result of tampon use. *Id.* Evidence later adduced by the plaintiffs revealed that, between 1975 and 1980, one of the tampon manufacturers (Johnson & Johnson) had received 150 complaints "of a more serious nature" resulting from tampon use. *Id.* at 445. The court found that "[u]p to the time of trial, [Johnson & Johnson] had conducted no studies to ascertain whether use of a tampon was in any way related to vaginal infection." *Id.* Similarly, see *O'Gilvie v. International Playtex, Inc.*, 821 F.2d 1438, 1446 (10th Cir. 1987), finding that Playtex disregarded studies demonstrating a connection between highly absorbent tampons and TSS.

Bendectin,[55] DES,[56] breast implants,[57] and tobacco[58] all dug in their heels and resisted conducting safety research on their products, even when preliminary study indicated that the products harmed the public. Although these manufacturers, thanks in large part to public research on their products, were ultimately held at least partly accountable for the harms that they created, their strategy of resisting research enjoyed a long period of success and remains a popular approach.[59] Remaining ignorant about the potential harms caused by one's products and activities increases the likelihood that the actor can avoid tort suits and stay out of the range of plaintiffs' attorneys' radar.

---

55. Merrell Dow, the manufacturer of Bendectin, conducted only a minimal amount of safety studies on Bendectin, all of which were done after marketing the product. *See* Joseph Sanders, *The Bendectin Litigation: A Case Study in the Life Cycle of Mass Torts*, 43 HASTINGS L.J. 301, 321 ("[T]he compound had not undergone substantial testing when introduced."). The absence of adequate safety testing led to early liability of Merrell Dow, although later evidence exonerated the manufacturer because it revealed a low to zero probability that Bendectin actually caused birth defects. *See* MICHAEL D. GREEN, BENDECTIN AND BIRTH DEFECTS: THE CHALLENGES OF MASS TOXIC SUBSTANCES LITIGATION 329 (1996) ("The best that we can say [with the benefit of the science available up until the mid-1990s] is that if Bendectin causes any birth defects, it does so extremely infrequently.").

56. For example, in *Bichler v. Eli Lilly & Co.*, 436 N.E.2d 182 (N.Y. 1982), at trial "[t]he jury determined that Lilly and other DES manufacturers wrongfully marketed the drug for use in preventing miscarriage without first performing laboratory tests upon pregnant mice" and that these tests would have alerted the manufacturers that "DES was capable of causing cancer." *Id.* at 185; *see also id.* at 189 (discussing Lilly's partial admissions regarding foreseeability of cancer resulting from DES).

57. Breast implants were not safety tested until the Food and Drug Administration (FDA) repeatedly insisted on added testing as a condition to marketing. The research finally filed with the FDA in 1991 was sorely inadequate. The leader of the FDA's Breast Prosthesis PMA Task Force reported that Dow's clinical studies were:

> "[S]o weak that they cannot provide a reasonable assurance of the safety and effectiveness of these devices" because they provide "no assurance that the full range of complications are included, no dependable measure of the incidence of complications, no reliable measure of the revision rate, and no quantitative measure of patient benefit."

STAFF OF HOUSE SUBCOMM. ON HUMAN RES. AND INTERGOVERNMENTAL RELATIONS, COMM. ON GOV'T OPERATIONS, 102D CONG., THE FDA'S REGULATION OF SILICONE BREAST IMPLANTS 27 (Comm. Print 1993) (quoting the FDA report).

58. *See* HILTS, *supra* note 35, at 10–11, 20–22, 23–41, 129 (describing the concealment of adverse health studies conducted by the tobacco industry).

59. *See* James A. Henderson, Jr., *Product Liability and the Passage of Time: The Imprisonment of Corporate Rationality*, 58 N.Y.U. L. REV. 765, 779 (1983) (observing that in terms of making safety improvements in an existing product, frequently "the safest course in the short run . . . is to admit nothing, alter course as little as possible, and offer to settle with no one").

2. *Reasons Not to Produce Information That Becomes a Public Good.* The tort system, which creates disincentives for actors to develop information on the externalities resulting from their products and activities, combined with the lack of any significant market incentives for producing such information provides sufficient explanation for the dearth of voluntary testing on externalities. In addition, whatever positive incentives may exist are mitigated because the information—once produced and publicized—becomes a public good. Thus actors producing useful information, unless it pertains exclusively to them, will be unable to capture its full benefit.[60] Any good news that safety testing may yield is of little value to a manufacturer unless it is publicized. But once publicized, competitors can capitalize on the information without bearing any of the costs of producing it.[61] Although theoretically actors will produce information on the harm resulting from their activities if the benefits outweigh the costs, when the information is also useful to competitors, the resulting reduction in benefit will be added to the tally in determining whether the information is worth the investment. For example, investments in research on improving screening methods for detecting neurological harms from exposure to toxic products not only helps the investing actor assess the harm caused by its activities, but can be used by others. Thus, if private actors develop enhanced capabilities for

60. *See generally* JACK HIRSHLEIFER & JOHN G. RILEY, THE ANALYTICS OF UNCERTAINTY AND INFORMATION 259–94 (1992) (dedicating a chapter to exploring the tension between information as a public good and incentives that encourage actors to invest in the production of information). Thus, positive spillovers, an opposite sort of market failure problem, can also arise in understanding and characterizing externalities. In close cases, the extent to which the information will reveal negative and/or positive spillovers may be difficult to anticipate. The only thing that can be sure from the production of information is that the information will produce some spillover effects—positive or negative—that discourage its production.

61. The public good problem accompanying scientific and technological discoveries provides the economic basis for justifying patents, copyrights, and trade secret protections. In these cases, the researcher is developing information that must remain private, thus "allowing the researcher to improve his situation relative to uninformed parties." *Id.* at 258. By contrast, disseminating privately produced information on air or water quality or even methods for testing harms would seem to rarely, if ever, provide advantages to competitors. In this way, the "public good" aspects do not necessarily detract from the actors' original incentives for obtaining the information: the information is not less valuable to the original researcher once it has been disseminated. Rather, the public good features simply underscore the reality that actors have produced a good for which they are not capturing full economic benefits. The pesticide laws attempt to mitigate this problem by requiring competitors to share the costs of mandatorily produced health and safety data incurred by one company when such data are also relevant to the safety of the competitors' products. *See infra* note 393.

detecting these harms, they help produce a public good for which they will not be compensated adequately.

B. Actors Will Generally Resist Disseminating Information about the Adverse Effects of Their Activities and Products

If actors believe that information about their activities has a negative value, they might not only resist producing this information, but also may make it more difficult for third parties to produce it. Indeed, the extent to which actors will actively impede the public production of information can be predicted using essentially the reverse of the economic formula for the production of information. Actors will invest as much in obstructing research as they expect to lose if the information is made publicly available.[62] Moreover, to the extent that actors enjoy superior access to or control over information essential to assess externalities, they may be able to increase the costs of third-party research simply by preventing access to key information. If actors believe that they have much to lose from public enlightenment about externalities—particularly, for example, if there is a potential for mass liability—they might even take affirmative steps to discredit or counter the claims made by third parties. Even if these efforts ultimately fail, the actors benefit by postponing the ultimate "day of reckoning"—sometimes indefinitely.

1. *Actors Often Enjoy Superior Information about the Suspected Harms Caused by Their Activities, and They Sometimes Conceal This Information.* Actors who create externalities affecting public health and the environment often enjoy private or superior information about their externalities.[63] These actors, with mountains of detailed

---

62. *Cf.* Shavell, *supra* note 34, at 263 ("It is socially optimal to acquire information when [the value of the information exceeds the cost of acquiring that information].").

63. Although the economics literature is incomplete, *see infra* notes 366–71 and accompanying text, economists do acknowledge firms' informational advantages with respect to determining the costs of abatement and with respect to private knowledge of compliance. *See, e.g.*, Claus Huber & Franz Wirl, *The Polluter Pays Versus the Pollutee Pays Principle Under Asymmetric Information*, 35 J. ENVTL. ECON. & MGMT. 69, 71 (1998) (assuming that a polluter has asymmetric information on the benefits of the polluting activity); Tracy R. Lewis, *Protecting the Environment When Costs and Benefits Are Privately Known*, 27 RAND J. ECON. 819, 826–31 (1996) (modeling regulation when firms have superior information about abatement costs and emissions levels); Daniel F. Spulber, *Optimal Environmental Regulation Under Asymmetric Information*, 35 J. PUB. ECON. 163, 163 (1988) (modeling regulatory options around the constraint of firms' private information on abatement costs); *infra* note 245 and accompanying text. Importantly, however, economists also assume that the victim actually has superior

facts about about their polluting activities and products, amass specialized private expertise about the ways that these activities or products could cause harm.[64] In their unique role as creators of a product or activity, these actors enjoy both superior knowledge and superior access to this information.[65]

The extent to which an actor has superior knowledge about an externality is generally a function of whether the harms associated with the externality are readily visible, without the aid of expensive instruments. When the information is not readily visible to others, actors can enjoy different degrees of asymmetrical access to that information. First, actors can have direct information about the effects of their activities on the environment and public health as a result of internal research and analysis.[66] Second, usually as a result of operating research production facilities or directing specific research, actors often enjoy privately-held, circumstantial information about the effects of their activities, as well as greater sophistication about how to conduct additional research on these effects.[67] Finally, actors might be in a better position to obtain information about the effects of their activities relative to others because they know approximately where or what to sample or could sample more cheaply, even though they have not yet done the research. In this setting, actors have superior access to information because they have an "inside track" on where best to obtain it.[68]

---

information on the damages done to public health and the environment. *See infra* note 367 and accompanying text.

64. The actor discharging wastes or producing products is essentially an expert for that activity and enjoys the types of information advantages that experts enjoy over their domain of expertise. *Cf.* Asher Wolinsky, *Competition in a Market for Informed Experts' Services*, 24 RAND J. ECON. 380 (1993) (discussing professional experts' advantage in determining the level of service needed).

65. Although the distinction between these two types of asymmetries—asymmetric information and asymmetric access to information—is not clearly relevant to economic analysis, it is pertinent to law because once the information is in the "files," it is potentially discoverable and, in some settings, reportable. Moreover, failure to disclose known information relevant to another party can constitute fraud. *See* 18 U.S.C. § 1001 (2000) (prohibiting the submission of false information to a government agency, and prohibiting the concealment of information). In such a legal setting, a manufacturer is better off remaining ignorant of all adverse effects when there are not specific, enforceable rules requiring information production. *See* Wagner, *supra* note 50, at 790–96 (arguing generally that common law tort causation requirements reward ignorance).

66. *See infra* notes 73–80 and accompanying text.

67. *See infra* note 69 and accompanying text.

68. *See infra* note 74 and accompanying text.

For externalities that are not readily apparent, actors can use their superior access to information to increase the costs associated with public efforts to understand the externality and, in some cases, can even impede third-party efforts to assess the resulting harms.[69] For example, the manufacturers of Agent Orange understood that the ingredient dioxin could adversely affect health and the environment, yet this harm was largely invisible and therefore unknown to veterans and others who were sprayed with the substance, as well as by the government who purchased it for wartime use.[70] The same story can be retold for a number of other products and wastes.[71] By contrast, other sorts of external harms—car accidents caused by drunk drivers; poorly designed buildings that collapse on individuals—impose obvious costs on society. Asymmetric, or private, information about the potential for harm might exist before the accident takes place, but after the accident, the fact that the activity caused harm is widely known.[72]

The types of information advantages available to actors who create externalities can be divided into at least two general categories. The first category relates to the superior information that actors derive simply from their expertise and involvement in the production cycle.[73] Manufacturers best know the contents, contaminants, and

69. The tobacco papers, for example, suggest that the tobacco industry learned how to manipulate nicotine levels to make cigarettes more addictive simply by using trace amounts of ammonia. Government and third-party research on cigarettes, by contrast, was unable reliably to characterize the addictive properties of nicotine, much less hypothesize that a manufacturer could manipulate a substance like ammonia to make cigarettes more addictive. *See, e.g.*, HILTS, *supra* note 35, at 46, 171 (reporting that "[t]he studies of nicotine among the [tobacco] companies were extensive—far beyond anything outside their walls" and quoting from a deposition of Dr. Jeffrey Wigand, Brown & Williamson whistleblower, describing how ammonia frees up nicotine so that more of it will be activated during smoking).

70. PETER H. SCHUCK, AGENT ORANGE ON TRIAL: MASS TOXIC DISASTERS IN THE COURTS 159 (1986). Judge Weinstein censured chemical companies for their failure to warn the government in light of earlier indications about Agent Orange's effects. *Id.*

71. *See supra* notes 53–58 and *infra* notes 246–48 and accompanying text.

72. Because there is little ambiguity about the existence of these sorts of accidents or the existence of some resulting harm, there are simply no opportunities for actors to argue that the harm really did not occur or was caused by others. These are, however, familiar arguments in toxic cases. *See, e.g.*, SCHUCK, *supra* note 70, at 3–15.

73. *See, e.g.*, Peter Osmundsen, *Regulation of Common Property Resources Under Private Information About Resource Externalities*, 24 RESOURCES & ENERGY ECON. 349, 350 (2002) (analyzing the regulatory impediments created by various firms' asymmetric information regarding common resource exploitation); *see also* CLIFFORD S. RUSSELL ET AL., ENFORCING POLLUTION CONTROL LAWS 10 (1986) (discussing the movement toward self-regulation in environmental laws); *infra* notes 245–48 and accompanying text. This "asymmetrical advantage

waste products associated with producing their products and often experience firsthand any adverse effects of the products and associated wastes.[74] Actors also have superior information about when, where, and how they eject materials into the environment. Whether the actors dispose of materials within a plant site,[75] in rural areas at midnight,[76] or in the normal course of business,[77] others will have a difficult time learning about it. Moreover, by actors' sheer proximity to the discharge or emission point, they are bound to gain additional information about pollution through smells, color, and even worker or wildlife reactions, such as rashes or fish kills.[78] Actors also best appreciate the probability and magnitude of a range of risks that could arise from their activities.[79] For example, Union Carbide at

---

enjoyed by firms is why the environmental laws have gradually moved increasingly toward" relying on heavily proscribed self-monitoring regimes that often require constant monitoring, assessing criminal penalties for fraudulent monitoring or tampering with monitoring equipment, and providing increasingly attractive protections for industrial whistleblowers. PERCIVAL ET AL., *supra* note 5, at 986–88.

74. *See, e.g.*, Lyndon, *supra* note 31, at 1815 ("[T]he chemical producer knows what the chemical is, while the buyer often does not. Without the chemical identity of the product, the buyer cannot seek assistance in developing information independently.") The existence of this asymmetrical access to adverse information regarding products is also the basis for the adverse information reporting requirements under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Toxic Substances Control Act (TSCA). *See infra* note 164 and accompanying text.

75. *See infra* note 247 and accompanying text.

76. The difficulty of catching parties who secretly dump hazardous wastes on the property of others (i.e., "midnight dumpers") led Congress to create an exclusion for owner liability under CERCLA. *See* 42 U.S.C. § 9607(b)(3) (2000).

77. *See, e.g.*, Lynn Blais et al., Enforcement Against Air Toxics Hotspots in Texas: A Report to the Texas Commission on Environmental Quality and the United States Environmental Protection Agency 45–50 (Nov. 8, 2004) (preliminary draft report, on file with the *Duke Law Journal*) (discussing residents' reports of flaming plumes and noxious odors in the middle of the night, but noting that inspectors were unable to verify the problem the next day when the problems had disappeared and the facilities denied the existence of any problem).

78. Employers also appreciate the suite of toxic exposures that their employees will encounter in the plant far better than outsiders who can spend only an hour at the plant trying to assess safety from sporadic data points. *See, e.g.*, *infra* note 103 (describing the asbestos industry's concealment of information regarding the adverse effects of asbestos on their sick workers). However, manufacturers may not have superior information about the adverse effects of their air emissions on global warming, for example, because they have no private advantage in understanding these potential regional and global harms.

79. Overcoming some of these asymmetries is the sole objective of the Emergency Planning Provisions of the Environmental Planning and Community Response Act (EPCRA) 42 U.S.C. § 11,001–11,050 (2000), which requires facilities to work with local emergency response officials to develop plans for responding to unexpected releases, explosions, and the like. Included in these detailed plans is the location and characteristics of all of the hazardous substances on the site. *Id.* §§ 11,021–11,023.

its Bhopal plant best understood the risks of the leak of methyl isocyanate arising from its manufacturing process and even had advance notice of the leak, but delayed notifying the surrounding neighborhood for more than an hour after the gas escaped the plant.[80]

The second type of informational advantage is the actor's ability to use several legal protections to actively exclude others from accessing the basic information and physical data needed to assess externalities. For example, intellectual property law allows actors to raise the costs of accessing information about externalities and, in some cases, to bar access to this information completely.[81] Using broad trade secret protections, manufacturers impede public access to a large body of information regarding their manufacturing processes, testing data, and the contents of their toxic products and waste streams.[82] Until a federal agency is forced to review the merits of a confidential business information claim and determines that it is unjustified, the information remains unavailable to health professionals, risk assessors, members of the public who have been exposed to the waste or product, and most regulators.[83] Even the legitimacy of an underlying trade secret claim is based largely on asymmetrical information; firms best know whether competitors can readily use information regarding their products and wastes to their economic detriment, or whether their trade secret claim is instead intended simply to impede access to "troublesome" information.[84]

Similarly, privacy law and real property law give actors the ability to exclude others from accessing information about activities

---

80. JOHN S. APPLEGATE ET AL., THE REGULATION OF TOXIC SUBSTANCES AND HAZARDOUS WASTES 1138–39 (2000).

81. The right to exclude others provides the purpose of these property-based legal protections. *See, e.g.*, HIRSHLEIFER & RILEY, *supra* note 60, at 259 (observing how patents, copyrights, and trade secrets provide "imperfect and partially effective property rights in ideas" to encourage the production of new information); *see also* MICHAEL A. EPSTEIN, EPSTEIN ON INTELLECTUAL PROPERTY 6-3 (1999) (discussing how copyright, trade secret, and patent laws each offer a unique contribution to the protection of "sensitive corporate information").

82. *See infra* Part III.B.1.

83. *See* Mary L. Lyndon, *Secrecy and Innovation in Tort Law and Regulation*, 23 N.M. L. REV. 1, 34–39 (1993) (discussing the costs of broad protections for confidential business information); Thomas O. McGarity & Sidney A. Shapiro, *The Trade Secret Status of Health and Safety Testing Information: Reforming Agency Disclosure Policies*, 93 HARV. L. REV. 837, 840–48 (1980) (same); *infra* note 280 and accompanying text.

84. Disparate evidence reveals that firms do exaggerate the need for broad trade secret protections for basic information about the externalities that the firms generate. *See infra* notes 284, 290–97 and accompanying text.

occurring on their property that might create negative externalities.[85] For example, government inspectors are typically permitted to enter private property to collect health and safety information only under conditions acceptable to the owner; otherwise they must obtain a warrant.[86] This privacy protection is maintained even if the actor engages in an activity suspected of creating external social costs. Such protections are relaxed only in an emergency.[87] As a result, government inspections often provide, at best, a preliminary and incomplete picture of the potential hazards and pollution sources at large facilities.[88] Government officials may be able to determine if an actor significantly underestimates or underreports pollution levels by conducting expensive ambient monitoring outside a facility, but such monitoring is still of little use in pinpointing particular, problematic sources of pollution inside the facility.[89]

---

85. *See infra* Part III.B.2. Although this Article focuses primarily on how the laws sometimes motivate actors to hide or ignore adverse effects of products and wastes on health and the environment, these same types of legal disincentives also occur in the laws governing the protection of endangered species. Most notable is the ability of private landowners to exclude those who wish to survey endangered species or landowners who can secretly destroy the species or its habitat to avoid the regulatory constraints of species protection. For an insightful analysis of these advantages that arise out of private property rights, see Stephen Polasky & Holly Doremus, *When the Truth Hurts: Endangered Species Policy on Private Land with Imperfect Information*, 35 J. ENVTL. ECON. & MGMT 22, 26–29 (1998).

86. *See, e.g.*, Marshall v. Barlow's, Inc., 436 U.S. 307, 324 (1978) (holding that warrantless searches under the Occupational Safety and Health Act, 29 U.S.C. §§ 651–678 (2000), are unconstitutional). *See generally* ARNOLD W. REITZE, JR., AIR POLLUTION CONTROL LAW: COMPLIANCE & ENFORCEMENT 496–504 (2001) (describing procedures governing consensual inspections conducted under environmental laws and procedures that apply to obtaining warrants when consent is not provided).

87. *See, e.g.*, REITZE, *supra* note 86, at 496–503 (discussing generally when a warrant is required for an inspection); *id.* at 500 (discussing the emergency circumstances when warrants are not required, which include "potential imminent hazardous situations and situations where evidence may be destroyed or removed while a warrant is obtained").

88. *See generally id.* at 489 (observing that inspections provide the "most important source of compliance information" but that they are "resource intensive" and thus need to "target sources to maximize the effectiveness of their inspection expenditures").

89. *See, e.g.*, Michael May, *The One That Got Away: Polluting Perps Go Down, But Huntsman Walks*, TEX. OBSERVER, Nov. 8, 2002, at 20 (observing that even if the few monitors in industrial neighborhoods reveal high levels of air pollutants, "it is usually impossible to prove *which* plant is responsible"); *see also* David Allen et al., Accelerated Science Evaluation of Ozone Formation in the Houston-Galveston Area, at 18 (Sept. 13, 2001) (unpublished manuscript, on file with the *Duke Law Journal*) (reporting, based on overflight monitoring of plumes, that plants in Texas are emitting far more hydrocarbons than would be expected based on their permit limits and emissions inventories), *available at* http://www.utexas.edu/research/ceer/texaqsarchive/accel_science_eval.PDF; Blais et al., *supra* note 77, at 3–16 (discussing elevated air pollutants in Texas City (in the Houston-Galveston

Experience bears out the prediction that actors will sometimes take advantage of these informational advantages and limit access to potentially damaging information about their products and activities.[90] For example, Johnson & Johnson,[91] A.H. Robins,[92] Merrell Dow,[93] and

---

corridor) based on two-day, annual mobile monitoring trips that measured elevated levels of air toxics).

90. *See, e.g.*, ALICIA MUNDY, DISPENSING WITH THE TRUTH: THE VICTIMS, THE DRUG COMPANIES, AND THE DRAMATIC STORY BEHIND THE BATTLE OVER FEN-PHEN 133–34 (2001) (citing Fen-Phen's attempts to conceal how many reports of pulmonary hypertension it received, and noting that the approved labeling was based on only four cases, though there were an additional thirty-seven that the company's safety surveillance officer was aware of but did not reveal). For examples of more general, industry-sponsored campaigns to mislead the public, media, and decisionmakers about the safety of the companies' products or the products of their competitors, see generally DAN FAGIN & MARIANNE LAVELLE, TOXIC DECEPTION xxi (1996). *See also supra* notes 53–58; *infra* notes 245–48 and accompanying text. *See generally* SHELDON RAMPTON & JOHN STAUBER, TRUST US, WE'RE EXPERTS! (2001) (using extensive case studies to illustrate the prolific use by corporations of third-party public relations consultants to distance themselves from misleading information and appear more reputable and credible).

91. *See supra* note 54.

92. A.H. Robins, the manufacturer of the Dalkon Shield, actively concealed the adverse results from the very limited safety testing it did conduct. For example, eight months after it started selling the Dalkon Shield, Robins initiated a two-year study on the effects of the Dalkon Shield on baboons that was never made available to the medical profession. "Among eight [of the baboons tested], one 'perished,' and among ten, three suffered perforation of the uterus . . . ." MINTZ, *supra* note 53, at 123 (quoting the testimony of Dr. John W. Ward, Director of Toxicology and Assistant Director of Scientific Development). Following an escalation of concern by company employees over the potential for the Dalkon Shield's string to carry bacteria from the vagina to the uterus, Robins retrieved 303 used strings for examination by a staff scientist, Thomas C. Yu, who found defects in all but 35 of the strings. Company officials swore that Robins maintained "no written records of the exams or the results." *Id.* at 134–35. There is also some suggestion that Robins destroyed sensitive Dalkon Shield documents to better defend against litigation. Schwadel, *supra* note 49; *see also supra* note 69 (describing a similar pattern with tobacco).

93. Merrell Dow's culpability in the controversial breast implant litigation in large part derived from its stubborn refusal to research the adverse effects of silicone in the body cavity (even at the insistence of the FDA), when its own preliminary, secret, in-house evidence suggested that the implants leaked and were harmful. *See, e.g.*, Hopkins v. Dow Corning Corp., 33 F.3d 1116, 1127–28 (9th Cir. 1994) (affirming a punitive damage award based in part on evidence that Dow Corning concealed the adverse results of clinical studies and knew that long-term studies were needed). In *Hopkins*, the court stated:

> Dow obtained results of a study in which four dogs received silicone gel implants that resembled the implants that Dow was then marketing. The results demonstrated that after six months, the implants appeared to be functioning properly, but that after two years, inflammation surrounding the implants demonstrated the existence of an immune reaction. Dow did not publicly release the results of this research for several years, and when it did ultimately release the results, Dow omitted the negative findings and implied that the implants were safe.

Id. at 1119; *see also* Rebecca Weisman, *Reforms in Medical Device Regulation: An Examination of the Silicone Gel Breast Implant Debacle*, 23 GOLDEN GATE U. L. REV. 973, 987 n.122 (1993) (quoting Dow Corning discovery documents and a summary of scientific studies). Dow Corning

the asbestos[94] and tobacco[95] industries were all caught concealing information about their products' adverse health impacts. Companies also have concealed the existence of contaminants in products, even when the products are widely used or heavily regulated.[96] Some companies have even resisted mandatory reporting requirements on the adverse effects of their products. For example, it was only after the Environmental Protection Agency (EPA) granted substantially reduced penalties for noncompliance with adverse reporting requirements under the Toxic Substances Control Act that companies volunteered 11,000 studies of their products—four times the number of studies submitted in the previous fifteen years.[97] Actors have not only taken advantage of existing information asymmetries but have worked to secure additional or broader protections on privately held information regarding the adverse effects of their products and activities.[98] This evidence, taken as a whole, indicates that many

---

also conducted a study in 1974 that revealed that silicone could "[t]rigger strong reactions of the immune system," but Dow Corning denied such a reaction at an FDA hearing in 1991. *Id.* at 988 n.123. Finally, in 1987 Dow Corning was aware that some of its employees had falsified documents regarding silicone breast implants, but Dow Corning did not alert the FDA to these misstatements until 1992. *Id.*

94. *See infra* note 103.

95. *See supra* note 58.

96. *See, e.g.*, MINTZ, *supra* note 53, at 123–27 (noting that A.H. Robins, the manufacturer of the Dalkon Shield, apparently failed to disclose that the shield contained copper and copper sulfate to avoid having the FDA classify and ultimately regulate the Shield as a drug); *supra* note 69 (discussing the tobacco industry's use of ammonia to manipulate nicotine levels without detection by government machines).

97. Agency Watch, *EPA's Voluntary Data*, NAT'L L.J., Nov. 4, 1996, at A10. In a related type of inducement to disclose violations within the companies' superior control, the National Pork Producers Council agreed to an independent environmental audit of their compliance with the Clean Water Act, conditioned on the EPA's agreement to significantly lower the penalties for the reported violations. *See, e.g.*, Richard E. Schwartz et al., *Encouraging Self-Auditing Within the Pork Industry: The Nationwide Clean Water Act Enforcement Agreement for Agriculture's First Industry-Wide Environmental Auditing Program*, 29 Envtl. L. Rep. (Envtl. L. Inst.) 10,395, 10,395 (1999).

98. Actors' primary investments along these lines are their efforts to broaden the privileges available to keep information secret. *See infra* Parts III.B.1, III.B.5. Actors also have invested in constitutional challenges to prevent government inspectors from obtaining information about the externalities that the actors generate—challenges that appear generally unsuccessful. *See, e.g.*, Balelo v. Baldrige, 724 F.2d 753, 758–60 (9th Cir. 1984) (rejecting a challenge mounted by the commercial fishery industry against regulations under the Marine Mammal Protection Act, 16 U.S.C. § 1371 (2000), as imposing an unconstitutional search and seizure because the regulations required stationing federal observers aboard large fishing fleets to ensure compliance); *see also infra* Parts III.A.2., III.B.2. Private actors have also worked affirmatively to destroy key information and evidence, thus precluding subsequent researchers from obtaining critical information. *See, e.g.*, *supra* notes 90–97 and accompanying text.

companies do have information regarding the harms of their activities and products that is unavailable to the general public and, depending on their corporate leadership and culture, may be unwilling to share that information.

In sum, actors who create externalities are best situated to access and produce information on the nature of the harms that their activities cause, but they also stand to lose from providing such information. As a result, these actors use their ability to control access to this information to create impediments for third parties who seek to ensure that polluting activities and hazardous products are in fact safe. At the very least, actors' ability to limit access to information about their products and activities raises the costs to third parties of developing even a preliminary understanding of these externalities.[99] Just as importantly, as the next Section discusses, this problem is exacerbated if and when an actor decides to actively discredit and obfuscate damaging third-party research.

2. *Actors Sometimes Manufacture Uncertainty about the Suspected Harms Caused by Their Activities.* Faced with especially incriminating information on the adverse effects of a product or activity, actors may not only decline to voluntarily assist in producing additional research but may actively work to obfuscate especially damaging information produced by others.[100] The same formula that predicts that rational actors will refrain from studying the invisible harms associated with their products and activities also predicts that rational actors will invest as much time, money, and energy in discrediting information on the adverse effects of their activities that they expect to lose if credible information is ultimately produced that can be used against them.[101] In dramatic cases, when expensive

99. *See supra* note 89 and accompanying text.

100. Unlike most goods, complex information is vulnerable to rather dramatic depreciation and even obsolescence. If information, such as a research study, is relatively complicated, then its credibility can be reduced simply through strategic efforts to attack the methods, experimental design, or integrity of the researcher. Unless onlookers have the time and wherewithal to investigate such attacks, the value of original studies will be reduced. Investing in ends-oriented research that is intended to refute previous findings can diminish, however temporarily, the value of a research study. For the breadth and sophistication of these efforts, see *infra* notes 107–31 and accompanying text. *Cf. infra* note 404 and accompanying text (discussing the scientific community's heavy reliance on conflict disclosures to avoid some of these problems).

101. Generally, one would expect it to be in an actor's best interest to make this investment if the loss that is expected from the information is greater than the costs of conducting

liability or regulations could result from an objective assessment of the externalities, actors could invest quite a lot to discredit third-party research and obscure research results. In such instances, even delaying the general acceptance of third-party research can produce sufficient returns to make an aggressive and organized campaign of obfuscation and obstruction worthwhile.[102]

Actors have developed a number of imaginative approaches to obscure or discredit potentially troublesome third-party research suggesting that their activities cause harm. The easiest approach is for an actor simply to publicize only the positive information about a product or activity, while keeping potentially damaging information private. Because actors control access to key information, this tactic allows them to present a misleadingly positive account of the externalities associated with their products and activities that helps to offset damaging research produced by outsiders. Various accounts exist of industry actors who selectively publish the positive studies within their control, while concealing or prematurely halting unfavorable research.[103] Actors can also take advantage of their

---

discrediting operations times the expected benefits of these discrediting projects. Actors will thus invest in discrediting projects if *expected loss from undisturbed information* > [(*costs of discrediting* x *expected benefits from discrediting*) – *losses if discrediting strategy is revealed*] x *high discount rate*. If the actor enjoys asymmetric information that is useful to the discrediting, then the costs of conducting the attacks are likely lower. *See supra* notes 90–97 and accompanying text.

102. *See, e.g.*, Gordon C. Rausser et al., *Information Asymmetries, Uncertainties, and Cleanup Delays at Superfund Sites*, 35 J. ENVTL. ECON. & MGMT. 48, 49 (1998) (arguing that potentially responsible parties at Superfund sites may use their asymmetric information regarding their contributions to a site to delay EPA investigation and cleanup because delay brings great cost savings); Sidney A. Shapiro & Thomas O. McGarity, *Not So Paradoxical: The Rationale for Technology-Based Regulation*, 1991 DUKE L.J. 729, 737–39 (making the case for how increased profits resulting from delay in regulation make it profitable in many cases for industry to judicially challenge regulatory requirements, regardless of the expected outcome on the merits).

103. One industry that has engaged in such conduct is the asbestos industry. The record of asbestos manufacturers' attempts to conceal or downplay the hazards of asbestos is well documented. *See generally* BRODEUR, *supra* note 35 (chronicling litigation against the asbestos industry). Some of the more dramatic examples include animal studies on asbestosis in the 1930s, the findings of which, by agreement, belonged to the investors until they agreed to disclose them to the public, *id*. at 118–19; notes detailing Johns-Manville Co.'s health review committee meeting during which executives "developed a corporate policy of not informing sick employees of the precise nature of their health problems for fear of workmen's-compensation claims and lawsuits," *id*. at 145; and successful company efforts to persuade the editor of a trade magazine that growing scientific studies on "asbestosis . . . [should] receive the minimum of publicity," *id.* at 116–17.

superior expertise by exaggerating the positive attributes of their products or activities in ways that could be disproved only through significant investigative efforts.[104] In some cases, actors have even managed to subvert third-party efforts to gather needed information by taking advantage of their ability to control the activity causing the harm. For example, in enforcement settings, actors have temporarily halted problematic activities during government inspections.[105] In other cases, manufacturers have gone so far as to tamper with legally required pollution control monitors.[106]

If the risks associated with third-party research are great enough, some actors may also find it necessary to undertake a more affirmative campaign of disinformation and obfuscation.[107] Manufacturing scientific controversy appears to be an established

---

Similar tactics have been used in other industries. For example, the manufacturer of the Dalkon Shield concealed evidence of that product's dangerousness. *See, e.g.*, Tetuan v. A.H. Robins Co., 738 P.2d 1210, 1240 (Kan. 1987) (awarding punitive damages based on corporate misconduct, including evidence that A.H. Robins "commissioned studies on the Dalkon Shield which it dropped or concealed when the results were unfavorable" and "consigned hundreds of documents to the furnace"); c*f.* MINTZ, *supra* note 53, at 122 (referencing a memo by Kenneth Moore, the project coordinator of Robins' Dalkon Shield, reporting that Robins' main purpose in funding research was "to make available for publication extremely good Dalkon Shield results"). The breast implant industry has engaged in similar conduct. *See* Hopkins v. Dow Corning Corp., 33 F.3d 1116, 1119, 1127–28 (9th Cir. 1994) (affirming a punitive damage award based in part on evidence that the defendant company concealed the adverse results of clinical studies and knew that long-term studies were needed). The tobacco industry vigorously concealed its research on the carcinogenic and addictive properties of cigarettes. *See, e.g.*, STANTON GLANTZ ET AL., THE CIGARETTE PAPERS 15 (1996) (concluding that by the early 1960s Brown & Williamson Tobacco Corporation and its parent, British American Tobacco, "had developed a sophisticated understanding of nicotine pharmacology" but did not disclose this understanding to consumers); *id*. at 58–107 (outlining documentary evidence of the tobacco industry's knowledge of and research on the addictive properties of nicotine); HILTS, *supra* note 35, at 38–40 (describing both the cover-up of rich research conducted on the carcinogenic properties of cigarettes and Brown & Williamson's "document retention" policy that involved shipping all such research and underlying documentation out of the country).

104. *See, e.g.*, Shankar Vedantam, *Antidepressant Makers Withhold Data on Children*, WASH. POST, Jan. 29, 2004, at A1 (describing the only partial publication and dissemination of clinical trials studying the effectiveness of specific antidepressant drugs on children and revealing that some studies yielding negative results had not been published).

105. *See infra* note 247 and accompanying text.

106. *See, e.g.*, Keith Schneider, *Coal Company Admits Safety Test Fraud*, N.Y. TIMES, Jan. 19, 1991, at A14 (reporting that since 1980 six mining companies have been convicted for tampering with devices that monitor levels of coal dust in mines).

107. The tobacco industry's broad and expensive campaign against public science provides the most familiar and disturbing account of this strategy. *See generally* HILTS, *supra* note 35, at 6, 8–12 (describing how tobacco officials' strategy in 1953 was to develop "comprehensive and authoritative scientific material which completely refutes the health charges").

strategy. For example, even Frank Luntz, a prominent Republican Party consultant, openly recommends promoting scientific controversy as a strategy for justifying President George W. Bush's position on global warming:

> Voters believe that there is *no consensus* about global warming within the scientific community. Should the public come to believe that the scientific issues are settled, their views about global warming will change accordingly. Therefore, *you need to continue to make the lack of scientific certainty a primary issue in the debate, . . .*[108]

Discrediting damaging independent research can become a collective endeavor when multiple actors with a common interest agree to share the costs of the discrediting.[109] In response to the highly influential Six Cities epidemiology study used by the EPA to revise its particulate standard, more than six hundred potentially affected industries from the petroleum, automobile, and other business sectors organized and formed the "Air Quality Standards Coalition" in order to criticize the Six Cities research.[110]

---

108. Frank Luntz, Straight Talk, The Environment: A Cleaner, Safer, Healthier America 137 (n.d.) (unpublished manuscript, on file with the *Duke Law Journal*). The quotation comes from a memo by consultant Frank Luntz to Republican policymakers obtained by the Environmental Working Group and posted on its website at http://www.ewg.org/briefings/luntzmemo/pdf/luntzresearch_environment.pdf (last visited July 27, 2004). *See also* Paul Krugman, Editorial, *Salt of the Earth*, N.Y. TIMES, Aug. 8, 2003, at A21 (quoting the Lutz memo on global warming and reiterating, based on the evidence, that much of the appearance of uncertainty is manufactured: "Very few independent experts now dispute that manmade global warming is happening, and represents a serious threat.").

109. Collective efforts organized by the tobacco industry, the Center for Regulatory Effectiveness, and the Competitive Enterprise Institute provide particularly good examples of what can be accomplished when stakeholders pool their resources. *See, e.g.*, GLANTZ ET AL., *supra* note 103, at 108–09 (recounting that, in the wake of having conducted scientific research illuminating the deleterious effects of tobacco use, the tobacco industry did not disclose these studies but engaged in two simultaneous campaigns: "an internal research campaign to develop a 'safe' cigarette and an external public relations campaign to convince the public that cigarettes had not been proven dangerous to health"); Center for Regulatory Effectiveness, *at* http://www.thecre.com (last visited Mar. 5, 2004) (on file with the *Duke Law Journal*) (describing the organization, which engages in collective attacks on publicly produced science and which sponsors legislation (thus far passed in the form of appropriations riders), providing more legal mechanisms for challenging public science); Competitive Enterprise Institute, *at* http://www.cei.org (last visited Mar. 5, 2004) (on file with the *Duke Law Journal*) (describing the organization, which filed a Data Quality petition against multiple agencies on global warming—presumably on behalf of a collective of affected industries).

110. *See, e.g.*, Richard Dahl, *Spheres of Influence*, 105 ENVTL. HEALTH PERSP. 1306, 1306 (1997) (describing the industries' Coalition and their efforts to obtain the raw data from the Six Cities Study); Jocelyn Kaiser, *Showdown Over Clean Air Science*, 277 SCIENCE 466, 466 (1997)

More aggressive efforts to manufacture uncertainty take on a variety of forms, but they generally involve either blatant, underhanded attacks on third-party research or investments in "counter-research" carefully designed to produce results more favorable to an actor's interests. Although in many areas there is no scientific consensus about certain issues and presenting another side of an issue is legitimate, the manufactured critiques and studies discussed here involve a strategic, ends-oriented effort to undermine credible research and obscure scientific consensus. Many actors have launched a frontal assault on academic or public research that documents how their products or activities harm the public health or the environment. In some cases, because of the inherent complexity of the studies, even high-quality technical research can be at least temporarily discredited by making groundless challenges about the methods used, the reliability of the data collected, the qualifications of the researcher conducting the study, or by suggesting that the review processes are flawed.[111] These "hired gun" attacks on third-party research are common in high-stakes cases when acceptance of

(describing the activities of the Coalition (although stating that it has only five hundred industrial members) and quoting it as taking the position that the science underlying the EPA's particulate rule is "totally inadequate"). The American Iron and Steel Institute, presumably one of the members of the Coalition, hired an epidemiologist from the University of Washington, Suresh Moolgavkar, specifically to critique the Six Cities Study. Hillary J. Johnson, *The Next Battle Over Clean Air*, ROLLING STONE, 48, 52 (2001). Finally, the Competitive Enterprise Institute (an organization that does not disclose its sources of funding on its website) published a report critical of the Six Cities Study in 2001. KAY JONES & BEN LIEBERMAN, THE ONGOING CLEAN-AIR DEBATE: THE SCIENCE BEHIND EPA'S RULE ON SOOT (2001), *available at* http://www.cei.org/PDFs/ongoing_clean_air_debate.pdf.

111. Credible studies, traditional research methods, and respected researchers (from the perspective of a "realist-constructionist") may all be deconstructed if those judging or scrutinizing the science do not respect the vulnerable, socially constructed features of traditional research methods, especially those unique to particular disciplines. *See generally* STEVEN COLE, MAKING SCIENCE 12–13 (1992). To require the testing and validation of each assumption that underlies a study would result in an infinite regress—the never-ending exposure of assumptions that lack validation. To circumvent this logical problem, established scientific communities informally agree on "accepted methods," some of which necessarily are based on consensual, but technically unvalidated, assumptions. Because they are consensual within the scientific community, once these consensual decisions gain acceptance scientists tend to take them for granted as necessary features of research. Unfortunately, outsiders and enemies of a particular research study are unlikely to give deference to accepted scientific methods based on consensual but technically unsupportable assumptions, leaving the research vulnerable to damaging deconstruction by persons seeking to discredit it. *See, e.g.*, Sheila Jasanoff, *Research Subpoenas and the Sociology of Knowledge*, 59 LAW & CONTEMP. PROBS. 95, 99–100 (Summer 1996).

the results could lead to shattering liability and publicity.[112] The tobacco industry is the most notorious with respect to using this tactic, but it is by no means alone.[113] Individual companies or trade associations engaged in the production of oil,[114] lead,[115] asbestos,[116] and beryllium[117] have all actively worked to discredit research that, if widely understood and accepted, would likely result in substantial liability, regulation, and market costs.[118]

---

112. To be sure, some of this adversarial vetting improves the quality of science. *See, e.g.*, Jocelyn Kaiser, *Synergy Paper Questioned at Toxicology Meeting*, 275 SCIENCE 1879 (1997) (discussing the scientific controversy surrounding potential human health effects of endocrine disrupters and the uproar created by a recent Tulane study on disrupters that was subsequently withdrawn because it misreported the research). But when the motive for vetting is an ends-oriented attack on specific results, the vetting is not beneficial and can distract or impair the value of information by focusing users on trivialities and artificial or minor quibbles. *See supra* note 111. Unlike with routine scientific vetting, in these efforts to discredit research, the attackers (or hired attackers) will work backwards to try to find a problem or alternative result that is more hospitable to their own interests. This is not how scientists review each others' work, and it does not produce outcomes that are randomly distributed along the result spectrum. In addition, because the attacker is biased with regard to the outcome, this type of scientific disagreement violates one of the premiere tenets of science. *See, e.g.*, Robert K. Merton, *The Normative Structure of Science*, *in* THE SOCIOLOGY OF SCIENCE 267, 275–77 (J. Gaston ed. 1973).

113. *See, e.g.*, Thomas O. McGarity, *On the Prospect of "Daubertizing" Judicial Review of Risk Assessment*, 66 LAW & CONTEMP. PROBS. 155, 179–99 (Fall 2003) (documenting the tobacco industry's attack on a watershed environmental tobacco smoke epidemiology study and the researcher who conducted it).

114. *See, e.g.*, Jeffrey Short, Abstract, *Stifling Science: Attacks on Government Scientists After the Exxon Valdez Oil Spill*, *in* Speaker Information, Center for Science in the Public Interest, Conference on Conflicted Science: Corporate Influence on Scientific Research and Science Based Policy 34 (2003) (unpublished manuscript, on file with the *Duke Law Journal*) (asserting that "motivated by litigation" over the Exxon spill, Exxon aggressively challenged the documentation of harm caused by the spill, using methods that included "misrepresentation of government data, manipulating agendas of scientific meetings, abuse of the scientific peer-review process, abuse of the Freedom of Information Act (FOIA), shadowing field studies, and groundless allegation of scientific misconduct"), *available at* http://www.cspinet.org/integrity/cs_conference_abstract.pdf.

115. The lead industry's protracted and multifaceted attack on Dr. Herbert Needleman's research published in the New England Journal of Medicine is the most familiar example of this type of campaign to discredit research. *See infra* note 119.

116. *See supra* note 103 and accompanying text.

117. The beryllium industry, among other tactics, identifies inevitable assumptions in research that cannot be rectified and maintains that, because of these gaps, more study is needed. *See, e.g.*, David Michaels, A Case Study of the Beryllium Industry 2 (2003) (unpublished manuscript, on file with the *Duke Law Journal*).

118. This tactic also is used affirmatively in challenging regulations. For example, virtually every substantive challenge mounted against an EPA model involves multiple technical disagreements on virtually every facet of the model. In several cases, moreover, the disagreements appear to be manufactured challenges that enjoy little support from the record.

In more than a few cases, an attack on the research has evolved into an attack against the integrity of the researcher as well. Unsupported allegations of scientific misconduct,[119] harassing subpoenas or depositions,[120] and burdensome data-sharing requests (often through public records statutes)[121] have all been used to distract or even intimidate academic or government scientists whose research has adverse implications for a company.[122] Exxon, for example, went to great lengths to discredit researchers who were assessing environmental damages resulting from the Exxon-Valdez spill, including filing harassing subpoenas seeking all records, data, and

---

See Thomas O. McGarity & Wendy E. Wagner, *Legal Aspects of the Regulatory Use of Environmental Modeling*, 33 Envtl. L. Rep. (Envtl. L. Inst.) 10751, 10757–70. In *Power Co. v. EPA*, 135 F.3d 791 (D.C. Cir. 1998), for example, electric utilities and industry groups challenged various aspects of the EPA's inputs to its models: the court found all of these challenges without basis and sometimes without support even in the briefs. Challenges rejected included comprehensiveness of the model's database, *id*. at 804, minor assumptions in the model unsupported by the data, *id*. at 805, significance of certain variables such as cost, *id*. at 813, weighting of smaller boilers, *id*., and the calculation of the cost-effectiveness of certain burners and processes, *id.* at 814–16.

119. Dr. Herbert Needleman, whose research on child lead poisoning was pivotal in the EPA's lead phase-out of gasoline, was alleged to have engaged in misconduct. The accusations of misconduct, brought by scientists who consulted with the lead industry, were without merit and he was cleared of wrongdoing. Herbert L. Needleman, *Salem Comes to the National Institute of Health: Notes From Inside the Crucible of Scientific Integrity*, 90 PEDIATRICS 977 (1992); Joseph Palca, *Lead Researcher Confronts Accusers in Public Hearing*, 256 SCIENCE 437 (1992); Gary Putka, *Professor's Data On Lead Levels Cleared By Panel*, WALL ST. J., May 27, 1992, at B5.

120. *See infra* note 352 and accompanying text.

121. *See, e.g.*, Paul M. Fischer, *Science and Subpoenas: When Do the Courts Become Instruments of Manipulation?*, 59 LAW & CONTEMP. PROBS. 159, 159 (Summer 1996) (describing a subpoena by R. J. Reynolds Tobacco Company for confidential information used in a controversial and critical research study); Steven Wing, *The "Chilling Effect" on Environmental Health Research: Industry Tactics and Institutional Disincentives*, *in* Speaker Information, Conference on Conflicted Science, *supra* note 114, at 36 (detailing how "[f]ollowing [the] release of a study describing [the] health impacts of living near an industrial swine operation, pork industry lawyers threatened to sue University of North Carolina researchers for defamation and demanded participant records that had been obtained under promise of confidentiality [through the Public Records Statute of North Carolina]").

122. For more examples of efforts to discredit researchers by insinuating that their research is not competent, see generally McGarity, *supra* note 113. There are also individual accounts about firms that have captured government officials and convinced them to suppress publication of adverse findings from government scientists. *See, e.g.*, JoAnn M. Burkholder, *Industry Responses to Publicized Links Between Water Quality Degradation and Concentrated Animal Feeding Operations*, Remarks at the Conference on Conflicted Science: Corporate Influence on Scientific Research and Science-Based Policy, The Center for Science in the Public Interest (July 11, 2003) (on file with the *Duke Law Journal*) (discussing this problem with government scientist Dr. James Zahn, who conducted research on the effects of Concentrated Feeding Operations for Swine in North Carolina).

ongoing research.[123] Research on R.J. Reynolds' use of the "Joe Camel" logo to induce teens to smoke threatened Reynolds to such an extent that the company attacked the individual researchers as well as their research. In an effort to halt this research, which was ultimately successful, the company filed harassing subpoenas and state public records requests seeking the release of confidential information, such as names and addresses of the children involved in the study. Reynolds also instigated scientific misconduct proceedings against the researchers, which were ultimately dismissed as without basis.[124]

In addition to attacking the credibility of the research and in some cases the researcher, affected actors have also financed counter-research designed to refute third-party research, either by producing different results or by suggesting that the results of the independent research cannot be reproduced[125]—a devastating critique within the scientific community.[126] By hiring scientists willing to "collaborate" closely with the sponsoring industry (under contracts that require

123. *See, e.g.*, Steven Picou, *Compelled Disclosure of Scholarly Research: Some Comments on "High Stakes Litigation,"* 59 LAW & CONTEMP. PROBS. 149, 155 (Summer 1996) (describing how third-party subpoenas served on his research relevant to the Exxon oil spill litigation "permanently disrupted" his research project "due to the constant need to respond to motions and affidavits," and how Exxon worked to deconstruct his research in order to undercut the plaintiffs' evidence and call into question his professional integrity); Short, *supra* note 114 (documenting Exxon's aggressive challenge to the documentation of harm caused by the spill). For an example of a critique of the integrity of government-paid scientists by an Exxon-paid scientist, see J.A. Wiens, *Oil, Seabirds, and Science. The Effects of the EVOS*, 46 BIOSCIENCE 587, 594 (1996).

124. Fischer, *supra* note 121, at 159.

125. *See, e.g.*, Charles H. Peterson et al., *The Joint Consequences of Multiple Components of Statistical Sampling Designs*, 231 MARINE ECOLOGY PROGRESS SERIES 309 (2002) (arguing that Exxon-paid scientists manipulated sampling designs to reach desirable conclusions).

126. *See, e.g.*, MUNDY, *supra* note 90, at 115 (discussing in detail the manufacturer of Fen-Phen's strategy for research on its controversial drug, suggesting that the manufacturer first "[p]roduce[d] studies [showing] no link or only a minimal link with valve disease" and then "[r]aise[d] questions about the validity of the research done at the Mayo Clinic and Fargo"); Deborah E. Barnes & Lisa A. Bero, *Industry-Funded Research and Conflict of Interest: An Analysis of Research Sponsored by the Tobacco Industry Through the Center for Indoor Air Research*, 21 J. HEALTH POL. & L. 515, 518–30 (1996) (concluding that the tobacco industry's sponsorship of the Center for Indoor Air Research (CIAR) compromised CIAR's stated mission of high-quality, objective research because of evidence of a conflict of interest in CIAR's choice of projects and its framing of research questions (i.e., attempting to show that poor nutrition, occupation, or genetic predisposition could cause the same diseases attributed to smoking) and in the discovery of likely data fabrication in CIAR studies that produced results more favorable to the tobacco industry). When an original database is public, actors can attack the public research more cheaply by commissioning consultants to statistically reanalyze (called "crunching") data until they produce favorable results.

sponsor control of the research), sponsors historically have been able to exert dramatic control over the outcome of research, to the point of designing studies, framing research questions, and even editing and ghostwriting articles.[127] Sponsors also routinely reserve the right to suppress publication of research that they fund and are not reticent to use this right if study results are adverse to their interests.[128] Some sponsors do not stop at merely funding, influencing, and controlling research. These sponsors have successfully published the same study in different journals under different author names with no cross-references, making it appear that research support favoring their product or activity is based on several independent studies, rather than simply a rereporting of the same findings.[129] Because the scientific community generally deems commissioned studies less objective than independent research, scientific journals increasingly

---

127. *See generally* SHELDON KRIMSKY, SCIENCE IN THE PRIVATE INTEREST: HAS THE LURE OF PROFITS CORRUPTED BIOMEDICAL RESEARCH? (2003) (discussing this problem throughout the book with considerable support). One of the editors of the Journal of the American Medical Association (JAMA) has argued that ghostwriting is occurring in biomedical articles at an alarming rate. Companies will pay prestigious big names who have not worked on studies to appear on the byline in the companies' place. Drummond Rennie et al., *When Authorship Fails: A Proposal to Make Contributors Accountable*, 278 JAMA 579, 580 (1997). As a result, some prominent research journals refuse to publish literature reviews or editorials by an author with a conflict of interest in the outcome, because the extent and effect of the author's bias is difficult to catch through the usual methods of replication and validation familiar to science. *See, e.g.*, Int'l Comm. of Med. Journal Editors, Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Writing and Editing for Biomedical Publication, *at* http://www.icmje.org (Oct. 2004) (on file with the *Duke Law Journal*) ("Disclosure of [conflicts of interest] is also important in connection with editorials and review articles, because it is [sic] can be more difficult to detect bias in these types of publications than in reports of original research."). There is also some literature finding, through statistics, that commissioned research is generally of lower quality than noncommissioned research, at least for the research commissioned by the tobacco industry. *E.g.*, Deborah Barnes & Lisa Bero, Abstract, *Scientific Quality of Original Research Articles on Environmental Tobacco Smoke*, 6 TOBACCO CONTROL 19 (1997).

128. *See, e.g.*, Bruce M. Psaty & Drummond Rennie, *Stopping Medical Research to Save Money: A Broken Pact with Researchers and Patients*, 289 JAMA 2128, 2128–29 (2003) (explaining that Apotex Inc. stopped two trials that were intended to identify adverse effects from an iron-chelation therapy, and that shortly thereafter the company issued legal warnings, under the guise of "confidentiality," to prevent the principal investigator from publishing the results or disclosing risks to patients); *see also supra* note 92 and accompanying text.

129. *See, e.g.*, Drummond Rennie, *Fair Conduct and Fair Reporting of Clinical Trials*, 282 JAMA 1766 (1999) (discussing the overpublishing—without cross-referencing—of clinical trials with specific examples from the literature); Rennie et al., *supra* note 127, at 580 (arguing that repeated publication of a single study "with or without minor additions, inflates bibliographies and is common," and that "[w]hen similar parts of the same trial are published repeatedly under different authors' names, without cross-referencing, the record is distorted in the name of promotion, and meta-analysis is confounded to the detriment of care").

require disclaimers of funding and author affiliation as a condition to publication.[130] To circumvent this disclosure requirement, some sponsors have developed ways to "launder" their research support through nonprofit "... shells, creating the illusion that they themselves play no role in research that supports their interests."[131] Actors have also commissioned review articles and convened expert panels that purport to summarize existing research on a topic—such as the health effects of environmental tobacco smoke—even though, in reality, the commissioned review articles or reports are intended (and contractually guaranteed) to portray existing research in the light most favorable to the sponsor.[132]

Unfortunately, the scientific community is generally not involved in refuting this manufactured controversy. Because much strategically produced research is of an applied nature, academic scientists, who are most interested in developments pertaining to basic research and scientific theory, are not likely to read, challenge, or attempt to

---

130. *See, e.g.*, Joseph Sanders, *The Bendectin Litigation: A Case Study in the Life Cycle of Mass Torts*, 43 HASTINGS L.J. 301, 337 (1992) (describing the studies that Merrell conducted after litigation in Bendectin cases as a "lose-lose proposition" because "[i]f they showed an effect, the studies would be used against the company" and if they did not "[a]ny slight technical flaw in the design or execution of the experiment would be exploited by plaintiffs to undermine Merrell's findings").

131. *See, e.g.*, Alicia Mundy, *Hot Flash, Cold Cash: How a Once-Respected Women's Group Went through The Change—With the Help of Drug Industry Money*, WASH. MONTHLY, Jan./Feb. 2003, at 35 (reporting on drug companies' influence on a nonprofit called the Society for Women's Health Research, which includes substantial corporate giving, sitting on the "corporate" board, and is ultimately reflected in the Society's position on various issues).

132. The skillful use of review articles has been identified as one strategy used by at least the tobacco industry. Deborah E. Barnes & Lisa A. Bero, *Why Review Articles on the Health Effects of Passive Smoking Reach Different Conclusions*, 279 JAMA 1566 (1998) (finding that the most strongly supported explanation for the discrepancy in reviews assessing the impact of passive smoking was whether or not they were written by authors affiliated with the tobacco industry). Some journals will not accept these commissioned review articles, although the ability of journals to police conflict disclosures is limited. *See supra* note 127.

The creation of handpicked or "stacked" expert panels is even more commonplace. *See, e.g.*, GLANTZ ET AL., *supra* note 103, at 32–33 (summarizing that the Tobacco Industry Research Committee (TIRC, later renamed Council for Tobacco Research (CTR)) was formed jointly by tobacco companies with the publicly identified purpose of "fund[ing] independent scientific research" on hazards of cigarettes, whereas internal documents reflect that its true purpose was "to convince the public that the hazards of smoking had not been definitively proven"); RICHARD KLUGER, ASHES TO ASHES 164–67, 205–12, 227–29, 466–68 (1996) (describing the activities and mission of the tobacco industry's TIRC/CTR); MUNDY, *supra* note 90, at 119–21 (discussing how the manufacturer of Fen-Phen convened an expert panel to review the drug, but that many of the experts selected had allegiances to the company).

replicate the commissioned results.[133] Moreover, in contrast to federally funded research, private research is not subject to the scientific-misconduct or research-objectivity regulations promulgated by the U.S. Office of Research Integrity.[134] Thus, virtually all quality checks on much of this "offscreen" research depend on the rigor of scientific journals and their peer review processes. Yet deficiencies in these processes have been well documented.[135] Thus, for much research on the harms created by externalities, actors with a sufficient stake in the outcome and with the financial wherewithal to exert influence can significantly affect the trajectory of scientific knowledge, at least in the short term.

C. Exceptions to the General Rule

It may not always be in a rational actor's interest to perpetuate ignorance about the social costs of its activities.[136] If an actor loses when the safety of its activities is not adequately assessed, the incentives are obviously reversed. For example, legal rules that presume the worst can create powerful incentives to conduct research.[137] Under these circumstances, because research might produce good news that lessens liability or compliance costs, or at

133. *See, e.g.*, James S. Coleman, *Policy Research in the Social Sciences*, *in* COMM'N ON THE OPERATION OF THE SENATE, 94TH CONG., 2D SESS., POLICY ANALYSIS ON MAJOR ISSUES 25, 27–29, 40 (Comm. Print 1977) (contrasting policy research from "discipline research" and discussing how the incentives for conducting policy research lie predominantly outside of the scientific community); DANIEL SAREWITZ, FRONTIERS OF ILLUSION: SCIENCE, TECHNOLOGY, AND THE POLITICS OF PROGRESS 98 (1996) ("[T]he science community . . . ascribes the greatest intellectual and social prestige to basic or 'pure' research—the source of new knowledge—while viewing the role of applied research and technology development as more concrete, less difficult, and therefore less intrinsically worthy.").

134. *See* Responsibility of PHS Awardee and Applicant Institutions for Dealing With and Reporting Possible Misconduct in Science, 42 C.F.R. §§ 50.101–50.105 (2003); HSS Responsibility of Applicants For Promoting Objectivity in Research for Which PHS Funding Is Sought, 42 C.F.R. §§ 50.601–50.607 (2003).

135. *See, e.g.*, DARYL E. CHUBIN & EDWARD J. HACKETT, PEERLESS SCIENCE: PEER REVIEW AND THE U.S. SCIENCE POLICY 94 (1990) (identifying the limitations of scientific peer review, including presenting evidence of caprice and bias, such as favoring famous authors, that sometimes play a larger role than the quality of the authors' work in a peer reviewer's evaluation); SHEILA JASANOFF, THE FIFTH BRANCH: SCIENCE ADVISERS AS POLICYMAKERS 69–71 (1990) (discussing studies that purport to show the influence of various forms of bias in the peer review process).

136. If there is no perceived benefit or cost-effective way to combat publicly disseminated research regarding an actor's externalities, the actor will simply not invest in challenging the research.

137. *See also infra* Part IV.C.2.

least better news than existing *status quo* assumptions, it pays to invest in research. The breast implant and Bendectin companies' investment in additional research in response to plaintiff verdicts provides a case in point.[138] Similarly, an actor may worry that local communities will express animosity about its pollution through costly lawsuits and picketing, both of which are potentially damaging to the actor's corporate image. In such cases, an actor may seek to stave off these potentially costly problems by conducting a legitimate and publicly accessible self-study. More subtle but perhaps much more powerful are the incentives created by worst-case cancer assumptions (i.e., precautionary policies) used by the EPA to regulate carcinogens.[139] The EPA's default assumption that there is a linear dose-response relationship for cancer, with the lowest doses still leading to harm, has provided a strong incentive for actors to collectively fund research on carcinogenesis.[140] This research, set against the worst-case background, can only be expected to produce good news relative to regulatory standards set at zero. In fact, at least some of the advances in understanding cancer caused by

---

138. *See* Rebecca S. Dresser et al., *Breast Implants Revisited: Beyond Science on Trial*, 1997 WISC. L. REV. 705, 743–44 (documenting and citing others who observed that scientific research on the adverse effects of breast implants and Bendectin peaked after and as a result of the unfavorable products liability litigation).

139. In extrapolating from high-dose studies on animals to possible low-dose effects, it is necessary to select some type of dose-response curve, but because there is generally no way to study low-dose effects, the appropriate curve must be based on policy considerations. As a working default dose-response curve, the EPA selects a linear curve for strong and intermediate carcinogens and other select substances, meaning that the response to a toxin increases in direct proportion to the dose of the toxin. *See, e.g.*, Proposed Guidelines for Carcinogen Risk Assessment, 61 Fed. Reg. 17,960, 17,981 (Apr. 23, 1996) (recommending this "default" assumption of linearity when there is evidence of adverse effects but not evidence to support an assumption that the dose-response relationship is nonlinear); *id.* at 17,986–90 (listing seven examples of types of substances subject to risk assessment and recommending a linear default for four of the seven types of substances); *see also* National Primary Drinking Water Regulations, 66 Fed. Reg. 6976, 7004 (Jan. 22, 2001) ("The use of a linear procedure to extrapolate from a higher, observed data range to a lower range beyond observation is a science policy approach that has been in use by Federal agencies for four decades."). Also central to this working assumption is the corollary assumption that animals provide a reliable surrogate for assessing the effects of a toxin on humans. *E.g.*, COMM. ON RISK ASSESSMENT OF HAZARDOUS AIR POLLUTANTS, NATIONAL RESEARCH COUNCIL, SCIENCE AND JUDGMENT IN RISK ASSESSMENT 86 (1994) [hereinafter NRC, SCIENCE AND JUDGMENT].

140. *See, e.g.*, Sean M. Hays et al., *Potential Uses of PBPK Modeling to Improve the Regulation of Exposure to Toxic Compounds*, RISK POL'Y REP. (Inside Wash. Publishers, Arlington, D.C.), Dec. 18, 1998, at 37 (industry consultant describes and advocates greater use of intricate and assumption-laden modeling for estimating cancer risks, a technique that is still limited by the unavailability of data for most chemicals and pollutants).

environmental contaminants is undoubtedly due in part to private sector investments in research encouraged by the EPA's protective regulations.[141]

Although certain markets might also reward as heroes those companies that take proactive steps to ensure that their products and activities do not create harmful externalities,[142] in the environmental law context such protective actions often follow, rather than precede, laws that require actors to avoid these harmful activities.[143] For example, regulations passed under the Marine Mammal Protection Act (MMPA) prohibit U.S. tuna companies from catching tuna with nets that injure dolphins.[144] When there was a public outcry because tuna was still being caught by fleets that were not complying with these requirements, Congress passed a second law providing for the use of "dolphin safe" labels to allow consumers to identify tuna caught with dolphin safe nets.[145] Faced with a public boycott if they continued to purchase from tuna suppliers who harmed dolphin, companies like StarKist supported and even encouraged such a federal labeling law. Federal labeling requirements could help them regain disenfranchised consumers, while at the same time portraying the tuna companies as corporate philanthropists who voluntarily relinquished profits to save dolphins.[146] Thus, despite preexisting laws

---

141. The American Chemistry Council's Long Range Initiative Program (LRI) exemplifies industry's research investments in understanding the mechanisms of carcinogenesis. *See, e.g.*, American Chemistry Council, Long Range Initiative (LRI) program, *available at* http://www.uslri.org; LRI, *The Chloroform Story: How Science Can Improve Regulatory Decision-making*, LRI PERSPECTIVES, Sept. 2003 (describing industry-funded research on chloroform that revealed that higher concentrations of chlorine were safe for public health in contrast to the EPA's assumption that there was no safe dose of chlorine), *available at* http://www.uslri.org/documents/cat_25/doc_362.pdf.

142. For an elaboration on when there might be competition to be heroic, see Richard H. McAdams, *The Origin, Development, and Regulation of Norms*, 96 MICH. L. REV. 338, 369–72 (1997).

143. *Cf. supra* note 39 and *infra* Part II.A.

144. *See, e.g.*, Taking and Related Acts Incidental to Commercial Fishing Operations by Tuna Purse Seine Vessels in the Eastern Tropical Pacific Ocean, 50 C.F.R. § 216.24 (restricting the use of purse-seine nets in the eastern, tropical Pacific Ocean); *see also* Marine Mammal Protection Act, 16 U.S.C. §§ 1371 and 1374 (2000).

145. *See* Dolphin Protection Consumer Information Act, 16 U.S.C. § 1385 (2000); *see also* Susan C. Alker, Comment, *The Marine Mammal Protection Act: Refocusing the Approach to Conservation*, 44 UCLA L. REV. 527, 557 (1996) (describing the public outcry that led to legislation for "labeling tuna cans as dolphin safe").

146. *See, e.g.*, Alker, *supra* note 145, at 557–58 (discussing StarKist and several other tuna companies' reaction to the public boycott and observing that these tuna companies came away "looking like 'good guys' who cared more about dolphins than profits"). Shortly after adopting

that had already attempted to require dolphin-safe tuna in the U.S., StarKist and other tuna producers were viewed as corporate heroes.

Additionally, of course, a firm might simply not act rationally and might voluntarily produce information on externalities, even if such information would potentially reduce profits and increase liability.[147] Indeed, a growing body of literature suggests that corporate managers respond to a variety of stimuli when making decisions.[148] To the extent that a corporation does not consider its immediate financial interests in deciding whether to voluntarily produce information regarding its potential externalities, then, it might not follow the rational paths of action previously discussed.

---

this dolphin safe policy, StarKist used it to its advantage in promotional materials, prompting one competitor to note, "They took a half-page ad in the New York Times and they only stopped murdering the dolphins the week before." Michael J. McDermott, *Charlie and the Mermaid Sing a Different Tuna; Tuna Marketing and Environmental Policy*, FOOD & BEV. MKTG., Sept. 1990, at 24.

147. This possibility is lessened somewhat by the limited legal requirements that encourage this production, *see infra* Part II, and the growing number of legal incentives that discourage information production, *see supra* Parts I.A, I.B; *infra* Part III. The possibility that firms might voluntarily produce information about how their products, wastes, or activities harm health and the environment also seems diminished by the reality that firms might not realize the large deficits in information. *See infra* Part IV.A. In fact, it appears that the necessary conditions for enforcing norms and rewarding compliance are largely absent. For one, it is not clear at what point the norm to produce information is triggered, or how much information is enough. Also, as detailed throughout Part I, there is little chance of third parties evaluating whether the norm has been violated. Thus, at least two of the three conditions for norm-based enforcement are missing. *See* McAdams, *supra* note 142, at 358 (identifying three conditions under which "the desire for esteem produces a [behavioral] norm" in a given population of individuals: (1) there is "consensus about the positive or negative esteem worthiness of engaging in [that behavior]," (2) there is "risk that others will detect whether one engages in [the behavior]," and (3) both the "consensus and risk of detection [are] well-known within the . . . population"); *cf.* Clifford Rechtschaffen, *Deterrence vs. Cooperation and the Evolving Theory of Environmental Enforcement*, 71 S. CAL. L. REV. 1181, 1193–94 (1998) (discussing skepticism that corporations will comply with environmental laws out of a sense of social responsibility, rather than because of the threat of sanctions or other deterrents).

148. *See, e.g.*, IAN AYRES & JOHN BRAITHWAITE, RESPONSIVE REGULATION: TRANSCENDING THE DEREGULATION DEBATE 22 (1992) ("[Business informants] claimed that they and their colleagues took seriously business responsibility, ethics, and obligations . . . to be responsive to nonshareholding stakeholders in the corporation."). *But see* JAMES V. DELONG, OUT OF BOUNDS, OUT OF CONTROL: REGULATORY ENFORCEMENT AT THE EPA 24 (arguing that the EPA's "arbitrary enforcement tends to encourage lawbreaking because business acceptance of the modern environmental ethic depends in part upon reasonableness").

II. THE LAWS DO NOT REQUIRE THE PRODUCTION OF NEEDED INFORMATION

Laws that require the production and disclosure of financial information are considered vital to ensuring a thriving securities market and strong corporate governance.[149] Information on the potential health and environmental harms caused by dangerous products and polluting activities seems at least as important for informed consumer and regulatory decisions. Indeed, the case for legal intervention is especially compelling for the production of environmental and health information given the lack of incentives for private actors to produce this information, and, in some cases, their parallel inclination to actually discredit the information that is available.[150] Nonetheless, current laws implemented by the EPA generally do not require information on a given product's or activity's risks or harms.[151]

Most environmental laws do aspire to ensure that needed information on environmental harms is developed and, in some cases, the laws even demand that actors bear full responsibility for producing this information. Every major environmental statute includes among its opening goals a declaration that externalities be identified and regulated so that the public and the environment will

---

149. *See, e.g.*, John C. Coffee, Jr., *Market Failure and the Economic Case for a Mandatory Disclosure System*, 70 VA. L. REV. 717, 734–37 (1984) (discussing, with empirical evidence (decreased price dispersion), the social benefits of the federal securities laws, in addition to their benefit to investors); Louis Lowenstein, *Financial Transparency and Corporate Governance: You Manage What You Measure*, 96 COLUM. L. REV. 1335, 1335 (1996) (discussing why corporate financial reporting in the United States "is so much better than that elsewhere, why it contributes so much to the fairness and efficiency of our financial markets, and most particularly why it has contributed so much to effective corporate governance and oversight"); Joseph E. Stiglitz, *The Contributions of the Economics of Information to Twentieth Century Economics*, 115 Q. J. ECON., 1441, 1467–68 (2000) (concluding that "[l]egal institutions—from reporting requirements to strong fraud laws to laws to protect minority shareholders from the majority—are all essential parts of a broad system of corporate governance" needed to counteract problems arising out of asymmetric information and incentives for strategic behavior).

150. *See infra* Part III.C.

151. This Article considers only the laws administered by the EPA, even though similar problems may arise in public health programs administered by the Occupational Safety and Health Administration and the Food and Drug Administration and in natural resource programs administered by the National Oceanic and Atmospheric Administration, the Forest Service, and various agencies in the Department of the Interior. *See also* BREYER, *supra* note 28, at 23–26 (discussing the classic justification for regulation based on preventing negative spillovers, but neglecting to consider as an added justification for social regulation the goal of requiring actors who engage in the negative spillovers to produce preliminary information about their activities, particularly when they enjoy superior information about the activities).

be fully protected, or at least protected to the extent reasonable or feasible. These statutes also require actors to actively assist in ensuring that public health and the environment are adequately protected.[152] In several statutes, in fact, the laws specifically direct the manufacturers or polluters to produce all needed information on the safety of their products or activities so that regulators can determine an appropriate regulatory response.[153] In the Toxic Substances Control Act (TSCA),[154] for example, Congress declared as one of the statutory goals that "adequate [safety] data . . . be developed . . . and that the development of such data should be the responsibility of those who manufacture and those who process such chemical substances and mixtures."[155]

Despite these noble statutory intentions, however, the regulation- and litigation-driven implementation of these laws nevertheless allows actors to escape much of the responsibility for producing vital information on the externalities that they create.[156]

---

152. Virtually all of the environmental laws require at least some actors to identify themselves as creating an externality, and to explicate the general nature of that externality. *See, e.g.*, Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), 7 U.S.C. § 136a (2000) (requiring manufacturers of new pesticides to conduct specific tests on the pesticide and obtain registration from the EPA before marketing the pesticide); TSCA, 15 U.S.C. § 2604 (requiring manufacturers of new chemicals to submit a premanufacture notification); Clean Water Act (CWA), 33 U.S.C. § 1321(a)(2) (2000) (prohibiting the point source discharge of pollution without a permit); RCRA, 42 U.S.C. § 6922 (2000) (requiring generators to test their wastes to determine whether they are hazardous); *id.* §§ 6923–25 (2000) (requiring transporters and treatment, storage, and disposal units handling hazardous wastes to self-identify and follow regulatory requirements); Clean Air Act (CAA), 42 U.S.C. § 7412(i) (2000) (prohibiting the emissions of air toxins in major amounts without a permit that specifies emissions limits for the source); Comprehensive Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. § 9603 (2000) (requiring persons in charge to report releases of reportable quantities of hazardous substances); Environmental Planning and Community Right-To-Know Act (EPCRA), 42 U.S.C. §§ 11,002–11,003, 11,022–11,023 (2000) (requiring covered facilities to self-identify; report their storage, use, and disposal of hazardous substances; and prepare an emergency response plan). Failure to self-identify can lead to both criminal and civil sanctions. *E.g.*, CWA, 33 U.S.C. § 1319 (2000).

153. *See infra* Part II.A.

154. 15 U.S.C. §§ 2601–2692 (2000).

155. *Id.* § 2601(b)(1).

156. The statutes that are most emphatic in requiring actors to produce information have not always been written or implemented in ways that ensure production of the needed research. As discussed at *infra* Part III.A.1, by requiring only the submission of "available" information on the safety of new and existing chemicals, TSCA generally provides disincentives for conducting new, voluntary research on chemical safety. EPCRA is written and implemented in a similar, perverse fashion. The statute requires some information of the harmful properties of a substance for the EPA to designate it as one of the chemicals in need of disclosure. *See* 42 U.S.C. § 11,002(a)(4) (empowering the EPA administrator to designate a substance as

This Part discusses the shortcomings of the existing environmental laws in ensuring the production of needed information. The first half of the Part surveys the limited, affirmative requirements that the laws do impose on actors for producing information about adverse effects. The second half then explores the various types of information that actors are not required to produce, even though much of this information is privately held and is vital to assessing the harm that results from private activities.

A. Information That Actors Are Required to Produce

Environmental laws, as currently implemented, limit the demands placed on actors to account for the harms that their products and activities create. There are only three circumstances under which actors are routinely required to produce information about their externalities, and they are discussed below.

1. *Manufacturers of Certain New, Hazardous Products (E.g., Pesticides and "Suspect" Toxic Substances) and a Smaller Set of Existing Hazardous Products Are Required to Conduct Prescribed Toxicity Tests to Get or Keep Their Products on the Market.* EPA regulations require manufacturers to conduct a series of mandated toxicological tests and obtain agency approval before marketing a new pesticide.[157] The EPA can also require toxicity testing for existing

---

hazardous based on its toxicity). Predictably, regulated parties vigorously challenge the listings as insufficiently supported. The D.C. Circuit agreed for at least one chemical, not appearing to notice the irony of a disclosure statute that allows polluters to avoid disclosure requirements if they skillfully avoid researching the safety (or harmfulness) of a toxic pollutant. *See* Troy v. Browner, 120 F.3d 277, 293 (D.C. Cir. 1997) (rejecting as arbitrary the EPA's decision to designate the chemical DMP as hazardous under EPCRA because both of the studies on which the EPA relied—the only two available studies on DMP—were performed in the Soviet Union during the 1960s and were insufficiently documented).

157. With only a few exceptions, all new pesticides are required to undergo a relatively thorough battery of safety tests pursuant to the registration requirements of FIFRA. 7 U.S.C. § 136a. Because existing pesticides are grandfathered into the regulatory program and must be tested after the fact, there is considerably less data available on them. *Id.* § 136a-1; *see also* Neurotoxic Pesticides; Availability of Data Call-In Notice, 64 Fed. Reg. 42,945 (Aug. 6, 1999) (requiring manufacturers of existing pesticides, for the first time, "to conduct acute, sub-chronic, and developmental neurotoxicity studies" on pesticide products). However, the need to set pesticide tolerances under the Food Quality Protection Act, 21 U.S.C. § 346a(b)(2) (2000), is causing the EPA to place some additional testing demands on manufacturers of existing pesticides. *See, e.g.*, Envtl. Prot. Agency, Endocrine Disrupter Screening Program, *at* http://www.epa.gov/scipoly/oscpendo/ (last visited Sept. 27, 2004) (on file with the *Duke Law Journal*) (providing information on the EPA's "approach and progress for screening and testing chemicals for potential endocrine disruption").

pesticides,[158] although this testing is not automatic and must be instigated by the agency.[159]

Testing can also be mandated for toxic substances, although this rarely occurs.[160] If the EPA determines that a new toxic substance

---

Under FIFRA, the EPA has developed a chart setting out the series of tests that a manufacturer must conduct before a pesticide is permitted to enter the market. EPA Data Requirements for Registration, 40 C.F.R. pt. 158 (2003) (setting forth a basic core set of over one hundred studies that would assist in determining the effects of pesticides); EPA Toxicology Data Requirements, 40 C.F.R. § 158.340 (providing a table for all testing requirements and guidelines under FIFRA).

Vigorous testing of new products is justified because, as noted previously, manufacturers have superior knowledge about product contents and therefore are in the best position to conduct these tests. In addition, manufacturers can test early in the course of product development, thereby avoiding the costs associated with marketing a product unlikely to pass muster with the agency. In some cases, a manufacturer can also use test results to modify a product's composition and, in so doing, to reduce its negative environmental impact. Research on industrial innovation reveals that for chemical products, more than 70 percent of the total development time (averaging from seventeen months to four or five years) is dedicated to the final stages of product design—after the product is designed, but before the product is marketed. *See* EDWIN MANSFIELD ET AL., RESEARCH AND INNOVATION IN THE MODERN CORPORATION 113–15, 118 (1971) (identifying five stages of the design of a product, beginning with applied research and ending with manufacturing start-up, and reporting that the final four stages consume most of the time of product design but can begin only after the product itself has been determined), *quoted in* GEORGE EADS & PETER REUTER, DESIGNING SAFER PRODUCTS: CORPORATE RESPONSES TO PRODUCT LIABILITY LAW AND REGULATION 53–54 (1983). The complementary asymmetries in information discussed in Part I.B.1, *supra*, make placing the responsibility on manufacturers for safety testing only that much more cost-effective.

158. This split between testing for old and new products, although problematic from an informational perspective, is partly justified by the economic gains in testing earlier in the life cycle and the legal and economic impediments to requiring manufacturers to test products already on the market. *Cf.* James A. Henderson, Jr., *Product Liability and the Passage of Time: The Imprisonment of Corporate Rationality*, 58 N.Y.U. L. REV. 765, 774 (1983) ("[T]o the extent that increases in exposure to liability are likely to flow from reasonable efforts by manufacturers to make their products safer, they discourage manufacturers from engaging at the margin in precisely the sorts of activities that tort law purports to encourage.").

159. *See supra* note 158; *infra* note 198 and accompanying text.

160. Except for chemicals produced in high volumes and posing a substantial risk of exposure, as set forth in 15 U.S.C. § 2603(a)(1)(A) (2000), TSCA provides the EPA with authority to impose testing requirements on new chemicals only if the EPA can demonstrate that the existing data are "insufficient" to assess the chemical and the EPA has reason to suspect that the new chemical "may present" a risk or hazard. *Id.* § 2604(e). To get around the vicious circle of ignorance built into these regulatory requirements, the EPA has devised a "suspect" category of chemicals based on their structural activity, which provides some indication, albeit imperfect, of whether they might be hazardous. If the structure of a chemical falls into one of these forty-five suspect chemical families, the EPA requires manufacturers to run what are often rather extensive tests to ensure that the chemical does not pose a risk. Wendy E. Wagner, *The Precautionary Principle and Chemical Regulation in the U.S.*, 6 HUM. ECOLOGY RISK ASSESS. 459, 465 (2000). There is even less testing required for existing toxic substances. *See infra* notes 162–63 and accompanying text.

poses a potential risk—a determination that is sometimes based solely on the substance's chemical structure—the EPA can require the manufacturer to conduct specific toxicity tests before allowing the chemical to be marketed.[161] The EPA also has the authority to require additional testing for existing toxic substances, but the agency must first present evidence that the chemical presents a potential risk to health or the environment.[162] In both cases, the testing is by no means automatic and, particularly for existing toxic substances, is generally the exception rather than the rule.[163] Manufacturers are also required to report the "adverse effects" of both pesticides and toxic substances already on the market, although these reporting requirements are not easily enforced.[164]

2. *Polluters Who Discharge through a Pipe into Surface Waters or Emit or Discard into the Outside Air or onto Land More Than a Threshold Amount of Pollution Must Get a Permit and Report Their Waste Disposal Activities*.[165] Current law requires actors to obtain a

---

161. *See, e.g.*, U.S. GEN. ACCT. OFFICE, TOXIC SUBSTANCES CONTROL ACT: LEGISLATIVE CHANGES COULD MAKE THE ACT MORE EFFECTIVE, at 46 (1994) (discussing the lack of testing required of existing chemicals and reporting that "[a]ccording to EPA officials, the agency has not used its authority to require more testing, largely because it must undergo a lengthy and costly rule-making process").

162. *See supra* note 152. To avoid challenges under this section, most of the testing requirements are negotiated by the EPA with manufacturers through voluntary testing agreements. *See, e.g.*, Holly E. Petitt, Comment, *Shifting the Experiment to the Lab: Does EPA Have a Mandatory Duty To Require Chemical Testing for Endocrine Disruption Effects Under the Toxic Substances Control Act?*, 30 ENVTL. L. 413, 426–27 (2000) (describing the EPA's expansive use of these testing agreements).

163. *See, e.g.*, U.S. GEN. ACCT. OFFICE, *supra* note 161, at 46 (observing, based on a study of TSCA test rules required of existing substances, that "little is known about the effects of many chemicals used in commerce"). The inadequate state of testing was the major impetus for the High Productive Volume (HPV) Challenge Program, which involves voluntary agreements between the EPA and manufacturers to test chemicals produced in high volumes. Information about the program is available at the EPA website on the HPV Challenge Program, at http://www.epa.gov/opptintr/chemrtk/volchall.htm (last visited Oct. 30, 2004) (on file with the *Duke Law Journal*). This voluntary agreement was accomplished in part because the EPA has greater authority under TSCA, 15 U.S.C. § 2603(a)(1)(B), to require testing for this set of chemicals because they are produced in higher volumes and hence the exposure risks are presumptively greater.

164. FIFRA, 7 U.S.C. § 136d(a)(2) (2000) ("If at any time after the reregistration of a pesticide the registrant has additional factual information regarding unreasonable adverse effects on the environment of the pesticide, the registrant shall submit such information to the [EPA] Administrator."); TSCA, 15 U.S.C. § 2607(c), (e) (reiterating the recordkeeping and reporting requirements); *see also infra* notes 215–17 and accompanying text.

165. *See, e.g.*, CWA, 33 U.S.C. §§ 1311, 1362(12), 1362(14) (2000) (clarifying that the prohibition on "discharging" pollutants into navigable waters without a permit applies only for

permit for major pollutant discharges and provide regular self-monitoring reports that, to the extent possible, account for the contaminants in their waste streams.[166] In addition, the largest dischargers of contaminants often must install monitoring equipment on large stacks and pipes within their facilities and are required to conduct periodic self-inspections on smaller sources within the facility to ensure that the requisite pollution control equipment is in place.[167] (No monitoring of actual emissions is ordinarily required for small sources of pollution at these facilities.) Some testing and associated recordkeeping are also required of industrial facilities before they send wastes off-site.[168] The receiving facilities, which ultimately dispose, store, or treat these hazardous wastes, are also required to keep records of their activities and to monitor the environment into which the treated wastes are discharged.[169]

To ensure a macroview of the overall magnitude of contaminants being released into the environment, the Emergency Planning and Community Right to Know Act (EPCRA)[170] requires facilities with especially large pollution loads to estimate and report the total amount of pollution that they generate, release, and ship off-site, on a chemical-by-chemical basis.[171] However, these estimates need not be documented, validated, or peer reviewed; instead, they can be based on rough estimates.[172] As a result, there are problems of

---

pollutants discharged through a "discrete conveyance" or point source); RCRA, 42 U.S.C. §§ 6922, 6924 (2000) (requiring generators and owners and operators of treatment, storage, and disposal facilities of hazardous wastes to meet federal standards for operating the respective facilities, which includes periodically testing the wastes); CAA, 42 U.S.C. § 7661a(a) (2000) (requiring Federal Clean Air Act permits only for "major" sources of emissions, including more dispersed "area" sources or other identified large facilities.)

166. CWA, 33 U.S.C. § 1318(a) (requiring permit holders discharging pollutants to keep records and monitor discharges); RCRA, 42 U.S.C. § 6922(a)(1), (6) (requiring recordkeeping and regular reporting of hazardous wastes generated); CAA, 42 U.S.C. § 7414(a)(3) (requiring enhanced self-monitoring for major stationary sources). The most thorough discussion of the self-monitoring requirements in environmental law is Arnold W. Reitze, Jr. & Lee D. Hoffman, *Self-Reporting and Self-Monitoring Requirements Under Environmental Laws*, 1 ENVTL. LAW. 681 (1995).

167. *See infra* note 250 and accompanying text.

168. 42 U.S.C. § 6922(a). Small quantity generators are effectively exempted unless they produce extremely hazardous wastes. *Id.* § 6921(d).

169. *See* 42 U.S.C. § 6924(p), (r), (s), (v).

170. EPCRA, 42 U.S.C. §§ 11,001–11,050 (2000).

171. EPCRA, 42 U.S.C. § 11,023.

172. The regulated party is only required to make "reasonable estimates" using available data. If monitoring is not otherwise required by law, the regulated party need not do more than make a reasonable estimate. *Id.* § 11,023(g)(2). An EPA study on the quality of data reported to

underreporting by certain facilities, both with regard to whether they meet reporting requirements, and with regard to the data that they submit about their polluting activities.[173]

3. *When the Accidental Release of a Hazardous Substance Occurs, Actors Must Report This Release If They Believe It to Exceed a Specified, Daily "Reportable Quantity."* Actors are required to report sudden releases of large amounts of hazardous substances from their facilities under threat of civil and criminal penalties.[174] If responsible for the sudden release, the actor may also be required to finance a more extensive risk assessment and, ultimately, to pay for resulting cleanup costs and damages to natural resources.[175] Under these reporting requirements, however, the actor is generally not required to measure the release directly and is excused from the obligation to report if the release is less than a threshold amount (ranging between one pound and five thousand pounds in a day).[176] Due to their superior informational advantages, some actors may

---

the Toxic Release Inventory (TRI) reveals that manufacturers use monitoring data as one of the bases for estimating annual use, release, and disposal of hazardous substances less than 20 percent of the time, whereas purchase or inventory records are used in making roughly 80 percent of the estimates. ENVTL. PROT. AGENCY, 1996 TOXIC RELEASE INVENTORY: DATA QUALITY REPORT 4-6, tbl.4-1 (1998) [hereinafter EPA TOXIC RELEASE REPORT], *available at* http://www.epa.gov/tri/tridata/data_quality_reports/ index.htm.

173. The EPA concludes in its 1996 study of the data quality of the TRI reports that:

> Overall, facilities correctly calculated thresholds for 95% of the EPCRA Section 313 chemicals used at the selected industries. However, the frequency of incorrect threshold determinations suggests that the TRI database might not account for a significant quantity of chemicals used at reportable levels. More specifically, the site survey results suggest that for RY 1996, facilities correctly reported for 88% of the chemicals that actually exceeded thresholds.

EPA TOXIC RELEASE REPORT, *supra* note 172, at 4-17. There was also systematic underreporting of air releases and off-site transfers (by as much as half the true amount). *Id.* at 5-14 tbl.5-2; 6-9 fig.6.2a.

174. *See* CERCLA, 42 U.S.C. § 9603(a) (requiring the "person in charge" of a facility to report releases of "reportable quantities" of "a hazardous substance"). Under the Clean Water Act, the actor must report the release of any pollution, including oil and nonhazardous substances, into navigable waters. *See* CWA, 33 U.S.C. § 1321(b)(5) (requiring the "person in charge" of a vessel or facility to report "any discharge of oil or a hazardous substance" that exceeds quantities promulgated by the EPA). Notification requirements governing releases from, and even the physical existence of, underground storage tanks are more expansive under RCRA, however. *See* 42 U.S.C. §§ 6991a and 6991b.

175. The damages for which responsible parties may be liable are set forth in the following provisions: CWA, 33 U.S.C. § 1321(b)(9), (10); Oil Pollution Act (OPA), 33 U.S.C. § 2702(b) (2000); RCRA, 42 U.S.C. §§ 6924(u)–(w) and 6991d; CERCLA, 42 U.S.C. § 9607(a)(4)(A)–(D).

176. Designation of Hazardous Substances, 40 C.F.R. § 302.4 tbl.302.4 (2003).

succeed in underestimating release levels and forgo reporting with little chance of being caught.[177]

B. Information That Actors Are Not *Required to Produce*

Except for the circumscribed sets of products and circumstances described above, actors are generally off the hook when it comes to identifying and analyzing the harms created by their products and activities. Even when actors are required to collect such information, these self-assessments are limited in scope, except for cleanups.[178] Typically actors are only required to provide information about the nature of the activity and not information about its possible adverse effects.[179] Indeed, as discussed in this Section, existing laws allow most private actors to avoid responsibility for providing any information about the harms created by their products and activities. It is instead left to the public, particularly government agencies, to collect and assess this information.[180]

1. *As Long As Their Activities Do Not Fall into the Discrete Sets of "Covered" Acts Identified Above, Polluters and Manufacturers of Hazardous Products Bear No Legal Responsibility for Producing Any*

177. *See, e.g.*, Blais et al., *supra* note 19, at 22–23 (discussing the ways that facilities can avoid reporting unexpected, large releases of air toxins under the current regulatory system).

178. *See supra* note 172 and accompanying text.

179. All of the pollutant monitoring requirements discussed in notes 165–73 and accompanying text, *supra*, require monitoring only of the characteristics of the waste stream, not of the probable or actual impacts on the environment. At best, responsibility for information production stops at the discharge point. For a discussion of the limited ecological tests required of the manufacturers of pesticides and toxic substances, see *infra* notes 198–99 and accompanying text.

180. In all cases, it is the regulator, rather than the actor, who identifies the substances that need monitoring. *See* CWA, 33 U.S.C. § 1311(b)(2)(C)–(D) (referencing a House Committee Report list of 126 toxic substances for which technology-based standards must be promulgated under the Clean Water Act); Safe Drinking Water Act (SDWA), 42 U.S.C. § 300g-1 (2000) (instructing the EPA to identify and set standards for drinking water contaminants); RCRA, 42 U.S.C. § 6921(a)–(b) (directing the EPA to list hazardous wastes and to develop other hazardous waste listing criteria); CAA, 42 U.S.C. § 7412(b) (2000) (listing 189 air toxins for which technology-based standards must be promulgated); EPCRA, 42 U.S.C. § 11,023 (2000) (establishing various reporting requirements for facilities that handle or dispose of more than a threshold amount of a list of hazardous substances specified by Congress in the authorizing statute); *see also* Atl. States Legal Found., Inc. v. Eastman Kodak, 12 F.3d 353, 358 (2d Cir. 1993) (recounting the EPA's CWA enforcement position, which allows the release (even in large quantities) of toxics not listed in a Clean Water Act permit); EPA, Addition of Certain Chemicals; Toxic Chemical Release Reporting; Community Right-To-Know, 59 Fed. Reg. 1788 (Jan. 12, 1994).

Information about Their Activities and Remain Essentially Invisible to Regulators and the Public. Although new and some old pesticides must undergo mandatory safety testing at the EPA's command,[181] no toxic substance needs to be tested unless there is some evidence that the chemical presents a potential risk.[182] This creates a "Catch 22" situation, because manufacturers can (and have) challenged the EPA's test requirements by arguing that the agency has insufficient evidence to show a risk of harm sufficient to justify testing.[183] This loophole may help to explain the absence of *any* toxicity information on 80 percent of the forty-five thousand products already in commerce before 1984: under the prevailing interpretation of its testing authority, the EPA faces significant obstacles in justifying additional testing requirements for these untested chemicals.[184]

Industrial actors similarly avoid a variety of disclosure and regulatory requirements about the disposal of hazardous wastes if they determine that the wastes do not qualify (in toxicity and volume) as hazardous. In some cases, they are permitted to use their own knowledge about the substance as the sole basis for the estimation, with no requirement for having this knowledge validated by an objective third party.[185] Moreover, as previously noted, actors need not even monitor or report spills of toxins unless they appear—to the actor—to exceed a threshold amount.[186]

2. *Even When There Is Information Indicating That a Particular Activity or Product Is Likely Causing Harm, There Are a Number of Circumstances for Which Actors Are Legally Excused from Reporting*

---

181. *See supra* note 157 and accompanying text.

182. Although TSCA does not demand that the EPA produce definitive proof of chemical hazards, it generally does require that the agency have some scientific evidence that a chemical presents a risk before imposing testing requirements, warnings, or use restrictions on a manufacturer. *See* TSCA, 15 U.S.C. § 2604(e) (2000) (permitting the EPA to require additional safety testing if it has reason to suspect that the new or existing chemical "may present" a risk or hazard); *see also* 15 U.S.C. § 2603(a)(1)(B)(i) (placing a lighter burden on the EPA to require testing on high production volume chemicals, and requiring only that the agency show a substantial risk of exposure).

183. The EPA must establish a "more-than-theoretical" probability of a hazard or significant risk of exposure to require additional testing. *See, e.g.*, Chem. Mfrs. Ass'n v. EPA, 859 F.2d 977, 984 (D.C. Cir. 1988).

184. NRC, TOXICITY TESTING, *supra* note 10; *see also supra* notes 23–24 and accompanying text.

185. Criteria For Listing Hazardous Waste, 40 C.F.R. § 262.11 (2003); *see also infra* notes 252–55 and accompanying text.

186. *See supra* Part II.A.3.

or Monitoring Their Harmful Activities. In virtually every state, actors who use pesticides and fertilizers that wash off into rivers and lakes as runoff escape accountability for producing information about their activities, even though these actors appear responsible for more than half of the water pollution in the United States.[187] Likewise, no monitoring of emissions or ambient air is required for the smaller sources of toxic air pollution under the Clean Air Act (although some standard pollution control technologies are usually required), even if cumulatively these sources account for a significant amount of the toxic air pollution emitted by large industrial facilities.[188] Even actors who unexpectedly release toxic air pollutants as a result of a malfunction or change in operations, or who discover that controls designed to reduce the pollutant load have failed, may not be required to measure, repair, or even report the problem.[189]

---

187. *See, e.g.*, U.S. GEN. ACCT. OFFICE, GREATER EPA LEADERSHIP NEEDED TO REDUCE NONPOINT SOURCE POLLUTION 8 (1990) (reporting that nonpoint source pollution is a predominant problem for 76 percent of the lakes, 65 percent of the streams, and 45 percent of the estuaries that fail to meet water quality standards).

188. *See* National Emission Standards for Hazardous Air Pollutants for Source Categories, 40 C.F.R. pt. 63 (2003) (providing no requirements for monitoring emissions). But these sources cumulatively do contribute a significant source of toxic air pollution in some urban areas. For example, in 1999, roughly one-third of the total emissions of hazardous air pollutants (HAPs) reported under EPCRA in Texas were from fugitive sources. (The search was done by requesting details on air emissions through the EPA's TRI Explorer Database which can be accessed at http://www.epa.gov/tri/). Indeed, beyond excusing facilities from ambient monitoring, the regulations provide facilities with fugitive sources wide latitude in self-monitoring their compliance with required pollution control equipment. Under the regulations, a facility is required to self-inspect to ensure compliance with technology-based requirements for fugitive emissions sources only at specified intervals, sometimes as infrequently as once per year. *See* Storage Vessel Provisions—Procedures to Determine Compliance, 40 C.F.R. § 63.120(a) (requiring visual inspections only once annually for storage vessels). When a facility catches its own violation, there is a period of time during which the facility can repair the problem without penalty. Under some fugitive pollution rules, this excused repair time can be as long as forty-five days. *Id.* § 63.120(a)(4). Theoretically, then, a facility may be able to emit HAPs from some fugitive sources in violation of an emissions requirement for as long as one year and forty-three days without violating air quality regulations. At the same time, these emissions would probably not be reportable emissions events because they would likely not exceed the reportable quantity over a twenty-four-hour period.

189. Malfunctions and unexcused releases must be reported only when the operator knows that the release exceeds the daily reportable quantity set for one or more hazardous substances under CERCLA. 42 U.S.C. § 9603(a) (2000). As a result, most releases need not be reported at all. Even when they are reported and the state agency or the EPA determines that they are preventable, corrective action could be required only if the emissions event produced a risk to health and safety (a data intensive inquiry). *See, e.g.*, Texas Emissions Event Law, TEX. HEALTH & SAFETY CODE ANN. § 382.0216(b) (Vernon 2001).

Actors owning land that leaches toxic substances onto neighboring land, into public recreational resources, or into other water supplies (including drinking water supplies), are effectively immunized from accounting for their pollution if the amount "appears" smaller than the reportable quantities defined by regulations.[190] The contamination may only be discovered if a governmental entity or other third party identifies the problem.[191] Under existing regulatory requirements, for example, Beatrice Foods, a defendant-polluter in the Civil Action drama, was legally able to ignore the fact that its wastes were dissipating into the groundwater until someone else discovered them (for example, local families trying to find a cause for the high rate of childhood cancer in their community).[192] Actors who formerly conducted hazardous disposal operations on land that they no longer own, or who sent wastes to dangerous dump sites, also appear to bear no responsibility for volunteering information about their prior activities, and, given their liability risks, are undoubtedly disinclined to do so.[193]

---

190. *See* CWA, 33 U.S.C. § 1321(b)(5) (requiring reports of spills of oil and hazardous substances only above a threshold amount and, even then, only from vessels or facilities, thus excluding runoff); CERCLA, 42 U.S.C. § 9603(a) (requiring reports of releases of hazardous substances only if they exceed a "reportable quantity").

191. Ultimately, owners can be held liable if their contributions are discovered and lead to response costs or cleanup activities. 42 U.S.C. §§ 9604(a), 9606(a), 9607(a). But until then, owners are free from responsibility. Recall some of the surprises this limited accountability brings. *See supra* note 21 and accompanying text.

192. This is the scenario that unfolded in the Beatrice Foods scandal, chronicled in *A Civil Action*. *See* HARR, *supra* note 21. Companies such as Beatrice Foods can take such a position provided that they do not have "knowledge" of the release of a reportable quantity of a hazardous substance, which is based on a daily rate of leaking that seems incapable of measure because of the passive nature of the release and that in any event is likely below reportable quantities because of the gradual leaching. *See* 42 U.S.C. § 9603(a) ("Any person . . . shall, as soon as he has knowledge of any release . . . of a hazardous substance from such vessel or facility in quantities equal to or greater than those determined pursuant to section 102 of this title, immediately notify the National Response Center . . . of such release."); Designation of Hazardous Substances, 40 C.F.R. § 302.4 (2003) (listing reportable quantities of various hazardous substances); *see also* HARR, *supra* note 21, at 491 (reporting that the EPA later "filed suit against both W.R. Grace and Beatrice Foods to recover the costs of the cleanup project," but that the EPA appears not to have filed a claim for failure to report).

193. Reporting is only required for the "person in charge," which appears not to include past activities or peripheral actors (although the EPA could in theory define the term more broadly). CERCLA, 42 U.S.C. § 9603(a). By contrast, past owners, generators, and transporters can all be strictly and jointly and severally liable for any resulting cleanup required at a site contaminated with hazardous substances. 42 U.S.C. § 9607(a). Under such a scenario, it seems unlikely that these potentially responsible parties (who appear not to be the "person in charge") will be very helpful in identifying the past history of dangerous hazardous sites, much less volunteering that these sites exist.

3. *In Addition to Being Excused from Monitoring or Reporting Potentially Harmful Activities, Manufacturing and Polluting Firms Are Also Excused from Researching the Adverse Effects of Most of Their Activities on Health and the Environment, Leaving the Public and Victims to do the Scientific Research.* With the single exception of requiring responsible parties to assess contamination at hazardous waste or similar sites,[194] actors are rarely required to support, much less conduct, ambient monitoring on the environment, even if their pollution or products cumulatively cause residents to become physically ill[195] or are suspected of contributing to fish kills in recreational rivers.[196] In fact, only rarely are actors required to account for the effects of their pollution or products on public health and the environment. For example, developers of wetlands are not required to conduct research on the wetlands they hope to fill to show that they are not environmentally valuable. On the contrary, opponents to the development must bear the burden of conducting this research, even though the land is often privately held and its

194. *See supra* notes 174–75 and accompanying text.

195. Sprayers of pesticide products, for example, might be required by state law to post signs alerting neighbors to the spraying. *See* N. Y. State Pesticide Coalition, Inc. v. Jorling, 874 F.2d 115 (2d Cir. 1989) (discussing such requirements in New York and determining they were not preempted by FIFRA). However, sprayers are neither required by federal law, nor generally by state law, to conduct monitoring of neighboring populations to ensure that they are adequately protected. Monitoring for the effects of pesticides, if done at all, is conducted and funded by state and federal governments. *See, e.g.*, Laws to Protect Public from Pesticides Not Being Followed, *at* http://www.mncenter.org/p.asp?WebPage_ID=24&Profile_ID=112 (Oct. 1, 2001) (arguing that the "Minnesota Department of Agriculture . . . has violated Minnesota law by failing to adequately monitor pesticide use and contamination" in Minnesota); California Department of Pesticide Regulation pesticide monitoring website, http://www.cdpr.ca.gov/docs/empm/pubs/tribal/tribproj.htm (last visited Mar. 3, 2004) (discussing an herbicide monitoring project on tribal lands in California conducted by both the State and U.S. EPA at tribes' request).

196. There are, for the most part, only three circumstances in which a party suspected of contributing to health or environmental problems may be required to reimburse the government for the expense of assessment: (1) the liability provisions of CERCLA are met (i.e., the hazard is a CERCLA "hazardous substance," the party falls into one of the four categories of liable parties, and the government incurred response costs or injunctive relief is justified), 42 U.S.C. §§ 9604(a), 9606(a), 9607(a); (2) there is a sudden discharge of oil or hazardous substances into navigable waters punishable under CWA, 33 U.S.C. § 1321(f) or OPA, 33 U.S.C. § 2702; or (3) the release presents an imminent and substantial endangerment to public health and welfare under the CWA, 33 U.S.C. § 1364(a), RCRA, 42 U.S.C. § 6973(a), or CAA, 42 U.S.C. § 7603. If one of these narrow conditions is met, the EPA or other parties (under more limited circumstances) may bring a suit against the party to recover the assessment damages or force them to study the harm. *Id*.

owners can deny the access needed for research.[197] Even manufacturers of new pesticides are not required to do field testing except when the EPA determines that this added research is needed as a result of the high potential for ecological harm.[198] Likewise, manufacturers of toxic substances—who are, in any case, generally excused from testing their products—are rarely, if ever, required to conduct anything more than laboratory toxicity tests once the EPA mandates testing.[199]

---

197. Developers and other wetland-fillers identify themselves as falling under the regulatory crosshairs of section 404 of the Clean Water Act, the "wetland provision," 33 U.S.C. § 1344, a self-determination that includes a number of exemptions. 33 U.S.C. § 1344(e)–(f). Once parties determine that the regulatory requirements apply to them, they must fill out an application and, if their development is not water dependent, must typically prove that there are no practicable alternative sites. (If their development is water dependent, they do not need to make this showing). After they provide this information, their homework is done. A permit application is available at http://www.spk.usace.army.mil/organizations//cespk-co/regulatory/pdf/ENG4345.pdf (last visited Oct. 30, 2004) (on file with the *Duke Law Journal*). No inventory of the wetlands, plant life, ecological functions, or wildlife is required unless the Army Corps of Engineers or the EPA ultimately decide that added assessments are required (usually pursuant to the National Environmental Policy Act) and also decide that the developer should conduct or finance that assessment. Otherwise, those opposing a wetlands development or the EPA, Corps, or affected state must prove that the wetlands have "significant" ecological value and that its destruction will significantly impact water quality or other ecological goods. *See generally* Permits for Discharges of Dredged or Fill Material into Waters of the United States, 33 C.F.R. pt. 323 (2003) (codifying practices that the Army Corps of Engineers must follow in issuing permits under the CWA); 404 Regulations, 40 C.F.R. pt. 232 (2003) (defining activities exempt from EPA regulation).

198. There are some ecological tests that pesticide manufacturers may be required to conduct when the expected harm is expected to be high, but even then manufacturers are generally required to test the product on only one or a few nontarget species, such as birds. *See, e.g.*, Environmental Fate Data Requirements, 40 C.F.R. § 158.290 (2003) (specifying additional tests that the EPA can require to assess environmental fate); Wildlife and Aquatic Organisms Data Requirements, 40 C.F.R. § 158.490 (2003) (specifying additional tests that the EPA can require to assess impacts on wildlife); Nontarget Insect Data Requirements, 40 C.F.R. § 158.590 (2003) (specifying additional tests that the EPA can require to evaluate effects on nontarget insects); *see also* Envtl. Prot. Agency, Data Requirements for Pesticide Registration, *at* http://www.epa.gov/pesticides/regulating/data.htm#longterm (last visited Mar. 3, 2004) (on file with the *Duke Law Journal*) (summarizing data requirements, including the fact that long-term or field studies are only required "when predictions as to possible adverse effects in less extensive studies cannot be made, or when the potential for harmful effects is high"); *infra* note 202 (explaining that the EPA is attempting to conduct an ecological risk assessment on several rodenticides).

199. Environment-related testing is not among the test guidelines for safety testing under TSCA. *See* Identification of Specific Chemical Substance and Mixture Testing Requirements, 40 C.F.R. pt. 799 (2003) (listing test guidelines for toxic substances). In fact, tests for developmental neurotoxicity and for reproductive/developmental toxicity were only added to the TSCA test guidelines (which list the types of tests that the EPA can require under a test rule) in 2000. *See* EPA, Toxic Substances Control Act Test Guidelines: Final Rule, 65 Fed. Reg.

4. *Actors Are Excused from Contributing to the Development of Methods for Assessing the Harms Caused by Their Activities, Leaving Regulators to Struggle with Developing the Tests.* The development of the methods to assess the impact of pollution and products (like pesticides) on public health is financed, published, and corroborated largely with public dollars.[200] The only role that private actors play in the development of assessment tools is to pick apart agency protocols and the necessarily limited scientific information upon which they are based.[201] The pesticide and chemical industries in particular are vigorous critics of the EPA's protocols and test guidelines, filing lengthy critiques of each tentative advance made by the EPA in assessing noncancer risks, while bearing none of the costs of these innovative research efforts.[202] The EPA's more than thirteen-year effort to promulgate a rudimentary rule requiring additional testing of certain chemical substances for neurological effects provides a case

---

No. 78,746, 78,748, tbl.1 (Dec. 15, 2000) (to be codified at 40 C.F.R. pt. 799) (listing seventeen new test guidelines added to the TSCA list of testing requirements). Even the high production volume (HPV) testing challenge, discussed *supra* note 163, requires only a few animal tests for these widely used chemicals. The six tests are acute toxicity, genetic toxicity, repeat dose toxicity, reproductive and developmental toxicity, and acute toxicity to fish. Physicians Committee for Responsible Medicine, Appendix A: The HPV Animal Test Battery, *at* http://www.pcrm.org/issues/PDFs/hpvappa.pdf (last visited Mar. 3, 2004) (on file with the *Duke Law Journal*).

200. *See, e.g.*, NRC, BUILDING A FOUNDATION, *supra* note 10, at 10, 49, 61 (pointing out that the EPA shoulders much of the burden of producing the information needed to support its regulatory programs, and highlighting the EPA's stark limitations given its $500 million research budget). *But see supra* Part I.C. (arguing that there are sometimes incentives for parties to develop this information, but usually only in the shadow of onerous legal liabilities or requirements).

201. *See, e.g.*, McGarity & Wagner, *supra* note 118, at 10 (detailing how the "EPA's models are frequently subject to tedious, technical nitpicking" by opponents and how "[v]irtually every substantive challenge [in court] mounted against an EPA model involves multiple technical disagreements on virtually every facet of the model").

202. For example, the EPA is currently attempting to conduct an ecological risk assessment on several rodenticides after becoming aware of potential adverse effects on birds and wildlife. Rodenticides; Availability of Preliminary Comparative Ecological Assessment, 68 Fed. Reg. 4468 (Jan. 29, 2003); *see also* EPA EDocket, *at* http://www.epa.gov/pesticides/rodenticidecluster/ (last visited Mar. 3, 2004). The effort was met with vigorous resistance by manufacturers who appeared to challenge virtually every facet of the assessment, without identifying ways in which the assessment could be improved. *See, e.g.*, Letter from John L. Hott, Syngenta Crop Protection, Inc. to the EPA, Comments on Rodenticide Ecological Assessment (Mar. 31, 2003), *available at* http://www.epa.gov/pesticides/rodenticidecluster; *see also infra* notes 231–35 and accompanying text (discussing a similar campaign against the testing of the herbicide atrazine).

in point.[203] The chemical industry provided the bulk of the critical input on the proposed guidelines,[204] and ultimately the EPA managed to require tests for only a portion of the neurological effects of concern with respect to ten chemicals in commerce.[205] The manufacturers' constant vigilance helps explain why the EPA has made little progress in promulgating even rudimentary testing methods to measure neurological, reproductive, ecological, and hormonal effects.[206]

III. THE LAWS ENCOURAGE ACTORS TO PERPETUATE IGNORANCE

It is bad enough that environmental laws—contrary to their promise—fail to require actors to produce information needed to assess their externalities. But some environmental laws lead to a still worse state of affairs: the laws sometimes reward actors for their ignorance, penalize them for producing useful knowledge, and

---

203. *See* Multi-Substance Rule for the Testing of Neurotoxicity, 58 Fed. Reg. 40,262, 40,262–63 (July 27, 1993) (to be codified at 40 C.F.R. pt. 799):

> EPA's efforts to obtain data to address its concern for the neurotoxicity of specific solvents dates back over 10 years to a proposed test rule, Chloromethane and Chlorinated Benzenes Proposed Test Rule, 45 Fed. Reg. 48,524 (July 18, 1980), which discussed EPA's concerns for the neurotoxic effects of chloromethane in adults after chronic exposure and on offspring exposed *in utero*, and concerns related to abuse liability.

204. The EPA reports that public comments were received on its 1991 proposal from

> Chemical Manufacturers Association (CMA) (Ref. 3), CMA's Acetone Panel (Refs. 4, 5 and 68), CMA's Glycol Ethers Panel (Ref. 6), CMA's Ketones Panel (Refs. 7 and 8), CMA's Oxo Process Panel (Refs. 9 through 12), the American Industrial Health Council (AIHC) (Ref. 1), the Diethyl Ether Manufacturers Task Group (DEMTG) (Ref. 13), BASF Corporation (BASF) (Ref. 2), The Dow Chemical Company (Dow) (Ref. 14), DuPont (Ref. 15), Kodak (Ref. 16), Monsanto (Ref. 17), Rohm and Haas (Ref. 18), Union Carbide (Ref. 19), the Interagency Testing Committee (ITC) (Ref. 21), Dr. J. Glowa of the U.S. Department of Health and Human Services (Ref. 20), Dr. D. McMillan of the University of Arkansas (Ref. 22), Dr. R. Neal of Vanderbilt University (Ref. 25), and Drs. D. Cory-Slechta (Ref. 23) and B. Weiss (Ref. 24) of the University of Rochester. These submissions contained both comments regarding the proposed rule and additional studies for EPA to consider before promulgating the final rule.

Multi-Substance Rule for the Testing of Neurotoxicity, 58 Fed. Reg. at 40,263.

205. *Id*. (conceding that the tests only assess neurotoxic effects after chronic exposure, without measuring changes on offspring exposed in utero or assessing concerns related to abuse liability, and concluding that the "EPA is requiring a very modest testing program in this area in comparison to the scientifically acknowledged diversity of the potential neurotoxic effects of concern").

206. *See generally* Guidelines for Reproductive Toxicity Risk Assessment, 61 Fed. Reg. 56,274 (Oct. 31, 1996); EPA, Guidelines for Ecological Risk Assessment, 63 Fed. Reg. 26,846 (May 14, 1998); EPA, Neurotoxicity Guidelines, 63 Fed. Reg. 26,926 (May 14, 1998). The EPA has not completed its development of preliminary methods for assessing hormonal effects. *See* ENVTL. PROT. AGENCY, *supra* note 13, at 1.

provide mechanisms for them to attack damaging public science that suggests they are causing harm.

This Part discusses three ways that existing laws, rather than promoting the production and dissemination of information about potential harms to the environment and public health, actually perpetuate ignorance. The first Section discusses how existing laws not only fail to create positive incentives for the production of needed information but actually create disincentives to information production. The second Section discusses how existing laws increase the asymmetric advantages that private actors have over the production of this information, particularly through the use of overbroad confidentiality privileges. The final Section then discusses how recent legal developments have increased the avenues available for regulated parties to manufacture controversy about regulatory science and, in so doing, to delay regulation and obfuscate the established scientific consensus.

A. Ignorance Is Bliss in Regulation and Enforcement

Under the current regulatory system, volunteering adverse information on the effects or even the existence of harms associated with one's product or activity is equivalent to shooting oneself in the foot. Regulation and enforcement increase in lockstep with the availability of public information on adverse effects.[207] Whereas no information means no regulation, a solid body of uncontested, adverse information will almost certainly lead to intrusive regulation, enforcement activity, and sometimes even a ban on the activity or product.[208] This Section argues that as long as information is neither

---

207. *See generally* Priority List of Substances Which May Require Regulation Under the Safe Drinking Water Act, 56 Fed. Reg. 1470, 1471 (Jan. 14, 1991) (explaining that the EPA selects contaminants for regulation under the Safe Drinking Water Act based in large part on "[a]vailability of sufficient information on the substance"); NRC, SCIENCE AND JUDGMENT, *supra* note 139, at 253 ("In the past, EPA has often appeared to base its priorities on the ease of obtaining data on a particular chemical."); Howard Latin, *Good Science, Bad Regulation, and Toxic Risk Assessment*, 5 YALE J. ON REG. 89, 141 (1988) ("In practice, agencies seldom commence regulatory proceedings until considerable evidence has accumulated that a substance may be hazardous."); Richard Wilson et al., *Uncertainty in Risk Assessment*, *in* RISK QUANTIFICATION AND REGULATORY POLICY 133, 136 (David G. Hoel et al. eds., 1985) (describing how the EPA's Carcinogen Assessment Group calculates risks for chemicals that have been tested on animals, but often entirely neglects other chemicals that have not been similarly tested, "even when other information suggests that risks from [such chemicals] may be large enough to be important").

208. *See infra* Part III.A.1.

required nor rewarded but instead is used punitively by the regulatory system, the decision about whether to voluntarily conduct and report research on one's product's or activity's externalities is an easy one. Ignorance is bliss.

1. *Information Burdens on the EPA as a Precondition to Regulation.* Despite actors' superior knowledge about the potential harms created by their products or activities, environmental laws assign the burden for justifying regulatory action to the EPA.[209] Although this burden does not technically require the agency to

209. The burden differs from statute to statute in terms of how much or what kinds of evidence the EPA must produce to satisfy it. The burden is substantially lighter than parallel common law requirements requiring plaintiffs to produce a "preponderance of the evidence" on causation, yet the EPA must still provide some information and justification for its regulatory decisions. *See generally* SIDNEY A. SHAPIRO & ROBERT L. GLICKSMAN, RISK REGULATION AT RISK: RESTORING A PRAGMATIC APPROACH 35 (2003) ("Most of the [environmental and public health] laws [surveyed] . . . use triggers that create less than the maximum evidentiary burden and, in particular, most fall in the middle categories—risk threshold or significant risk threshold."). For most standards promulgated to regulate pollutant discharges under the Clean Water and Clean Air Acts, Congress specified the particular substances of concern for the EPA in advance. The EPA's primary burden under these statutes is to ensure that its resulting technology-based standards are not arbitrary and capricious (with the challenger bearing the burden of showing that they are). *See* CWA, 33 U.S.C. § 1311(b)(2)(C)–(D) (2000) (referencing a House Committee Report list of 126 toxic substances for which technology-based standards must be promulgated under the Clean Water Act); 42 U.S.C. § 7412(b) (2000) (listing 189 hazardous air pollutants for which technology-based standards must be promulgated). Other science-based regulatory decisions made under CERCLA, EPCRA, RCRA, SDWA, FIFRA, and for ambient standards for criteria pollutants under the CAA, have required the EPA to provide some scientific research justifiying regulation, without requiring definitive proof. *See, e.g.*, SDWA, 42 U.S.C. § 300g-1(b)(1)(A) (2000) (providing that to promulgate a Maximum Contaminant Level Goal, the EPA must show (1) that a contaminant "*may* have an adverse effect on the health of persons" (emphasis added), (2) that the contaminant "is known to occur or [that] there is a substantial likelihood that the contaminant will occur in public water systems," and (3) that "regulation of [the] . . . contaminant presents a meaningful opportunity for health risk reduction"); RCRA, 42 U.S.C. § 6903(5) (2000) (defining "hazardous waste" for purposes of the statute as that which because of "quantity, concentration, or physical, chemical, or infectious characteristics *may*—(A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (B) pose a substantial present or potential hazard to human health or the environment" (emphasis added)). Only the regulation of existing chemicals under TSCA has been read to place a heavy evidentiary burden for justifying protective regulations on EPA, a burden EPA can meet only with "substantial evidence," primarily from science and economics. *See, e.g.*, Corrosion Proof Fittings v. EPA, 947 F.2d 1201, 1215 (5th Cir. 1991) (holding that the EPA failed to present sufficient evidence to justify a complete ban on asbestos in light of statutory language requiring it to "promulgate the least burdensome, reasonable regulation" to achieve adequate protection of the environment).

engage in active information production and research,[210] in reality the lack of available information on the harms created by suspect products and activities makes producing this information essential.[211] Even mandates directing agencies to issue protective standards have been interpreted to require some information to justify regulatory intervention.[212] When this information is sorely incomplete, controverted, or effectively unobtainable, agencies have a difficult time supporting regulatory action.[213] Under such a regulatory system,

---

210. For all regulatory requirements, the EPA generally bears some burden of proof, although the evidentiary demands can be quite light. *See, e.g.*, Delaney Clause, Food, Drug, and Cosmetic Act, 21 U.S.C. § 379e(b)(5)(B) (requiring only a test on animals showing that a food additive is carcinogenic to justify a regulatory ban of that additive). Through time, however, the courts and others have raised the EPA's burden higher, particularly under some statutes. *See* SHAPIRO & GLICKSMAN, *supra* note 209, at 70–71 (discussing the raised evidentiary burden imposed on the EPA by some courts and the resulting paralysis of agency decisionmaking); *infra* note 213.

211. The EPA has dedicated considerable resources to collecting information and developing new tests. *See supra* note 200 and accompanying text. Yet the EPA's role as gatekeeper on existing and future information on health and the environment also suggests room for capture. This may or may not explain the consistent despair that prominent bipartisan committees express with respect to the EPA's research priorities and the coherence of its research programs. *See, e.g.*, COMM. ON RESEARCH AND PEER REVIEW IN EPA, NAT'L RESEARCH COUNCIL, STRENGTHENING SCIENCE AT THE U.S. ENVIRONMENTAL PROTECTION AGENCY: RESEARCH MANAGEMENT AND PEER REVIEW PRACTICES (2000) (recommending, based on an assessment of science at the EPA, that the EPA's areas for improvement are strengthening its scientific leadership, enhancing the production of information, and anticipating future environmental needs with scientific research), *available at* http://www.nap.edu/catalog/9882.html.

212. *See* Chlorine Chemistry Council v. EPA, 206 F.3d 1286, 1291 (D.C. Cir. 2000) (vacating the EPA's zero tolerance standard for chlorine in drinking water because it is "arbitrary and capricious" and exceeds statutory authority because it does not account for the "best available evidence" suggesting that there is a nonzero safe level); Natural Res. Def. Council, Inc. v. EPA, 824 F.2d 1146, 1152 (D.C. Cir. 1987) (en banc) (holding that a zero standard for vinyl chloride under the Clean Air Act is not appropriate and suggesting that, under the Act, the EPA may account for remaining uncertainties in setting a nonzero standard).

213. There is a substantial body of scholarship discussing the tendency of reviewing courts to require the EPA to produce considerable evidence to support its regulatory standards. *See, e.g.*, R. SHEP MELNICK, REGULATION AND THE COURTS: THE CASE OF THE CLEAN AIR ACT 241 (1983) (discussing the implications of the reviewing courts' insistence on complete scientific evidence for each stage of the standard-setting process); Richard J. Pierce, Jr., *Two Problems in Administrative Law: Political Polarity on the District of Columbia Circuit and Judicial Deterrence of Agency Rulemaking*, 1988 DUKE L.J. 300, 311 ("Courts also have . . . require[d] that agencies 'find' unfindable facts and support those findings with unattainable evidence."). As a result, the most studied risks tend to be regulated first. *See* Wendy E. Wagner, *The Science Charade in Toxic Regulation*, 95 COLUM. L. REV. 1613, 1681–82 (1995) ("[A]gencies tend to be 'science-biased' in selecting the toxic substances to regulate: instead of . . . prioritiz[ing] substances based on the risks they present to health and the environment, the agencies appear

actors who want to minimize regulatory intervention have little incentive to produce information showing that their products or activities are safe. Instead, they are best advised to maintain a status quo of ignorance.[214]

Laws that require actors who discover bad news to report it further exacerbate incentives for ignorance.[215] Under existing laws, manufacturers of pesticides and toxic substances who discover adverse information about their products are required to report this information to the EPA.[216] From the manufacturer's perspective,

---

to . . . [select] substances with more scientifically established health effects . . . over less-studied substances, many of which . . . [may] present greater risks at lower concentrations.").

214. The safest course for manufacturers in the short term is to avoid safety testing altogether, particularly for existing chemicals or new chemicals that fall through the regulatory cracks. Most manufacturers appear in fact to follow this safer course. The OTA and the GAO both found that the majority of premanufacture notices (PMNs) filed under TSCA contained little to any toxicity data on the new chemicals. U.S. GEN. ACCT. OFFICE, *supra* note 161, at 45–46; OFFICE OF TECH. ASSESSMENT, THE INFORMATION CONTENT OF PREMANUFACTURE NOTICES 6 (1983), *available at* http://www.wws.princeton.edu/cgi-bin/byteserv.prl/~ota/disk3/1983/8313/8313.PDF. A 1994 article also quotes EPA officials as observing that the agency, in reviewing PMNs, "often may not have a sample of the new chemical" and also "often does not get basic physical state information" on the new chemical. *Premanufacture Notification: Data, Funding Gaps for New Chemicals Program Prompt Concern, Criticism from SAB Committee*, 18 Chem. Reg. Rpt. (BNA) 997, 997 (1994).

Beyond the perverse incentive for ignorance, such a data bias in regulation leads to imbalances in the regulatory terrain, much like those lamented by Peter Huber in criticizing the old-new distinction in regulation. *See* Peter Huber, *The Old-New Division in Risk Regulation*, 69 VA. L. REV. 1025, 1073–75 (1983) ("Every regulation of one source of risk will cause some secondary 'risk displacement,' encouraging producers or consumers to favor alternative, less stringently regulated processes or products that will themselves be risky in some degree."). If some substances are regulated because there is a lot of information, and others are ignored because there is little information, activities will shift toward the unregulated and unstudied wastes, products, and general externalities. This problem is not new to environmental law. For example, although Congress busily closed off opportunities to dispose of wastes into the water and air, it left others open and thus essentially encouraged more damaging types of pollution, like disposal of hazardous wastes on land. *See* H.R. REP. NO. 94-1491, pt. 1, at 4 (1976) (recognizing that, during the passage of the Resource Conservation and Recovery Act of 1976, Pub. L. No. 94-580, 90 Stat. 2795 (codified as amended in scattered sections of 42 U.S.C.), the "federal government . . . [spent] billions of dollars to remove pollutants from the air and water, only to dispose of such pollutants on the land in an environmentally unsound manner"); Frances H. Irwin, *An Integrated Framework for Preventing Pollution and Protecting the Environment*, 22 ENVTL. L. 1, 12–14 (1992) (discussing how fragmentation of statutes leads to the transfer of pollutants to other environmental media).

215. *See, e.g.*, CERCLA, 42 U.S.C. § 9603(a) (2000) (requiring the person in charge to immediately report a release of a reportable quantity of a hazardous substance). *See generally supra* Part II.A.3.

216. *See* FIFRA, 7 U.S.C. § 136d(a)(2) (2000) ("If at any time after the registration of a pesticide the registrant has additional factual information regarding unreasonable adverse effects on the environment of the pesticide, the registrant shall submit such information to the

engaging in exploratory research under such a legal regime is decidedly hazardous.[217] The EPA, in turn, may use any adverse information to promulgate stricter standards. The manufacturer, of course, can avoid this entire scenario simply by not assessing the safety of its products and activities. In such a legal environment, ignorance will always be the best recourse.

The direct correlation between the availability of information and the likelihood of regulatory intervention not only encourages manufacturers to pursue a policy of strategic ignorance, but also makes it beneficial for them to campaign to raise the EPA's burden of proof still higher for initiating regulatory action. A higher burden of proof in an information-starved area such as health and safety regulation could significantly reduce the number of regulations that the agency can support.[218] Requiring more research as a prerequisite to promulgating protective regulation also places greater demands on agency resources and ignores the fact that actors enjoy superior information about the risks posed by their activities.

Regulated parties' campaign to further raise the burden of proof for the EPA is most evident in their general advocacy of information-intensive checks on regulation, like cost-benefit analysis[219] and

---

Administrator."); TSCA, 15 U.S.C. § 2607(c), (e) (2000) (requiring manufacturers and processors to maintain records of "significant adverse reactions to health or the environment . . . alleged to have been caused by the substance or mixture" and to immediately report "information which reasonably supports the conclusion that such substance or mixture presents a substantial risk of injury to health or the environment").

217. *See generally* Reitze & Hoffman, *supra* note 166, at 739–41 (discussing civil and criminal penalties for violating reporting requirements, including criminal enforcement of false reporting and fraud).

218. TSCA, for example, has been interpreted by the Fifth Circuit to place the burden on the EPA not only to establish the scientifically established risks of an existing chemical before taking regulatory action, but also to establish that the chemical's public health risks outweigh the social benefits of the substance and that the EPA has selected a regulatory approach to preventing health harms that is the "least burdensome" in comparison with alternative approaches. Corrosion Proof Fittings v. EPA, 947 F.2d 1201, 1215, 1223 (5th Cir. 1991). This heavy evidentiary burden has effectively discouraged the EPA from taking regulatory action against dangerous chemicals. *See* Thomas O. McGarity, *The Courts and the Ossification of Rulemaking: A Response to Professor Seidenfeld*, 75 TEX. L. REV. 525, 548 (1997) ("In the six years that have passed since the *Corrosion Proof Fittings* opinion, the EPA has not initiated a single action under section 6 of TSCA . . . .").

219. The use of cost-benefit analysis to rebut protective standards is mandatory under a few statutes. *See generally* Applegate, *supra* note 33, at 269 (recounting that FIFRA and TSCA both target "unreasonable" adverse risks, and that the legislative history suggests that this requires balancing costs and benefits). The most prevalent use of cost-benefit analysis occurs informally, under an executive order that requires cost-benefit analyses for economically significant rulemakings. *See, e.g.*, Exec. Order No. 12,291, 3 C.F.R. 127 (1982), *reprinted in* 5 U.S.C. § 601

regulatory "good-science" reforms, which demand that the EPA accumulate a definitive body of hard evidence on harm before implementing a proposed regulation.[220] Cost-benefit requirements surreptitiously increase the evidentiary demands on regulators by

(1988) (specifying cost-benefit requirements issued by President Reagan); Exec. Order No. 12,866, 3 C.F.R. 638 (1994), *reprinted in* 5 U.S.C. § 601 (2000) (specifying cost-benefit requirements issued by President Clinton and retained by President George W. Bush with only minor changes in Exec. Order No. 13,258, 3 C.F.R. 204 (2002)). In this administrative setting, cost-benefit analyses are not only used as an aid in conducting regulatory analysis, but are being used more affirmatively to reorder agency priorities or even stall or abandon some protective rulemakings altogether. Under President George W. Bush, for example, the Office of Information and Regulatory Affairs (OIRA), within the Office of Management and Budget (OMB), has developed several initiatives that endeavor to reorder EPA priorities and rulemakings based in large part on the results of cost-benefit accountings. *See generally* Draft Report to Congress on the Costs and Benefits of Federal Regulations, 67 Fed. Reg. 15,014, 15,020 (Mar. 28, 2002) [hereinafter OMB Cost-Benefit Report] (describing OIRA's effort to shift from being a "reactive" to a "proactive" force "in suggesting regulatory priorities for agency consideration"). These initiatives include targeting existing rules that "should be rescinded or changed to increase net benefits by either reducing costs or increasing benefits," *id*. at 15,022, engaging in the same sort of activity with respect to "problematic" agency guidelines that have not complied with process requirements like cost-benefit accountings, *id*. at 15,035, and sending prompt letters to agencies when OIRA believes that they are not prioritizing a particular, "beneficial" regulatory activity as highly as they should, *id.* at 15,020.

220. Good-science reforms that have been passed and implemented include the Data Quality Act, Treasury and General Government Appropriations Act for Fiscal Year 2001, Pub. L. No. 106-554, § 515, 114 Stat. 2763 (2000), and the Data Access Act, Omnibus Appropriations Act for Fiscal Year 1999, Pub. L. No. 105-277, 112 Stat. 2681-495 (1998), discussed *infra* Part III.C. Other good-science reforms are still in the proposal stages. *See, e.g.*, Alan Raul & Julie Zampa Dwyer, *Regulatory* Daubert, 66 Law & CONTEMP. PROBS. 7, 7 (Fall 2003) (proposing that the *Daubert* test "provides a suitable framework for reviewing the quality of agency science and the soundness of agency decisions"). The earliest versions of good-science regulatory proposals were blatant efforts to use good science as a Trojan horse for regulatory delay by insisting on impossible burdens of evidence as a prerequisite to regulation. President Reagan was the originator of the idea that health and environmental regulation should not proceed unless it is based on good science, which in turn necessitates hard proof of damage to health. JONATHAN LASH ET AL., A SEASON OF SPOILS: THE STORY OF THE REAGAN ADMINISTRATION'S ATTACK ON THE ENVIRONMENT 131 (1984); Howard Latin, *Regulatory Failure, Administrative Incentives, and the New Clean Air* Act, 21 ENVTL. L. 1647, 1662 n.40 (1990) ("[T]here is abundant evidence that administrators [of the EPA under President Reagan] frequently chose to 'study' uncertain issues as a way to avoid resolving them."). More recent efforts are more sophisticated and varied, but they all tend to work toward narrowing the range of evidence that regulators can consider, as well as raising the EPA's burden of proof to justify regulation. *See infra* notes 228–35 and accompanying text. As a result, because the EPA bears the burden of proof, and because that burden is relatively onerous, regulated entities will volunteer information or engage in information production only when it is likely to make the resulting regulation less stringent. Further, to the extent that the information is asymmetrical, industry will attempt to use its superior control to its advantage by disclosing only information that benefits it and concealing information that is damaging. Finally, the burden will encourage obstructionist behavior from regulated parties: they will attack studies that might lead to stronger standards. *See infra* Part III.C.

requiring them to demonstrate quantitatively that the benefits of regulation exceed its costs.[221] As cost-benefit is currently practiced, nonquantified and poorly understood harms are generally excluded from the quantitative calculations.[222] For example, a familiar poison such as arsenic—which appears to cause neurological harms, endocrine effects, at least seven different types of cancer, reproductive and development effects, and other life-threatening harms—is evaluated in a cost-benefit analysis only on the basis of its risks of causing bladder and lung cancers, because these two cancers are the only risks that have been studied sufficiently to be quantified.[223]

Information problems of a different nature affect the cost side of the equation. Quantifying the costs of regulation currently depends, in large part, on the regulated parties' estimates of compliance costs. Because the bulk of the essential data needed to prepare these estimates is privately held and therefore not subject to critical review,

---

221. Meeting this requirement, in itself, is quite resource intensive. To estimate the benefits associated with the product or activity being considered for regulation, each potential harm associated with the product or activity must be identified, the impact of the harm must be quantified, and this quantification must be translated into monetary terms. The costs to industry of complying with the proposed regulation must also be quantified. Ironically, though, for all of the cost-benefit reports that are produced annually, none appear to account for the costs incurred in conducting the analysis, either in terms of staff resources or delay.

222. *See* David M. Driesen, *The Societal Cost of Environmental Regulation: Beyond Administrative Cost-Benefit Analysis*, 24 ECOLOGY L. Q. 545, 604 (1997) ("[Cost-benefit analysis] will tend to produce lower benefit valuations than those of consumers, overestimate costs, and cause agencies to make very few decisions in a world of serious environmental problems from a variety of sources."); Thomas O. McGarity, *A Cost-Benefit State*, 50 ADMIN. L. REV. 7, 58 (1998) ("When information or values that arise cannot easily be factored into the benefit models, the modelers often simply ignore them. . . . [N]eglecting 'soft' considerations . . . does bias the analysis against regulatory intervention, because the cost side of the equation implicates fewer 'soft' considerations than the benefits side." (emphasis omitted)).

223. *See* ENVTL. PROT. AGENCY, EPA 815-R-00-026, ARSENIC IN DRINKING WATER RULE: ECONOMIC ANALYSIS 1-4 (2000) (listing nonquantifiable, potential adverse effects of arsenic including skin cancer, kidney cancer, cancer of the nasal passages, liver cancer, prostate cancer, cardiovascular effects, pulmonary effects, immunological effects, neurological effects, endocrine effects, and reproductive and developmental effects), *available at* http://www.epa.gov/safewater/ars/econ_analysis.pdf. None of these nonquantified harms are factored into either the low- or the high-bound estimates of the benefits of regulation. *Id*. The benefits of preventing the two quantifiable cancers are the only benefits that are compared against the costs of compliance to identify a final cost-benefit-justified standard. *Id.* at 1-6. The standard ultimately chosen by the EPA (after some waffling within the new administration)—10 micrograms—appears on this cost-benefit table as the point at which the cost estimate and the upper-bound benefits estimate balance at a seven percent discount rate. *Id*.

the costs are often inflated.[224] In fact, retrospective studies of the veracity of industry cost estimates show that such estimates are generally double the actual cost to the regulated party.[225]

These limitations on the accuracy of cost-benefit requirements—underestimating benefits and overestimating costs—are nevertheless ignored by many analysts.[226] The Office of Management and Budget's (OMB's) Annual Cost-Benefit Reports to Congress, which compile all of the cost-benefit reports prepared governmentwide, have, on occasion, not only failed to acknowledge both sources of error but have presented the final estimates as if they magically identify the precise point at which regulation is appropriate.[227]

---

224. This behavior is not necessarily duplicitous; it likely constitutes a rational reaction aimed at preventing overregulation. Regardless of motive, economists recognize the tendency of regulated parties to overestimate the costs of regulation. *See* Spulber, *supra* note 63, at 178–79 (concluding that asymmetric information about abatement costs to firms subject to environmental regulations can be very entrenched); *see also* Jason S. Johnston, *A Game Theoretic Analysis of Alternative Institutions for Regulatory Cost-Benefit Analysis*, 150 U. PA. L. REV. 1343, 1350 (2002) (modeling regulatory impediments that arise from cost-benefit regimes when the regulatory targets possess private information on the cost of compliance and enjoy opportunities to block regulation).

225. *See* Thomas O. McGarity & Ruth Ruttenberg, *Counting the Cost of Health, Safety, and Environmental Regulation*, 80 TEX. L. REV. 1997, 2042 (citing a study conducted by Goodstein and Hodge, which found that in eleven of twelve regulatory initiatives that they examined, "the initial estimates were at least double the actual costs"). Professors McGarity and Ruttenberg report that another study conducted in 1995 by the Congressional Office of Technology Assessment found that the ex ante cost estimates for the Occupational Safety and Health Administration's (OSHA's) 1974 vinyl chloride standard exceeded $1 billion; however, a survey released subsequently found that compliance costs were in the $228–278 million range. *Id.* at 2031. One of the major struggles in ensuring that industry estimates are accurate is the lack of empirical knowledge concerning the costs of regulations for businesses or even how many regulations apply to businesses. *Id.* at 2032–33. To address this information gap, the General Accounting Office undertook a study in 1996 to understand the impact of federal regulation on regulated businesses. Initially, most of the companies contacted were obstinate about supplying material that would advance this study; of the fifteen that consented, little information was provided in the way of compliance costs, and "none of the companies provided cost data that were both comprehensive and incremental." *Id.* at 2035 (quoting U.S. GEN. ACCT. OFFICE, REGULATORY BURDEN: MEASUREMENT CHALLENGES AND CONCERNS RAISED BY SELECTED COMPANIES 49 (1996), *available at* http://www.gao.gov/archive/1997/gg97002.pdf).

226. *See infra* notes 364–67 and accompanying text.

227. In a recent draft Cost-Benefit Report, for example, the OMB omitted the qualitative costs and benefits from most of the cost-benefit tables. *See, e.g.*, OMB Cost-Benefit Report, 67 Fed. Reg. 15,014, 15,024 tbls.5–6, 15,042 tbl.14 (Mar. 28, 2002) (assigning total dollar figures to the benefits and costs of rules when in some rulemakings the EPA explicitly indicated that it was only able to quantify some of the benefits and costs); *id.* at 15,038 tbl.13 (listing the benefits of paperwork requirements as zero even though the OIRA concedes in the text that "[a]t present, it is not feasible to estimate the value of annual societal benefits of the information the government collects from the public"). In the only table in which OIRA provided an indication

Good-science reforms appear even more obviously crafted to exploit the limits in scientific information as an excuse to postpone regulation.[228] Under this approach, the agency, by default, must produce definitive scientific research on harms caused by an activity before rushing to regulate.[229] Good-science advocates, however, never urge that the regulated actors be charged with producing this good-science research as a condition to operating, even though such a burden would be in keeping with the precautionary objectives of the relevant statutory mandates.[230]

"Good science" reforms are not only used by regulated parties to attempt to raise the bar on the amount of evidence needed to justify protective regulation, but are also used to limit the type of information available to the agency to support its burden. For example, concerned about potential regulatory restrictions on the herbicide atrazine, its manufacturer and agricultural users argue not only that the EPA must scientifically justify regulatory restrictions on the product, but that the science acceptable for regulation must be

---

that not all costs and benefits had been quantified—Table 7—OIRA did not list qualitative costs and benefits under the columns headed "costs" or "benefits," but under the "other information" column. *Id.* at 15,025 tbl.7. OMB concluded its report by totaling only the monetized costs and benefits of all regulations in final, cumulative tables to provide an even more error-laden basis for evaluating the appropriateness of regulation. *Id.* at 15,042 tbl.14.

228. *See supra* note 220. *See generally* Donald T. Hornstein, *Accounting for Science: The Independence of Public Research in the New, Subterranean Administrative Law*, 66 LAW & CONTEMP. PROBS. 227 (Fall 2003). As discussed later, in their most recent incarnation, these good-science reforms also provide regulated parties with more powerful tools for challenging individual studies produced with public monies that incriminate their activity or product. *See infra* Part III.C.

229. *See* DEMOCRATIC CAUCUS OF THE HOUSE COMM. ON SCIENCE, 104TH CONG., ENVIRONMENTAL SCIENCE UNDER SIEGE: FRINGE SCIENCE AND THE 104TH CONGRESS (1996) (report by Rep. George E. Brown, Jr., ranking Democratic member) (identifying the sinister use of "sound science" in Congress to paralyze environmental regulation), *available at* http://www.house.gov/science_democrats/archive/envrpt96.htm.

230. *See supra* notes 220–28 and accompanying text; *see also* D. Hiep Truong, Daubert *and Judicial Review: How Does an Administrative Agency Distinguish Valid Science from Junk Science?*, 33 AKRON L. REV. 365, 370 (2000) (examining "the possibility of using the *Daubert* standard to effectuate a more meaningful judicial review of an agency's determination of risk" and arguing that "[b]y using the *Daubert* standards, a reviewing court is simply treating an agency like a testifying expert"); Charles D. Weller & David B. Graham, *New Approaches to Environmental Law and Agency Regulation: The* Daubert *Litigation Approach*, 30 Envtl. L. Rep. (Envtl. L. Inst.) 10,557, 10,566–72 (2000) (providing detailed recommendations for how the courts can incorporate *Daubert* into their review of agency science, including using *Daubert* hearings for the review of certain agency actions).

conducted under a limited number of EPA-approved protocols.[231] This means, according to industry representatives, that cutting-edge research discovering significant adverse effects on frogs exposed to low levels of the herbicide (the male frogs develop female reproductive organs)[232] must be excluded from the agency's assessment of the herbicide's safety.[233] For this research to be acceptable, the manufacturer argues, the EPA must first promulgate a testing protocol for these endocrine effects—a process that might take decades, given industry opposition[234]—and then must compel or fund applied research using those protocols.[235] Such restrictions on regulatory decisionmaking make it impossible for regulations to be based on the best available science, however. To the extent that actors succeed in convincing the EPA to exclude credible research from its decisions because the research fails to meet their narrow conceptions of good science, regulatory decisions become still more information-deprived.

2. *Information Burdens on the EPA as a Precondition to Enforcement.* Just as actors are likely to appreciate that producing information about their products and activities can lead to increased regulatory requirements, they are also likely to understand that volunteering information about violations of existing laws will be rewarded with enforcement actions and sanctions.[236] Although some

---

231. *See* Center for Regulatory Effectiveness, Request for Correction, *supra* note 43, at 7 (arguing that "[u]ntil and unless there are properly validated tests, there can be no reliable information regarding atrazine's purported endocrine effects").

232. *See* Hayes et al, *supra* note 43 (reporting the effects of atrazine on frogs).

233. Specifically, this group of industrial actors argues:

> As soon as possible, EPA should correct its *Environmental Risk Assessment* at pages 11, 90–94, to state that there is no reliable evidence that atrazine causes "endocrine effects" in the environment [and thus exclude the Hayes study from regulatory consideration]. EPA's corrected *Environmental Risk Assessment* should state that there can be no reliable, accurate or useful information regarding atrazine's endocrine effects until and unless there are test methods for those effects that have been properly validated.

Center for Regulatory Effectiveness, Request for Correction, *supra* note 43, at 9.

234. *See supra* Part II.B.4.

235. This latter burden is also problematic. The EPA's lack of funds makes it unlikely that it can finance much of the research itself, and this type of applied research is not a candidate for general science funding from the National Science Foundation. On the other hand, if forced, industry could conduct the research using its own scientists, labs, reporting methods, and contractual agreements, thus exerting at least some control over the outcome. *Cf. infra* notes 400–04 and accompanying text (discussing problems with biased research).

236. This resulting deliberate ignorance is one of the principal justifications for the audit laws that provide decreased penalties and, in some cases, even the promise of confidentiality

states do attempt to reward firms with good compliance records,[237] most environmental enforcement regimes provide only sticks, not carrots.[238] Coors Brewing Corporation learned this lesson the hard way when it voluntarily discovered and reported to state regulators 189 violations of Clean Air Act requirements.[239] Rather than rewarding Coors's candor, state regulators greeted the voluntary disclosure with a $1.05 million fine and more stringent emissions reduction requirements.[240]

Coors's experience only serves to remind the regulated community that when compliance costs are high and the likelihood of being caught is low, ignorance—or at least silence—is bliss. Moral and ethical imperatives notwithstanding, enforcement theory instructs that rational actors will not comply with a law or regulation if the economic benefits that they derive from their violation exceed the cost of the sanction times the probability of being caught.[241] In the case of environmental violations, the probability of being caught depends both on the extent to which the violation is evident and on the resources of the enforcers: in many regulatory settings, both can

---

privileges for incriminating information if actors conduct self-assessments in compliance with environmental requirements. *See infra* notes 263–69 and accompanying text.

237. The state of Texas does attempt to reward companies who are regularly in compliance: the greater the number of inspections that reveal a plant is in compliance, the higher the performance rating and the lighter the penalties for violations that are ultimately discovered or self-reported. *See* 30 TEX. ADMIN. CODE § 60.2 (West 2003). This increases the financial incentives for firms to discover and correct violations in advance of an inspection (conditioned on the likelihood that the inspector is also likely to discover the violations).

238. There are rarely rewards for documenting overcompliance with regulatory requirements. Economists, however, have suggested that rewards may be in order under some circumstances, especially when a firm enjoys private information about its compliance. *See* Lewis, *supra* note 63, at 826–37 (discussing this literature).

239. *See Coors Says Fine Could Deter Corporate Environmental Audit*, Daily Env't. Rep. (BNA) A3 (July 28, 1993) (stating that the Colorado health department "cited Coors for 100 air pollution emission notification violations, 56 permit violations and 33 volatile organic compound violations").

240. *See id*. The state later backed down, perhaps as a result of adverse publicity, and settled the enforcement case by requiring Coors to pay $237,000 and reduce emissions. *Coors Settles with State over Violations Discovered During Company's Self Audit*, Daily Env't. Rep. (BNA) A3 (Feb. 22, 1994). The state's initial ingratitude motivated the Colorado legislature to pass a relatively broad audit law. *Id*; s*ee also infra* notes 263–69 and accompanying text (discussing self-audit laws).

241. *See, e.g.*, STEVEN SHAVELL, *The Optimal Structure of Law Enforcement*, *in* A READER ON REGULATION 307, 308–10 (R. Baldwin ed., 1998) (observing that firms will find it financially imprudent to comply with legal requirements when *benefits of noncompliance* > (*probability of being caught in violation*) x (*sanctions/penalty*)). The penalty should also include the costs of defending oneself in an enforcement case.

be quite low.[242] Indeed, it is the regulators' lack of resources for discovering most environmental violations[243] that makes environmental enforcement so heavily dependent on self-reporting by

242. This simple calculation has been lost on at least a few judges, however. In *Sierra Club v. Cedar Point Oil Co.*, 73 F.3d 546 (5th Cir. 1996), the district court held that the appropriate amount of civil penalties that should be charged to a company that illegally disposed of produce water into Galveston Bay for 797 days without a permit should be determined solely by reference to the economic benefits that accrued to the company as a result of its noncompliance. Under the court's assessment methods, as long as the probability of being caught is somewhat less than 100 percent (an inevitability) and as long as attorneys' fees are not too high, it is in actors' interest to remain ignorant of their environmental obligations and any resulting violations. The Fifth Circuit affirmed the penalty assessment, holding that it was not clearly erroneous. *Id.* at 575–76. As a predictor and, of course, as precedent for how the courts will assess civil penalties, the opinion clearly makes noncompliance the economically preferable option. *See also infra* notes 270–72 and accompanying text.

243. The literature is replete with discussions of underfunded and understaffed enforcement offices at the EPA and state environmental protection departments. *See, e.g.*, JOEL A. MINTZ, ENFORCEMENT AT THE EPA: HIGH STAKES AND HARD CHOICES 113–18 (1995); U.S. GEN. ACCT. OFFICE, GAO-RCED-95-65, EPA AND THE STATES: ENVIRONMENTAL CHALLENGES REQUIRE A BETTER WORKING RELATIONSHIP 3 (1995); Rena I. Steinzor, *EPA and Its Sisters at 30: Devolution, Revolution, or Reform?*, 31 Envtl. L. Rep. (Envtl. L. Inst.) 11,086, 11,086–89 (2001). As of 2000, the EPA employed roughly four hundred full-time inspectors to monitor compliance nationally. *See* REITZE, *supra* note 86, at 491 n.20. Enforcement resources at the state level provide the bulk of the enforcement artillery; yet states vary considerably in the resources and manpower that they dedicate to environmental enforcement. *See* OFFICE OF INSPECTOR GEN., ENVTL. PROT. AGENCY, NO. 7100246, AUDIT OF REGION 9'S ADMINISTRATION OF THE CALIFORNIA AIR COMPLIANCE AND ENFORCEMENT PROGRAM (1997) (discussing serious weaknesses in California's enforcement programs), *available at* http://www.epa.gov/oigearch/reports/1997/air9tabl.htm; Victor B. Flatt, *A Dirty River Runs Through It (The Failure of the Enforcement in the Clean Water Act)*, 25 B.C. ENVTL. AFF. L. REV. 1, 34 (1997) (concluding, based on an empirical study comparing enforcement of Clean Water Act requirements in Washington and Georgia, that substantial differences exist between the states in their commitment to enforcing the Act). The EPA's oversight of state programs also provides only partial assurance that enforcement will be rigorous. *See, e.g.*, OFFICE OF INSPECTOR GEN., ENVTL. PROT. AGENCY, NO. E1AE7-63-0045-100244, CONSOLIDATED REPORT ON OCEA'S OVERSIGHT OF REGIONAL AND STATE AIR ENFORCEMENT PROGRAMS (1998) (discussing the shortcomings of the EPA's ability to oversee the states' implementation of the Clean Air Act), *available at* http://www.epa.gov/oigearth/reports/1998/8100244.pdf.

TSCA and FIFRA programs are not delegated to the states, and thus the EPA remains the sole agency overseeing enforcement of these programs. Information on the EPA's enforcement resources under FIFRA was not readily available, although in terms of the number of inspections conducted by EPA regional offices, this statute fared the worst, accounting for only 1 percent of all inspections conducted in 1998 (a decline from roughly 4 percent in 1995). REITZE, *supra* note 86, at 491. Some dated information on the staffing and resources of the EPA's TSCA program, which primarily involves the review of premanufacture notifications under TSCA, suggests that the program is badly understaffed. An OTA project found that in the nineteen-year history of TSCA implementation, the EPA had reviewed only "about 2 percent of the 70,000 chemicals in commerce." OFFICE OF TECH. ASSESSMENT, U.S. CONGRESS, PUB NO. OTA-BP-ENV-166, SCREENING AND TESTING OF CHEMICALS IN COMMERCE 11 (1995).

regulated parties.[244] Consequently, regulated actors, who know whether they are in compliance with regulations and can limit access to their facilities, are able to lower the probability that their violations will be discovered.[245] When industries strategically avoid leveling with regulators about the extent of modifications to their facility in order to sidestep onerous Clean Air Act requirements,[246] or when an oil refinery flushes an open tank filled with volatile hazardous wastes

---

244. *See* Rechtschaffen, *supra* note 147, at 1253 (arguing that "self-audits uncover and correct many violations that the government would never discover on its own"); *see also infra* notes 258–59 and accompanying text.

245. This problem is appreciated by some environmental economists, who have written articles devising regulatory approaches that no longer allow private parties to benefit from private information regarding compliance. *See* Frank Jensen & Niels Vestergaard, *Moral Hazard Problems in Fisheries Regulation: The Case of Illegal Landings and Discard*, 24 RESOURCES & ENERGY ECON. 281, 281–82 (2002) (proposing a "tax/subsidy" mechanism to regulate fisheries); Lewis, *supra* note 63, at 826–37 (suggesting ways to decrease information rents through incentive regulation); Kathleen Segerson, *Uncertainty and Incentives for Nonpoint Pollution Control*, 15 J. ENVTL. ECON. & MGMT. 87, 88 (1988) (describing "an economic incentive scheme that could be used to control [pollution] even in the presence of uncertainty and monitoring difficulties"). The problem also has been explored by Drs. Polasky and Doremus in their analysis of endangered species protection. *See* Polasky & Doremus, *supra* note 85, at 41 (concluding from their analysis that the current Endangered Species Act (ESA), "in which the burden of proof is on the regulator and compensation is provided only in extreme cases, gives landowners little incentive to cooperate with information collection activity"). Congress has been attentive to these problems, and has provided incremental adjustments to individual environmental laws that endeavor to increase the probability of catching violations by increasing protections to whistleblowers, *see generally* TSCA, 15 U.S.C. § 2622 (2000); OSHA, 29 U.S.C. § 660 (2000); SDWA, 42 U.S.C. § 300j–9(i) (2000); CWA, 33 U.S.C. § 1367 (2000); CAA, 42 U.S.C. § 7622 (2000); RCRA, 42 U.S.C. § 6971 (2000); CERCLA, 42 U.S.C. § 9610 (2000), and providing bounties to third parties who report violations, *see generally* CAA, 33 U.S.C. § 7413(f) (2000); CERCLA, 42 U.S.C. § 9609(d). The use of citizen suits also serves to increase the probability that violations will be caught and sanctioned. *See generally* Barton H. Thompson, Jr., *The Continuing Innovation of Citizen Enforcement*, 2000 U. ILL. L. REV. 185 (2000) (describing the important role that citizen enforcement plays in detecting and enforcing violations).

246. *See, e.g.*, James Lofton, *Environmental Enforcement: The Impact of Cultural Values and Attitudes on Social Regulation*, 31 Envtl. L. Rep. (Envtl. L. Inst.) 10,906, 10,913 (2001) (discussing how, in one case:

> [M]anagers [of large utility plants] were aware that if the scale and magnitude of the massive construction projects needed to keep the plants running came to EPA's attention, it was unlikely that EPA would agree that these projects were routine maintenance, repair, or replacement. Rather than seeking agency guidance to determine if their practices were legal, [these] managers took careful notes at power industry conferences where they were counseled to use the term "'routine maintenance'" rather than "'modifications'" when talking to EPA officials about component replacements at coal-fired plants.

(footnotes omitted)).

while front-office staff keep the state inspector waiting,[247] they demonstrate how much latitude they have in safeguarding potentially damaging private information and, in so doing, limiting the probability of an enforcement action.[248]

To counteract this problem and raise the probability of catching violations, some environmental laws employ rigid self-monitoring requirements that mandate actors to self-monitor and self-report their polluting activities under guidelines that leave little room for discretion.[249] The Clean Water Act requirements for discharge permits and the Clean Air Act requirements governing large electric utilities provide the best examples of these inflexible, self-monitoring requirements: they require actors to install monitors on large pollution stacks and outflow pipes that automatically sample the pollutant stream at regular intervals.[250]

Self-monitoring requirements established under other environmental regulatory programs are considerably more permissive, however. In fact, many other regulatory self-monitoring requirements provide actors great discretion regarding when and how

---

247. *See* RUTH CLEVELAND, TEXAS NATURAL RESOURCE CONSERVATION COMMISSION UPSET/MAINTENANCE INVESTIGATION REPORT, BP AMOCO, TEXAS CITY BUSINESS UNIT 2 (2000) (on file with the *Duke Law Journal*).

248. *See also infra* note 257.

249. *See, e.g.*, EPA Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks, 40 C.F.R. § 280.40 (2003) (prescribing release detection methods for all underground storage tanks to detect leaks "from any portion of the tank and the connected underground piping that routinely contains product").

250. *See* CWA, 33 U.S.C. § 1318(a)(A) (requiring dischargers to install monitoring equipment and maintain records on discharges); CAA, 42 U.S.C. § 7414 (same); *id.* § 7651k(a) (requiring utilities engaged in a sulfur dioxide trading program to install continuous emissions monitoring equipment). *But see* Flatt, *supra* note 243, at 18–19 (observing that smaller point sources often are not required to obtain National Pollutant Discharge Elimination System (NPDES) permits, making it difficult to track their individual or cumulative contributions to water quality problems). In promulgating regulations for continuous emissions monitors for large utilities, the EPA has even established penalties for monitors that fail, producing even stronger incentives for accurate compliance information. *See, e.g.*, Acid Rain Program: General Provisions and Permits, Allowance System, Continuous Emissions Monitoring, Excess Emissions and Administrative Appeals, 58 Fed. Reg. 3590, 3635 (Jan. 11, 1993) (promulgating a rule assuming that emissions are at the maximum level whenever there are not continuous emissions monitoring data).

However, even these programs have been criticized by the GAO for leaving substantial gaps in both the accuracy and representativeness of self-reporting information. *See* U.S. GEN. ACCT. OFFICE, GAO/RCED-90-155, AIR POLLUTION: IMPROVEMENTS NEEDED IN DETECTING AND PREVENTING VIOLATIONS (1990); U.S. GEN. ACCT. OFFICE, GAO/RCED-93-21, ENVIRONMENTAL ENFORCEMENT: EPA CANNOT ENSURE THE ACCURACY OF SELF-REPORTED COMPLIANCE MONITORING (1993).

they self-monitor and report pollution, including allowing them to determine whether they even fall under an environmental regulatory program at all.[251] Actors, for example, can determine based on their own knowledge when or whether to test wastes to determine if they are hazardous and subject to expensive disposal restrictions.[252] As previously discussed,[253] actors are also given considerable discretion in determining whether sudden releases of a hazardous substance exceed threshold amounts and require reporting.[254] Because the regulated entities themselves make many of the key decisions about how and when to comply,[255] enforcement officials lack reliable and consistent information about the nature of these activities.[256] Thus, the

---

251. *See, e.g.*, Reitze & Hoffman, *supra* note 166, at 743–45 (deeming it problematic that the major environmental statutes rely heavily on facilities "to identify themselves as subject to regulation, monitor their own compliance and report to the EPA or the authorized state agency").

252. *See, e.g.*, Standards Applicable to Generators of Hazardous Waste, 40 C.F.R. § 262.11 (2003) (instructing generators of potentially hazardous wastes under RCRA to "[a]pply[ ] knowledge of the hazard characteristic of the waste" or "[t]est[ ] the waste" according to federal regulations but not specifying what constitutes adequate "knowledge," how often wastes should be tested, how to ensure that wastes being tested are representative, or how generator compliance with the regulation should be documented); *see also* EPCRA, 42 U.S.C. § 11,023(g)(2) (2000) (requiring facilities to make only "reasonable estimates" of their use, manufacture, and processing of listed hazardous substances to determine whether they are covered under the TRI requirements); *supra* notes 173–74. Other "knowledge-based" self-monitoring requirements include (1) whether to report the release of a reportable quantity of hazardous substances under CERCLA, 42 U.S.C. § 9603(a), and associated regulations, 40 C.F.R. § 302.6 (requiring notification once a "person in charge" "has knowledge," but only when "the total amount of the mixture or solution equals or exceeds the RQ [reportable quantity]"); and (2) whether a facility is "major" and thus subject to various, more stringent emission requirements under the Clean Air Act, *see* CAA, 42 U.S.C. § 7511e (2000) (detailing when a source is major for purposes of heightened regulatory restrictions under nonattainment rules, determinations that are left to the facilities' discretion to validate).

253. *See supra* Parts II.B.1–2.

254. *See* CWA, 33 U.S.C. § 1321(b)(5) (relying on "person in charge" to accurately assess whether there has been a release of more than a reportable quantity of hazardous substance); CERCLA, 42 U.S.C. § 9603(a) (same).

255. *See, e.g.*, Caroline B. Buenger, *Reliance on Generator Knowledge to Characterize Waste Under RCRA: Gambling on the Use of 'Unacceptable' Knowledge*, 27 Envtl. L. Rep. (Envtl. L. Inst.) 10,439, 10,441–42, 10,447–48 (1997) (outlining the uncertainty of the EPA's generator testing requirements and its scant enforcement of the requirements (three administrative enforcement cases in seventeen years, all of which the EPA lost), and explaining how this uncertainty might allow a source of waste to defend itself successfully in future enforcement actions using the "fair notice" defense).

256. In discussing an enforcement suit for violations of the Clean Air Act against a large chemical plant in Texas, Mr. May details the regulators' difficulties in learning about the high concentrations of air toxins in the air, tracing them to a particular facility, and then ultimately linking them to a particular problem inside that facility. After quoting the EPA as testifying in

probability of identifying violations under such circumstances is extremely low when the compliance requirements are vague *and* the regulated party controls the information needed to prove noncompliance.[257]

Not surprisingly, then, a substantial shortfall exists between the number of enforcement actions and an industry's own admissions of noncompliance.[258] In one survey, two-thirds of corporate counsel

---

the trial that it "relied 100 percent on the accuracy of information reported by regulated facilities," the author (May) observes that "if the neighbors hadn't complained, Huntsman's [the polluting facility's] crimes would have gone entirely unnoticed." *See, e.g.*, May, *supra* note 89.

257. Actors in some settings have gone to great lengths to keep the information to themselves. *See supra* notes 90–96. In the partly analogous context of Endangered Species Act enforcement, several authors have noted the resistance of some private landowners to providing any information on the species or providing access to their land for government regulators to conduct an inventory. In one report, regulators resorted to using volunteers from the Girl Scouts to survey private, open lands for endangered species because landowners were less likely to use guns against these girls. Polasky & Doremus, *supra* note 85, at 23. Others have documented landowners destroying the species' habitat before regulators discover the animals' existence on the private land. *See* David A. Dana, *Natural Preservation and the Race to Develop*, 143 U. PA. L. REV. 655, 695 n.107 (1995) (discussing "substantial evidence of [landowner] races to destroy natural habitats in anticipation of the adoption of habitat preservation restrictions").

258. Corporate surveys suggest that firms might be more willing to conduct self-audits if penalties for the detected violations were waived or reduced. A 1995 Price Waterhouse survey reported that half of the corporate respondents would expand their environmental auditing if penalties were reduced for violations voluntarily discovered and corrected, revealing a potential shortfall between the violations caught by regulators and the violations existing within corporations. *See* Incentives for Self-Policing: Discovery, Disclosure, Correction and Prevention of Violations, 65 Fed. Reg. 19,617, 19,619 (Apr. 11, 2000). Disparate empirical evidence of substantial noncompliance with environmental requirements reinforces the possibility that at least some firms are not engaged in self-audits, or at least not self-audits that lead to compliance. *See, e.g.*, Jensen & Vestergaard, *supra* note 245, at 281–82 (observing that illegal landings (fishing that exceeds fishing quotas) of cod in the North Sea account for 22 percent of the catch weight and 51 percent of the number of caught fish, a finding that they attribute to the private information of fishermen regarding compliance); Blais et al., *supra* note 19 (describing the difficulties of detecting violations of air toxics requirements); *see also* May, *supra* note 89 (describing very high, unexplained levels of air toxics at the border of a large chemical plant in Port Neches, Texas, which ultimately were traced to broken equipment that the company declined to fix and did not report); *id.* (reporting on a different study in Houston in 2002 "show[ing] that amounts of ethylene and propylene measured in the atmosphere seem to be at least three times higher than the emissions inventories reported by industry").

In a harsh critique of the EPA's enforcement policies, James Delong, a senior research associate at the Competitive Enterprise Institute, argues that most violations of environmental laws are trivial and do not harm the environment, a conclusion that he supports with surveys of firms regarding their prosecuted "noncompliance events" and the EPA's statistics on civil enforcement cases. DELONG, *supra* note 148, at 12–17. What Delong neglects to account for in reaching his conclusion, however, are the substantial gaps in the EPA's enforcement information. The EPA's civil cases involve only *identified* violations that support a calculation of noncompliance: they say nothing about violations that the EPA has not discovered. Indeed, the number of enforcement suits would seem to rise with the availability of evidence on the types of

believed that their client corporations had, in the prior year, violated at least one environmental law, yet the vast majority of these violations appear not to have been either reported or caught.[259] Empirical statistics and enforcement reports also provide support for the intuitive prediction that the more rigorous the enforceable requirements, the higher the rate of compliance.[260] When environmental regulatory programs leave little discretion for actors with regard to self-reporting, enforcement actions are more abundant; conversely, when regulated parties are afforded discretion with regard to self-monitoring, the number of enforcement actions drop.[261]

---

violation. *See* note 207 and accompanying text. For violations about which firms are able to guard information on compliance, one would expect a relational decline in the enforcement suits filed. Yet, this pivotal role of private information in understanding compliance rates is completely omitted from Delong's critique of the EPA's enforcement effort. *See* DELONG, *supra* note 148, at 17 (concluding from the EPA's enforcement record that the "number of major violations . . . is quite small, unless EPA's investigators are amazingly inept"); *cf.* ENVIRONMENTAL WORKING GROUP, ABOVE THE LAW: HOW THE GOVERNMENT LETS MAJOR AIR POLLUTERS OFF THE HOOK 15 (1999) (arguing that "paperwork violations" are not necessarily insignificant but can conceal substantial underlying violations of emissions requirements), *available at* http://www.ewg.org/reports_content/abovethelaw/washington.pdf. Economists writing in the area of environmental enforcement would consider Delong's failure to account for the role of private information in evaluating compliance rates to be a fatal error. *See supra* note 63 (discussing the effect of asymmetrical information).

259. *See* Marian Lavelle, *Environmental Vise: Law, Compliance*, NAT'L L.J., Aug. 30, 1993, at S1 (discussing a survey of corporate counsel in which two-thirds admitted that their client companies recently had violated environmental laws, although most lawyers surveyed asserted that it was not possible to achieve full compliance with the environmental laws because of their cost, complexity, and uncertainty). This survey seems to finesse related arguments that the regulatory requirements are too complex to understand, *see, e.g.*, DELONG, *supra* note 148, at 35–55, given that at least some of the applicable laws were apparently clear enough for "corporate counsel" to conclude that their companies were violating them.

260. *See* Flatt, *supra* note 243, at 27 (empirically relating noncompliance problems for NPDES permits under the Clean Water Act with the strength of enforcement resources); Rechtschaffen, *supra* note 147, at 1206–08 (describing a number of GAO and academic reports finding that increased enforcement of Clean Water Act requirements (in which self-monitoring expectations are unambiguous) leads to increased compliance rates); *cf. id.* at 1227–30 (describing a broader range of studies that show a direct correlation between the intensity of enforcement and compliance rates).

261. *See, e.g.*, Maria E. Chang, *Citizen Suits: Toward a Workable Solution to Help Created Wetlands Succeed*, 6 U. FLA. J.L. & PUB. POL'Y 77, 98 (1993) ("Most citizen suits have concentrated on the [Clean Water Act] because that statute requires monitoring and self-reporting, making it relatively easy to identify violations."); LeRoy C. Paddock, *Environmental Enforcement at the Turn of the Century*, 21 ENVTL. LAW. 1509, 1523–24 (1991) (observing that the greatest number of citizen suits have occurred under the Clean Water Act "in part, because violations cannot be as easily identified using reports submitted under those [other] programs"); Susan D. Carle, Note, *A Hazardous Mix: Discretion to Disclose and Incentives to Suppress Under OSHA's Hazard Communication Standard*, 97 YALE L.J. 581, 581–84 (1988) (discussing evidence of manufacturers' extensive noncompliance with OSHA's Hazardous Communication

Empirical support for a similar correlation between enforcement levels and compliance rates is also found in the tax literature.[262]

Ten years of experience with self-audit laws also provide surprising evidence of how actors may be able to escape enforcement by controlling the release of internal information.[263] These self-audit laws, passed by at least twenty-three states and the federal government,[264] are based on the fundamental premise that regulators

---

Standard (HCS), which is linked to the failure of the standard to require manufacturers to disclose product ingredients, making it nearly impossible for workers and others to enforce); *see also* Polasky & Doremus, *supra* note 85, at 27 (discussing similar information burdens in the enforcement of the Endangered Species Act on private land and noticing, after listing the evidentiary obstacles for government enforcers, the dearth of enforcement cases).

262. *See, e.g.*, Leandra Lederman, *The Interplay Between Norms and Enforcement in Tax Compliance*, 64 OH. ST. L.J. 1453, 1503–05 (2003) (explaining that cash businesses—which generally lack documentation about transactions and thus have many informational advantages—have higher than normal tax noncompliance rates).

263. *See, e.g.*, PERCIVAL ET AL., *supra* note 5, at 989 (describing laws that protect environmental audits from disclosure in some circumstances); John H. Cushman, *Many States Give Polluting Firms New Protections*, N.Y. TIMES, Apr. 7, 1996, at A1 (reporting that "one state after another is adopting legislation to protect companies from disclosure or punishment when they discover environmental offenses at their own plants"). The EPA has also used self-disclosure incentive programs for more specific reporting requirements under TSCA and testing and reporting requirements under the Clean Air Act. *See* EPA AUDIT POLICY UPDATES 2002, at 1177 (PLI Corp. Law & Practice Course, Handbook Series, No. B0-00L2, 830 (May/June 2002)).

264. Rechtschaffen, *supra* note 147, at 1244–48 (listing and discussing twenty-three state audit laws and the EPA's counterproposal for an audit law). A state's enthusiasm for providing these rewards varies tremendously, ranging from protecting the firm from any enforcement action while keeping the violations confidential to simply lowering penalties to a more predictable amount if a firm voluntarily discloses the violations. *See e.g.*, *id.* at 1246 (discussing state laws that protect firms conducting self-audits from enforcement action); Leroy Paddock, *Environmental Accountability and Public Involvment*, 21 PACE ENVTL. L. REV. 243, 247 (discussing the state of Minnesota's use of penalty waivers for self-dislosed environmental violations). EPA's self-audit guidelines are by far the least generous, providing only reduced sanctions for voluntarily disclosed violations. Incentives for Self-Policing; Discovery, Disclosure, Correction and Prevention of Violations, 60 Fed. Reg. 66,706, 66,711–12 (Dec. 22, 1995). Revisions in 2000 provided more generous timelines and helpful clarifications, but still retained the limited immunities for penalties. Final Policy Statement on Incentives for Self-Policing: Discovery, Disclosure, Correction and Prevention of Violations, 65 Fed. Reg. 19,618, 19,618 (Apr. 11, 2000).

At the other end of the spectrum are self-audit laws, like those passed in Colorado, that create a presumption of immunity from all penalties for self-discovered violations provided that they are disclosed and corrected within a reasonable time. George Van Cleve & Keith W. Holman, *Promise and Reality in the Enforcement of the Amended Clean Air Act Part II: Federal Enforceability and Environmental Auditing*, 27 Envtl. L. Rep. (Envtl. L. Inst.) 10,151, 10,161 (1997). The protections offered by these more generous state laws, however, may be undercut by the EPA's opposition to the laws and its threat to overfile on state cases, which effectively removes any protections that these state laws offer. Channing J. Martin, *Voluntary Disclosure of Environmental Violations: Is Mea Culpa a Good Idea or a Bad Move?*, 32 Envtl. L. Rep. (Envtl.

will be unable to catch most violations. The laws thus attempt to enlist the cooperation of the regulated parties by rewarding those who volunteer violations.[265] Although the merits of these audit laws have been contested,[266] their impact on the regulated community clearly underscores the extent of these actors' superior knowledge of noncompliance. By January 2002, for example, 1,500 entities nationwide volunteered environmental violations at 6,065 facilities in order to obtain reduced penalties under the EPA's audit policy.[267] Presumably, these violations would have escaped discovery without the incentives policy. An even more insidious lesson from the self-audit laws arises from the nature of the violations that are being reported. The violations that are being self-reported under the EPA's policy are primarily those violations that would be most easily detected by regulators if regulators invested the resources to investigate them. At the same time, these self-reported violations are generally inexpensive to rectify, for example, violations of recordkeeping requirements.[268] This could mean that regulated

---

L. Inst.) 10,692, 10,694–96 (2002); *see also* Thomas J. Kelly, Jr. & Gregory S. Braker, *Navigating the Bermuda Triangle of Environmental Criminal Enforcement*, 2001 A.B.A. SEC. ENV'T, ENERGY & RESOURCES 17 (discussing adverse ramifications for criminal liability).

265. *See* David A. Dana, *The Perverse Incentives of Environmental Audit Immunity*, 81 IOWA L. REV. 969, 969–73 (2002). As defense lawyers have observed, however, the incentives in audit laws are probably not sufficient for violations that invite other liabilities or charges. *See also* Kelly & Braker, *supra* note 264, at 5–7 (detailing the multiple litigation risks that could flow from voluntarily disclosing environmental violations to the EPA, including toxic tort litigation; state enforcement; criminal charges, particularly against employees; government contracting problems; and shareholder suits).

266. *See, e.g.*, Dana, *supra* note 265, at 982–93 (arguing, with public choice models, that audit immunities could lead to less preventative management); Rechtschaffen, *supra* note 147, at 1255–57 (detailing the arguments against audit laws).

267. Martin, *supra* note 264, at 10,695.

268. *See* EPA AUDIT POLICY UPDATES 2002, *supra* note 263, at 822 (showing that more than 83 percent of the audit settlements resolve violations of EPCRA and the CWA, which both have clear reporting obligations that are easy for regulators to enforce and for regulated entities to correct); *see also* Martin, *supra* note 264, at 10,696 (noting that the main use of the EPA's audit immunities is for "recordkeeping obligations" and hypothesizing that the laws might be used more frequently when "[i]t is quick and easy to come into compliance" and "[t]here has been no harm to the environment"). Despite the low costs of compliance, EPCRA and CWA reporting violations can result in high penalty amounts if caught by regulators. *See, e.g.*, EPCRA, 42 U.S.C. § 11045(a) (2000) (specifying maximum civil penalties of $25,000 per day for violations of emergency planning requirements). For example, the EPA settled with ten telecommunications companies for six hundred violations of EPCRA and the CWA, which required "properly notifying local emergency planning committees of the presence of hazardous chemicals and preparing spill prevention plans to reduce the risk of environmental accidents, and protect the safety of those who respond if an accident occurs." EPA AUDIT POLICY UPDATES 2002, *supra* note 263, at 803. Under the audit settlement, the companies corrected

parties' control over internal information enables them to volunteer incriminating information only when the economics support such a disclosure. Regulated parties' self-reporting behavior also suggests that they may avoid disclosing more serious violations when they perceive that the probability of being caught by a regulator will be low, especially as compared against the economic benefits they gain by not installing the requisite pollution controls or satisfying other regulatory requirements in a timely fashion.[269]

---

these recordkeeping violations (presumably at low cost) and paid a total of $128,772 in penalties, which was based on the amount the EPA calculated that the companies saved in delaying their compliance. "Pursuant to the Audit Policy, the Agency has waived or proposed to waive more than $4.2 million in potential gravity-based penalties that otherwise could have been assessed." *Id*. Putting the math together, one can assume that the companies ultimately paid over $250,000 in penalties and compliance costs to avoid an enforcement action (and its accompanying litigation expenses) that could have resulted in a $4.2 million penalty. *See supra* note 241 (presenting the formula). Settling with the agency under the audit policy would thus be irrational only if the probability of being caught was less than 6 percent—unlikely for such obvious recordkeeping omissions. Even if the company expected much lower penalties (e.g., 10 percent of the maximum $4.2 million fine), it would be in its interest to engage in an audit settlement if it thought the probability that it would be caught was 60 percent or higher. In fact, enforcement for more obvious and even flagrant reporting violations may cause enforcement officials to look for other violations at a plant, making volunteer settlements of these "red flags" even more rational. This back-of-the-envelope calculation also reveals why it is not in a firm's interest to disclose violations that will be costly to correct (e.g., requiring new equipment valued at $500,000) or when the probability of detection of the violation by a regulator is likely to fall in the single digits. Assuming that the economic benefits of noncompliance are equal to the costs of compliance ($1 million total in this example), and assuming roughly the same penalties ($4.2 million), firms would not be inclined to report violations so long as the probability that an enforcement official would discover the violation is less than about 23 percent.

269. *See, e.g.*, Steven A. Herman, *NCSL Study Finds That State Environmental Audit Laws Have No Impact on Company Self Auditing and Disclosure of Violations*, 13 NAT'L ENVTL. ENFORCEMENT J. 18, 19 (Dec. 1998/Jan. 1999) (finding that more than three-fourths of corporations report performing compliance audits irrespective of the existence of audit laws, but that they also report that they did not disclose violations, even in states with privileges). One counterexample could be the willingness of some firms to enter into agreements with the EPA to undertake complete facility audits. *See, e.g.*, Martin, *supra* note 264, at 10,696. The nature of these agreements might give insight into whether companies believe that the audits are in their financial best interest because corrections are low cost or because the prospect of civil penalties is so high that EPA assistance is needed.

To the extent that penalties under an audit policy are equivalent to the economic benefits of noncompliance, reported violations again would seem to include only the most minor, economically trivial violations. Economic benefit calculations, which appear to form the basis for calculating penalties in most cases, are also likely to be attractive to regulated parties because these parties again enjoy private information about what the economic benefits might be. In contrast to estimating the costs of regulation for a cost-benefit analysis, however, in these economic benefit calculations, the regulated party/violator has strong incentives to deflate estimates. Empiricists could have some fun determining whether this underestimation occurs in fact. *See supra* note 63 and accompanying text.

Certain regulatory programs not only allow actors to reduce the likelihood that they will be caught committing a violation, but also encourage them to remain ignorant about these violations so that, in the event of an enforcement action, they will face lesser sanctions. Under current law, the more actors understand about the adverse effects of their activities, the higher the penalty when they are caught.[270] Indeed, knowledgeable violators face not only high civil fines but criminal penalties.[271] If actors smell a pungent odor in their air emissions but do not investigate, their penalties will likely be limited to civil sanctions—punishment less severe than if they sample the air with a device, discover an excessive level of pollutants, then do nothing or discard or ignore the monitoring data.[272] Knowingly

---

270. *See, e.g.*, CWA, 33 U.S.C. § 1319(g)(3) (2000) (providing that culpability is one factor to consider in assessing the proper amount of administrative penalties); OFFICE OF ENFORCEMENT AND COMPLIANCE ASSURANCE, ENVTL. PROT. AGENCY, CIVIL PENALTY POLICY FOR SECTION 311(B)(3) AND SECTION 311(J) OF THE CLEAN WATER ACT 10 (1998) (stating that penalties should be based in part on "the sophistication of the respondent and the resources and information available to it, and any history of regulatory staff explaining to the respondent its legal obligations or notifying the respondent of violations"), *available at* http://www.epa.gov/compliance/resources/policies/civil/cwa/311pen.pdf.

271. Statutes providing criminal sanctions include the following: FIFRA, 7 U.S.C. § 136*l*(b) (2000); TSCA, 15 U.S.C. §§ 2614, 2615(b) (2000); CAA, 42 U.S.C. § 7413(c) (2000); CWA, 42 U.S.C. § 1319(c); CERCLA, 42 U.S.C. § 9603(b)–(d) (2000); RCRA, 42 U.S.C. § 6928(d)–(e) (2000). *Cf.* Richard J. Lazarus, *Meeting the Demands of Integration in the Evolution of Environmental Law: Reforming Environmental Criminal Law*, 83 GEO. L. J. 2407, 2407–13 (1995) (arguing that the moral culpability features of criminal law are not appropriately integrated into the decentralized environment of environmental criminal law and that reform is needed).

272. *See, e.g.*, United States v. Hopkins, 53 F.3d 533 (2d Cir. 1995) (explaining a case in which the defendant-vice president of a manufacturing plant was convicted of falsifying, tampering with, or rendering inaccurate a monitoring device or method because, contrary to the regulatory requirements, he held back self-monitored samples that exceeded regulatory standards and, when this did not work, he instructed employees to dilute samples with tap water or reduce zinc concentration using a coffee filter); *see also* Kelly & Braker, *supra* note 264, at 3 (warning attorneys of the risks of criminal prosecution following the voluntary disclosure of civil violations under the EPA's audit policies and advising that "it may be more expedient to disclose potential criminal violations directly to the appropriate U.S. Attorney's Office [of criminal investigations]"). Similar perverse incentives could also result from criminal enforcement of the Endangered Species Act, in which private landowners are best advised not to look for endangered species before developing land. Because criminal sanctions for "harming" an endangered species only apply to "knowingly" harming the species, such sanctions seem capable of being avoided by willful ignorance. *See* ESA, 16 U.S.C. §§ 1538(a)(2)(B), 1540(b) (2000) (providing criminal sanctions for "knowing" violations only); *cf.* Michael J. Bean, *The Endangered Species Act and Private Land: Four Lessons Learned from the Past Quarter Century*, 28 Envtl. L. Rep. (Envtl. L. Inst.) 10,701, 10,706–07 (1998) (discussing the perverse incentives for owners to destroy or develop land to avoid federal regulation under

violating the environmental laws is a crime and is sanctioned more severely than reckless or civil violations.[273]

B. Increasing Protections for Concealing Information

With such strong reasons to resist producing information, it is no surprise that actors not only avoid learning about the adverse harms created by their products or activities but, once such news is discovered, actively seek legal protections to limit the disclosure of the incriminating information.[274] By claiming broad protections, actors can raise the costs to others of accessing this information or, in some cases, can even bar access completely. This Section details several discrete legal protections. Each allows actors to claim confidentiality privileges for privately held, damaging information. The protections bar most public access to the information. Indeed, in many instances even the EPA's access is restricted.

1. *Trade Secret or Confidential Business Information Protections.* Trade secret or confidential business information protections,[275] which provide firms with a vehicle for erecting

---

the ESA, and the resulting efforts of the Department of the Interior to reverse these incentives by rewarding collaborative land management).

273. *Compare, e.g.*, CWA, 33 U.S.C. § 1319(c)(1) (providing criminal penalties for "negligent violations"), *with id.* § 1319(c)(2)–(3) (providing criminal penalties for "knowing violations" and "knowing endangerment"). *See also* RCRA, 42 U.S.C. § 6928(d)–(f) (levying criminal penalties only for knowing violations and defining "knowingly" in a way that excludes recklessness). Although there have been concerns about the knowledge standards for criminal environmental law, they have not taken issue with the perverse incentives for ignorance. Still, many of the proposals for reform that have emerged from this debate implicitly circumvent these perverse incentives by recommending that criminal law be used only for repeat, sinister types of violations. *See, e.g.*, Lazarus, *supra* note 271, at 2514–17 (discussing the difficult legislative choices regarding what facts a criminal defendant should know to warrant criminal prosecution and suggesting alternatives, some of which only require a defendant to be aware that he is doing something reckless rather than requiring proof of the "defendant's knowledge of all of the technical details"); Memorandum from Earl E. Devaney, Director, Office of Criminal Enforcement, to the Environmental Protection Agency, The Exercise of Investigative Discretion 2, *at* http://www.epa.gov/enforcement/resources/policies/criminal/exercise.pdf (Jan. 12, 1994) (on file with the *Duke Law Journal*) (recommending that criminal environmental enforcement focus on the most significant and egregious violators, such as repeat or deliberator violators and those who tamper with data and monitors).

274. *See* Lyndon, *supra* note 83, at 20 ("In the absence of a well-developed information context, the market not only discourages firms from producing data about side effects, but encourages ignorance and deception.").

275. For a thoughtful discussion of the tensions between trade secret law and health and safety protection, see *id*. at 4–50.

immediate and costly barriers to accessing information about the harms created by their products or activities, constitute the broadest form of information protection. Confidential business information (CBI) claims are regularly used to limit access to health information on toxic substances and pesticides, including information on exposure risks, and on chemical identity and ingredients.[276] Such claims can even be used to protect information collected by inspectors in the course of environmental compliance inspections.[277] Even though most health and safety data are legislatively excluded from trade secret protections,[278] once a trade secret claim is asserted, the EPA generally considers it valid[279] until a party requests the information under the Freedom of Information Act (FOIA).[280] Under existing regulations,

---

276. *See* Envtl. Prot. Agency, Confidential Business Information (CBI) Review, *at* http://www.epa.gov/pesticides/foia/cbi.htm (last visited Oct. 30, 2004) (on file with the *Duke Law Journal*) (listing environment-related information that is commonly claimed as confidential); *infra* note 290 and accompanying text. OSHA also allows employers to withhold information on chemical identities from employees by claiming they are protected as trade secrets, as long as they indicate that they have done so on the label. EPA Hazard Communication, 29 C.F.R. § 1910.1200(i) (2003).

277. *See* EPA Definitions, 40 C.F.R. § 2.201 (2003) (defining a business confidentiality claim).

278. Because trade secret protections are a general common law construct and not constitutionally protected forms of property, Congress has authority to balance them against other goals, including health and environmental protection. Although Congress strikes the balance differently in the various environmental statutes, it has indicated that the balance should favor the general disclosure of information needed to determine potential adverse public health and environmental effects. *See, e.g.*, TSCA, 15 U.S.C. § 2613(b) (2000) (stating types of data of which disclosure is not prohibited); CWA, 33 U.S.C. § 1318(b) (exempting all information on "effluent data," standards, or limitations from protection as trade secrets); CAA, 42 U.S.C. § 7414(c) (2000) (same for "emission data"); CERCLA, 42 U.S.C. § 9604(e)(7)(F) (2000) (identifying "information with respect to any hazardous substance" not entitled to protection).

279. *See* EPA Confidentiality of Business Information, 40 C.F.R. § 2.204(c)–(d) (2003) (placing the burden for investigating and determining the validity of a CBI claim on the EPA, with no reference to substantiation of the claim by the claimant). The EPA has promulgated categorical denials of CBIs for certain types of information (e.g, permit applications for NPDES permits under the Clean Water Act), which presumably take effect immediately and reject such claims. *See, e.g.*, EPA Confidentiality of Information, 40 C.F.R. § 122.7(b) (2003) (identifying narrow categories for which "claims of confidentiality . . . will be denied").

280. *See* 40 C.F.R. § 2.204(a) (describing the procedures that the EPA must follow "in making initial determinations of whether business information is entitled to confidential treatment for reasons of business confidentiality"); Public Information and Confidentiality, 65 Fed. Reg. 80,394, 80,395 (Dec. 21, 2000) (observing that "CBI regulations generally do not require a business to submit a substantiation until disclosure becomes an issue"). Generally, it appears that a FOIA request serves as the impetus for the EPA to review a CBI claim. *See id.* ("EPA often finds it necessary to make final confidentiality determinations as a result of FOIA requests or rulemaking."). In 1994, the EPA reported that it received more than forty thousand

there are no sanctions for asserting overbroad CBI claims.[281] Moreover, with the exception of EPCRA,[282] such claims require no substantiation—for the privilege to apply, the firm has only to stamp the documents "confidential."[283]

Firms that are unenthusiastic about granting public access to information on the harms created by their products and activities face few restraints in abusing these generous trade secret protections.[284]

FOIA requests a year, many of which seek confidential business information. Public Information and Confidentiality Regulations, 59 Fed. Reg. 60,446, 60,447 (Nov. 23, 1994). Nonetheless, in 1990, the EPA aggressively challenged over seven hundred CBI claims under TSCA on its own (without a FOIA trigger) and appeared to make substantial headway in reducing the number of overinclusive claims. *See* Julie Yang, Note, *Confidential Business Information Reform Under the Toxic Substances Control Act*, 2 ENVTL. LAW. 219, 235 (1995) (reporting and documenting this development). The literature does not reveal whether the EPA has been able to keep up with this internal review effort since 1990.

281. Empirical evidence discussed in notes 290–97 and accompanying text, *infra*, in fact suggests that industry tends to err heavily on the side of overclaiming CBI for health and safety information.

282. EPCRA allows firms to keep chemical identities confidential but explicitly requires companies to justify claims in their initial CBI requests. 42 U.S.C. § 11042(a)(2)(A)(ii) (2000). Accordingly, the EPA has developed a second set of regulations governing claims for trade secret protection for chemical identifiers covered under EPCRA; these regulations, in contrast to the EPA's regulations for other statutes, are specifically intended to "eliminate[] legally invalid and frivolous [CBI] claims." Trade Secrets Claims for Emergency Planning and Community Right-To-Know Information, 61 Fed. Reg. 67,016, 67,017 (Dec. 19, 1996). Nonetheless, if the company provides the requisite supporting documentation, the EPA appears to grant the claim without reviewing the merits. The claim is only reviewed once a party files a FOIA request or in the unlikely event that the EPA decides to invest resources in the review of classified information on its own initiative. EPA Trade Secrecy Claims, 40 C.F.R. § 350.9(b) (2003).

283. *See* 40 C.F.R. § 2.203. No official from the company need take responsibility for asserting the claim, and there are no penalties for asserting the claim when it is facially frivolous. *See id.* §§ 2.201–2.310; *see also* Christopher J. Lewis, Comment, *When is a Trade Secret Not So Secret? The Deficiencies of 40 C.F.R. Part 2, Subpart B*, 30 ENVTL. L. 143, 171–72 (2000) (making this same observation regarding the lack of disincentives for overbroad CBI claims). The firm is presumed to waive the privilege, or at least must justify it later if it does *not* stamp information as confidential when first submitting it to the EPA. 40 C.F.R. § 2.203(c). *See also* Yang, *supra* note 280, at 223 (discussing how "easy" it is for companies to file CBI claims under TSCA). For a contrasting approach to CBI taken under EPCRA, see EPA Trade Secrecy Claims, 40 C.F.R. §§ 350.5, 350.7, 350.13, 350.27 (2003).

Once the information is publicly disseminated, the company loses its right to claim the misappropriation of a trade secret. *See, e.g.*, James T. O'Reilly, *Seeking a Truce in the Environmental Information Wars: Replacing Obsolete Secrecy Conflicts with New Forms of Sharing*, 30 Envtl. L. Rep. (Envtl. L. Inst.) 10,203, 10,204 (2000) (discussing this point and concluding that "[t]his threat of income loss provides the economic incentive that motivates industry to oppose agencies' broader dissemination of industry-submitted technological and process data.").

284. The EPA openly concedes that the problem of overbroad CBI claims is serious:

Routinely stamping all information as "confidential business information" is expeditious and immediately protects such information from public scrutiny. At the same time, making a CBI claim increases search costs for others.[285] Indeed, to obtain information that has been improperly claimed as CBI, an interested party must submit a FOIA request, submit a follow-up FOIA request if pieces of information appear left out or unaccounted for, and be prepared to litigate if the information is not produced.[286] Because the public typically is denied access not only to the nondisclosed information, but also to the firm's justification for asserting the CBI claim,[287] the public is handicapped in its ability to challenge an EPA decision that information is appropriately classified as a protected

---

> EPA receives a large number of submissions of various types of information claimed as CBI. Many of the claims received are very broad, and the Agency has limited resources to deal with this stream of information. As a result, large amounts of information claimed as CBI are retained by the Agency longer than necessary, and broad or non-specific CBI claims may limit public access to information that is not actually CBI.

Public Information and Confidentiality: Advance Notice of Proposed Rulemaking; Withdrawal of 1994 Proposed Rule, 65 Fed. Reg. 80,394, 80,395 (Dec. 21, 2000).

285. *See, e.g.*, U.S. GEN. ACCT. OFFICE, *supra* note 161, at 54–55 (1994) (discussing how the scientific community and others would benefit from lower cost access to TSCA data that is claimed CBI); Carle, *supra* note 261, at 596–600 (discussing manufacturers' tendency to claim product ingredients as trade secret protected under OSHA, making OSHA's hazard communication standard, which provides warnings to workers, effectively unenforceable). As a result, a CBI claim raises the search costs for others to access the information, in some cases so substantially that interested parties will not invest the money or time to obtain the information or even learn how they might obtain it.

Perhaps still more likely to discourage disclosure are the onerous consequences for the poor federal bureaucrat who makes a decision to disclose information stamped as CBI when that official's decision later turns out to be wrong. Agency officials who wrongfully divulge trade secret information can be charged criminally and imprisoned for up to one year, and they must be terminated from their position. Trade Secret Act, 18 U.S.C. § 1905 (2000). RCRA and EPCRA also provide sanctions for persons who disclose trade secret information who are not employees of the government. TSCA, 15 U.S.C. § 2613 (2000); RCRA, 42 U.S.C. § 6927(b)(2) (2000); EPCRA, 42 U.S.C. § 11045(d)(2) (2000); s*ee* CAA, 42 U.S.C. § 7414(c) (2000) (stating that an administrator cannot divulge information entitled to protection as a trade secret).

286. For these and other scientific costs that flow from CBI claims, see Lyndon, *supra* note 83, at 36–37. Search costs are also high because the FOIA response, at its best, is a data dump. There are few electronic search techniques to sort through the information, and it is rarely organized. Thus, even once documents are obtained, they are costly to organize and assess.

287. *See* 40 C.F.R. § 2.205(c) (providing that, in most cases, a company's substantiation for a CBI claim should receive automatic classification as CBI); *see also* Public Information and Confidentiality, 65 Fed. Reg. at 80,396 (conceding potential problems with the EPA's policy of automatically classifying substantiations as CBI if the firm requests them, which in turn deprives FOIA requestors of not only the information, but the basis for the CBI claim used to prevent its disclosure).

trade secret.[288] Although less dramatic, even agency officials can be impeded in accessing and using information stamped CBI, regardless of whether the claim is meritorious:

> Staff discussions on [CBI chemicals] must be held in secure areas, documents can be reviewed only in secure environments, meeting notes themselves become confidential documents and must be logged and guarded under lock and key, and computers must have their memories and permanent storage media erased after processing confidential data.[289]

Available evidence confirms what one might expect from these overgenerous trade secret protections: firms routinely use CBI claims without basis.[290] One organization even went so far as to claim a firm address as protected trade secret information.[291] In 1990, for example, the EPA reviewed CBI claims under the Toxic Substances Control Act (TSCA) and challenged some nonmeritorious claims. By 1992, "industry had voluntarily amended and withdrawn over 600 claims after EPA's inquiries."[292] A 1992 study found that confidential

---

288. *See* Lyndon, *supra* note 83, at 35 (making this same argument).

289. U.S. GEN. ACCT. OFFICE, *supra* note 161, at 55; *see also* O'Reilly, *supra* note 283, at 10,204–06. Moreover, only "cleared" regulators are allowed access to information claimed as CBI. Until recently, the statute was read to foreclose allowing state officials to access information claimed as CBI. Yang, *supra* note 280, at 231. The EPA has worked to provide states access to CBI information through the "contractors" provision of TSCA, 15 U.S.C. § 2613(a)(2). Yang, *supra* note 280, at 232. Nevertheless, given these barriers to access, some of this information is likely missed or proves practicably unobtainable to agency regulators or their citizen-oriented watchdogs.

290. *See, e.g.*, OFFICE OF POLLUTION PREVENTION & TOXICS, ENVTL. PROT. AGENCY, FINAL ACTION PLAN: TSCA CONFIDENTIAL BUSINESS INFORMATION REFORM 1-5 (1994) (observing that some and possibly many CBI claims under TSCA lack merit); Sheila A. Ferguson et al., Influence of CBI Requirements on TSCA Implementation, Hampshire Research Associates 41 (Mar. 1992) (unpublished manuscript, on file with the *Duke Law Journal*) (concluding, by reviewing CBI claims from 1977 through 1990, that "all available evidence supports the proposition that much of the information covered by CBI claims is not legitimately entitled to protection as TSCA CBI").

The GAO reports that the Hampshire Study also found that firms claimed as CBI under TSCA information that had already been disseminated publicly. "For example, information contained elsewhere in newspaper articles and corporate annual reports was submitted as was publicly available information from EPA's Toxics Release Inventory, a system that contains nationwide information on toxic chemicals emitted into the air, ground, and water by manufacturing facilities." U.S. GEN. ACCT. OFFICE, *supra* note 161, at 56–57.

291. *See Industry Moves to Exempt Sensitive Information from TSCA Reporting*, CHEMICAL ENG'G, Aug. 1994, 45–46.

292. U.S. GEN. ACCT. OFFICE, *supra* note 161, at 56. The EPA's limited resources make this approach available only in the short term, however. *Id.* The EPA also reviewed CBI claims on health and safety studies and found that over one-fifth of the claims had no merit. *Id.*

information was identified in more than 90 percent of the premanufacture notices required for new toxic substances under TSCA,[293] a statute in which Congress explicitly stated that "health and safety stud[ies]" are not ordinarily protected from disclosure by trade secret claims.[294]

Industry representatives admit that they claim CBI protection when the claim is inappropriate.[295] In fact, the pervasiveness of CBI claims is one of industry's primary arguments against reforming the system. Firms argue that such practices are so prevalent that justifying the vast array of information that they routinely claim as confidential business information would be unduly burdensome. They have even argued that requiring this substantiation might violate the Regulatory Flexibility Act[296] given the added burden that the requirement would impose on small manufacturers.[297]

From the standpoint of environmental and public health protection, the EPA's CBI program is a disaster. Allowing firms to classify much of the information that they are legally required to submit minimizes even the modest benefits achieved by requiring actors to produce at least some information on the harms caused by their products and activities. Moreover, actors taking this approach run only slight risks. CBI claims are made discreetly, so there is little public awareness that firms are taking advantage of this loophole. In

---

293. *Id.* at 5.

294. TSCA, 15 U.S.C. § 2613(b). *See generally* McGarity & Shapiro, *supra* note 83, at 874–75 (arguing that TSCA "specifically exempt[s] health and safety studies from the protections otherwise afforded to proprietary information").

295. In the GAO's 1994 study, industry commentators who were interviewed "accepted the [GAO's] basic finding that the chemical industry does make improper confidentiality claims and needs to address such claims." U.S. GEN. ACCT. OFFICE, *supra* note 161, at 58. They defended their practice of overclaiming under TSCA, however, by arguing that "the purpose of TSCA information is to provide EPA with a factual basis for chemical regulation, not to provide a basis for disseminating data on the chemicals to other interested organizations." *Id.*

296. 5 U.S.C. §§ 601–612 (2000).

297. *See, e.g.*, Letter from Warren E. Stickle, President, Chemical Producers and Distributors Association & Bill Balek, President, International Sanitary Supply Association, to the EPA Docket 2–3 (June 13, 2001) [hereinafter Stickle & Balek Letter] (responding to probosed changes in the CBI rules, *see* Public Information and Confidentiality, Advance Notice of Proposed Rulemaking, 65 Fed. Reg. 80,394 (Dec. 21, 2000)), *available at* http://www.cpda.com/Content/regulatory_affairs/archived/CPDAISSAComments.pdf. At the same time, the agency's administrative costs appear quite substantial. *See, e.g.*, Lyndon, *supra* note 83, at 35 ("The agency whose mandate is to foster health protection ends up in the anomalous position of 'sanitizing' and protecting industry documents . . . .").

addition, firms face few, if any, sanctions for making overbroad CBI claims.

Given the multifaceted advantages that accrue to firms from classifying information on the externalities created by their products and activities, it comes as no surprise that the EPA's concerted efforts to reform the CBI program have consistently failed.[298] Indeed, industry representatives not only vigorously oppose regulatory reform, but they argue that existing protections are inadequate to ensure that competitive secrets are safe from disclosure when public health and safety data are disseminated. One trade association has even insisted that still broader protections are needed and has proposed legislation to that end.[299]

2. *Privacy Protections.* Firms also take advantage of limited privacy protections that make it more difficult and costly for the

298. Over the past decade, the EPA has twice attempted to reform the problem of overbroad CBI protections—without success. *See* Public Information and Confidentiality Regulations, 59 Fed. Reg. 60,445 (Nov. 23, 1994); Public Information and Confidentiality, Advance Notice of Proposed Rulemaking, 65 Fed. Reg. 80,394 (Dec. 21, 2000); U.S. GEN. ACCT. OFFICE, ENVIRONMENTAL INFORMATION: EPA COULD BETTER ADDRESS CONCERNS ABOUT DISSEMINATING SENSITIVE BUSINESS INFORMATION (June 1999) [hereinafter U.S. GEN. ACCT. OFFICE, ENVIRONMENTAL INFORMATION] (commenting on the usefulness of such information), *available at* http://www.loyola.edu/dept/politics/intel/rced99-156.pdf; U.S. GEN. ACCT. OFFICE, *supra* note 161 (discussing the EPA's assessment of the risks of chemicals); Ferguson et al, *supra* note 290 (noting that CBI claims severely limit access to TSCA data); Stickle & Balek Letter, *supra* note 297 (responding to the proposed reforms); *see also* Yang, *supra* note 280, at 229–37 (discussing the EPA's failed effort to reform CBI under TSCA in 1994); *CBI Rule on Hold as Regulatory Negotiation Eyed*, 26 Env't Rep. (BNA) 17 (1995).

The EPA has also suggested that firms provide materials accounting to strengthen EPCRA reporting, which would include information on toxic chemicals that enter, are used, and leave the facility. This proposal was also opposed and ultimately terminated by industry. *See, e.g.*, U.S. GEN. ACCT. OFFICE, ENVIRONMENTAL INFORMATION, *supra*, at 11, 12 (discussing how industry opposition on CBI grounds led to the abandonment of this proposal).

299. Industry argues that even more trade secret protections are needed given the "mosaic" effect—the ability of competitors to piece together information about their operations from bits of publicly available data. *See, e.g.*, Public Information and Confidentiality, 59 Fed. Reg. at 80,396 (discussing how the regulated community "has made the argument that multiple pieces of data which may not qualify individually to be treated as CBI and are made publicly available can be pieced together to reveal a trade secret"); Stickle & Balek Letter, *supra* note 297, at 5 (discussing the threats that the mosaic effect presents to trade secret information). In 1998, the law firm of Ropes & Gray prepared a report for the Chemical Manufacturers Association that advocated adoption of a "uniform statute that would make it easier for its members to assert confidentiality claims based on the 'mosaic' argument." U.S. GEN. ACCT. OFFICE, ENVIRONMENTAL INFORMATION, *supra* note 298, at 22.

government to access information about their externalities.[300] Although the Supreme Court has upheld the aerial surveillance of a large industrial facility without consent of the owner as consistent with the Fourth Amendment,[301] in-person inspections require inspectors to obtain either prior permission from the owner or an ex parte warrant from a court.[302] Some courts, moreover, insist that such warrants provide only limited access for inspectors. For example, if an inspector enters a site for a routine inspection and discovers that invasive sampling is needed—a need not anticipated when the initial warrant was obtained—the inspector may be required to return to court to obtain a second ex parte warrant before conducting the sampling.[303] Moreover, only government inspectors have access to private industrial premises. Even when there are discharges from a property onto adjacent land, neighboring residents have no way to obtain access unless the owner invites them on the site.[304]

3. *Litigation Settlement.* Litigation settlements also provide a vehicle for preventing public access to incriminating information on the harms caused by one's activities or products. Even though private litigation has uncovered some of the most important information on the adverse effects of products such as asbestos, lead, and tobacco,[305]

---

300. Fourth Amendment protections from unreasonable searches and seizures generally require government inspectors to obtain a warrant before entering a facility without consent. There are several exceptions that weaken these protections for industrial establishments. *See* REITZE, *supra* note 86, at 497–98, 500–03.

301. *See* Dow Chem. Co. v. United States, 476 U.S. 227, 237–38 (1986).

302. *See, e.g.*, REITZE, *supra* note 86, at 499–500 (outlining a neutral EPA inspection scheme). To obtain a warrant for administrative purposes, the inspector must generally have some evidence of suspected violations ("reasonable suspicion of a violation") or must be selecting the facility at random using "neutral" criteria. *Id.* at 499.

303. United States v. Tarkowski, 248 F.3d 596, 599–601 (7th Cir. 2001); *see also* Roger D. Schwenke, *Regulatory Access to Contaminated Sites: Some New Twists to an Old Tale*, 26 WM. & MARY ENVTL. L. & POL'Y REV. 749, 754–83 (2002) (surveying case law on ways that landowners can impede or file takings claims challenging government efforts to obtain access to private land for purposes of sampling and cleanup).

304. To enter the site without permission or a privilege would constitute trespass. RESTATEMENT (SECOND) OF TORTS § 163 (1965). Even the privilege to enter private land to abate a private nuisance appears to require the trespasser to possess information of the nuisance to justify the entry. *Id.* § 201.

305. Tobacco provides the best example, *see generally* GLANTZ ET AL., *supra* note 103; HILTS, *supra* note 35, although important revelations about the safety of products also emerged in a variety of other mass tort cases, *see supra* notes 53–57 and accompanying text. Of course, even the most aggressive plaintiffs' attorneys are sometimes unable to dislodge damaging internal documents (without resorting to theft) if the company is willing to resist discovery in illegal ways. *See, e.g.*, Henry Weinstein, *Judge Imposes $100,000 Fine on Tobacco Company*

when private cases settle and the plaintiffs are willing—usually as a result of a bonus payment—the record of such information can be sealed or destroyed.[306] This practice has troubled judges and scholars because it implies that, simply by paying enough, an actor may keep damaging information from public view, even when the actor's products or activities have engendered litigation precisely because the actor knowingly failed to disclose the harms.[307]

4. *Nondisclosure Contracts.* Actors also take advantage of nondisclosure clauses to conceal adverse information about their products.[308] When required by law to produce certain studies, manufacturers and others often contract the research out to university scientists and consultant laboratories.[309] These contracts typically allow the manufacturer to retain ownership of the results and control how the research is reported in the literature.[310] Through these contracts, firms are sometimes able to suppress research that is

---

Litigation, L.A. TIMES, Dec. 31, 1997, at D1 (reporting that a court imposed a $100,000 penalty against Brown & Williamson for failing to comply with pretrial discovery orders requiring the company to turn over internal documents).

306. *See, e.g.*, Marty Steinberg, *Protection of Proprietary Rights and Trade Secrets*, C520 A.L.I.-A.B.A. 655, 672–74 (1990) (discussing how courts can (but ordinarily are loathe to) seal files containing trade secret information or grant protective orders). Firms can also attempt to resist sharing these documents by claiming attorney-client and related privileges for much of the information. *See, e.g.*, Kelly & Braker, *supra* note 264 (advocating the use of discovery privileges to avoid criminal liability). *But see* Reitze & Hoffman, *supra* note 166, at 715–16 (discussing the limits of these privilege claims when they concern self-evaluative documents sought by the government in environmental enforcement cases).

307. *See, e.g.*, Jack B. Weinstein & Catherine Wimberly, *Secrecy in Law and Science*, 23 CARDOZO L. REV. 1, 18–30 (2001) (discussing the problem of secrecy agreements in mass tort cases and how they may in fact conflict with the protection of public safety); Keith Schneider, *Court Rejects U.S. Effort to Keep Exxon Valdez Settlement Agreement Secret*, N.Y. TIMES, Mar. 9, 1991, at A9.

308. They accomplish this through confidentiality and nondisclosure agreements. *See, e.g.*, Steinberg, *supra* note 306, at 672 (providing overview of these agreements in the context of trade secret protections).

309. *See, e.g.*, Gayle Charnley & Jacqueline Patterson, *Use of Human Subjects Data for Regulating Chemical Exposures*, 33 Envtl. L. Rep. (Envtl. L. Inst.) 10,923, 10,927 (2003) (referring to pesticide manufacturers' use of contract laboratories to conduct required testing in course of a larger discussion about the usefulness of private clinical testing); *see also supra* notes 125–32 and accompanying text.

310. *See, e.g.*, Elina Hemminki et al., *The Courts—A Challenge to Health Technology Assessment*, 285 SCIENCE 203, 203 (1999) (describing several cases in which manufacturers mounted legal challenges to prevent the dissemination of data); *see also supra* note 103 and accompanying text. This is such a problem that journals are beginning to require disclosure of these conditions as a prerequisite to publication. *See infra* notes 404–05 and accompanying text.

unfavorable.[311] Moreover, after suppressing research results, firms may even be able to "shop" for other scientists to conduct the same research with modifications to the study design or analytical methods that, while meeting legal requirements, produce more favorable results.[312] Typically, outside parties have no way to become aware of this trial-and-error approach. It is difficult to know the extent to which this "gaming" of scientific research occurs, but the high rate of bias in sponsor-financed research suggests significant sponsor influence in both study design and the reporting of study results.[313] To the extent that firms do suppress unfavorable research, of course, this practice distorts the scant scientific information that remains.

5. *State Privilege Laws.* Over the last decade, several new protections have emerged that provide even more opportunity for actors to keep adverse information about their products and activities to themselves. Some state self-audit laws, for example, provide sweeping protections for information relating to externalities. Some states not only waive or limit sanctions, but actually provide actors with a mechanism for making the contents of their self-audits, including the discovery of violations, privileged—in some cases even from the state government.[314] Although strong opposition from the EPA may be eroding these state privilege laws,[315] firms have

311. D. Blumenthal et al., *Withholding Research Results in Academic Life Science: Evidence From a National Survey of Faculty*, 277 JAMA 1224 (1997); Drummond Rennie, *Thyroid Storm*, 277 JAMA 1238 (1997); Steven A. Rosenberg, *Secrecy in Medical Research*, 334 N. ENG. J. MED. 392 (1996); s*ee also supra* notes 53–58 and accompanying text.

312. *See, e.g.*, *supra* notes 43, 125–32 and accompanying text (providing examples of sponsors who have commissioned favorable research, although it is not possible to verify directly the use of nondisclosure contracts for these arrangements); *cf.* Alan Zarembo, *Funding Studies to Suit Need*, L.A. TIMES, Dec. 3, 2003, at A1 (reporting that Exxon terminated a contract for research on punitive damages when the research produced undesirable conclusions, but that Exxon did not prohibit the researcher from publishing the paper).

313. *See* KRIMSKY, *supra* note 127, at 141–61 (discussing the "funding effect" in case studies of biomedical research and citing to empirical studies, published in medical journals, observing that the outcomes of industry-sponsored research is more favorable to the sponsor (statistically) than parallel research that is federally funded).

314. *See, e.g.*, Rafe Peterson, *Environmental Law Update*, PROB. & PROP., July/Aug. 2000, at 63, 63–64 (stating that twenty-six states have adopted environmental privilege laws that make voluntary environmental audit reports inadmissible in court proceedings and provide immunity from liability or reduction in penalties for violations disclosed as a result of such audit reports). These privileges, when adopted by states, are sometimes much broader than the EPA's provisions. *Id.*

315. The EPA does this by threatening to override state protections with federal suits. *See supra* note 264.

attempted to use these laws to withhold information from local citizens regarding releases of air toxins and contaminants into groundwater. In at least one case, this effort was successful.[316] A hodgepodge of other state laws, particularly those governing voluntary cleanup of contaminated land, also provides actors with an ability to classify information about potential harms under circumstances in which the information ordinarily would be made public.[317]

6. *National Security Legislation.* National security legislation may provide regulated parties with an opportunity to prevent public disclosure and even regulatory use of unfavorable information by claiming that the information presents national security risks.[318] The

316. *The Review of Activities by the Federal Government Concerning Individuals or Organizations Voluntarily Submitting to Environmental Audits: Hearing Before the Senate Comm. on Env't and Pub. Works*, 105th Cong. 55 (1997) (statement of Steven Herman, Ass't Administrator, Office of Enforcement & Compliance Assurance, Envtl. Prot. Agency).

317. A number of state voluntary cleanup laws reward private parties for conducting voluntary cleanups by protecting their cleanup and sampling information from public disclosure. *See, e.g.*, Bradford C. Mank, *Reforming State Brownfield Programs to Comply with Title VI*, 24 HARV. ENVTL. L. REV. 115, 173–74 (2000).

> In some states, "any reports or information about the investigation and cleanup of a site [containing hazardous substances] remain confidential and are not admissible or discoverable in a civil suit or administrative action . . . unless the certified professional responsible for reviewing the cleanup finds a 'threat or danger to public health or safety or the environment' or the state brings a criminal prosecution against the volunteer [who cleaned up the site]."

Id. at 174. Professor Mank observes, based on a survey of state laws governing the cleanup of "brownfields" or moderately contaminated sites, that "[m]ost states do not require individual notice to residents in the host community or even to contiguous property owners." *Id*.

318. *See generally* Rena Steinzor, "*Democracies Die Behind Closed Doors": The Homeland Security Act and Corporate Accountability*, 12 KAN. J.L. & PUB. POL'Y 641 (2003) (discussing the potential adverse implications of the Homeland Security Act for disclosure of environmental information).

Detailed risk management plans, required under EPCRA to ensure rapid emergency response to sudden leaks or plant failures, have been removed from the Internet due to concerns that the worst-case scenarios might give terrorists dangerous ideas. *See, e.g.*, *Right-To-Know After September 11th, Hearing Before the Subcomm. on Water Res. and Env't of the House Comm. on Transp. & Infrastructure*, 107th Cong. 20–23 (2001) (statement of Elaine Stanley, Dir. of the Office of Envtl. Info. Analysis & Access, Office of Envtl. Info, U.S. Envtl. Prot. Agency) (discussing the potential adverse implications of the Homeland Security Act for the disclosure of environmental information); *see also* Joseph D. Jacobson, *Safeguarding National Security Through Public Release of Environmental Information: Moving the Debate to the Next Level*, 9 ENVTL. LAW. 327, 387–88 (2003) (criticizing the EPA's policy and arguing that "[n]ot posting this information on the Internet simply forces a would-be terrorist to spend a few extra minutes on the computer researching available 'target' data that would otherwise be conveniently assembled by EPA," given that terrorist organizations have "already demonstrated that they are willing to spend on planning their attacks").

Homeland Security Act,[319] passed in 2002, offers the greatest potential for this abuse because it provides facilities with the ability to claim that information submitted voluntarily to the government—a surprisingly ambiguous determination—is "critical infrastructure information" with national security consequences.[320] These national security consequences not only prohibit the federal agencies from sharing this information with the public under the Freedom of Information Act[321] but even bar federal and state agencies from using the information to take regulatory action.[322] Moreover, much like CBI, facilities make the initial determination about what constitutes "critical infrastructures" information that must be kept confidential.[323] Such self-classifications are likely to receive only sporadic oversight by regulating agencies if the history of CBI is any guide,[324] a danger exacerbated by the fact that the Homeland Security Act also subjects federal officials who disclose information labeled as "critical infrastructures information" to criminal charges.[325] Less worrisome are restrictions, the exact nature of which is still unknown, levied by a small cadre of government officials and journal editors on the publication of scientific research that they believe to present security risks.[326] Some commentators suggest that these multifaceted

319. Homeland Security Act of 2002, Pub. L. No. 107-296, 116 Stat. 2135 (2002).

320. *See id.* § 214, 116 Stat. at 2152 (codified at 6 U.S.C.A. § 133 (Supp. 2004)).

321. *See* Procedures for Handling Critical Infrastructure Information, 68 Fed. Reg. 18,524, 18,528 (Apr. 15, 2003). In this respect, some have argued that the Homeland Security Act simply codifies the protections afforded "voluntarily submitted information" under *Critical Mass Energy Project v. Nuclear Regulatory Commission*, 975 F.2d 871 (D.C. Cir. 1992), thus adding no significant new impediments to the public disclosure of this information. *See, e.g.*, Steinzor, *supra* note 318, at 643, 652. Yet, as discussed, Homeland Security Act regulations interpret the Act as barring federal agencies from "using" this information for enforcement actions or even for requiring added security protections at critical infrastructures.

322. *See* Procedures for Handling Critical Infrastructure Information, 68 Fed. Reg. at 18,526 ("Federal agencies shall not utilize critical infrastructures information (CII) for regulatory purposes without the written consent of the submitter.").

323. *See id*. at 18,525 (designating requirements for identifying information as protected "critical infrastructures information").

324. For a discussion of the potentially expansive reach of the term "critical infrastructure information," see Steinzor, *supra* note 318, at 658–63.

325. *See* § 214(f), 116 Stat. at 2152 (subjecting any employee of the U.S. Government who "knowingly publishes, divulges, discloses, or makes known in any manner or to any extent not authorized by law, any critical infrastructure information protected from disclosure by this subtitle" to a possible fine, not more than one year in prison, and termination from employment).

326. *See, e.g.*, DANA A. SHEA, CONGRESSIONAL RESEARCH SERVICE, RL31695, BALANCING SCIENTIFIC PUBLICATION AND NATIONAL SECURITY CONCERNS: ISSUES FOR

protections for information under the ambiguous umbrella of national security are only the beginning of a range of methods that industrial actors might employ to suppress research on their products and activities.[327]

C. *Providing Opportunities to Manufacture Controversy about Public Science*

Existing environmental laws not only discourage actors from producing information and provide them with the ability to remove from public view some of the limited information they do produce, but several laws actually facilitate the ability of actors to disparage credible research. The recently enacted Data Quality Act[328] and Data Access Act,[329] as well as regulations governing scientific misconduct and the subpoena of third-party information,[330] all provide opportunities for private actors to contest the quality of research and taint the integrity of researchers, even when the actors' charges are without scientific merit. Most of these laws, moreover, operate in just one direction: they allow private parties to challenge federally funded science but insulate private research from scrutiny. Not surprisingly,

---

CONGRESS 13–20 (July 9, 2003) (describing measures taken by the executive branch, the Department of Defense, Congress, and scientific professional societies to restrict the dissemination of research that presents discoveries that could be used against the United States by terrorists); *see also* MASS. INST. OF TECH., IN THE PUBLIC INTEREST: REPORT OF THE AD HOC FACULTY COMMITTEE ON ACCESS TO AND DISCLOSURE OF SCIENTIFIC INFORMATION (June 12, 2002) (identifying the federal limitations on research posed by national security regulations and recommending that MIT not take part in research that involves classified research because it conflicts with the open communication principles that are fundamental to science and academia), *available at* http://web.mit.edu/faculty/reports/publicinterest.pdf.

327. *See, e.g.*, SHEA, *supra* note 326, at 25 (identifying some of the concerns with classification systems imposed by the government, including overbreadth and unaccountable decisionmaking); Eugene P. Skolnikoff, *Protecting University Research Amid National-Security Fears*, CHRON. HIGHER EDUC., May 10, 2002, at B10 (same); *cf.* Stephanie Strom, *Small Charities Abroad Feel Pinch of U.S. War on Terror*, N. Y. TIMES, Aug. 5, 2003, at A8 (reporting that new Treasury Department guidelines that recommend the types of information that should be provided by nonprofits on their giving and spending—guidelines intended to prevent the channeling of funds to terrorist organizations—are so burdensome for small, international nonprofits that it might discourage giving to these groups).

328. Treasury and General Government Appropriations Act for Fiscal Year 2001, Pub. L. No. 106-554, § 515, 114 Stat. 2763 (2000).

329. Omnibus Appropriations Act for Fiscal Year 1999, Pub. L. No. 105-277, 112 Stat. 2681-495 (1998).

330. *See generally* Responsibility of PHS Awardee and Applicant Institutions for Dealing with and Reporting Possible Misconduct in Science, 42 C.F.R. §§ 50.101–50.105 (2003); FED. R. CIV. P. 45 (providing authority to subpoena third-party research).

the genesis of at least one of the most recent and powerful tools enabling actors to manufacture controversy about public science—the Data Quality Act[331]—has been traced to an industry consultant who drafted the law and navigated it, in the form of an appropriations rider, to enactment.[332] Because the Act passed as a rider to a large appropriations bill, most members of Congress seem to have been unaware of its content or existence.[333]

The Data Quality Act and the OMB's implementing guidelines provide interested parties with a formal process both for seeking the correction of information that they believe is unreliable and for appealing agency denials of such correction requests.[334] Under this law, actors have a ready-made process for challenging research, information, and raw data that suggest their products or activities cause adverse effects as long as the agency "disseminates" this information, a term that seems to include using information to support regulatory decisions.[335] At the same time, most of an actor's

---

331. *See supra* note 328.

332. *See, e.g.*, James T. O'Reilly, *The 411 on 515: How OIRA's Expanded Information Roles in 2002 Will Impact Rulemaking and Agency Publicity Actions*, 54 ADMIN. L. REV. 835, 840 n.20 (2002) (suggesting that a former director of a prominent industry group "had been the principal drafter" of the Data Quality Act). This same consultant, and his organization, have been relatively busy filing their own Data Quality Act complaints, or co-sponsoring complaints or letters threatening action. *See generally* Center for Regulatory Effectiveness, Data Quality Act US, *at* http://www.thecre.com/quality/index.html (last visited Sept. 15, 2004) (on file with the *Duke Law Journal*).

333. The Data Quality Act is devoid of legislative history or debate. *See* Hornstein, *supra* note 228, at 232–33 (discussing the origin of the law). From the oral history surrounding its passage, it appears that most members of Congress were unaware of its content or existence. *See, e.g.*, NAT'L ACAD. OF SCIS., ENSURING THE QUALITY OF DATA DISSEMINATED BY THE FEDERAL GOVERNMENT, DAY 1, at 32 (2002) [hereinafter NAS, DATA QUALITY TRANSCRIPT, DAY 1] (quoting Alan Morrison of Public Citizen that the Data Quality Act "came up as part of a very large appropriations act that most people didn't even know contained this particular piece of legislation"), *available at* http://www7.nationalacademies.org/stl/4-21-02_Transcript.doc.

334. *See, e.g.*, Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies; Republication, 67 Fed. Reg. 8,452, 8,459 (Feb. 22, 2002) [hereinafter Data Quality Guidelines] (noting that section III.3 of the Guidelines provides that "agencies shall establish administrative mechanisms allowing affected persons to seek and obtain, where appropriate, timely correction of information maintained and disseminated by the agency that does not comply with OMB or agency guidelines"). The OMB's guidelines actually enlarged the reach of the Data Quality Act. *See, e.g.*, NAS, DATA QUALITY TRANSCRIPT, DAY 1, *supra* note 333, at 133 (presenter Dan Cohen) (observing that OMB added a substantive appeal process in its guidelines that was not required in the original Data Quality Act).

335. The Data Quality Act applies only to information that is "disseminated," a term initially interpreted by experts to apply only to information that was made public. *See, e.g.*, NAS, DATA QUALITY TRANSCRIPT, DAY 1, *supra* note 333, at 97 (quoting Alan Morrison)

own research is protected from the reach of the Act under one or more exclusions introduced by the OMB, the agency selected to oversee the Act's implementation across all other agencies.[336] Moreover, any private research that is subjected to the Act need not be identified with conflict disclaimers or other indicia of potential bias, even though most scientific journals insist on such measures to ensure the objectivity and integrity of the research that they publish.[337]

During its first year of implementation, the Data Quality Act was used primarily by industry advocates to question models, information, and research used by the EPA.[338] Industry groups filed complaints arguing for the exclusion of pathbreaking endocrine research on a

---

(suggesting that the requirements kick in only after the agency "puts its own interpretation" on studies, because that constitutes a "new generation and hence dissemination of information").

336. In the Data Quality Act guidelines, the OMB exempts from the reach of the Data Quality Act all information claimed as a trade secret, an exemption that effectively excludes a great deal of industry-produced health and safety information. *See* Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies; Republication, 67 Fed. Reg. at 8,460 ("Making the data and methods publicly available will assist in determining whether analytic results are reproducible. However, the objectivity standard does not override other compelling interests such as privacy, trade secrets, intellectual property, and other confidentiality protections."); *supra* Part III.B.1 (discussing how large this category of CBI information is). Research prepared by regulated actors and submitted as "public filings" (which arguably could include data required by the TRI under EPCRA or routine monitoring data) or used in "adjudications" (which could include information required in applications for licenses and permits under the environmental laws) are also exempt from the Act under OMB's guidelines. Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies, 67 Fed. Reg. at 8,452. Depending on how the EPA interprets these terms, OMB's exceptions may exempt from the Data Quality Act a rather large category of industry-prepared information.

337. *See infra* Part IV.B.2.

338. Industry has also been the primary beneficiary of this law, filing comments relating both to the EPA's science and to comments offered by public interest groups on the EPA's regulatory programs. Two-thirds of the petitions filed to date against the EPA were filed by industry or industry-funded organizations, like the Competitive Enterprise Institute and the U.S. Chamber of Commerce. *See* http://www.ombwatch.org/article/articleview/1419/ for a listing of recent data quality charges. Although the correction requests are far fewer than expected, most of the industry complaints are quite extensive and target large and important regulatory projects, like the model for climate change and a risk assessment for a widely used herbicide. *See* Envtl. Protection Agency, Environmental Information: EPA Information Quality Guidelines, *at* http://www.epa.gov/quality/informationguidelines/iqg-list.html (last visited Sept. 15, 2004) (on file with the *Duke Law Journal*). The CEI even filed the first appeal of a Data Quality Act petition, asking a district court to require the government to withdraw the climate change model until the CEI's criticisms have been addressed. *See* Andrew C. Revkin, *Suit Challenges Climate Change Report by U.S.*, N. Y. TIMES, Aug. 7, 2003, at A21.

For the most up-to-date status of Data Quality Act petitions, see the EPA's log at http://www.epa.gov/quality/informationguidelines/ (last visited Sept. 28, 2004) (on file with the *Duke Law Journal*).

widely used herbicide, atrazine,[339] and for the abandonment of climate change models developed by the Department of Commerce,[340] even though most of the issues in dispute concerned policy and value choices rather than scientific disagreements.[341] In each of these Data Quality Act complaints, moreover, the burden is placed exclusively on the agency to produce and defend its documentation of the externalities that the regulation addresses, notwithstanding contrary instructions in the authorizing statute.[342] The Act places no responsibility on the actors themselves to produce high-quality information that documents the safety of their products and activities.[343]

A second appropriations rider, passed one year earlier—the Data Access Act[344]—provides actors with a second useful mechanism

339. *See supra* note 43.

340. Letter from Christopher C. Horner, Competitive Enterprise Institute, to Information Officer, EPA, Request for Response to/Renewal of Federal Data Quality Act Petition Against Further Dissemination of "Climate Action Report 2002" (Feb. 10, 2003) [hereinafter Horner Letter], *available at* http://www.epa.gov/quality/informationguidelines/documents/7428.pdf.

341. Indeed, most of the major petitions seeking correction of information take issue with underlying policy choices used by the EPA, such as the conservatism of its default assumptions in a risk assessment, rather than with the standard features of the information that it employs. *See, e.g.*, Horner Letter, *supra* note 340; Center for Regulatory Effectiveness, Request for Correction, *supra* note 43; Chemical Products Corporation, Request for Correction of the IRIS Barium Substance File (Oct. 29, 2002), *available at* www.epa.gov/quality/informationguidelines/iqg-list.html; *see also* Letter from Paul Gilman, Assistant Administrator, EPA, to Jerry Cook, Chemical Products Division (Jan. 30, 2003), *available at* www.epa.gov/quality/informationguidelines/documents/2293Response.pdf.

342. *See, e.g.*, Hornstein, *supra* note 228, at 239 (noting how corporations may now argue that "any member of 'the public' should be allowed access to any study referenced by agencies and that any 'affected person' should be allowed to lodge objections to data quality with agencies"); O'Reilly, *supra* note 283, at 10,208 (discussing the possibilities for abuse of data quality procedures to delay agency activities).

343. *See, e.g.*, Treasury and General Government Appropriations Act for Fiscal Year 2001, Pub. L. No. 106-554, § 515, 114 Stat. 2763 (2000) (specifying that the "agency" shall provide a complaint and correction process on all disseminated information, promulgate guidelines establishing processes to ensure that the dissemination information is of high quality, and maintain logs of complaint requests).

344. The Shelby Amendment was passed as a rider to the Omnibus Appropriations Act for Fiscal Year 1999, Pub. L. No. 105-277, 112 Stat. 2681-495 (1998). The author of the bill, Senator Shelby, maintains that there were floor discussions of the legislation that took place before the requirement became part of the Omnibus Consolidated Appropriations Bill for Fiscal Year 1999. Richard Shelby, *Accountability and Transparency: Public Access to Federally Funded Research Data*, 37 HARV. J. ON LEGIS. 369, 378–79 (2000). He also recounts efforts to repeal the bill or suspend its entry into force. *Id.* at 380. He does not explain why it was passed as a rider to an appropriations bill, however, rather than as stand-alone legislation.

for challenging research used to promulgate regulations.[345] The Data Access Act requires that all data underlying a federally funded study be made available to requesting parties through the Freedom of Information Act.[346] Studies conducted without the benefit of public funds by industries or others are not covered by the legislation's data-sharing requirements.[347] The Act threatened to provide interested parties with access to all data and records underlying research, including ongoing research, without any compensation to the researcher.[348] After an uproar from the scientific community, the OMB narrowed the reach of the Act to provide access only to *completed* federally funded research and also requires the requestor to compensate the researcher for time and copying costs.[349] Nevertheless, the requirement for release of data underlying third-party studies, often provided in a readily analyzable electronic database, makes it easier for actors to reanalyze studies using statistical tests that can be rerun continually until they produce a

345. The Shelby Amendment (or Data Access Act) requires the OMB to amend Circular A-110 to require "[f]ederal awarding agencies to ensure that all data produced under an award will be made available to the public through the procedures established under the Freedom of Information Act." 112 Stat. at 2681-495.

346. *Id*.

347. *See* Final Revision, OMB Circular A-110, 64 Fed. Reg. 54,926, 54,930 (Oct. 8, 1999) (requiring the production of research findings even if they were "produced under an award that [was] used by the Federal Government in developing an agency action that has the force and effect of law").

348. The original rider was much more far-reaching than the OMB-interpreted Data Access requirements. The central purpose of the rider, according to Senator Shelby, was to provide interested parties with an opportunity to review and, if necessary, challenge the results of regulation-relevant research, regardless of whether it was published or complete. Shelby, *supra* note 344, at 379.

349. Vigorous opposition by the scientific community helped persuade the Clinton Office of Management and Budget to draft implementing regulations for the Data Access Amendment that were far narrower than Senator Shelby intended—requiring the sharing of data only for "published studies" rather than for all ongoing research, limiting the data disclosure to data needed to "validate the study," and requiring requestors to pay researchers for reasonable costs incurred in responding to data requests. *See, e.g.*, OMB Circular A-100, 64 Fed. Reg. at 54,926; Shelby, *supra* note 344, at 383–89 (discussing, with concern, the various ways in which the OMB interpreted the Shelby Amendment narrowly to limit its reach). The regulations finally promulgated by the OMB largely duplicate the scientific community's informal standards for data sharing. The act's formal data-sharing requirements appear at least somewhat more onerous, however. For example, data-sharing plans are required as a condition for obtaining large National Institutes of Health grants. *See* NAT'L INSTS. OF HEALTH, NOT-OD-03-032, Final NIH Statement on Sharing Research Data Release (Feb. 26, 2003) ("The NIH expects and supports the timely release and sharing of final research data from NIH-supported studies for use by other researchers."), *available at* http://grants.nih.gov/grants/guide/notice-files/NOT-OD-03-032.html.

more favorable result.[350] Moreover, as with the Data Quality Act, the Data Access Act has been structured to ensure that scrutiny is focused on public science and not on industry-sponsored science.[351]

Actors also use more traditional mechanisms, such as lawsuits and subpoenas, to challenge the integrity of public science and harass researchers, even when researchers are not parties. For example, under the power to subpoena third-party information, Philip Morris and Exxon both filed overbroad, harassing third-party subpoenas against researchers who were not involved in the litigation as parties or experts because their research findings were considered incriminating.[352] Indeed, at least in the breast implant litigation, even plaintiffs' attorneys appear to have used subpoenas to harass scientists and delay their research when the research began to suggest that breast implants did not cause serious harm to users.[353] By filing such subpoenas, actors concerned about damaging research are able to intimidate scientists and delay research. Subpoenas also offer the

---

350. There are some concerns that the Data Access Amendment might still intrude on the established norms for data sharing in some fields, such as epidemiology, in which researchers are less likely to share elaborate databases until they have published multiple articles based on their data collection efforts. Eliot Marshall, *Epidemiologists Wary of Opening Up Their Data*, 290 SCIENCE 28, 29 (2000). There are also some concerns that this new data access tool can be used to harass researchers doing high-profile work. *See, e.g.*, NAT'L RESEARCH COUNCIL, ACCESS TO RESEARCH DATA IN THE 21ST CENTURY: AN ONGOING DIALOGUE AMONG INTERESTED PARTIES: REPORT OF A WORKSHOP viii (2002) [hereinafter NRC, DATA ACCESS REPORT] (recounting the concerns of both organizations).

351. *See, e.g.*, NRC, DATA ACCESS REPORT, *supra* note 350, at 27 (reporting that the chair of the NRC committee, Richard Merrill, expressed concern over the fact that the Shelby Amendment "is not bilateral in its application" because it does not apply "to data that are generated by private dollars that are submitted to support agency decisions"); *id.* at 16 (reporting that panelist David Hawkins, a representative of a public interest advocacy group, criticized the Shelby Amendment for being "one-sided" because it applies only to "federally funded research" and not to "industry-supported studies that have been submitted on a confidential basis").

352. FED. R. CIV. P. 45 (providing authority to subpoena third-party research if it is relevant to ongoing litigation). *See generally* Symposium, *Court-Ordered Disclosure of Academic Research: A Clash of Values of Science and Law*, 59 LAW & CONTEMP. PROBS. 1 (Fall 1996). For example, R.J. Reynolds served third-party subpoenas on Dr. Paul Fischer and his coauthor requesting all documents, including confidential records, relating to the ongoing study of the effects of the Joe Camel advertising campaign on children. The harassment led Dr. Fischer to resign his tenured post at the Medical College of Georgia and return to family practice in a nearby community. Fischer, *supra* note 121, at 162; *see also* Picou, *supra* note 123, at 155 (describing the adverse impact of Exxon's third-party subpoenas on research on the damages resulting from the spill).

353. *See generally* MARCIA ANGELL, SCIENCE ON TRIAL (1996) (describing the abuse of subpoena power by plaintiffs' attorneys attempting to delay research at the Mayo Clinic that threatened to substantially weaken their case for causation).

potential for dredging up information that may later help actors attack the merits of unfavorable research.

Finally, researchers engaged in federally supported research—but not privately financed research—can be formally accused of scientific misconduct. To ensure that scientific research is conducted honestly, federal law provides the Office of Research Integrity (ORI) the authority to investigate federally funded researchers who are alleged to have engaged in scientific misconduct, which includes fabrication, falsification, and plagiarism of data.[354] Unless the supervising institution has established penalties for the filing of false or harassing claims of misconduct against scientists, this tool can be and has been abused—at least in the tobacco and lead industries—in attempts to discredit researchers whose studies produce unwelcome results.[355]

IV. REFORM

Under current legal rules, not only are actors best off by refusing to take responsibility for assessing the harms that they inflict upon society, but actors can profit from attacking public science that attempts to conduct this research in their absence. A variety of legal tools allow actors to carve out worrisome areas of public science with surgical precision and discredit both research and researchers, even when doing so runs against the existing scientific consensus and the public interest.[356] To the extent that these attacks succeed, even in the short term, they suggest a single, ugly reality: the information on externalities that emerges will not reflect the objective work of talented scientists, but something less. The greater the private interest in thwarting unwelcome research, the more likely it is that good science will be eclipsed by biased science and manufactured critiques. Even scientific knowledge, in other words, can be contaminated by money.[357] Although in the long term the merits of the public science may win out, both political will and public resources will be needed to rebuff the attacks.

---

354. Responsibility of PHS Awardee and Applicant Institutions for Dealing with and Reporting Possible Misconduct in Science, 42 C.F.R., § 50.102 (2003).

355. *See* Fischer, *supra* note 121, at 166 (discussing unsupported allegations of scientific misconduct brought against himself and his coauthor by scientists who were part-time consultants to the tobacco industry); *see also supra* note 119.

356. *See supra* Part III.C.

357. This broader theme is explored in KRIMSKY, *supra* note 127.

Thus, "commons ignorance" is not a minor problem easily dismissed. Without accurate information on the harms caused by products or activities, it is almost impossible to develop effective regulatory programs to address such harms. The gaps in information are still so large that most U.S. regulatory programs only address cancer risks, leaving little assurance of protection from ecological, neurological, reproductive, hormonal, and developmental harms.[358] Democratic processes also fail when decisionmakers, the attentive public, and interest groups cannot obtain relevant information needed to participate.[359] In fact, when potential harms are hidden, these groups may be unaware of the need to participate at all. Even markets fail in a world where consumers and investors are unable to make meaningful choices between companies based in part on the safety of their products and activities. Companies that make added investments in minimizing harmful impacts will generally not be rewarded because their claims cannot be validated, and if their investments are large enough they will lose out because they cannot compete. Without reliable information for comparing the safety of products and activities, the market is bound to favor those products and production processes that can be done at the lowest cost, regardless of the resulting harms to the public.[360]

These political and market failures are even more serious when actors control privately held knowledge regarding potential adverse

---

358. *See supra* notes 13–14, 202–05 and accompanying text.

359. Professor Komesar provides a conceptual formula that predicts participation based in large part on access to information. The extent of an individual's participation, Professor Komesar argues, is based simply on the difference between the benefits that will accrue to the person by participating and the costs of participation. NEIL K. KOMESAR, IMPERFECT ALTERNATIVES: CHOOSING INSTITUTIONS IN LAW, ECONOMICS, & PUBLIC POLICY 7–8 (1994).

360. Like the used car market, in which the sellers' superior information about the condition of used cars leads buyers to discount the quality of the cars and force down the price, the lack of information could cause consumers to discount safer products and processes, making them noncompetitive. For the classic articulation of this phenomenon, see George Ackerlof, *The Market for 'Lemons': Qualitative Uncertainty and the Market Mechanism*, 84 QUART. J. ECON. 488 (1970). This condition—whereby sellers have superior information regarding quality, but buyers are unable to validate their quality claims—can lead to adverse selection, meaning that higher quality products cannot survive in the depreciated market. The resulting adverse selection thus favors products and production processes that can be done at the lowest cost, regardless of the external harms their activities cause to the public. Mary Lyndon makes precisely the same argument. *See* Lyndon, *supra* note 31, at 1814 ("Buyers' inability to screen products removes any incentive for manufacturers to differentiate between toxic and nontoxic products and to screen before production. The result is a higher overall level of toxicity in products than would result if toxicity were a visible characteristic."); s*ee also* HISRSHLEIFER & RILEY, *supra* note 60, at 307–12 (providing a fuller account of this "adverse selection").

effects of their products and activities. Knowledge is power. Actors who enjoy an asymmetric advantage in accessing and controlling information about their externalities can use it to their advantage when attempting to influence how regulatory programs are designed. Standards set on the basis of information available to the regulatory agencies will be skewed when actors succeed in concealing adverse information. Similarly, if actors are able to influence the development of enforcement programs, one might expect those programs to be markedly ineffective in overcoming actors' superior information, a result borne out in practice.[361] The greater the actors' informational advantages, the greater are the obstacles to developing effective regulatory programs.

This final Section presents suggestions for dealing with issues relating both to the lack of information about environmental harms and actors' asymmetric control over some of the information. This discussion presents three parallel lines of reform. First, policy analysts and scholars must acknowledge the problem of incomplete information, including asymmetric informational advantages, and account for these problems in their theories, models, and proposals for reforming environmental law. Second, reformers should address features of the existing regulatory program that serve only to exacerbate problems associated with the lack of information and asymmetric control over needed information. Third and finally, proactive efforts are essential to produce more information on the harms caused by dangerous products and polluting activities.

---

361. *See supra* Part II.B. It is of course possible that the high evidentiary burdens placed on regulator-enforcers discussed in Part III.A, *supra*, are simply a legislative accident and not the result of sophisticated legislative and regulatory lobbying. Yet the recurring nature of the problem leads to a reasonable suspicion that there are other forces at work. The aggressive use and promotion of privileges, such as confidential business information, audit privileges, and even national security protections, reinforce a suspicion that regulated parties are eager to limit the information that can be used against them. Regulated parties' efforts to raise the barriers for enforcement data also underscore their interest in minimizing the risks of enforcement when possible. *See, e.g.*, Credible Evidence Revisions, Final Rule, 62 Fed. Reg. 8,314, 8,317 (Feb. 24, 1997) (noting that industry filed comments in opposition to the EPA's proposal to use credible evidence in enforcement, arguing in part that the "EPA, states or citizen groups would use credible evidence to bring enforcement actions for insignificant violations" and that "the use of credible evidence in enforcement actions would violate sources' constitutional right to due process because sources would "not have sufficient 'fair warning' regarding potential enforcement."). Regulated parties can weaken enforcement programs significantly by demanding that violations be proved with definitive information that they know enforcers will be unable to obtain.

A. Acknowledging the Problem

The first step to addressing the pervasive problem of incomplete information is to admit that the problem exists and to begin to account for it in decisionmaking and regulatory analysis. Acknowledging the problem sounds deceptively simple, but it is not. Accepting this problem will require rethinking and reexamining decades of legal and economic scholarship that has neither accounted for the dramatic gaps in current knowledge nor considered the ways in which this incomplete information is deeply embedded in multiple forms of market and legal failure.

For its part, thirty years of environmental law scholarship has produced countless analyses and accompanying proposals for reform of environmental regulation that assume a world of perfect or at least optimal information for the circumstances: these analyses and proposals neglect the fact that much of the critical information is under the significant control of regulated parties. Seminal thinkers such as Professors Bruce Ackerman at Yale,[362] Richard Stewart at NYU,[363] and Cass Sunstein at Chicago[364] are representative of a top

362. In both *The Uncertain Search for Environmental Quality* and *Clean Coal/Dirty Air*, as well as in a famous Stanford Law Review debate with Howard Latin over the wisdom of technology-based standards, Professor Ackerman demonstrates his disgust at regulatory tools that do not use more fine-tuned, information-dependent methods of deciding policy without seeming to consider that the tools actually evolved in this counterintuitive direction for a reason—because information was not forthcoming. BRUCE A. ACKERMAN & WILLIAM T. HASSLER, CLEAN COAL/DIRTY AIR (1981); BRUCE A. ACKERMAN ET AL., THE UNCERTAIN SEARCH FOR ENVIRONMENTAL QUALITY 328–30 (1974); Bruce A. Ackerman & Richard B. Stewart, *Reforming Environmental Law*, 37 STAN. L. REV. 1333, 1335–40 (1985).

363. Professor Stewart remains wedded to the errors of the Stanford article that he coauthored with Professor Ackerman. Although Professor Stewart does concede the need for additional scientific information in subsequent articles, he assigns the task of information collection to centralized government, almost as an aside, without pointing out that, without this added information, his preferred administrative tools suffer and might fail. *See, e.g.*, Richard B. Stewart, *A New Generation of Environmental Regulation?*, 29 CAP. U. L. REV. 21, 151–54 (2001).

364. Professor Sunstein, the most recent entrant to this genre, endorses highly analytical tools like cost-benefit analysis and comparative risk analysis, both of which depend fundamentally on a solid information base. *See, e.g.*, Cass Sunstein, *Administrative Substance*, 1991 DUKE L.J. 607, 627–42. While acknowledging uncertainties and the ability of regulated parties to resist and even impede the production of information, especially in his earlier work, Richard H. Pildes & Cass R. Sunstein, *Reinventing the Regulatory State*, 62 U. CHI. L. REV. 1, 103–04, 116 (1995); Cass R. Sunstein, *Congress, Constitutional Moments, and the Cost-Benefit State*, 48 STAN. L. REV. 247, 264, 301 (1996), Sunstein effectively ignores these problems in his technocratic solutions to regulation. His endorsement of a form of cost-benefit analysis that includes adjustments for uncertainty still lets regulated parties off the hook for producing the information (he does not appear to endorse precautionary estimates, see *infra* note 377) and

echelon of scholars who insist, often passionately, on the need to implement elaborately information-dependent reforms without considering the barriers to producing needed information or discussing how to produce it. Economic critiques and analyses of environmental law also ignore the forces favoring the underproduction of vital information—an oversight that often undermines both the critique and the reform proposal. For example, Professor Myrick Freeman, an economist, expresses great impatience with the inefficiencies of regulating polluters by requiring them to install the best pollution control technologies, rather than by requiring them to meet environment- or health-based standards for each individual pollutant at a given locale. Yet Professor Freeman naively assumes the existence of information on the harm and environmental effects of each toxic substance, and further assumes that polluters with this information will willingly share it with regulators.[365] Even more contemporary critiques of environmental regulatory programs by economists typically assume that conditions governing the production of information are much more hospitable than they in fact are.[366] For example, economists who do account for

---

thus also is likely to underreport uncertainties and regulated actors' superior access to producing the needed information. His proposals also place a significant burden on the few quantified risk estimates that the agency is able to produce, by calculating benefits using best-guess averages and selecting arbitrary multipliers to account for the universe of remaining unknowns. *See, e.g.*, Cass R. Sunstein, *The Arithmetic of Arsenic*, 90 GEO. L.J. 2255, 2282–83 (2002) (advocating that in quantifying the benefits of an arsenic standard for drinking water, the only available quantitative information (on the risks of bladder cancer) should form the quantitative anchor and that nonquantified benefits (which he fails to list, see *supra* note 223 and accompanying text) should then be factored in by multiplying the bladder cancer estimates times four). Thus, Sunstein develops an approach that creates few, if any, incentives for additional information production and encourages actors to obfuscate and challenge what information is available. Moreover, the prominence of Professors Sunstein, Stewart, and Ackerman might have even served to facilitate other scholars' uncritical acceptance of their assumptions. *Cf.* Robert K. Merton, *The Matthew Effect in Science*, 159 SCIENCE 56 (1968) (finding evidence that the "greats" in science generally enjoy much more critical acclaim than newcomers, even when their contributions are equivalent).

365. A. Myrick Freeman III, *Air and Water Pollution Policy*, *in* CURRENT ISSUES IN U.S. ENVIRONMENTAL POLICY 12, 49–58 (Paul R. Portney ed., 1978).

366. The failure to account for the stubborn problems of incomplete information, which is repeated from article to article, seems entirely forgivable when set against the larger body of economics literature. *See, e.g.*, Stiglitz, *supra* note 149, at 1461 (arguing that "much of what economists believed—what they thought to be true on the basis of research and analysis over almost a century—turned out not to be robust to considerations of even slight imperfections of information"). Professor F.A. Hayek, for example, not only overlooked pervasive ignorance regarding the existence and extent of externalities in concluding that centralized government was inferior in forcing internalization of pollution-related externalities, but also ignored the

asymmetries in analyzing environmental regulation still assume that pollutant levels translate immediately and easily into quantified harms and that victims, rather than regulated actors, enjoy superior information regarding these harms.[367] In truth, information regarding the harmfulness of an activity, if it exists at all, is likely to be asymmetrically held by the actor.[368]

Even realists who pride themselves on taking incremental or pragmatic approaches to addressing environmental issues do not adequately acknowledge the problems associated with the lack of information about environmental harms.[369] When choosing among various policy options, pragmatic approaches tend to work incrementally from what is known and take for granted that accurate and relatively complete information is available.[370] The narrow,

---

actors' superior access to this information and their disinclination to produce it. Thus, his argument that a central authority cannot cope with the complexity of all of the relevant information seems to miss the fundamental insight that, without a central authority, there might be no reliable information at all. F. A. Hayek, *The Use of Knowledge in Society*, 35 AM. ECON. REV. 519, 524 (1945) (arguing without any awareness of the equilibrium for ignorance on externalities that "[w]e need decentralization because only thus can we ensure that the knowledge of the particular circumstances . . . will be promptly used").

367. *See, e.g.*, Huber & Wirl, *supra* note 63, at 71, 83 (assuming that the victims have asymmetric information about the harm caused by an actor's externalities and concluding from that assumption that a "pollutee pays" rule (rather than a "polluter pays" rule) could lead to more efficient outcomes); Lewis, *supra* note 63, at 820, 841 (discussing how the public enjoys privately held information about the benefits of regulation because it best knows its true preferences for health and environmental protection). This erroneous assumption thus neglects the most substantial and fundamental problem of environmental regulation—the lack of information on the consequences of varying pollutant levels or types of toxic products.

Economists do seem to appreciate that a polluting firm enjoys superior access to information concerning its compliance costs, and in some articles, economists additionally recognize that polluters also enjoy superior information about their pollution levels. *See, e.g.*, Lewis, *supra* note 63; Jensen & Vestergaard, *supra* note 245.

368. See *supra* Part II.B.1.

369. *See generally* DANIEL A. FARBER, ECO-PRAGMATISM: MAKING SENSIBLE ENVIRONMENTAL DECISIONS IN AN UNCERTAIN WORLD 178–79, 185 (1999) (noting the great uncertainties in environmental science and the complications that they raise for making informed regulation, but ignoring the stubborn features of this incomplete information and implying that regulatory policy should work to accommodate competing values, without acknowledging the difficulty of doing so when one party enjoys superior information and the public is more generally uninformed); SHAPIRO & GLICKSMAN, *supra* note 209 (advocating a more incremental and pragmatic approach to regulatory decisionmaking, but not tackling the stubborn problems of incomplete information and their effect on incremental decisionmaking).

370. *See, e.g.*, Charles E. Lindblom, *The Science of "Muddling Through,"* 19 PUB. ADMIN. REV. 79, 83–84 (1959) (providing a descriptive account of how public officials make decisions under conditions of very limited information and proposing a normative strategy for decisionmaking, called "successive limited comparisons," that instructs how officials can select among several short-term options).

incremental decisionmaking process accepted by most pragmatists blind them to large-scale forces that reward ignorance.[371]

Environmental scholarship can no longer ignore issues relating to the lack of information about environmental harms and regulated parties' asymmetric control over this information. Unless scholars and policymakers address information problems explicitly, their recommendations and policy decisions are unlikely to be useful and risk being counterproductive. For example, information-intensive legal reforms generally ignore the fact that regulated actors control much of the needed information, leading to idyllic proposals that inadvertently rely on the willingness of regulatees to volunteer much of the information essential to regulate them. Three particularly salient strands of contemporary policy analysis—cost-benefit analysis, critiques of the precautionary principle, and good-science initiatives—provide ready evidence of the types of analytical errors that result when stubborn information problems are ignored.

Scholars and policymakers who promote cost-benefit analysis tools routinely fail to consider at least four important information-related problems in their evaluations. First and most surprisingly, these scholars and analysts generally ignore the fact that the information on which cost-benefit analyses are based is woefully incomplete and is often in the superior control of the regulated actors. As previously discussed, under current guidelines cost-benefit analyses consider only harms that have been identified and quantified.[372] Given the dearth of toxicity testing on most chemicals, however, even the most basic risks, like acute effects, have been quantified for only a fraction of all chemicals in commerce.[373] Cost-benefit analysis as currently practiced nevertheless must pretend that

---

371. *See, e.g.*, RALPH L. KEENEY, VALUE-FOCUSED THINKING vii–ix, 29–30, 44–51 (1992) (highlighting the benefits of value-focused thinking and discussing how neglecting a universal map of the goals, problems, and possible solutions can result in wrongheaded decisions).

372. *See supra* note 227 and accompanying text; *see also* SHAPIRO & GLICKSMAN, *supra* note 209, at 103 (observing how cost-benefit studies done by the OMB ignore the nonquantified environmental benefits and noting that critics of regulation tend to ignore this fact); LISA HEINZERLING & FRANK ACKERMAN, PRICING THE PRICELESS: COST-BENEFIT ANALYSIS OF ENVIRONMENTAL PROTECTION 2 (Georgetown Law & Policy Inst., 2002) (arguing that "[m]any benefits of public health and environmental protection have not been quantified and cannot easily be quantified . . . . Even when the data gaps are supposedly acknowledged, public discussion tends to focus on the misleading numeric values produced by cost-benefit analysis while relevant but non-monetized factors are simply ignored."), *available at* http://www.law.georgetown.edu/gelpi/papers/pricefnl.pdf.

373. *See supra* note 23.

these untested or undertested chemicals bring society net benefits specifically because there is no research on their potential harms.[374] Second, cost-benefit analysis neglects the possibility that some information about environmental harms may be unavailable or unreliable. As discussed throughout this Article, regulated parties are in the best position to assess the scope and nature of the harms flowing from their products and activities. However, as evidenced by their ability to conduct internal research that can be concealed and to classify information on chemical composition and health and safety,[375] it is not at all clear that the publicly disseminated information used to support cost-benefit analysis reliably reflects the safety of regulated parties' products and activities. Third, cost-benefit proponents fail to come to terms with the fact that private actors are the primary source of information on compliance costs, and they have strong incentives to inflate these estimates in ways that go undetected. Finally, cost-benefit analysts fail to consider that their heavy reliance on available information might actually discourage actors from producing some of this needed information. Because current cost-benefit methods lock in existing information, without accounting for gaps in information or identifying who is best situated to address them, private actors will perceive that contributing information other than that which is unambiguously in their favor has only costs, not benefits.[376]

Analysts who critique the precautionary principle also routinely fail to acknowledge the principle's capacity for creating strong incentives for the private sector to produce information about environmental harms.[377] Under a precautionary approach, until an

374. *See supra* notes 225–27 and accompanying text.

375. *See supra* Part I.B.1.

376. *See supra* Part I.A.

377. The information production features have been completely ignored in some critical commentary on the principle. *See, e.g.*, CASS R. SUNSTEIN, BEYOND THE PRECAUTIONARY PRINCIPLE 2, 9, 10 (John M. Olin Law & Economics, Working Paper No. 149, 2d Series Apr. 2002) (arguing that the precautionary principle "is literally paralyzing—forbidding inaction, stringent regulation, and everything in between," and ignoring its benefits to information production), *available at* http://www.law.uchicago.edu/Lawecon/index.html; John D. Graham, The Role of Precaution in Risk Management, Remarks Prepared for The International Society of Regulatory Toxicology and Pharmacology Precautionary Principle Workshop, *at* http://www.whitehouse.gov/omb/inforeg/risk_mgmt_speech062002.html (June 20, 2002) (on file with the *Duke Law Journal*) (ignoring the information-forcing features of the precautionary principle and concluding that "adoption of precautionary measures should be preceded by a scientific evaluation of the hazard and, where feasible, a formal analysis of the benefits, risks, and costs of alternative precautionary measures," without accounting for who will produce this large body of information). *But see* Richard B. Stewart, *Environmental Regulatory Decision*

actor can demonstrate that a product or activity is safe, that product or activity will be regulated as if it is hazardous.[378] Consequently, for products and activities governed by this principle, it is very much in an actor's interest to conduct the research needed to show that their products and activities are not as hazardous as the principle presumes.[379] Regardless of whether the precautionary principle is ultimately a viable approach to regulation, the principle's capacity for forcing the production of information should not be ignored when comparing the principle against other regulatory alternatives.

Supporters of good-science initiatives also ignore stubborn problems of uncertain and asymmetric information in fashioning reforms that purport to improve the state of regulatory science. Perhaps the most remarkable oversight is the fact that good-science laws such as the Data Access Act focus exclusively on assessing the quality of federally funded research used for regulation and exempt privately funded research from the same scrutiny,[380] despite private industry's clear interest in the results of the studies that it funds.[381] Good-science reform proponents also fail to account for the fact that the reforms expect the government, rather than regulated parties, to bear full responsibility for collecting and defending this good science. The reforms thus do nothing to counteract perverse incentives for actors to remain ignorant of the potential harm caused by their activities or to take advantage of their superior access to some of the needed information.[382] Finally, analysts favoring current good-science initiatives fail to consider whether it is sensible to invest resources in

---

Making Under Uncertainty, *in* AN INTRODUCTION TO THE LAW AND ECONOMICS OF ENVIRONMENTAL POLICY: ISSUES IN INSTITUTIONAL DESIGN 71, 102–03, 109, 111 (Timothy Swanson ed., 2002) (acknowledging, with some approval, the precautionary principle's tendency to shift information production to the regulated actor, but arguing that this should not be required unilaterally across all areas of regulation or else inefficiencies will result).

378. *See* John Applegate, *The Precautionary Preference: An American Perspective on the Precautionary Principle*, 6 HUM. & ECOLOGY RISK ASSESS. 413, 417 (2000) (describing the precautionary principle as taking a "foresee and forestall" approach).

379. *Id.* at 420–26 (identifying examples of this general precautionary approach in U.S. law).

380. *See supra* notes 344–47 and accompanying text.

381. *See* Hornstein, *supra* note 228, at 240–45 (discussing corporate sponsorship of university research and the inherent dangers that lie therein).

382. *See* Wendy E. Wagner, *The "Bad Science" Fiction: Reclaiming the Debate Over the Role of Science in Public Health and Environmental Regulation*, 66 LAW & CONTEMP. PROBS. 63, 92–93 (Fall 2003) ("There is little incentive for a regulated entity to invest in voluntary research that could produce results that not only lead to more stringent regulatory requirements, but that could impair, rather than improve, the marketability of its products."); *supra* notes 342–43 and accompanying text.

disputing the limited information available when it accounts for only a fraction of the information needed to understand the harm caused by an activity or to develop a fine-tuned regulatory response.[383]

The first step to legal reform is an accurate characterization of the problem. To this end, more work is necessary to understand actors' incentives to produce information about the effects of their activities on the environment and how current laws affect those incentives. Thus far environmental law scholars have been of little help in this inquiry, and if anything have reinforced imperfect information problems as a result of their pervasive inattention to these features of information.

B. Correctives to Existing Laws

As this Article has attempted to show, a regulatory program that actively deters the production of reliable information about environmental harms, in a setting where actors are already reluctant to learn of or share such information, is indefensible. At a minimum, reform efforts should address the most egregious shortfalls in current environmental regulatory programs. The correctives discussed in this Section are only a beginning, amounting to little more than tinkering with some of the worst legal provisions that perpetuate commons ignorance.

1. *Penalties for Concealing Health and Safety Information.* Actors have considerable information about the health and safety of their products and polluting activities, yet they conceal this information from public view with the help of various, seemingly insignificant legal protections.[384] Many of these protections, moreover, appear to be the result not of conscious policy decisions, but instead stem from the failure of regulatory programs to prevent regulated parties from keeping potentially incriminating information secret.

The most sweeping way to address this problem would be for Congress to make it illegal to invoke trade secret and other protections to classify information about the adverse effects of products and activities that threaten public health and the

383. *See generally* Shelby, *supra* note 344 (discussing the OMB's policy of providing improved access to federally funded research data, but failing to discuss the need for similar protections for privately produced research used in regulation, or the need for more aggressive funding of environmental science generally).

384. *See supra* Part III.B.

environment. A requirement mandating the reporting of all health-related information (including the chemical compositions of products and wastes) could be enforced with both civil and criminal sanctions and levied against any party involved in producing or concealing information. In instances when disclosure could lead to clear competitive losses or national security risks, the government could intercede, at the petition of the actor, and either provide compensation or classify the information.[385] The primary drawback of this broad-scale reform—other than its political feasibility—would arise at the back end of the reform, if and when actors sought compensation for the diminished value of their trade secret. Calculating compensation awards would be especially difficult because adjudicators would have to separate out the role of potentially classified information in the larger setting of competitor harm. The appropriate amount of a damage award, moreover, would depend partly on the actor's superior information regarding the extent of its competitive harm. It is also unclear how many requests for compensation the EPA would receive, leaving open the possibility that it might incur substantial administrative costs to process compensation requests. Given these uncertainties, the best approach might be an incremental one, eliminating all confidentiality protections on one category of information—e.g., all information on pollutants and wastes—at a time.

Short of such sweeping legislative reform, the EPA could make more incremental, but still meaningful, progress in addressing secrecy regarding health and environmental information by limiting existing protections. Specifically, revisions to both the EPA's CBI regulations and its adverse reporting regulations could increase the amount of health-related information available to the public. The following Sections discuss these more incremental reforms.

a. Confidential Business Information. The EPA, the General Accounting Office (GAO), and independent research consultants have each concluded that the overbroad regulatory protections available for trade secrets are not legitimate, justified, or economically optimal.[386] A 1999 GAO report on CBI claims

385. *See infra* notes 393–94 and accompanying text.

386. *See, e.g.*, ENVTL. PROT. AGENCY, *supra* note 290 (expressing a commitment to limiting overbroad CBI claims); U.S. GEN. ACCT. OFFICE, ENVIRONMENTAL INFORMATION, *supra* note 298, at 23–25 (recognizing the EPA's creation of an information office to address industry

pertaining to health and safety information, for example, found only weak support for industry claims that the confidential information is useful to competitors and could not otherwise be obtained by them.[387] Industry itself seems to acknowledge the lack of competitor interest in CBI, touting the infrequency of FOIA claims.[388] Recent technological developments and other changes in the competitive environment further suggest that whatever legitimate benefits industry may have derived from trade secret protections in the past are becoming obsolete.[389]

There is a surprisingly rich body of literature suggesting remedies for problems that arise at the intersection of trade secret and environmental and public health regulation.[390] Two of these reform

---

concerns with the production of information); U.S. GEN. ACCT. OFFICE, *supra* note 161, at 54 (finding that confidentiality claims "limit[] the dissemination and usefulness of the data because many interested groups are not allowed access to the data"); Ferguson et al., *supra* note 290, at 41 (concluding based on review of CBI claims from 1977 through 1990 that "all available evidence supports the proposition that much of the information covered by CBI claims is not legitimately entitled to protection as TSCA CBI").

387. U.S. GEN. ACCT. OFFICE, ENVIRONMENTAL INFORMATION, *supra* note 298, at 15–19. In the report, for example, the GAO notes that "competitive intelligence professionals" and "industry representatives" disagreed on the value of environmental reporting to secure competitors' secrets. Industry representatives stated that the information "often contains valuable details about their competitors while other competitive intelligence professionals said that such information is neither sufficient or even necessary." *Id.* at 15. The GAO went on to note that "[r]egardless of their views on the usefulness of this information, industry officials acknowledged that they could do a better job in protecting their sensitive business information while still complying with EPA's and states' reporting requirements." *Id*.

In the report the GAO also provided other information suggesting that industry might be inflating its claims that broad CBI protection in environmental regulation is needed to preserve its trade secrets. It noted that in the two states employing materials accounting, "fewer than two percent of the facilities . . . made confidentiality claims in 1996" or thereafter even though both states (New Jersey and Massachusetts) have permissive CBI procedures. *Id.* at 18.

388. Industry representatives, for example, have argued that the "EPA receives few FOIA requests and for a limited number and kind of product, compared to the burden of up-front CBI justification for hundreds of thousands of components." Stickle & Balek Letter, *supra* note 297, at 1. They continue that "[c]oncerning FIFRA, there are approximately 20,000 products with up to 400,000 components. Thousands of these pesticide products have never had a FOIA request and never will. To require up-front substantiation of all pesticide products would be a waste of resources [on registrants]." *Id.* at 2. Under TSCA, "CBI protection is a right and not a privilege" and disclosure of chemical identity would result in "horrendous and irreparable harm for the chemical manufacturer." *Id*.

389. *See* O'Reilly, *supra* note 283, at 10,203 (discussing the "obsolescence of industry's fixation on the physical security of regulatory submissions containing their chemical data" in the wake of the information age).

390. *See, e.g.*, Lyndon, *supra* note 83, at 50–55 (proposing an alternative to trade secrets that will protect industry competitive advantages); McGarity & Shapiro, *supra* note 83, at 882–87 (recommending exclusive use periods for health and safety data that have trade secret value, but

proposals offer particularly promising approaches to combating the abuse of trade secret protections. Professors Thomas McGarity and Sidney Shapiro propose the first option, which entails regulators exempting any health and safety data or information about environmental externalities from trade secret protection. For those actors who can demonstrate competitive losses from the disclosure of this information, a cost-sharing mechanism could be devised to provide compensation.[391] Under such a scheme, modeled roughly on the data compensation schemes required for pesticide manufacturers under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA),[392] competitors benefiting from a disclosure would be required to reimburse the disclosing firm for its costs and competitive losses.[393] In cases when the beneficiaries of the safety information are diffuse, public funds would provide the reimbursement. Prior to implementing such a reform, it would be advisable to conduct a follow-up to the GAO's 1999 study to better isolate areas in which competitive harm is most likely and develop approaches that directly address those potential harms.[394]

A second amalgam of reforms could begin by requiring firms to provide upfront substantiation for their CBI claims.[395] A further

---

requiring full disclosure); O'Reilly, *supra* note 283, at 10,208–11 (proposing a narrower trade secret protection for protecting information and more effective mechanisms for sharing information with the public); *see also* U.S. GEN. ACCT. OFFICE, *supra* note 161, at 5 (suggesting specific legislative changes to TSCA to reduce the problem of overbroad CBI protections).

391. McGarity & Shapiro, *supra* note 83, at 874–82.

392. FIFRA, 7 U.S.C. §§ 136–136y (2000).

393. Under FIFRA, subsequent manufacturers that benefit from data previously submitted by another manufacturer must compensate that manufacturer for part of the development costs if their application occurs within ten years after the original data were produced. *See* FIFRA, 7 U.S.C. § 136a(c)(1)(F) (providing the original applicant a right to "exclusive data use" for registration of pesticides after 1978). The Supreme Court has upheld the constitutionality of this provision, including the use of binding arbitration to determine the amount of compensation. *See* Thomas v. Union Carbide Agric. Prod. Co., 473 U.S. 568, 571 (1985). Under the right circumstances, manufacturers can copyright their studies. *See* 17 U.S.C. § 102(a) (2000) (providing copyright protections to published studies and to unpublished studies provided that certain requirements are met). But because the results of a study can be used by regulators without having to pay copyright royalties (assuming that the manufacturer shares the study with an agency), then other manufacturers are still able to free ride on the regulatory benefits of the information.

394. *See* Lyndon, *supra* note 83, at 50–55 (discussing use of environmental patents to provide firms with mechanisms for seeking compensation for disclosure of competitively valuable information); McGarity & Shapiro, *supra* note 83, at 882–87 (recommending full disclosure but allowing firms to claim "exclusive use").

395. Public Information and Confidentiality, 65 Fed. Reg. 80,394, 80,395 (Dec. 21, 2000) (to be codified at 40 C.F.R. pt. 2) (discussing a proposal for up-front substantiation of CBI claims

corrective would be to set an expiration date—say seven years—on all CBI claims, to be extended only upon a convincing showing of need. Finally, the EPA could levy penalties for CBI claims found to be unjustified based either on an internal agency review or a review conducted following a FOIA request. Such sanctions seem reasonable, especially in light of the significant penalties that can be levied against EPA officials who release trade secret-protected information without justification.[396] Indeed, eliminating or substantially reducing sanctions against government officials for the disclosure of CBI also appears warranted.

Both sets of reforms would involve implementation costs: the EPA would incur costs associated with determining damage awards for affected businesses, while firms would incur expense in substantiating their CBI claims. Although these costs diminish the overall gains of the reforms, evidence of current CBI abuse makes some form of legal counterpressure seem both inevitable and cost-justified.

b. Suppressing Health and Safety Data through Sealing Litigation and Nondisclosure Contracts. To limit the opportunities for actors to conceal adverse information through nondisclosure contracts, sealing litigation records, or by claiming various legal privileges, the EPA could require mandatory disclosures of health and safety information. Already, four separate statutory provisions require actors to report adverse effects under relatively narrow circumstances.[397] By providing broader and more specific requirements for reporting under these same provisions, the EPA could minimize opportunities for actors to dodge or delay adverse information reporting,[398] while simultaneously enlarging the circle of actors required to report. For example, requiring any party who

---

and stating that "[w]e believe this would help reduce the number of overly-broad or non-specific claims").

396. *See supra* note 285.

397. *See* FIFRA, 7 U.S.C. § 136d(a)(2) (2000) (requiring the reporting of adverse effects to the EPA); TSCA, 15 U.S.C. § 2607(c), (e) (2000) (same); CWA, 33 U.S.C. § 1321(b)(4), (5) (2000) (requiring the reporting of releases into surface waters); CERCLA, 42 U.S.C. § 9603(a) (2000) (requiring the reporting of releases of reportable quantities of hazardous substances).

398. For example, under the Clean Water Act and CERCLA, reporting requirements could be revised to require the reporting of any non-*de minimis* releases. Legal authority exists for the EPA to make this change because Congress clearly delegates the decision about setting reportable quantities or threshold levels to the EPA. *See* CWA, 33 U.S.C. § 1321(b)(4); CERCLA, 42 U.S.C. § 9602(b).

works with the manufacturer and is aware of adverse effects (including scientists hired under nondisclosure contracts)[399] to report such information would greatly increase the probability that adverse information will be disclosed when these provisions are backed by civil and criminal penalties.

2. *Penalties for Inappropriately Generating Controversy about the Credibility of Public Information.* In a society that values open communication and free speech, penalties for producing ends-oriented research and unjustified scientific critiques need to be carefully crafted. The best antidote for biased research is a system that earmarks the source of bias, thus providing useful signals for those trying to understand the source of controversy without chilling speech or adversely affecting the ability of actors to perform research as they see fit.[400] In more dramatic situations, when actors actively abuse existing processes in ways intended to harass scientists, however, affirmative disincentives for abuse should be imposed.

a. Stigmatizing Biased Critiques and Research. Under the current system, patently biased research and research critiques enjoy roughly the same regulatory credibility as research produced by scientists with no financial interest in the outcome and no sponsor control.[401] The EPA does not require conflict disclosures for scientific information submitted for regulatory purposes, and it makes no apparent distinction between research produced by academics under federal contract and research funded and controlled by a regulated party and produced as a condition to regulation.[402] As a result,

399. Congress is somewhat vague about who is required to report releases of hazardous substances. *See, e.g.*, CWA, 33 U.S.C. § 1321(b)(5) (requiring reporting by an undefined "person in charge"); CERCLA, 42 U.S.C. § 9603(a) (same). Under TSCA, however, "any person who has possession of a study" is among those required to report relevant health and safety findings on a toxic substance to the EPA. 15 U.S.C. § 2607(d). Clearer definition of what constitutes a "study" and how to satisfy the statute's reporting requirements could impose substantially greater demands on researchers as well as sponsors.

400. *See* David Michaels & Wendy E. Wagner, *Disclosure in Regulatory Science*, 302 SCIENCE 2073, 2073 (2003) (proposing the use of elaborated conflict disclosures to provide the government with information on how research independence might have been compromised in research used for regulation).

401. The argument and reform proposed in this Section are based on Michaels & Wagner, *supra* note 400.

402. As discussed, moreover, a significant portion of industry-sponsored research used in these regulatory efforts is protected from external scientific review through trade secret and confidential business privileges. *See supra* Part III.B.1. In fact, despite its promise of requiring

decisionmakers, the public, and even the media can be misled by research findings suggesting that there is scientific controversy about important regulatory questions, when in truth there is relative unanimity among independent scientists about the subject.[403] The failure to distinguish between research conducted with no apparent agenda and research that has at least the potential for bias can have a negative effect on the quality of regulatory decisionmaking.

The scientific community has flatly rejected the EPA's willingness to treat all science as equal. Scientific journals and academic institutions have developed elaborate processes for signaling when research has been produced by scientists with conflicts of interest. They sometimes even refuse to publish research when the sponsor retains control over the reporting and ultimate publication of the results. The leading medical journals of the U.S. and Great Britain, for example, no longer publish articles based on studies done under contracts in which the investigators did not have the unfettered right to publish the findings. In a joint statement, the editors of thirteen medical journals assert that contractual arrangements allowing sponsor control of publication "erode the fabric of intellectual inquiry that has fostered so much high-quality clinical research [and] make medical journals party to potential misrepresentation, since the published manuscript may not reveal the extent to which the authors were powerless to control the conduct of a study that bears their names."[404] It is particularly instructive that the scientific community relies heavily on researchers' disclosure of conflicts of interest despite the fact that, as part of the peer review process, scientific editors and peer reviewers are often better situated, because of their greater scientific expertise, to identify biased research than regulators, the public, or political officials.

The EPA's laissez-faire approach to research could be reformed by adopting conflict disclosures similar to those used by the biomedical journals. Under such a reform, researchers and scientists providing critiques, comments, and research submitted to or used by an agency would be required to sign a conflict form specifying the

---

agencies to use and publicize only "good," "objective" science, the Data Quality Act requirements omit any disclosure requirements for conflicts of interest. By ignoring these disclosure requirements, the Data Quality Act seems to provide the public with misleadingly incomplete information for evaluating the integrity of research used for regulatory decisions.

403. *See, e.g.*, *supra* note 111 and accompanying text.

404. Frank Davidoff et al., *Sponsorship, Authorship and Accountability*, 286 JAMA 1232, 1233 (2001); *see also supra* note 127.

extent of financial and sponsor influence on the research.[405] Researchers, for example, would be required to disclose financial and other conflicts of interest that might bias their work, and they would also be required to disclose whether they had the contractual right to publish their findings without influence and without obtaining consent of the sponsor. If their work was reviewed by a party affected by the regulation prior to publication or submission, they would need to disclose that review as well. Sponsors would also be required to provide this disclosure for all information they submit to the EPA.

If the EPA mandated disclosures, sponsors relinquishing control over the design and reporting of their sponsored research would finally be rewarded for their restraint and openness.[406] Requiring disclosure of the extent of sponsor influence on a project would prevent sponsors who only fund, but do not control, research from being tarred with the same brush as sponsors who work closely with researchers to control the design, methods, and reporting of results. Rewards for disinterested research, in turn, should generate incentives for doing more of it. In addition, requiring mandatory conflict-of-interest disclosures will benefit the public, policymakers, and the media by making it easier for them to assess the objectivity of individual research projects, especially when a "scientific controversy" arises.[407] Requiring standardized disclosures should also

---

405. For an example of one such form used by the Journal of the American Medical Association, see Authorship Responsibility, Financial Disclosure, Copyright Transfer, and Acknowledgment (JAMA Form), *available at* http://jama.ama-assn.org/cgi/data/292/1/112/DC1/1 (last visited Oct. 11, 2004) (on file with the *Duke Law Journal*), requiring a signature along with submitted articles.

406. Currently, because these positive attributes of researcher independence cannot be advertised or validated, actors cannot gain reputational advantages or esteem norms from relinquishing control over research studies. *Cf.* Ackerlof, *supra* note 360 (observing that, in general, establishing a strong reputation is one of the primary means to avoid the downward forces of adverse selection); McAdams, *supra* note 142, at 369–72 (arguing that norms work only when others can observe the good behavior).

407. *See, e.g.*, Cornelia Dean, *Editing Science*, *in* Speaker Information, Conference on Conflicted Science, *supra* note 114, at 10 (discussing the challenges to journalists in reporting the status of research accurately and in "learning and reporting the financial ties of those [scientists] who make the news"). With such a reform in place, the EPA could post all research conducted on any given chemical or environmental issue, along with the "objectivity" status of each of the studies, based on the extent of sponsor control over the research. *See, e.g.*, Envtl. Prot. Agency, Integrated Risk Information System Substance List, *at* http://www.epa.gov/iris/subst/index.html (last visited Oct. 30, 2004) (on file with the *Duke Law Journal*) (providing risk estimates on a chemical-by-chemical basis, with a reference list at the end of each chemical-specific report that currently does not but could provide information about the independence of each study). This would provide valuable information for scientists,

assist journal editors and fellow scientists in evaluating studies when they serve on scientific advisory boards or are otherwise involved in reviewing regulatory science.

b. Penalties for Abuse of Process. The current regulatory system allows actors to abuse, with impunity, a variety of litigation and administrative mechanisms in order to delay regulation and harass and discredit public scientists.[408] The Data Quality Act, the Data Access Act, third-party subpoenas, FOIA requests, and state public records statutes have all been used strategically to intimidate researchers and delay or halt their research.[409] Third-party subpoenas and the Data Quality Act arguably invite abuse, because even if the underlying petition is ultimately determined to be unfounded, the actions still succeed in wearing down researchers and delaying proceedings.[410] Deterrents to abuse, by contrast, are nonexistent. Few sanctions are in place to deter abuse of any of these procedures, not

---

regulators, and the public. If, for example, the only positive studies on a new pesticide registration application were "controlled by" the pesticide manufacturers or users, this information would help in weighing all of the information, particularly if the adverse studies were produced by parties free of sponsor control.

408. This is a concern that has been expressed by the scientific community, a group that is historically reluctant to take part in policy deliberations. *See, e.g.*, Frederick R. Anderson, *Science Advocacy and Scientific Due Process*, ISSUES IN SCI. & TECH., Summer 2000, at 71, 74 (advocating a balanced approach to ensuring the credibility of scientific information because of the dangers of actors abusing legal tools "to harass and intimidate researchers by impugning their integrity or motives, chill new research, increase the costs of research, and deter volunteers for research"); NRC, DATA ACCESS REPORT, *supra* note 350, at 2 (reporting that scientists oppose the Data Access Amendment "on the grounds that it would invite intellectual property searches by industry and scientific competitors, jeopardize the privacy of research subjects, decrease the willingness of research subjects to participate in studies, expose researchers to deliberate harassment, and increase costs and paperwork"); *id.* at 14 (reporting that Dr. Bruce Alberts of the National Academy of Sciences expressed concern that "there is a danger that the [Data Access] [A]mendment could be used to harass scientists whose work is found objectionable by anyone, for any reason"); *id.* at 20 (recounting similar concerns from an invited speaker, Judge Jack Weinstein).

409. *See* Bert Black, *Research and its Revelation: When Should Courts Compel Disclosure?*, 59 LAW & CONTEMP. PROBS. 169, 175 (Summer 1996) (describing the use of subpoenas to harass scientists and chill research); Robert M. O'Neil, *A Researcher's Privilege: Does Any Hope Remain?*, 59 LAW & CONTEMP. PROBS. 35, 36 (Summer 1996) (describing the harm to research and researchers from compelled disclosure and the lack of meaningful attention to the problem by the courts); *supra* Part III.C.

410. *See* Hornstein, *supra* note 228, at 244–45 (discussing threats arising out of new lawsuits brought under the Data Amendments); *supra* notes 338–43 and accompanying text.

even sanctions against those who file frivolous allegations of scientific misconduct.[411]

A very straightforward reform would be to impose hefty sanctions for abuse of these processes, similar to—but more effective than—the sanctions levied for litigation abuse.[412] Moreover, regardless of the merits, complainants could also be required to pay the reasonable costs incurred by researchers, attorneys (if needed), and supporting institutions in responding to each and every misconduct allegation or request for information correction.[413] Absent such reforms, those researchers whose work has immediate impact on regulatory policy may be forced to halt or reduce their ongoing research to respond, at their own expense, to each information request, irrespective of its merits. Delaying research, in fact, may be precisely the objective that entities requesting the information are trying to achieve.[414]

If these proposed sanctions do not significantly curtail the harassment of scientists, stronger legislative or regulatory remedies

---

411. *See generally* Scientific Misconduct Regulations, 42 C.F.R. pt. 50 (2003) (failing to provide safeguards against trivial lawsuits). Like scientific misconduct charges, petitions against the quality of an agency's science under the Data Quality Act can be filed at any time, by anyone, and can include as many complaints and challenges as the petitioner desires. There are no costs or sanctions for filing meritless complaints under the DQA or for requesting data and reanalyzing it in problematic ways. *See* NAS, DATA QUALITY TRANSCRIPT, DAY 1, *supra* note 333, at 99 ("[One] can file as many correction requests as [one wants. One does not] have a quota on correction requests. . . . What the agency would or should do with them is of course a more difficult situation." (quoting the observations of Alan Morrison)); *cf.* Black, *supra* note 409, at 183 (recommending that, to provide some disincentives for filing harassing third-party subpoenas, the moving party should be required to pay the attorneys' fees for that expert "if a compromise offer is made to the party seeking disclosure and the court's ruling requires no disclosure beyond the offer").

412. FED. R. CIV. P. 11(c). Accordingly, if there is no good faith basis for a good-science challenge, penalties should be levied against the challenger. Such sanctions, consistent with the assumption of good faith, would penalize only the very worst abuses, but the threat of sanctions could also help deter marginal abuse of these processes.

413. Currently, the only costs that might be passed on to the party filing the complaint or data access request are the "reasonable" costs of producing data under the Data Access Act. OMB, Final Revision, OMB Circular A-110, 64 Fed. Reg. 54,926, 54,930 (Oct. 8, 1999) (allowing, but not requiring, the federal awarding agency to "charge the requestor a reasonable fee equaling the full incremental cost of obtaining the research data" and explaining that "[t]his fee should reflect costs incurred by the agency, the recipient, and applicable subrecipients"). This approach should be extended to other good-science laws as well. *See supra* notes 408–09.

414. *See* NRC, DATA ACCESS REPORT, *supra* note 350, at 14 (reporting that presenter Bruce Alberts of the National Academy of Sciences expressed concern that the data access provision could be abused in ways that might ultimately "discourage the best young people from choosing careers in science").

may be in order. Researchers at the receiving end of abusive scientific misconduct charges, subpoenas, public records requests, and good-science complaints should have available a set of counterclaims providing not only damages for their time and expenses, but also punitive awards for any delays or adverse impacts on the progress of their research. To provide incentives for public sector groups to bring such challenges on behalf of affected scientists, the availability of attorneys' fees is also critical.[415]

C. Proactive Reform

Correcting the tendency of current laws to exacerbate problems associated with the lack of information about environmental harms will make it somewhat easier to collect needed information, but this correction alone will not address the overarching need to increase substantially the amount and quality of information that is available. It is unquestionable that considerably more information is needed.[416] There is less consensus, however, with regard to the specifics—what types of information are needed most and how to determine priorities. Several different National Academy of Science expert panels have attempted, unsuccessfully, to develop elaborate systems for prioritizing information needs.[417] Economists similarly have struggled to develop formulas that calculate the appropriate

415. For a similar suggestion, see Anderson, *supra* note 408, at 76, who proposes a nonprofit to defend harassed scientists using good-science tools.

416. Indeed, a series of recommendations and reports by expert scientific panels convened to address the subject reveals a strong consensus that far more information is needed. *See supra* note 10 and accompanying text. Despite this consensus, research funding at the EPA appears to be shrinking, or at best remaining steady over the decades. *See* POWELL, *supra* note 15, at 149–50 (recommending based on a book-length study of science at the EPA that the EPA's science budget should increase substantially provide it with needed research support); COMM. ON RESEARCH AND PEER REVIEW IN EPA, *supra* note 211, at 35–36 (identifying that research funding at the EPA through the EPA's research arm—the Office of Research and Development—is approximately 7 percent of the agency's total budget and showing graphically how the funding has remained relatively flat from 1980 to 2000, even though the EPA's larger budget has fluctuated).

417. *See, e.g.*, NRC, BUILDING A FOUNDATION, *supra* note 10, at 45 (identifying criteria for prioritizing needs for environmental research, which include timing, novelty, scope, severity, visibility, and probability); NRC, TOXICITY TESTING, *supra* note 10, at 207–26 (establishing a framework for prioritizing the testing of chemicals).

investment in information given the expected returns,[418] but they generally concede that these formulas are of little practical utility.[419]

Scientific and economic experts who endeavor to identify immediate information needs ultimately converge upon the same conclusion: determining when and whether to produce more information is, at its core, a social question that cannot be resolved exclusively by experts and technical analysis. The difficulty that scientists and economists face in specifying the ideal level of information for environmental and public health regulation derives in large part from uncertainty about what information new research will produce.[420] At the same time, the question "How much information?" carries with it a large set of social considerations that should not be answered by experts, even if the experts were capable of determining the benefits of research in advance. These complications are twofold. First, some of the benefits, particularly the benefits to advances in scientific knowledge and spillover benefits to the public from the additional knowledge, defy quantification or monetization. As a result, the only rational or legitimate way to answer the question is to employ some democratic-based process for finding the answer. Second, the benefits of having additional information will vary from setting to setting and ultimately depend in part on whether the information facilitates regulation or whether, on the other hand,

418. *See, e.g.*, Roy Radner & Joseph E. Stiglitz, *A Nonconcavity in the Value of Information*, in 5 BAYESIAN MODELS IN ECONOMIC THEORY 33, 34 (Marcel Boyer & Richard E. Kihlstrom eds., 1984) (attempting to model the value of information to decisionmakers relative to its cost and concluding with proof that "the demand for information will not be a continuous function of its price").

419. The models have been largely written off as involving an "infinite regress of economizing on economizing on economizing," and the effort to develop an economic model to predict when information production efforts have reached optimality—at which point no additional research is cost-justified—remains "a fundamental source of bounded rationality in economic decision making." J. Barkley Rosser, Jr., *A Nobel Prize for Asymmetric Information: The Economic Contributions of George Akerlof, Michael Spence and Joseph Stiglitz*, 15 REV. POL. ECON. 3, 9 (2003).

420. Recent research in endocrine effects caused by very low exposures to chemicals, for example, suggests watershed developments in the science of toxicology that could, at least for a time, generate more questions than answers with each new basic research project. *See* John P. Myers et al., *Endocrine Disruptors—A Controversy in Science and Policy: Session III Summary and Research Needs*, 22 NEUROTOXICOLOGY 557, 557–58 (2001) (discussing the new discoveries and resulting research needs that flow from research on endocrine disrupters).

regulatory approaches can be devised to circumvent the need for new information.[421]

Accordingly, recommendations for information needs and priorities are beyond the purview of a law review article. Even without specifying directions with regard to what information is needed, however, it seems possible to devise methods to facilitate information production. To this end, this final Section offers suggestions for how information can be produced under various circumstances once information needs have been determined. The three mechanisms for producing information presented here vary primarily by the nature of the actors' asymmetrical advantages over relevant information. In all three cases, this Article consistently assumes that actors will be responsible for producing any necessary information on the harms created by their products and activities because it is they who create the externalities in the first place.[422] Naturally, if instead the government carries the burden of producing such information, it will need to expend the added costs and confront the possible barriers associated with securing information that regulated actors hold.

1. *Ensuring Standardized Information Requirements.* For information about manufacturing or disposal activities that require on-site access or take place in the early stages of product development, the actors themselves are in the best position to produce the information at the lowest cost. This is primarily because the actors control much of the information about their products and their manufacturing and disposal activities.[423] Regulatory approaches seeking this information, then, will obtain it at the lowest cost if they require actors to perform the information collection.[424] Not only is this

421. Because some regulatory tools can be devised to address externalities *without* the need for information in the short or in the long term, the benefits of added information may be reduced, perhaps substantially. Absolute bans on some activities, if the activities themselves are perceived as socially valueless (like the spread of anthrax, for example), can resolve the information problem by making additional research superfluous for purposes of regulation. Although it might still be beneficial to understand the toxic mechanisms of anthrax and even to determine whether some levels can be tolerated without adverse reactions, this research is no longer answering any immediate social question.

422. *See supra* notes 31–33 and accompanying text.

423. *See supra* notes 63–80 and accompanying text.

424. For example, in the case of the cow herders on Professor Hardin's commons, the herders would be required to count their cattle (using specific methods) and report the number regularly in exchange for continued use of the commons. If government officials attempted to

the lowest-cost approach, it may be the only way to collect the information given the extent of the actors' control.

As long as it is possible to specify information production requirements with precision, leaving little room for actors to manipulate results based on their asymmetric advantages, effective strategies can be devised for requiring actors to collect and report information on externalities associated with their products or activities.[425] There are already several programs that require on-site monitoring, specify methods for collecting data, and detail protocols for conducting prescribed tests.[426] These approaches could be expanded to require actors to collect additional information.[427] For example, facilities could be required to install on-site ambient air monitors when added information on pollutant levels is needed.[428]

---

collect this information, they would need to invest in regular visits to the commons. They might need to count cattle throughout the day, and they might still lack the needed information to trace the total number of cattle back to their respective owners if more restrictions became necessary to protect the commons. This government-based approach to counting and tracing cattle on the commons would likely be a much costlier approach to collecting the needed information.

425. Ideally, these more precise information requirements could be accomplished by combining the rigid protocols for testing described in Part II.A.1, *supra*, with the conflict disclosure requirements discussed previously in notes 405–07 and accompanying text, *supra*.

426. *See supra* Part II.A.

427. The National Academy of Sciences made a similar recommendation, now nearly thirty years old. *See* 2 NAT'L RESEARCH COUNCIL, COMM. ON ENVIRONMENTAL DECISION MAKING, DECISION MAKING IN THE ENVIRONMENTAL PROTECTION AGENCY: A REPORT TO THE U.S. ENVIRONMENTAL PROTECTION AGENCY FROM THE COMMITTEE ON ENVIRONMENT AND NATIONAL RESEARCH COUNCIL 50–58 (1977).

Whether the information is needed, of course, depends on the initial, bracketed decision regarding information priorities. Incremental schemes for producing information (that similarly dodge the overarching question and need for priorities), for example, generally require actors to produce certain information as a condition to operation when there are reasons to suspect that their activities could cause harm. *See, e.g.*, Applegate, *supra* note 33, at 324–25 (discussing surrogate factors used for new chemicals under TSCA, such as chemical structure, that could be used to determine whether or how much additional data should be required); Polasky & Doremus, *supra* note 85, at 42–43 (discussing occasions under which developers should be required to prove that a development will not harm endangered species). Professor Applegate also argues that, in this more incremental approach to requiring the production of information, a more flexible testing authority "can reduce the absolute cost of testing by permitting a tiered or staged testing program that requires more expensive or long-term testing only on the basis of earlier tests that indicate some likelihood of effects." Applegate, *supra* note 33, at 318.

Basic research, as discussed in Part IV.C.3, *infra*, would also be essential to ensuring that perverse incentives for information production and innovation do not emerge from surrogate factors that are too narrow or become entrenched over time.

428. *See* Blais et al., *supra* note 19, at 28 (advocating the use of ambient monitors for air toxins because of the lack of assurance against violations and other unmonitored releases that cause recurring upsets).

Actors could also be required to conduct additional safety research on their wastes and products, especially if there is reason to suspect potential hazards or harms are not being caught by existing regulations. Such an approach could be modeled on the testing required under FIFRA.[429] Actors who experience recurring and unauthorized releases of pollution from their facilities might be required to install new or additional monitors on problematic sources to keep better, more accurate records of excessive emissions and cumulative releases of pollutants into the environment.[430]

Shifting the burden of producing such information to regulated parties will force them to internalize more of the costs associated with their activities. Consistent with economic theory, requiring actors to internalize these costs would help ensure that more of the external harms imposed on society were reflected in actors' business decisions.[431] Indeed, even when actors do not enjoy asymmetrical control over information, public policy should require some information production as a precondition to engaging in activities that create externalities. Requiring the production of information as a prerequisite to operating would ensure that actors internalize the cost of producing this information.

---

429. *See* 40 C.F.R. § 158.240–158.740 (2003) (providing a table of testing requirements). For a proposal of what the data call-in authority could look like legally, at least in the case of toxic products, see Applegate, *supra* note 33, at 322–23. The recommended call-in authority is similar to FIFRA's broad mandate, but it is reinforced with specific agency guidelines.

Actors could be required to conduct regular, specified tests of wastes, in contrast to the more ambiguous requirements for hazardous waste testing under RCRA. For example, actors could be required to test every barrel of waste or to provide certain documentation that their periodic sampling is representative. *See supra* notes 252–55 and accompanying text (discussing the limitations of current requirements governing hazardous waste testing and compliance under RCRA).

430. Emergency reporting requirements under CERCLA and the CWA cover only conditions in which (1) the releases are continuous, 42 U.S.C. § 9603(f)(2) (2000); or (2) the releases are sudden, substantial, and isolated (like a spill), *id.* § 9603(a); 33 U.S.C. § 1321(b)(5) (2000). In truth, some releases, especially into air and water, are likely the result of equipment malfunctions, power outages, and the like, which may recur with some regularity even though they are not continuous. Yet even though they may occur more frequently, there is typically no additional monitoring of these periodic "upsets." To address this situation, the EPA could require more regular monitoring at facilities where there are unauthorized releases of hazardous substances. *See* CERCLA, 42 U.S.C. § 9604(a) (2000) (providing the EPA with broad authority to respond to releases and threatened releases of hazardous substances).

431. *See* Applegate, *supra* note 33, at 308 (describing how licensing can create incentives for information production and can shift the burden of producing information to the actor).

2. *Producing Incentives for Information Production.* For cases in which actors enjoy advantages over information so substantial that it becomes difficult to devise standardized information production requirements, incentive programs seem the most promising approach to producing useful information.[432] Such an approach is consistent with findings relating to securities regulation, which conclude that regulated entities are more inclined to produce a full range of credible information when they are rewarded rather than penalized for the results.[433] Rather than condition incentives for divulging incriminating information on rewards of amnesty, as state audit laws do,[434] the incentives that this Section proposes do essentially the opposite—imposing penalties until actors can show that they are actually causing fewer adverse effects than originally supposed.[435] In this sense, then, the incentive assumes the worst (rather than the best, as amnesty arguably does) about actors and creates incentives for actors to contradict this assumption. The incentives are thus akin to the "penalty defaults" proposed by Professors Ian Ayres and Robert Gertner, which encourage actors to reveal superior information by assuming the worst about them as a default.[436]

Incentives for information production in environmental regulation could be accomplished by basing regulatory standards on worst-case predictions and reducing regulation when credible information suggests that harms have been overestimated. The amorphous precautionary principle, when employed with the

---

432. *Cf.* Lewis, *supra* note 63, at 840 (advocating a "game of disclosure or persuasion" in which the actor cannot operate or pollute until regulatory approval is obtained; this game entices an actor with asymmetrical information to disgorge that information to obtain the license).

433. *See* Lowenstein, *supra* note 149, at 1341 (lauding the success of American capitalist markets as a function of comprehensive disclosure requirements).

434. *See supra* Part III.B.5.

435. It is also unclear how strong the incentives are for information production under state and federal audit laws. In the abstract, the extent to which amnesty or reduced penalties provide an incentive for facilities to disclose incriminating information depends in large part on the probability that these facilities would be caught in violation in the first instance. Given that in many environmental regulatory settings this probability is low, the extent to which amnesty serves as a reward depends both on the probability of being caught and the costs of compliance associated with turning oneself in. *See supra* notes 268–69 and accompanying text.

436. *See* Ian Ayres & Robert Gertner, *Filling Gaps in Incomplete Contracts: An Economic Theory of Default Rules*, 99 YALE L.J. 87, 91 (1989) ("[P]enalty defaults are purposefully set at what the parties would not want—in order to encourage the parties to reveal information to each other or to third parties . . . .").

appropriate bells and whistles, seems to aspire to this result.[437] To make sure that these information incentives are real, regulators would need to develop a system that in fact reduced regulatory burdens when a regulated party volunteered credible exculpatory information.[438] Under this approach, actors would bear the primary burden for producing exculpatory information. However, they would do so only when they perceived that research results would demonstrate that their activities were less harmful than assumed.[439] Because actors have superior information about their products and activities, they are best positioned to know whether additional information might ultimately reveal that the externalities resulting from their products and activities are significantly less harmful than supposed (and that, accordingly, regulatory requirements should be lowered). Moreover, given that there will always be uncertainty about the harms that a product or activity causes, this approach promises to ensure that at least part of the burden of resolving this uncertainty falls to the actors whose products and activities create the uncertainty in the first place.

---

437. *See generally* Carl F. Cranor, *Asymmetric Information, the Precautionary Principle, and Burdens of Proof*, *in* PROTECTING PUBLIC HEALTH & THE ENVIRONMENT: IMPLEMENTING THE PRECAUTIONARY PRINCIPLE 74 (Carolyn Raffensperger & Joel A. Tickner eds., 1999) (discussing the precautionary principle in the context of considering what information is needed to protect against the health risks posed by toxic substances).

438. *See* Wagner, *supra* note 382, at 127–32 (arguing for a more precisely defined rebuttal point for the conservative default options and other precautionary policies in environmental regulation). Any information an actor produces to rebut protective assumptions would require rigorous validation. *See* Ronald J. Gilson & Reinier H. Kraakman, *The Mechanisms of Market Efficiency*, 70 VA. L. REV. 549, 594–609 (1984) (discussing the importance of verification costs for information production requirements). In cases of more basic research, this might require—beyond disclosure—validation of the result and peer review by expert panels (although facility audits might need to be conducted by third-party professionals, with attending liability and civil penalties for bias or fraudulent reports). *Cf.* Lowenstein, *supra* note 149, at 1355 (conceding that even with the rigid information requirements of financial disclosures under securities laws, regulated parties still manage to "jiggle" the numbers).

439. This is precisely the approach taken by Proposition 65, Safe Drinking Water and Toxic Enforcement Act of 1986, CAL. HEALTH & SAFETY CODE §§ 25249.5–25249.13 (West 1999), in California, which requires industries to disclose chemicals present in their products and polluting activities when these chemicals cause cancer and birth defects. The statute also provides incentives for firms to produce information; disclosures are not required for low levels of harm if a "business responsible for the exposure can show that the level of exposure in question is below a scientifically based, statutorily defined threshold of risk." Roe, *supra* note 46, at 10,235. This incentive system led industry to cooperate closely with California regulators, leading to the publication of "risk-based standards for 282 individual chemicals in less than five years, without any legal mandate" and on a small budget relative to that of the U.S. EPA. *Id*.

A similar approach could be used to improve information on the environmental harms created by a single facility. Incentives for actors to audit and report information on these individualized harms, for example, could be created by developing a worst-case estimate of the extent of the polluting activities and the resulting harms (not simply the name and total pounds of chemicals released).[440] These worst-case estimates of harms would then be available to investors, community groups, and the public at large. Under such a scenario, facilities might have a strong incentive to produce validated information rebutting one or more of the worst-case assumptions.[441] For example, worst-case projections of the expected level of air toxins at a facility might be rebutted if the facility made use of regularized ambient air monitors (employed in ways specified by regulators).[442] In addition to ensuring accurate reporting of information about environmental harms, this approach would provide actors with incentives to reduce harmful activities as some academics have argued with respect to the Toxic Release Inventory (TRI).[443] It is critical to such an approach, however,

---

440. These worst-case projections could be based on permit data, TRI data, and other facility-specific information; for unquantified potential harms, conservative or worst-case "fudge factors" could be added to the estimate as placeholders pending further research. The worst-case estimate of harm would include factors adjusting facility estimates of the amount of hazardous chemicals in products and pollutant streams to reflect credible, worst-case scenarios. Risk analyses, using uniformly conservative estimates, would then be used to calculate the harms and nonquantifiable, potential harms that could result from these worst case loading estimates. The resulting information would produce an accounting of the cumulative impacts that might be imposed on health and the environment by a facility, which would be much more informative than the TRI (which does not translate such information) and the very primitive scorecard tool. Envtl. Defense Network, Scorecard, *at* http://www.scorecard.org (last visited July 30, 2003) (providing basic data comparing pollution levels in various U.S. locales).

441. Dr. David Roe's study of the effects of Proposition 65 disclosures on firm behavior suggests that disclosures may in fact be a powerful tool to encourage this type of exculpatory research. Roe, *supra* note 46, at 10,235–37; *see also* Bradley Karkkainen, *Information as Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm?*, 89 GEO. L.J. 257, 346 (2001) (arguing that Proposition 65 provides firms with "an incentive to produce and disclose as much credible toxicity and exposure data as may be necessary to persuade state regulators to establish the 'no significant risk' regulatory thresholds for substances they emit").

442. This could be also done with a certified, third-party audit, much like the use of intermediaries and auditors in securities regulation. *See* Bernard S. Black, *The Legal and Institutional Preconditions for Strong Securities Markets*, 48 UCLA L. REV. 781, 793–96 (2001) (describing the use of these certified intermediaries or auditors).

443. *See* Applegate, *supra* note 33, at 295–96 (noting how even the approximate data disclosed under EPCRA regarding the use and disposal of annual amounts of hazardous substances "can be used to establish and revise laws and regulations, to influence lawmakers and regulators, and to negotiate or litigate with emitters" (footnotes omitted)); Karkkainen,

that the worst case be identified with some precision, or at least not be too optimistic lest the facility find it can cause adverse effects that are in reality worse than the assumed worst-case conditions.

3. *Subsidizing Government Research.* Given the powerful incentives actors have to remain ignorant about any adverse consequences associated with their products and activities, it is not realistic to expect them to ignore these interests when it comes to conducting basic or applied research that cannot be constrained with carefully crafted protocols. As a result, most basic research used for regulation, as well as applied research that cannot be constrained with government-blessed protocols or rigorous oversight, should be performed by disinterested government or federally funded academic scientists not influenced by sponsors or financial incentives. This approach also makes sense because regulated actors rarely enjoy asymmetrical access to non-facility-specific research; thus assigning responsibility for conducting basic research to regulated actors yields few if any cost advantages.[444] Currently, the federal government is already the primary benefactor of most basic and innovative applied research in the environmental sciences, making this proposal more a plea for continued support than one for reform.

Although this is a more controversial suggestion, to the extent that greater funds are needed to support research and that actors are responsible for creating at least some of the research needs, asking actors to pay a fee or a modest, added tax (flat or graduated) to support a portion of such research might be appropriate.[445] The underlying logic of this suggestion is that if actors are creating at least some of the need for environmental research, they should assist it financially. The resulting facility-based revenues could then be used

---

supra note 441 (discussing the strong incentives that the TRI creates for actors to reduce their use and release of listed hazardous chemicals).

444. In fact, especially for some basic research, such as research on toxicogenomics, the research challeges are so extensive that it will not be cost-effective for different parties to conduct the research simultaneously and may risk duplicating efforts. *See*, *e.g.*, Envtl. Prot. Agency, Draft: Potential Implications of Genomics for Regulatory and Risk Assessment Applications at EPA 40–45, *at* http://www.epa.gov/OSA/genomics-external-review-draft.pdf (Mar. 2004) (external review draft, on file with the *Duke Law Journal*) (discussing the research challenges presented by toxicogenomics). In such cases, the government will be able to conduct the research more cost-effectively because of its better-equipped laboratories and diverse scientific staff.

445. *See* Lyndon, *supra* note 31, at 1835–41 (proposing a tax on companies that produce toxic substances to finance government production of information on such substances).

to support federal development of improved screening tests and assessment methods and to finance basic environmental research.

CONCLUSION

Environmental regulatory programs have failed to come to terms with the fact that much of the information needed to support regulation will not be produced voluntarily or emerge spontaneously over time. On the contrary, parties whose activities and products create environmental harm have strong incentives to remain ignorant about the nature and extent of these harms. For these actors, "ignorance is bliss." This Article has explored these incentives and how they lead most rational actors whose activities and products create externalities not only to avoid sharing this information, but also to actively resist third-party efforts to investigate their activities. As a result, even when the public is willing to subsidize research on the harms that various externalities impose on society, this research may be eclipsed by biased research and manufactured critiques prepared by those actors who stand to lose if the truth about the harmful effects of their activities comes to light. The only appropriate response to this propensity for ignorance is to adjust legal rules in ways that penalize actors when they conceal adverse information or inappropriately attack damaging public research, and reward actors for producing needed information.