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Maximizing Profit and Endangering Health: Corporate Strategies to Avoid Litigation and Regulation

SUSANNA RANKIN BOHME, AM, JOHN ZORABEDIAN, DAVID S. EGILMAN, MD, MPH

Corporations and industries use various tactics to obscure the fact that their products are dangerous or deadly. Their aim is to secure the least restrictive possible regulatory environment and avert legal liability for deaths or injuries in order to maximize profit. They work with attorneys and public relations professionals, using scientists, science advisory boards; front groups, industry organizations, think tanks, and the media to influence scientific and popular opinion of the risks of their products or processes. The strategy, which depends on corrupt science, profits corporations at the expense of public health. Public health professionals can learn from this strategy how to effectively build scientific and public opinion that prioritizes both good science and the public health. *Key words:* mass media; industry; ethics, business; lawyers; public relations; liability, legal; public opinion; advisory committees; occupational disease; environmental disease.

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A corporation that produces or uses materials that have proven deleterious effects on health faces the threat of loss of revenue because of the danger involved. Such a threat may come from regulators concerned with protecting the public health, workers or consumers who have been injured or killed by the product or process, or scientists who are concerned with toxicity. Corporations generally have the best information about their own products, and are usually aware of the safety risks involved. Many corporations decide to produce dangerous commodities regardless of risk, however, and must devise ways to protect their markets and profitability. Over the course of several decades, corporations and industries have developed and refined scientific, legal, and public relations tactics to maintain their ability to make profits despite the dangers posed by their products. Viewed together, these tactics take the shape of a strategy that, although enacted differently by various industries and corporations, has enough commonality to be understood as part of the modus operandi of at least a large proportion of corporations in the United States. The strategy is meant to achieve two main goals: 1) secure

the least restrictive possible regulatory environment; and 2) avoid legal liability for worker or consumer deaths or injuries.

The ultimate goal of the strategy is profit maximization, which companies achieve by ensuring favorable market and operating environments. The dissemination of previously secret industry documents produced in toxic tort litigation has made it possible to thoroughly document the strategies employed by various tobacco, asbestos, beryllium, plastic, and chemical companies, their industry organizations, front groups, and industry-funded scientists. Internal documents produced in such litigation provide evidence that the actions of industry have been both deliberate and malign. The success of these strategies over many years is apparent in their continued impact on standard setting, limitation of tort liability, and delay and weakening of regulatory oversight. Utilizing these documents, we examine some of the tactics corporations use to achieve these goals.

Corporations from these industries do not act alone in carrying out such plans. Instead, they work closely with attorneys, usually from giant defense firms, and equally powerful public relations (PR) companies. Several PR and law firms have taken the lead at aiding corporate producers of dangerous goods. These include the law firm of Jones, Day, Reavis and Pogue (Jones, Day) and the PR companies Hill and Knowlton (H & K) and Burson-Marsteller. These firms have used similar techniques and strategies for a number of their corporate clients. For example, when courting Brush Wellman, the major U.S. producer of beryllium, Hill and Knowlton assured the company that it had conducted campaigns "analogous to the beryllium situation," including:

- "asbestos and human health
- saccharin and federal regulation
- dioxin and public health
- lead and public health
- vinyl chloride and cancer"¹

Both PR and law firms perform duties for corporations that go well beyond the general conception of what their work is. PR firms do not limit themselves to planning media outreach, but also contract scientific studies, plan broad-based legal strategies, create "citizens' groups" that support the industry or product at hand, and work to discredit scientists seen as oppos-

Address correspondence and reprint requests to: Susanna Rankin Bohme, 8 North Main Street, Suite 404, Attleboro, MA 02703, U.S.A.; e-mail: <susanna_bohme@egilman.com>.

ing the goals of the corporation. Law firms not only work on legal strategy, but may also contract scientific studies, formulate scientific defenses, and lobby public officials.

The triumvirate of corporation-PR firm-legal firm utilizes a number of secondary actors to carry out key tactics, which have been largely successful in providing scientific alibis for dangerous products, by helping companies avoid regulation and liability. The tactics include:

1. Conducting or hiring outside scientists to conduct research designed to show the "safety" of a particular process or product; generate controversy about its effects; and mount attacks on scientists and on scientific work that shows the dangers of the product or process.
2. Organizing groups of industry-friendly "third-party" scientists to support industry's scientific positions in regulation-setting processes, the courtroom, and public opinion; these are frequently dubbed "scientific advisory boards" (SABs)*
3. Creating and/or utilizing "front" groups, industry organizations, and think tanks to provide an appearance of legitimacy and/or to further objectives.
4. Utilizing and influencing the media to sway popular opinions

This is not a complete list, and a variety of other tactics may also be used to avoid regulation and liability. Corporations may use bankruptcy protection, or restructure their businesses such that the riskiest jobs are conducted by workers for whose injuries the corporation is not legally liable. For example, in "tolling," a manufacturer sends its chemical product to another company to have it processed, maintaining ownership of the product, but not responsibility for protecting workers.¹ While these practices do have serious ramifications for the science of occupational and environmental health, we do not consider them in detail here.†

FUNDING SCIENTISTS

Globally, industry spends trillions of dollars on research each year. The most money is spent in the United States, where \$157 billion was spent on industry-sponsored research of all kinds in 1997.³ It is unclear how much of the total is spent on health and

safety research, but we do know that industry far outspends government on health and safety research. While the National Institute of Environmental Health Sciences, the federally-funded agency charged with researching environmental health risks has an extramural research budget of only \$462 million, the *Chronicle of Higher Education* recently reported that "an industry sponsored study done 10 years ago of risks in just one field...cost about 'half' " that.⁴

Corporations rely on scientists and their research in a number of forums; an article or set of articles minimizing the dangers of a product or process will be used to influence regulators, argue against liability in the courtroom, influence subsequent scientific research, and even sway popular opinion. Corporations also depend on scientists to testify in both regulatory hearings and court cases.

The problem with corporate funding is that it can bias scientists in favor of those who pay the bill. Kjaergard and Als-Nielsen have shown that the conclusions of researchers who received funding from a for-profit group were "significantly more positive toward the experimental intervention" than the conclusions of researchers without competing interests.⁵ These figures may reflect an unconscious bias in favor of sponsors even when no undue pressure is brought to bear on the researchers. More troublesome are several other trends in corporate-sponsored science that point toward deliberate corruption of results.

Manufacturing Doubt

One of the most common tactics used by corporations and law and PR firms is to contract scientists to pursue questions or analyze in such a way as to generate "controversy" over what would otherwise be clear-cut health risks. As former Assistant Secretary of Energy of Environment, Safety and Health David Michaels has convincingly shown, "doubt is their product." Michaels points out that the research of firms such as Exponent is regularly used to challenge regulation, not by providing solid evidence that a product or process is safe, but by maintaining, "that evidence is ambiguous, so regulatory action is unwarranted."⁶

When faced with evidence that shows the dangers of their products or processes, some corporations or industries have relied on a strategy of creating scientific doubt by raising general questions about the types of evidence that can be relied on to show causation.

For example, in his 1962 paper for R.J. Reynolds Tobacco Company (RJR), Alan Rodgman acknowledged that the "amount of evidence accumulated to indict cigarette smoke as a health hazard is overwhelming. The evidence challenging such an indictment is scant."⁷ Rodgman then listed some of the ways the industry discounted the evidence for the "lung cancer-cigarette-smoke proposition":

*We refer to these groups as SABs throughout, whether or not they formally adopted this nomenclature.

†A patient of one of the authors (DE) provides an example of the effect tolling can have on epidemiologic studies. The patient worked at Shintech in Brazoria County, Texas, along the Gulf Coast. Shintech was located across from a Dow plant. Pipes ran back and forth between the two plants, transporting raw material from Dow to Shintech and vinyl chloride from Shintech to Dow. DE's patient, who developed glioblastoma, is not included in any epidemiologic study involving Dow or VCM.

statistical studies cannot prove cause-and-effect relationship between two factors (a criticism of the epidemiology), mice are not men (a criticism of the biological evidence); metaplasia and hyperplasia do not become cancerous (a criticism of the pathologic evidence); and no experimental evidence exists to show that any cigarette smoke constituent is carcinogenic to human lung tissue at the level present in cigarette smoke (a criticism of the chemical evidence).

The chemical and tobacco industries have stressed the appropriateness of a particular type of evidence according to which type of evidence seemed most favorable to them. Chemical companies in particular have stressed the unique importance of epidemiologic studies in establishing cause-effect relationships.^{8,9} In general, they claim that animal models, molecular understanding, and pathologic data cannot establish cause-effect relationships. According to the Chemical Industry Institute of Technology (CIIT), a private, not-for-profit research organization created and funded by the chemical industry, industry-funded research has been successful in influencing regulators on the acceptability of animal evidence:

In 1992 EPA admitted for the first time that some chemicals causing cancer in laboratory animals are not relevant to human health risks. CIIT strongly influenced the EPA change of attitude.¹⁰

The chemical industry's professed reliance on human epidemiologic data is largely due to the fact that such data are difficult to obtain and are time- and resource-consuming, as many toxics-related diseases have latency periods of 20 to 40 years. By the time the studies are completed, patent rights have expired and chemical companies have new (possibly substitute) chemicals to promote.

The tobacco industry, faced with epidemiologic evidence showing a link between cancer and smoking, argued that greater weight should be placed on animal data and/or mechanistic understanding.⁷ Occasionally, when chemicals or other toxins, such as benzene or arsenic, are found to cause cancer in man, but not in animals, the chemical industry scientists reverse their arguments and, like the tobacco companies, argue that causation in man cannot be established until scientists produce positive animal studies and understand the exact mechanism of carcinogenesis. Apparently, the only "proof" that will satisfy the chemical or tobacco industries is substantiation that lies one step beyond the existing evidence.

Science to Specification

Science to specification is what we call the scientific work that is carried out with the express purpose of reaching a "conclusion" that supports a corporate or

industry regulatory or litigation objective. This research may be conducted in in-house corporate laboratories, nonprofit research institutes, or for-profit "science-for-hire" firms. For example, in the institute's own words, the chemical industry-funded CIIT is valuable because it "generates data which supports industry positions on risk analysis to modulate federal regulatory demands."¹⁰

The work of Dr. Dennis Paustenbach is illustrative of the problems that arise when research is conducted to specification. Dr. Paustenbach is president and founder of the private for-profit consulting firm ChemRisk, Inc., a "consulting firm providing state-of-the-art toxicology, industrial hygiene, epidemiology, and risk assessment services to organizations that confront public health, occupational health, and environmental challenges."¹¹ He performed similar services for Exponent Inc.†

Much of Paustenbach's research has been conducted for corporate clients who are faced with liability suits. For example, Exponent described its business as follows:

Exponent serves clients in automotive, aviation, chemical, construction, energy, government, health, insurance, manufacturing, technology and other sectors of the economy. Many of our engagements are initiated by lawyers or insurance companies, whose clients anticipate, or are engaged in, litigation over an alleged failure of their products, equipment or services.¹²

Similarly, ChemRisk advertises that its "scientists and engineers have served as technical advisors to lawyers in all aspects of environmental, occupational, toxic tort, and product liability litigation, including "Technical strategy development, [p]roviding scientific advice, [e]xpert testimony, [s]election and preparation of expert witnesses, [a]ssistance in cross-examining opponent's expert witnesses." ChemRisk claims that:

A distinguishing characteristic of our legal support work is our emphasis on conducting original, field research which fills data gaps. This work is usually an essential component in resolving disputes involving chemical, or radiological agents. We have provided support to litigants in some of the most publicized and complex major toxic tort law suits including silicone breast implants, developmental toxicants, beryllium, hexavalent chromium, benzene, asbestos, brake dust, dioxin, various pesticides, and many others.¹¹

In the case of Paustenbach's research, "filling data gaps," can mean producing science to specification. Instead of beginning with a question and seeking the

†Paustenbach formed ChemRisk in 1987 and moved it to Exponent from 1998 to 2003. He re-formed ChemRisk in mid-to-late 2003 and moved some of the Exponent operations to the newly formed ChemRisk. He is currently president of ChemRisk.

most accurate possible answer, this research starts with the desired "conclusions." For example, in 1990 Paustenbach developed a proposal for the American Petroleum Institute and described it as follows:

McLaren/ChemRisk is pleased to provide this proposal to develop an alternative cancer potency estimate for benzene. It is our understanding that API would like us to develop a succinct, yet scientifically compelling, integrated position statement to be used in comments to the state of North Carolina and as a possible springboard for future analyses that could be presented to US EPA and the State of California.¹³

The proposal goes on to explain some of their methods and indicates that comments from API member companies and other API consultants will be incorporated into final published papers.

... EPA and OSHA considered benzene to cause all types of leukemia in their development of cancer potency estimates for benzene. ... The objective of this task is to develop a succinct, compelling position that presents evidence that AML is the only type of leukemia induced by benzene exposure (task 4.1). A meeting with Dr. Richard Irons will be needed in order to discuss the molecular basis for benzene-induced AML (task 4.2).

Deliverable to the API benzene task force. Draft manuscript, suitable for publication in *Fundamental and Applied Toxicology*. Comments from the Task Force and Dr. Irons will be incorporated into a final document.

This work was published in the scientific literature, without disclosure that the research had been conducted with a foregone conclusion and had been subject to editing by a task force of industry representatives.^{14,15}

The API recently funded two other consultants—Drs. Irons and Wong—to develop research that, "was expected to provide scientific support for the lack of a leukemia risk to the general population, evidence that current occupational exposure limits do not create a significant risk to workers and proof that non-Hodgkin's lymphoma could not be caused by benzene exposure." In this case the API held ultimate editorial control. They had the right to prevent the research from going forward if they did not like the interim results.¹⁶

Science Laundermats

Sometimes consultants are needed to launder other consultants' work. For example, Dr. Crump served as a consultant for the Asbestos Information Association legal team and testified against OSHA regulations proposed to reduce exposures to asbestos in 1984.¹⁷ Almost 20 years later, Crump and co-researcher Dr. Wayne Berman received a contract from the EPA to

develop a mathematical model that would assess the risks of contracting cancer from various forms of asbestos. They concluded that chrysotile asbestos, the type that comprised more than 95% of the asbestos used in the United States, probably does not increase the risk of contracting mesothelioma—the cancer that is almost uniformly associated with exposure to asbestos.¹⁸ While the EPA has not accepted Crump and Berman's model and while their current official policy states that all asbestos fiber types are equally likely to cause cancer, asbestos companies have already used this paper as the basis for asking courts to dismiss thousands of lawsuits filed by victims.¹⁹

Asbestos companies that are defendants in Texas filed a legal motion to have the court adopt the Crump model as the standard of causation for all asbestos litigation in that state. It was obvious that Dr. Crump could not testify for the companies in a tort case before the EPA had decided what to do with his model because had he testified for industry sponsors and he would thus have discredited himself as an impartial scientist. Instead, the companies hired Dr. Laura Green's consulting company, Cambridge Environmental, which describes its litigation services as the design of "technical strategies for arguing the merits of the client's case and for addressing the likely counter-arguments."²⁰

Dr. Green gave testimony relying on and affirming the validity of Crump's work.²² Dr. Green did not disclose that Crump and Berman had based their model on a discredited dose-response analysis that had been created by asbestos-industry-funded researcher J. C. McDonald.²³⁻²⁵ The McDonald research had been discredited by J. C. McDonald himself because it used an unreliable method in attempting to address a much-discussed issue: whether environmental levels of asbestos-containing dust (a variable percentage of which was asbestos fibers depending on the mining or milling process in question) could be used to determine levels of airborne asbestos fibers. In commenting on the reliability of his dose estimates, McDonald stated, "the fiber equivalent of this [dust] exposure level has not been established. Available data suggest that, in Québec, this may be in the region of five fibers per ml. *It remains doubtful, however, whether conversion to a fiber equivalent can have much epidemiologic validity*" [emphasis added].²³ While such laundering of data through a series of consultant reports can't change scientific facts, it can influence judges, juries, regulatory agencies, and the press.

[§]The judge's subsequent opinion on Dr. Green's testimony was that "[h]er credibility was challenged by her belief that money paid to academics to produce learned treatises should not be disclosed, and by the fact that her one previously published treatise on the subject of asbestos 'grew out of' expert witness work she had done for a party to asbestos litigation that was not disclosed in the treatise. Her testimony that 'honest people don't disclose conflicts of interest' borders on the absurd."²¹

Attacks on "Opposing" Scientists

One of the most ethically troubling methods for controlling the scientific debate is the efforts by companies to discredit, intimidate, or invoke scandal around opposing scientists. The orchestrated attacks on Dr. Irving Selikoff, the author of several early studies warning about the health effects of asbestos, are a prime example of companies' scare tactics and intimidation.

During the 1960s, the asbestos industry continued to deny that asbestos caused cancer among workers. PR and research activities focused on discrediting Selikoff's findings. The PR professionals pointed to the scientific limitations of the studies acknowledged by the authors, and sought to emphasize in the media that the studies were inconclusive. One PR response to Selikoff noted that his research was "based on limited reports relating to a relatively small group of workers who install and/or remove a *variety* of insulation materials, including some which contain asbestos."²⁶

The asbestos companies did not stop with public attacks on Selikoff's science, however. Shortly after the landmark Mount Sinai conference on asbestos health effects (organized by Selikoff) in October 1964, the Asbestos Textile Institute (ATI) had their attorneys at Cadwalader, Wickersham & Taft send a letter to Selikoff accusing him of "unwise treatment of research data in public discussions." The letter concluded by warning Selikoff that the ATI

urge[s] caution in the discussion of these activities to avoid providing the basis for possibly damaging and misleading news stories. The right to study and to discuss these subjects is clear, of course. But the gravity of the subject matter and the consequences implicitly involved impose upon any who exercise those rights a very high degree of responsibility for their actions.²⁷

Such a message, arriving from a law firm at the behest of an industry group, is best understood as a veiled threat to sue Selikoff or other scientists who publicly discussed the asbestos hazards revealed by their research.

Other asbestos-manufacturing companies put Selikoff under surveillance and tried to discredit him. In November 1965, Owens-Corning Fiberglass (OCF) personnel worried that Selikoff's activities would hurt sales:

Our present concern is to find some way of preventing Dr. Selikoff from creating problems and affecting sales. A direct approach might be more damaging than helpful and I am only suggesting that we explore, at this time, all avenues open to us.²⁸

The OCF staff reviewed "intelligence" they had gathered on Selikoff that they believed could be used to discredit him and protect their sales.²⁹ They discussed

what they erroneously assumed to be his immigrant status and noted that he was licensed as a doctor in the United States through a "broad reciprocal arrangement with a foreign country."³⁰

In February 1971, members of the ATI revisited the issue of the "dangerous" Selikoff.³⁰ After disregarding the likelihood of discrediting Selikoff through the medical establishment, ATI resigned itself to dealing with his "half-truths":

Dr. J. L. Goodman speaking as a member of the ATI Environmental Health Committee stated that Dr. Selikoff is a "dangerous" man, and the asbestos industry is going to have to learn how to combat his tactics!

. . . When asked if something could be done thru [sic] the American Medical Association [to control Dr. Selikoff] Dr. Goodman expressed doubt. There is a grievance committee of the AMA but was very difficult to get it to act. Thought [sic] that perhaps pressure on the Mount Sinai School of Medicine might be effective.

Incredibly, the attacks on Selikoff did not end with his death. Thirteen years after he died, a British historian and asbestos industry litigation consultant published a 30-page article claiming that Selikoff had fraudulently presented himself as a medical doctor because he had allegedly never obtained a medical degree.^{31,32} This assertion was untrue, but the history journal that published this falsehood refused to publish a photograph of Selikoff's medical degree, and it had to be published elsewhere.³³

Another example in the occupational health field occurred just a few years ago, at Brown University in Providence, Rhode Island. After Dr. David Kern, an associate professor at Brown, published findings of lung disease among workers at a nearby textile plant, the owner of the plant, who was a member of the board of directors of Kern's hospital, sought retribution.³⁴ Brown and the hospital jointly terminated his position.

SCIENTIFIC ADVISORY BOARDS (SABs)

Another technique used by PR firms, large law firms, and the companies they represent is to establish "scientific advisory boards" to address a particular issue. All too often SABs are not truly independent advisors, but rather groups of scientists who publish favorable research, speak for industry interests at regulatory hearings and in the press, and testify as expert witnesses in tort litigation lawsuits. For example, the tobacco companies established the Center for Tobacco Research Scientific Advisory Board and the beryllium companies established the Beryllium Industry Scientific Advisory Committee. An SAB can pose as an impartial, authorized scientific body while in fact fur-

thering industry goals of generating favorable science and public opinion and avoiding liability.^{35,36}

U.S. Gypsum/Hill and Knowlton SAB

In the early 1980s, at the behest of asbestos product manufacturer U.S. Gypsum Corporation (USG), Hill and Knowlton (H&K) developed communication strategies for the express purpose of derailing litigation by public schools seeking damages for asbestos removal, discouraging future litigation, and shifting public attitudes about asbestos and individual asbestos companies. H&K recommended that U.S. Gypsum form a coalition with other asbestos companies to face the threat together. The formation of a scientific advisory board was key to the overall strategy.³⁷ H&K executives proposed the formation of a *"third-party panel of independent experts to be available for testimony, commentary and technical support in appropriate markets and forums."* H&K saw the need for such an "independent" panel to build credibility for a company and industry that were rapidly being discredited:

[A]sbestos manufacturers, like industry proponents of nuclear energy a few years ago, have little, if any, credibility. Evidence adduced by recognized, independent experts, in tandem with the company's own, can significantly heighten credibility. (This kind of backing could also shore up the wavering school board member who may not be convinced removal is the most efficient or appropriate action.)

In addition, the SAB would voice an opinion on asbestos dangers that would support the industry's interests and maintain the appearance of a scientific controversy despite evidence of asbestos harms.

[T]he scientific evidence supporting the allegation of health hazards posed by these products is ambiguous and can be interpreted different ways. Nevertheless, how the science is read will have a major impact on verdicts. And, the preponderance of the evidence appears to be on side of the plaintiffs. (The government, presumably a disinterested party, has thrown all its weight behind total removal of asbestos in schools.)

While many other SABs kept industry funding secret, in this case, H&K thought that disclosing industry funding for a supposedly independent panel would in itself be a positive public relations move for the industry:

[O]ne notable result of the asbestos controversy is the public perception of corporations shunning their social responsibilities. A panel, funded by, but independent of, the industry could go a long way in ameliorating that perception.

As mentioned, the panel should be funded by all the industries cooperating in the coalition. And the coalition should make a public statement that while it is providing funding, conclusions and recommendations are entirely those of the panel. (Two caveats occur here. First, Participating companies should make their position clear at the outset, but necessarily, distinguish their Position from any arrived at by the panel. Second, to be truly independent, the panel must be balanced—members should be included who in the past may have had questions and concerns about the issue.)

The SAB was meant to influence public opinion on a variety of levels, and its "independent" conclusions would be used as a centerpiece for H&K's campaign.

One important use of this panel could be to request that it review the EPA protocol used in arriving at conclusions. This, then could be incorporated into both legal and public relations strategies. . . . [A]n independent panel, like the proposed coalition, could help deflect attention away from affected companies. Technical questions, etc., could be referred to panel members, for example. And, answers would have that much more credibility coming from third-party sources. . . . Members of the panel should be available to school boards, on request. They should be available to undertake technical assignment e.g., review of EPA protocol, etc. Finally, they should be available to the media and for other forums (speech platforms, etc.) as appropriate.

Other SABs

In 1976, H&K developed similar techniques for the Chemical Manufacturers Association (CMA) vinyl chloride monomer producers group (VCM-PVC).³⁸ H&K told the VCM-PVC producers group that they needed "third-party experts" to respond to adverse press coverage of vinyl chloride workers whose cancers were caused by vinyl chloride exposure:

As a case in point, this underlines the need for developing third-party experts who will come forward and help clarify issues as they develop. We need additional third-party candidates for this kind of role, and requested the membership provide these for future reference.

In 1989, H&K made similar recommendations to Brush Wellman Inc., the major manufacturer of beryllium in the United States¹:

Third-party scientific in engineering experts from academia and industry, NASA for example, should be enlisted to review the Brush Wellman public relations materials. The testimonials of these outside experts should be cast as a forward in a white paper and liberally referenced in all support materials, such as brochures and video scripts. The review of

the material by independent scientists will persuasively verify the scientific inclusions in the public relations materials.

These third-party experts may also be used to provide objective information that is supportive of Brush Wellman in a variety of forms, such as at congressional hearings were to media representatives.

While SABs can certainly produce legitimate science, they have been used by these and other corporations and industry groups to put the goals of limiting regulation and avoiding liability ahead of genuine scientific research.

FRONT GROUPS, INDUSTRY ORGANIZATIONS, AND THINK TANKS

Front Groups

Like their use of SABs, the corporate strategists also use front groups to provide an appearance of legitimacy to their science. In their strategy memo to U.S. Gypsum, H&K PR consultants explained how the formation of an industry-wide coalition or front group would allow USG to share resources with other companies and counter the public allegations of "activists." Serving as an information source and media response mechanism for the industry, the front group "could also act to deflect attention away from affected companies," and "take the heat from the press and activist industry critics."³⁷

In 1984, the asbestos companies, under the leadership of W. R. Grace, formed a front group paradoxically named the "Safe Buildings Alliance" (SBA). The SBA downplayed asbestos hazards to discourage schools and other private and public entities from removing asbestos and suing the companies for removal or repair costs. A court later determined that "Due to the financial and operational control that the [asbestos manufacturers] exercise over the SBA, the SBA is merely the alter ego of the [asbestos manufacturers]. . . ." [emphasis added].³⁹

In addition, H&K staff intended to use the SBA to utilize the media to influence public opinion, and sway a range of government and regulatory bodies, school boards, labor unions, medical and scientific professionals, and even "internal" audiences (employees).⁴⁰

The front group was to:

- Contain problem to schools. Prevent EPA or other governmental entities from yielding to union pressure and pressure from other constituencies to extend mandate to inspect for Monokote (and other brand name [asbestos-containing] fireproofing substances) to include commercial buildings.
- Minimize the number of cases where removal of the material containing asbestos becomes the option of choice.
- Prevent product liability suits.

- Prevent or mitigate legislation, at all governmental levels, that would authorize governmental subsidy to schools for removal of materials, thereby encouraging adoption of the removal option.
- Significantly enhance understanding of all target audiences of the health risks associated with removal of the material in question; encourage intelligent assessment of issues affecting options for dealing with presence of material.⁴⁰

While the SBA was an industry-run organization, other front groups have been designed to resemble real "grassroots" organizations that appear to be run by and for autonomous citizens' groups.

For example, the PR firm Burson-Marsteller (BM) has focused on organizing such front groups. This technique, which is an attempt to put the moral power of citizens' campaigns to work promoting private corporate interests, is often referred to as "Astroturf" (phony grass). To battle the efforts of genuine "grassroots" groups, and to provide an air of legitimacy for a company's goals, BM has formed many "grassroots" organizations. Unfortunately, these groups are fraudulent, in the sense that the company organizes and pays for their operation. They are not organic, self-determining organizations that are created through citizen or consumer activism.

One notorious example of Astroturf is the National Smokers' Alliance (NSA), developed by BM on behalf of Philip Morris.⁴¹ The NSA sought to portray regulation on smoking in public places as an infringement of basic U.S. freedoms. Backed by millions of dollars of tobacco-industry money, BM ran newspaper advertising campaigns, set up a toll-free number, paid canvassers and telemarketers, and published newsletters.⁴² By 1995 the NSA claimed a membership of 3 million, even though it received less than 1% of its funding from members' dues and was headed by BM's vice president.⁴² Some people were counted as members whether or not they paid dues, and at least some were given cigarette lighters in exchange for signing up. In an attempt to build their membership rolls, the NSA considered drafting Philip Morris employees into the group as members.⁴² While the group claimed it wanted to "empower" smokers and make their voices heard, internal memos reflected a cynical concern about this strategy, stating: "We don't want to 'empower' them to the point that they'll quit."⁴²

Several other examples of BM-generated front groups have been cited by Ethical Consumer, a British group devoted to exposing the environmental records of corporations.⁴³ These include:

- British Columbia Forest Alliance, a front for Canadian logging interests⁴³
- World Business Council for Sustainable Development (WBCSD), an international big business organization, accused of hijacking the agenda at the Rio Earth Summit in 1992⁴³

- Californians for Realistic Vehicle Standards, a front for the auto industry, opposing pollution regulation⁴⁴
- Coalition for Clean and Renewable Energy, set up to undermine opposition to a controversial dam-building project in Quebec⁴⁵
- Forest Protection Society, lobbying for the Australian timber industry⁴³

Industry Organizations and Trade Groups: The Asbestos Information Association Example

Industry organizations have served as a vehicle for corporations within one industry to develop a common scientific agenda to allay public and government concerns about the dangers of their products. Industry organizations are an efficient way for corporations to lobby regulatory agencies. For example, the Asbestos Information Association (AIA), formed by the asbestos industry, led by a consortium of many asbestos companies including Johns-Manville and Union Carbide, successfully weakened OSHA and EPA regulations.

In 1973, Matthew Swetonic, then the director of the AIA, in a speech to the trade association and prospective members, reviewed the problems faced by the industry and AIA's response. He reviewed the "bad news" that "twenty-five thousand workers exposed to the industries' asbestos containing products and five thousand of their own manufacturing workers have died or will eventually die of asbestos-related disease" but contrasted this with "the good news" that, "... Despite all the negative articles on asbestos-health that have appeared in the press over the past half-dozen years, very few people have been paying attention."⁴⁶

Mr. Swetonic explained the impact of the AIA: "I think it is a gauge of the effectiveness of the total industry involvement in this most crucial matter that of eleven main requirements in the [OSHA] standards, the industry position was accepted totally by OSHA on nine of the eleven, about fifty percent on a tenth, and totally rejected on only one. The struggle is far from over. We must not only continue but indeed expand our activities and the various areas of concern." Among other changes, Swetonic credited the AIA lobbying for changes in the OSHA-required product label, including the removal of the words "cancer" and "danger" that NIOSH had recommended.⁴⁶

Think Tanks: The Mercatus Center Example

While not necessarily formed as part of any particular corporation's or industry's strategy to limit regulation and liability, a number of right-wing think tanks share these goals with corporate actors. Their generous corporate funding and intellectual capital make them a powerful force in swaying public opinion and influencing lawmakers. A number of well-known think tanks, including Cato, Heritage, and Mercatus,

attempt to both limit corporate liability and curb public health regulations.

The think tanks can be very effective at limiting regulation. The Mercatus Center is housed at George Mason University but funded primarily by Koch Industries (a privately held chemical company).⁴⁷ The *Wall Street Journal* called Mercatus "the most important think tank you've never heard of" and reported that:

Mercatus analysts sometimes contort themselves to build a case against regulation. . . . [They] criticized one EPA rule to reduce surface ozone because the EPA didn't take into account that clearer skies would increase the rate of skin cancer. Later, two other Mercatus scholars blasted a different EPA rule on diesel engines, arguing that it was bad because it would increase surface ozone in some cities. This time they didn't say anything about the cancer-prevention benefits of more smog.⁴⁷

In 2001, the first year of the Bush administration, Mercatus criticized 44 regulations. The Bush administration selected 60% of those regulations for elimination or modification. In contrast, the National Association of Manufacturers failed to get the administration to abide any of its recommendations for regulatory "reform."⁴⁷

Think tanks can also exert constant pressure on the media and provide a steady stream of "experts" on economic, health, and environmental issues. A recent survey of think-tank citations in the print and electronic media, conducted by Fairness & Accuracy in Reporting (FAIR), found that 50% of all press citations in 2004 were to conservative or center-right think tanks. Only 16% of media citations quoted progressive or center-left think tanks; the remaining 33% citing centrist think tanks such as the Brookings Institution.⁴⁸

UTILIZING AND INFLUENCING THE MEDIA

Companies and their PR firms use the popular media to influence public opinion regarding the safety of their products. A broad media campaign reproduces manipulated science in a popular format. Such a broad-based strategy is meant to influence the public, legislators, regulators, and potential jurors, who hold immense power to hold corporations accountable in tort actions.

H&K openly discussed the importance of juries and laid out a strategy to influence them, citing the potential adverse effect of jury verdicts on the financial community and stockholders. Any legal decisions against the company, or other asbestos companies, could "trigger a domino effect," and as litigation continues, "publicity about the suits can bubble up into the national media," leading to "negative consequences for the company as a purveyor of what is popularly thought to be extremely hazardous material."³⁷

The PR consultants recognized that popular attitudes about asbestos, supported by a growing body of

medical evidence linking asbestos to lung disease in workers and end users of asbestos products, would have a direct relationship to jury attitudes. To avert losses in court and on Wall Street, the company, and the industry as a whole, would have to discredit the science behind the law suits, and alter public attitudes about their deadly commodity.³⁷

Corporate PR Masquerading as Independent Opinion or Coverage

In order to reach potential jurors, who are unlikely to read scientific publications, corporations have developed programs to restrict and coordinate the flow of health information to the media.³⁷ H&K's asbestos media strategy relied on securing interviews of and placing bylined articles by experts "sympathetic to the company's point of view." H&K consultants referred to this as "capturing 'share of mind'" on the national level.³⁷

One tactic used by companies is to sponsor ghost-written editorials that advance industry positions without acknowledging their source. As noted above, the asbestos industry used the Safe Buildings Alliance in the 1980s as a conduit for planting favorable ideas in news outlets. Other industries have used similar techniques. For example, the tobacco industry secretly paid a sportswriter to write a biased article, which was published in *True* magazine and the *National Enquirer*. The *Wall Street Journal* later exposed this episode, and the writer eventually went to work at a PR firm.⁴⁹

More recently, the *Austin American-Statesman* exposed a University of Texas-Austin professor of nuclear engineering for submitting a letter he did not write in support of the nuclear lobby. The professor confessed to the newspaper that he had merely signed his name to a letter penned by a PR man from a Washington firm hired by the Nuclear Energy Institute.⁵⁰ The reporter had searched databases for similar articles, and found several editorials with nearly the exact same language, under different authors, in several other newspapers.⁵⁰

PR firms have also developed a new technique using video news releases, or VNRs. These visual press releases, which are often satellite-downloadable, are intended to influence public perceptions by appearing to be actual news segments produced by the broadcast news media. In fact, many VNRs have been shown by broadcast networks without disclosure of their industry sources. PR firms produce thousands of VNRs every year, many tout new pharmaceutical products.⁵¹

Investment in the Media

With \$2 billion spent annually on advertising, the tobacco industry has made cigarettes the most heavily advertised product in the United States. While the advertisements themselves sought to shore up the

market by reassuring smokers that cigarettes were glamorous and with images implying that cigarettes are safe, the industry's advertising dollars made the media natural economic allies.⁴⁹⁻⁵² A secret memo prepared by tobacco defense lawyers assessed the efficacy of these programs, "Through a studied investment of its advertising dollars, the industry both coerced the print media to avoid coverage of anti-smoking stories and enlisted the media's support in opposition to proposed restrictions on print advertising."⁴⁹

H&K and the Chemical Manufacturers Association (CMA) employed similar techniques to defend vinyl chloride after scientists found that the chemical—used in the formulation of consumer products such as hair-spray and plastics—was carcinogenic. The PR techniques identified in a 1976 memorandum to an industry group signal the industry's desire to use the media to allay public concerns about vinyl chloride and cancer.³⁹ The CMA and H&K retained the services a number of eminent television and radio journalists to train their personnel in methods to field "volatile" questions from "adversary broadcast and media people."³⁸

This type of professional advice calls into question the conflicts of interest of journalists who are paid by the industries they might be called upon to cover objectively, especially when fees paid to "high-profile" journalists can reach \$100,000.⁵³ For example, Philip Morris USA paid Deborah Norville, a CBS TV anchor, to mock a TV show at a Philip Morris convention.⁵⁴ Five years later, she co-hosted a newsmagazine segment on tobacco taxes that contained factual errors about the effects of cigarette taxes on smuggling, and prominently featured (without disclosure) an interview with a paid consultant to the Canadian Tobacco Manufacturers Council.⁵⁴

One highly-paid speaker, ABC's John Stossel,[¶] a co-anchor/correspondent for "20/20," produced a segment in 2000 called "The Food You Eat," which misrepresented research on organic foods.⁵⁶ In an apparent conflict of interest, Stossel is also a for-hire speaker through the Agricultural Speakers Network, whose clients include hundreds of Agribusiness companies.⁵⁷ For the segment, Stossel argued that organic produce may in fact be more dangerous than conventional produce, with ABC's tests showing increased levels of *Escherichia coli* bacteria in organic sprouts and lettuce. He also maintained that the tests found no pesticide residue in either the conventional or the organic produce, thereby removing a key reason for buying organic food.⁵⁶ But according to the scientists that ABC hired, they had never tested any of the produce for pesticides, only for bacteria. During the broadcast, Stossel commented that "it's logical to worry about pesticide

[¶]The media watch group Fairness & Accuracy in Reporting (FAIR) estimated in 1998 that Stossel's combined income exceeded \$1 million annually.⁵⁵

residues, but in our tests, we found none on either organic or regular produce." The testimony of both researchers indicates that Stossel was referring to tests that did not exist.⁵⁶

Whether or not high fees for speaking engagements influence reporting, journalists have a professional obligation to "present the news with integrity and decency, avoiding real or perceived conflicts of interest."⁵⁸ According to the code of ethics of the Radio–Television News Directors Association, electronic journalists "should operate as trustees of the public, seek the truth, report it fairly and with integrity and independence, and stand accountable for their actions."⁵⁸ Journalists should not "accept gifts, favors, or compensation from those who might seek to influence coverage."⁵⁸ These speaker fees certainly violate these ethical standards.

CONCLUSION

The strategy developed by corporations working in concert with law and PR firms has been successful in limiting both liability and regulation. Today in the United States, the federal agencies charged with protecting occupational and environmental health are underpowered and underfunded, and the current Bush administration is continuing the deregulatory policies of Bush predecessors George H. W. Bush and Ronald Reagan. A similar deregulatory trend is under way worldwide with the globalization of the "free trade" orthodoxy. The resulting corporate profit comes at a great cost: the health and lives of everyday citizens.

Without vigilant oversight by government regulators, a true watchdog press, citizen and union participation, and universal ethical standards for scientific research, industry will continue to use this strategy to maximize profits while minimizing health protections.

We suggest that concerned health professionals and others adopt some of the tactics described here (with the exclusion of poor-quality science designed to result in a predetermined outcome), but use them to *protect* rather than *undermine* public health. Scientists must form more effective linkages with unions and authentic grassroots community organizations. We must write genuine editorials and articles for the lay press. And we must testify at Congressional and regulatory hearings and in toxic tort litigation. A sharp blade can serve either as a scalpel or as a murder weapon.

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Corporate Corruption of Science

Guest Editors

DAVID S. EGILMAN, MD, MPH, AND SUSANNA RANKIN BOHME, AM

Over a Barrel:

Corporate Corruption of Science and Its Effects on Workers and the Environment

DAVID S. EGILMAN, MD, MPH, SUSANNA RANKIN BOHME, AM

Although occupational and environmental diseases are often viewed as isolated and unique failures of science, the government, or industry to protect the best interest of the public, they are in fact an outcome of a pervasive system of corporate priority setting, decision making, and influence. This system produces disease because political, economic, regulatory and ideological norms prioritize values of wealth and profit over human health and environmental well-being. Science is a key part of this system; there is a substantial tradition of manipulation of evidence, data, and analysis, ultimately designed to maintain favorable conditions for industry at both material and ideological levels. This issue offers examples of how corporations influence science, shows the effects that influence has on environmental and occupational health, and provides evidence of a systemic problem. *Key words:* corporate; science; industry; occupational health; environmental health.

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Occupational and environmental diseases are often viewed as isolated and unique failures of science, the government, or industry to protect the best interest of the public. However, a closer look reveals that far from being an anomaly, occupational and environmental diseases are an outcome of a pervasive system of corporate priority setting, decision making, and influence. In the United States alone in 2002, a total of 139 million workers suffered "5500 fatal work injuries, 4.4 million nonfatal injuries . . . 294,500 illnesses . . . [and] estimates suggest that occupational disease deaths exceed 55,000 per year."¹ With even

more serious problems in the developing world, the worldwide toll of occupational illness, injury, and death is large. Environmental health-related illnesses and deaths add to the toll. When occupational and environmental health stories make the headlines of the popular press, however, observers are often left with impression that the offending corporation is a "bad apple" in an otherwise healthy barrel.²⁻⁴ As the articles in this issue show, there are simply too many bad apples to blame the problem on individual products, scientists, or even corporations. The problem is with the barrel. In other words, the current economic and political system (both in the United States and in the global context) privileges corporate actors and actually provides incentives for the production of injury and disease rather than its prevention. This metaphorical barrel produces disease because political, economic, regulatory, and ideological norms prioritize values of wealth and profit over human health and environmental well-being.⁵

As we have argued elsewhere,^{6,7} to the extent that science is carried out by and for corporations, it becomes subject to the corporate logic of profit maximization. Milton Friedman's 1970 directive, that "the [only] social responsibility of business is to increase its profits" describes fairly accurately the standard that drives most corporate behavior today.⁸ The corporation is an entity whose main purpose is to generate profit for its stockholders.^{9,10} The imperative to reduce costs means keeping wages low, minimizing investment in environmentally-friendly technologies, resisting regulation by the state, and failing to implement "voluntary" safety and health standards. In the global economy, the mandate to maximize profit leads corporations into a seemingly unending "race to the bottom," where transnational corporations shop for the nations with the lowest occupational and environmental standards.¹¹

Address correspondence and reprint requests to: David S. Egilman, MD, 8 North Main Street, Suite 404, Attleboro, MA 02703, U.S.A.; telephone: (508) 226-5091; e-mail: <degilman@egilman.com>.

Science is important to corporations, public health professionals, and the public. It is the yardstick for measuring the health risks of corporate products and processes, and is depended upon by politicians, consumers, and workers to make decisions about what is a "reasonable" risk to citizens, to themselves, to the environment, and to society at large. Corporations have much at stake when the safety of their products is put to scientific test, and spend hundreds of billions on research each year worldwide.¹² Industry-funded research takes place in a variety of formats and venues, including universities, corporate laboratories, and science-for-hire firms that conduct research for corporate clients. In the United Kingdom, corporations funded £250 million (US\$375 million) of university research in 2001.¹³ In the United States, home to many of the world's largest corporations and dominant science journals, private commercial funding of university research has expanded drastically over the past decades. This funding grew from \$264 million in 1980 to \$2 billion in 2001, making U.S. universities more dependent on private commercial funding than ever before.¹⁴ The extent of corporate-funded science is troubling because, as the articles in this issue demonstrate, history shows a substantial tradition of manipulation of evidence, data, and analysis, ultimately designed to maintain favorable conditions for industry, at both material and ideological levels.

The articles included in this issue provide both examples and analysis of how corporations influence science and the effects that influence has on environmental and occupational health. The group published here is an eclectic one, in terms of scope, content, and discipline. We have included pieces by historians and sociologists as well as toxicologists and epidemiologists, on the grounds that an in-depth understanding of the impact of corporate interest on science requires investigation from a number of different perspectives.* While many of the articles focus on one particular chemical, process, or corporation, taken together, they provide detailed and often startling evidence of a systemic problem.

Contributor Skip Spitzer, in his paper, "A Systemic Approach to Occupational and Environmental Health," describes this system as one in which "corporate power and its effects [are] endemic features of national socioeconomic systems and the rapidly integrating global order." Spitzer is concerned with understanding what he calls an "underlying structure of harm" in order to more effectively organize popular

movements for social and economic change. He describes several important features of the system that produces disease and environmental damage, including an unsustainable emphasis on growth, the failure of business competition, and the social and political power of corporations.

One of the most important aspects Spitzer addresses is the fact that corporations "largely ignore social and environmental costs," chiefly through externalizing them, or shifting costs to governments, neighbors, or workers. As economist Robert Monks has put it, a corporation "tends to be more profitable to the extent it can make other people pay the bills for its impact on society."¹⁰ For example, when a company emits air and water pollution, it externalizes the cost of that pollution and its attendant health and environmental damages onto individuals and governments who may get sick, be forced to pay for cleanup, or pay for damages in indirect ways (such as fisherpeople who must buy fish because the stream they caught from no longer contains fish). If a company can avoid paying these true costs of the manufacture and use of its products, its profits are enhanced and it has an economic advantage over its more socially responsible or regulated competitors. Since these costs are often large (for example, when applied, such costs have driven many companies into bankruptcy), they provide large incentives for companies to avoid them by influencing the regulatory process or by moving them to the developing (or perhaps more accurately the underdeveloping) world.^{15,16}

While externalities are costs that are not accounted for by the corporation, sometimes human health does appear on the corporate balance sheet. When it does, however, it generally appears as a cold number, devoid of any value but the economic. Calculations of the "value of a life" are often made at least partly according to the wages that would have been earned by an individual person.¹⁷, pp.665,660-678 In tort law, for example, economic damages are in large part based on wage loss—a janitor killed by benzene-induced illness would be "worth" less than a CEO killed the same way. This logic operates on the global level as well; Harvard President Lawrence H. Summers, then the World Bank's chief economist, famously argued in 1991 that "[T]he World Bank [should] be encouraging MORE migration of the dirty industries to the LDCs [less developed countries]" because, among other reasons,

The measurements of the costs of health impairing pollution depends on the foregone earnings from increased morbidity and mortality. From this point of view a given amount of health impairing pollution should be done in the country with the lowest cost, which will be the country with the lowest wages.¹⁸

Aside from encouraging the unequal distribution of risk, the dependence on calculation of the value of the life encourages poor environmental and occupational health

*Many of the contributors, including one of the editors (DE) have served as expert witnesses in litigation. This is not a coincidence, as many of the articles in this issue would have been impossible to verify without access to corporate documents accessed through the legal discovery process. One of the major advantages of tort litigation is that it is one of the few ways to bring corporate documents into the public domain.

policies across the board. A text by leading U.S. economists points out that "virtually every regulation by EPA [Environmental Protection Agency] and OSHA [Occupational Safety and Health Administration] fails a benefit-cost test" using the value-of-life formula.^{17,p.678} In other words, if the monetary value of life were the only yardstick used to determine the use of safety precautions, even fewer protective regulations would be enacted.

Finally, since the usual penalty for inflicting environmental and/or occupational disease is the "restitution" of the injured through the payment of compensatory fines rather than criminal penalties or confiscatory fines, the costs never approach the economic advantage that accrues to companies that perpetrate these injuries and often completely escape liability. In other words, it can be cheaper to use old, unsafe equipment, kill a worker, and pay OSHA fines (if any) than to install safety equipment to begin with. This is particularly true because it may be less profitable to spend X dollars today on a protective technology or process (and produce no injuries or deaths to be compensated) than to invest the same amount of money in a profit-earning venture (with the expectation that profits will exceed any future compensation cost). This problem is literally compounded by the fact that future compensation costs are discounted to "present value" or the amount of money that if invested today will accrue to the estimated compensation cost.^{17,p.32-34}

The corporate practices of externalization of occupational and environmental cost, assigning monetary values to life, and discounting are countered by social standards for health and safety, embodied in national or international regulation and/or worker and consumer movements. To counter or prevent regulation and citizen movements and maintain their ability to maximize profit, corporations actively engage in the making of public opinion. Science is a powerful tool in affecting social standards, and is often used by industry in hopes of influencing public and regulatory acceptance of a particular industry, process, or product. As the articles in this issue show, when science functions as a tool to affect public opinion or labor or environmental regulation, it does not function as a value-free arena of neutral inquiry, but is subject to influence by the corporate goal of profit maximization. In any case, corporations use several strategies not only in the production of scientific studies that are favorable to them, but also in the communication of those studies to audiences that are important in public decision making, such as lawmakers and juries. While such communication is often not thought of as part of the scientific process per se, it is a key part of the corporate use of science. Corporate strategies in the production of science and the communication of science are interlinked, and are both extremely important to consider in a critical evaluation of the corporate corruption of science.

CORPORATE STRATEGIES FOR THE PRODUCTION OF SCIENCE

By the "production" of science, we mean the processes involved in posing questions and making hypotheses, planning and carrying out studies, drawing conclusions from data, reviewing and analyzing other scientists' work, and so on. This is essentially the day-to-day work of toxicologists, epidemiologists, physicians, and basic scientists (molecular biologists and others). Corporations may influence scientific production when they run their own development or toxicology laboratories, or when they pay universities or private firms to carry out research for them. This influence can be seen in subtle or overt ways. Sometimes, reasonable, honest, and competent scientists can differ, and corporations will fund, utilize, or depend on the science that is more favorable to their products, often because it seems the most "reasonable" to them. Kjaergard and Als-Neilsen¹⁹ and Als-Neilsen et al.²⁰ found that of scientists conducting randomized clinical trials of therapeutic interventions, those with corporate funding were significantly more likely to favor the intervention than researchers without such funding. As Sheldon Krinsky has shown, universities and university scientists are increasingly involved in venture capital enterprises based on scientific research and development, leaving both institution and individual with deep conflicts of interest.²¹ Sometimes, deeply embedded beliefs about a material's or an industry's safety leads to scientific bias.²² Other times, though, scientists and others consciously use faulty science to craft a rationale for a minimum level of health and environmental protections.

Perhaps the easiest way to downplay the negative health impact of a dangerous substance is to simply fail to publish studies that demonstrate that impact. For example, Jock MacColloch, in his "Mining and Mendacity, or How to Keep a Toxic Product in the Marketplace," shows how the Canadian asbestos industry failed to publish their data that showed Quebec asbestos miners incurred high rates of asbestosis and other health problems. In fact, Canadian asbestos companies publicly claimed for decades that Canadian miners did not suffer from asbestosis. It is the industry's careful "management of medical knowledge," writes MacColloch, that "has been the key to the continued use of asbestos."

Phyllis Mullenix's "Fluoride Poisoning: A Puzzle with Hidden Pieces," shows how the fluoride industry, working in concert with the U.S.-funded Manhattan Project, both suppressed and altered studies to maintain the impression that fluoride was safe and beneficial. The studies she reviews have never been publicly discussed before, and offer important data on fluoride toxicity as well as revealing suppression of research. Mullenix focuses on three key sets of data on occupational hazards of inhalation of fluoride particulate or gas, show-

ing how three studies were either suppressed or manipulated to suit the needs of the industry. For example, she details how a study published in the *Journal of the American Dental Association* "haphazardly" assigned workers to control or exposed groups regardless of actual exposure, and blamed worker tooth condition on individual oral hygiene rather than fluoride exposure. The studies Mullenix discusses were never considered in the establishment of a standard for occupational exposure to gaseous or particulate fluoride and fluorine, allowing expanded industrial use of fluoride but resulting in respiratory and lymph node disorders and dental problems for exposed workers.

While McCulloch and Mullenix offer examples of strategies for the manipulation of science within particular industries, these strategies are in fact used again and again to manufacture a clean bill of health for hazardous products. Valerio Gennaro and Lorenzo Tomatis's "Business Bias: or How Epidemiologic Studies May Underestimate or Fail to Detect Increased Risks of Cancer and Other Diseases" describes a number of strategies corporate-funded epidemiologic studies can use that will "almost invariably lead to negative results." The authors present 15 strategies, including: the creation of a dilution effect by comparing all workers with an unexposed control group instead of comparing exposed with unexposed workers; failing to control for the healthy-worker effect; considering exposure to only one substance; and failing to build in adequate follow-up periods when studying diseases (such as cancer) with long latency periods.

"Abuse of Epidemiology: Automobile Manufacturers Manufacture a Defense against Asbestos Liability," by Egilman and Billings, provides a closer look at the research of epidemiologists associated with and funded by the manufacturers of asbestos-containing brakes. This piece explores the various methods researchers have used to show not only that brake mechanics' exposures to asbestos are "safe," but that, as is often the case in manipulated research, such exposures actually reduce the risk of contracting the disease the exposure is otherwise known to cause.

CORPORATE STRATEGIES FOR THE COMMUNICATION OF SCIENCE

In order for science to help ensure a favorable climate for corporate profit maximization, it must influence public opinion. Corporate science is often undertaken with an essentially political purpose: to minimize regulation and influence the beliefs of workers, consumers, and jury members.

Regulation at the national level is often the main obstacle to the externalization of corporate profits. The regulatory apparatus can require industry to dispose of waste safely, limit worker exposures to toxins, and ensure that consumer products are safe, among

other things. In the United States, there has been a movement against regulation since at least the mid-1970s. Business interests have successfully argued that regulation costs jobs, stunts innovation, and harms the economy. Using targeted campaign contributions, focused lobbying, and other tactics, U.S. corporations exert considerable influence on the regulatory process. Due to the economic and political power of the United States, this under-regulation puts enormous pressure on other countries to do likewise.

William Kovarik provides an example of how corrupt industry science can influence regulation in his "Ethyl-leaded Gasoline: How a Classic Occupational Disease Became an International Public Health Disaster." Despite early-20th-century debates over the safety of leaded gasoline and the knowledge of alternative fuels (ethanol), lead industry captains were able to persuade regulators that not only was lead necessary as an anti-knock fuel, but it was safe for the public. Kovarik shows how in the 1920s, corporations such as Ethyl Corporation and General Motors worked to silence the voices of public health officials concerns about lead risks, and hired Dr. Robert Kehoe of the Kettering Laboratory, who argued that lead did not pose a real public health risk. He follows the debate on lead through to the 1970s phase-out of leaded gasoline, which began in the United States in the wake of the emissions standards of the Clean Air Act of 1970 and continues in some parts of the world today.

A current example of corporate influence on science is given in Caroline Snyder's piece, "The Dirty Work of Promoting 'Recycling' of America's Sewage Sludge," which shows how industry pressure at one U.S. regulatory agency, the United States Environmental Protection Agency, has resulted in a policy of using toxic municipal sewage sludge containing human and industrial waste as crop fertilizer. The commitment to this policy over more than 30 years has resulted in corrupt science, attacks on policy opponents, and adverse human health reactions, including at least three deaths.

Jennifer Sass's and Peter Infante's commentaries on recent butadiene regulation at the U.S. EPA and the U.S. Occupational Safety and Health Administration (OSHA) demonstrate the techniques industry uses to influence regulation, and the success of those techniques in the U.S. regulatory sphere. Sass, in her "Industry Efforts to Weaken EPA's Classification of the Carcinogenicity of 1,3-Butadiene," shows problems with industry influence on butadiene scientific panels at both the EPA and the International Agency for Research on Cancer (IARC). At EPA, an industry-heavy science advisory board (SAB) persuaded the EPA to base its estimate of butadiene cancer potency on a weak study that lacked individual exposure data, was likely to have misclassified exposure levels, and counted only deaths from leukemia, not living leukemia cases. At IARC, a vote to classify 1,3-butadiene as a human carcinogen was

reversed in an extraordinary second vote that reclassified the chemical as a "probable human carcinogen." Peter Infante, in "Safeguarding Scientific Evaluations by Governmental Agencies: Case Study of OSHA and the 1,3-Butadiene Classification," shows how a similar reclassification took place at OSHA, where, despite clear evidence of elevated rates of lymphohematopoietic cancer due to workplace benzene exposure, the agency declined to pass a more stringent standard on its own, but rather arranged for industry and labor representatives to come to an agreement on the standard. While industry agreed to the OSHA-suggested standard, industry representatives also convinced the agency to downgrade the classification of butadiene to a "probable human carcinogen" rather than a "human carcinogen." The end result was a classification based on negotiation rather than science; and one that could wrongly assuage workers' fears and negatively affect workers applying for compensation for lymphohematopoietic cancer.

On an international level, free-trade agreements negotiated through the World Trade Organization (WTO), bilateral agreements such as NAFTA, and the structural adjustment programs imposed on many developing countries by the World Bank and often the International Monetary Fund (IMF) have sometimes militated against national labor and environmental regulation. Free-trade agreements can also mean that national health, safety, and environmental regulations characterized as restrictive of trade can open national governments to expensive suits under agreements such as NAFTA or GATT, which can have a chilling effect on regulation in general.²³ The current export-oriented development model has also meant that there is immense pressure on nations to deregulate; multinational corporations (MNCs) have their pick of nations in which to invest or manufacture, and can choose the nation with the least restrictive rules. A weaker regulatory environment often translates into expanded profit margin, but has not been accompanied by rising standards of living for people in most cases.¹¹ Erika Rosenthal's contribution to this issue shows how MNCs may also use international agreements to undercut national regulation. Despite the documented occupational health toll of pesticide use in Central America, the pesticide industry has been able to insert language into drafts of both the Central American Customs Union (CACU) and the Central American Free Trade Agreement (CAFTA) that would "harmonize" pesticide laws across the isthmus. If CAFTA and the CACU are enacted, recent strong legislation in Nicaragua will be made meaningless.

While the regulatory apparatus is a key target for corporations interested in defending the safety or healthfulness of their product, industry also works to convince a much larger group of people of the safety of their products. This group includes workers, consumers, and jury members. For workers, the relative safety of the

product is important in making decisions about taking or remaining in a job, the wage they will accept for the job, and whether they will organize and make demands of the company. Consumers, who can be either individuals or companies, may refuse to buy a product if it perceived as unsafe or the most dangerous of several alternatives. Finally, juries have immense power to hold corporations accountable in personal injury lawsuits. Obviously, these groups overlap, and taken together they include most of the public.

Juries, consumers, and workers all come into contact with scientific research in various forms at various times. Workers may receive scientific information from employers in the form of warnings and training materials. Juries must consider scientific material in the course of debates over issues such as causation or the adequacy of product warnings. Individual consumers may receive the least scientific information of these groups, but may encounter warnings (home users of pesticides, for example), or purposefully investigate the effects of particular products. Business consumers receive warnings, manufacturers' safety data sheets and other scientific information from vendors.

For many jury members, consumers, and workers, however, their opinions on health- and environment-related matters are not formed through the consideration of scientific data or materials per se, but rather through the myriad ways that information is received by them in their day-to-day life. People receive knowledge about health and hazards from a variety of sources. For corporations engaged in the production of harmful substances, using those sources to influence public knowledge is key to maintaining profitability and protecting against legal losses.

The article, "Maximizing Profit and Endangering Health: Corporate Strategies to Avoid Litigation and Regulation," by Bohme, John Zorabedian, and Egilman, addresses how corporations work with public relations and legal firms work to influence both scientific and public opinion of their hazardous products. The corporations and firms involve a number of secondary actors—such as the media and scientists—in carrying out a strategy designed to maximize profit through minimizing both regulation and legal liability for health problems caused by their products or production.

Michael Jacobson's "Lifting the Veil of Secrecy from Industry Funding of Nonprofit Health Organizations" shows one way corporate entities spread their message of safety. Many trusted and well-known organizations, such as the American Heart Association, which are widely perceived as providing or disseminating objective scientific information, are substantially supported by corporate groups. Jacobson shows how professional organizations, university research institutes, health charities, and other nonprofit groups that receive corporate funding may be limited or influenced by their corporate sponsors; and how some organizations that

seem independent are in fact created and controlled by industry. We note that this corporate strategy extends to the international sphere: as Nicholas Ashford et al. have shown, the International Commission on Occupational Health, which bills itself as an "international non-governmental professional society whose aims are to foster the scientific progress, knowledge and development of occupational health and safety in all its aspects," is in fact dominated by multinational corporate interests.^{24,25} ICOH has sought to strengthen its ties with international bodies such as the ILO and the WHO in order to influence international health guidelines and policy, but has failed to be up front about the fact that most of its members represent the interests of industry.

Corporate campaigns to influence public opinion may not address the health effects of a product or process per se, but may work to make that product or process seem indispensable to protect jobs, maintain an adequate standard of living, or achieve some other social or economic good. For example, Raj Patel, Robert Torres, and Peter Rosset's article, "Genetic Engineering in Agriculture and Corporate Engineering in Public Debate" shows how Monsanto has used a variety of strategies to claim that its products (first pesticides and then genetically-modified foods) are not only safe, but beneficial to both the environment and economic growth, while at the same time foreclosing critiques of these technologies as dangerous and environmentally unsound.

SOLUTIONS

The problem posed by corporate corruption of science is a big one. But there are policy and scientific measures that can be taken to ensure a science that is more interested in protecting human and environmental health than in girding up the profit of multinationals. Many such suggestions are offered by contributors to this issue.

We believe the problems of the corporate corruption of science must be addressed not only at the material level, but at the ideological level as well. To many, corporate power now seems natural and beneficial. The dubbing of economic neoliberalism as "free trade," for example, sums up a whole set of benefits the economic model is supposed to provide (such as unfettered access to economic growth, a "level playing field" for all actors, an escape from the bureaucracy of the state, and so on), while obscuring the negative social, cultural, and economic aspects of the neoliberal program, which in fact has resulted in increasing inequality both within individual nations and on regional and global levels.^{26,27} In the face of the power of corporate capitalism to define itself in positive terms, we must work on developing a new way of thinking about the role of the corporation in order to build lasting change in science and other arenas.

There are, of course, many examples of citizens' groups, nongovernmental organizations, and even national governments that are challenging aspects of corporate hegemony. The worldwide movement to contain corporate power and develop economic alternatives to the corporate-driven laissez-faire economy includes many health-focused groups that are doing important work to improve access to health care, address the social roots of ill health, and force companies to take responsibility for the health problems their products can cause during manufacture, use, and disposal.

This work can be further built on by a program for cultural and political change that has at its core the vision and practice of a scientific research that is ethical, well-conducted, and focused on the fostering of occupational and environmental health.[†] The goals of such a program would work to change the way we think about corporate capitalism by:

- holding corporations and corporate-funded scientists accountable for the quality of their work;
- conducting research on key areas in occupational and environmental health that are not being addressed by status quo science;
- developing a broad-based citizen movement to foster scientifically-literate citizen action for healthier workplaces, communities, and natural environments; and
- building a global network to address shared occupational and environmental health harms from both an activist and a scientific perspective.

This is an admittedly broad agenda that has as its goal the mobilization of a populace through the articulation of concerns about corporate-funded science and the presentation of alternatives in a manner that resonates with people's own concerns, interests, and issues.

Occupational and environmental health offers an ideal platform from which to address wider social and economic inequities on a national and international basis. Many people experience first- or second-hand the serious effects of ill health. Those who are healthy can be moved by an understanding that their health or the health of their children may be at risk. Health is greatly affected by social factors such as racism, income inequality, and human rights, around which some groups are already organized or politicized. Growing awareness of the social roots of ill health holds the potential to mobilize a diverse citizenry over shared

[†]While some would argue that well-conducted science cannot focus on "fostering" anything other than an abstract truth, we disagree. Public health is fostered by well-conducted science that addresses important public health questions; it does not require that science come up with predetermined results, only good results. Currently, many of the most important public health questions are not being asked by science, or their answers are meant to serve the interests of profit rather than health.

concerns, and can contribute to an effective and understandable critique of the inequities of the social, economic, and political system.

This sort of broad agenda for change has been proven successful by the U.S. right wing, which, over the past 30 years or more, has made a concentrated effort to bring U.S. citizens closer to its political ideals. Its success has been due to its ability to frame its agenda in terms that are compelling to everyday people. The right-wing agenda "makes sense" to many people, including those whom it does not materially benefit, because the right has been so successful in influencing the terms of the debate, reaching a broad citizen base, and speaking in a language that appeals to a broad range of people. This did not happen by accident, but was rather the product of a concentrated effort to change the way North Americans think. Ironically, its leaders are aware of and have followed the teachings of Vladimir Ilyich Lenin and the Italian communist philosopher Antonio Gramsci.²⁸ The effort was, to a large extent, executed by the "think tanks" such as Cato, Heritage, and the Manhattan Institute.²⁹

Those of us concerned with occupational and environmental health need to do the same thing. We must build the infrastructure required to develop and articulate a strong vision of a progressive, egalitarian, and people- (rather than corporate-) centered science and politics. We need institutions and coalitions dedicated to the principles elaborated here. Parts of this work are already being done by various groups in the United States and worldwide, but the importance of this program means it deserves a more concentrated focus. Such a focus could be taken on by a coalition of environmental, labor, and public interest groups that already work in a similar vein, but we think it requires the formation of a new organization (or organizations) that would by necessity draw on those groups' expertise. In short, we call for the creation one or more "think tanks" dedicated to produce and promote the science, the hegemonic constructs, and the infrastructure needed to return science to the production of public and environmental health instead of private profits and human and environmental disease and decay.

Different nations and regions clearly have different political, economic, and cultural realities, but similar efforts are certainly necessary in all parts of a world undergoing rapid global integration. National or regional organizations could work together on shared goals, and coordinate action on the many occupational and environmental health issues that are essentially global in nature (pesticide trade, application, and pollution; emissions and global warming; and labor trafficking, for example).

As the papers in this issue show, the corporate corruption of science is not only widespread, with a long history, but is a real threat to the health and well-being of people and the environment the world over. Such a problem deserves a concerted response on the part of conscientious public health researchers.

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