The Warning Game: Evaluating Warnings Under California's Proposition 65

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The Warning Game: Evaluating Warnings Under California's Proposition 65

Clifford Rechtschaffen*

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INTRODUCTION

In 1986, California voters overwhelmingly\(^1\) approved the Safe Drinking Water and Toxic Enforcement Act of 1986,\(^2\) an initiative better known as Proposition 65. Voters passed the initiative to address the failure of government institutions to protect Californians from health threats posed by hazardous chemicals.\(^3\) Specifically, voters declared their rights to safe drinking water, to information about chemical exposures, and to strict enforcement of toxics laws.\(^4\) The statute has received extraordinary national attention for its innovative regulatory approaches, and has been alternatively labeled revolutionary\(^5\) and wildly irresponsible.\(^6\)

Although the statute imposes both a warning obligation and a discharge prohibition, its centerpiece has proven to be the requirement that businesses provide warnings whenever their products or activities expose persons to toxic chemicals. While such warning and information disclosure requirements\(^7\) are not new, they have become

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4. Id. at § 1(a)-(c).
5. Lead in Ceramicware and Crystalline: An Avoidable Risk: Hearing Before the Ad Hoc Subcomm. on Consumer and Environmental Affairs of the Senate Comm. on Governmental Affairs, 102d Cong., 2d Sess. 19 (1992) [hereinafter Hearings] (testimony of David Roe, Senior Attorney, Environmental Defense Fund: "[Proposition 65] is nothing less than a quiet revolution in the ability of law to grapple with some . . . . difficult issues . . . .").
6. See Leslie Roberts, A Corrosive Fight Over California's Toxics Law, 243 SCIENCE 306, 307 (1989) (reporting that industry calls Proposition 65 "duplicative, unnecessary, expensive and a nightmare to comply with," while biochemist Bruce Ames calls it a "thoroughly silly law, with an enormous cost and no gain in public health."). Id. at 306. During the campaign, opponents of the initiative argued that the statute would shut down the state's agricultural industry. See ARGUMENT AGAINST PROPOSITION 65, in CALIFORNIA BALLOT PAMPHLET, GENERAL ELECTION, NOV. 4, 1986, at 55 [hereinafter BALLOT PAMPHLET] ("Many common fertilizers, weed and pest control materials . . . would be effectively banned for most farmers. Farmers may even have to stop irrigating."). Some opponents argued that the effects would spread even further and that the initiative would "bring chaos to our state's court system, cripple our economy, and send California's technology and business improvements back some 20 years . . . ." BRUCE H. JENNINGS, SENATE OFFICE OF RESEARCH, REPORT TO THE STATE SENATE OF 1990, CALIFORNIA'S EXPERIENCE WITH PROPOSITION 65: IMPLEMENTING THE SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT, No. 498-S, at 27 (1990) [hereinafter CALIFORNIA'S EXPERIENCE] (quoting remarks of California Grape and Tree Fruit League).
7. Regulatory schemes requiring manufacturers to provide health or safety warnings or disclose other product information include FDA's labeling requirements for pharmaceutical products, EPA's pesticide labeling program, warnings for cigarettes and saccharin, and EPA's warning programs for homeowners' exposure to radon and citizens' exposures to hazardous waste. W. Kip Viscusi, REFORMING PRODUCERS LIABILITY 133 (1991). For background on federal labeling laws, see SUSAN G. HADDEN, READ THE LABEL: REDUCING RISK BY PROVIDING INFORMATION (1986).
increasingly popular and important over the past fifteen years, most notably with the adoption of worker and community right-to-know provisions. This trend is likely to continue, especially given the current legislative movement to scale back environmental regulation and the increased interest in market-based incentives as an alternative to traditional direct regulation.

Proposition 65 represents the most ambitious attempt by any state to regulate hazardous chemical exposure through information disclosure rather than by direct mandate. Its coverage is broader than that of other laws, encompassing exposures in diverse environmental media. The implementing regulations promulgated by the California Health and Welfare Agency (HWA) (now the Office of Environmental Health Hazard Assessment (OEHHA)) require warnings for consumer product exposures, occupational exposures, and environmental exposures. Thus, Proposition 65’s reach extends to everything from shoe polish, newly constructed homes, and food and wine, to chemicals in the workplace and factory emissions.

This Article analyzes how Proposition 65’s warning requirement has fared in practice. Proposition 65 has had mixed success in realizing its underlying statutory goals of providing individuals with sufficient


10. Id. § 22-12601(c).

11. Id. § 22-12601(d).
information to make meaningful choices and reducing exposure to toxic chemicals. The statute has been largely ineffective in promoting informed choice because of sparse statutory guidance and inadequate implementing regulations for its warning provisions. The lack of adequate regulatory criteria has also contributed to overwarning by enabling businesses to provide vague and uninformative warnings that recipients will likely ignore. However, in the consumer marketplace, where substitute chemicals are available, Proposition 65 has encouraged significant product reformulation. The Act has also helped to reduce toxic air emissions and other environmental exposures, the result of increased industry scrutiny of its processes and concern about negative publicity. Its weakest impact has been in the workplace, where it largely has been subsumed by existing worker hazard communication programs.

Part II of this Article provides general background about Proposition 65's provisions. Part III discusses the various rationales underlying information disclosure laws such as Proposition 65, and the statute's principal objectives. Part IV then analyzes the extent to which warnings provided by businesses have achieved the statute's goals. It first evaluates how effectively these warnings communicate to the public the information necessary to promote informed decision-making and satisfy the public's "right to know" in light of general principles of cognitive psychology and risk communication. It then analyzes the extent to which Proposition 65 warnings, or the statutory warning requirement more generally, have induced toxics reductions. This Part also considers whether the statute has promoted overwarning. Part V sets forth specific recommendations for improving the effectiveness of current warnings.

I
STATUTORY PROVISIONS OF PROPOSITION 65

A. Overview of Proposition 65 Warning Requirements

Proposition 65 applies to a group of chemicals listed by the State of California as known carcinogens or reproductive toxicants. Over 500 carcinogenic substances and 153 reproductive toxicants have been listed under Proposition 65. In part, the statute prohibits a per-
son in the course of doing business from "knowingly" discharging or releasing any listed chemical "into water or onto or into land where such chemical passes or will probably pass into any source of drinking water." Proposition 65 also imposes a far-reaching warning requirement: businesses must provide a "clear and reasonable" warning prior to "knowingly and intentionally" exposing any individual to a listed chemical. "Knowingly" is defined as knowledge that a discharge of or exposure to a listed chemical is occurring, although it does not require knowledge that the exposure or discharge is unlawful. "Intentionally" is not defined by regulation, but is likely to be interpreted as intent to commit an act that results in exposure.

The statute applies to all private businesses with ten or more employees, and exemptions to the warning requirement are very limited. Only exposures to carcinogens that pose "no significant risk" of cancer, or to reproductive toxicants that are below 1/1000th of the No Observable Effect Level (NOEL) for that chemical, are exempt from the warning requirement.

Although the statute does not define the "no significant risk" level for carcinogens, implementing regulations have defined it as one excess cancer case per 100,000 persons exposed for a lifetime. The must automatically be listed under the statute. See id. § 25249.8(a),(b). As a result of this expedited process, the State has developed the most comprehensive list of carcinogens of any government agency. William S. Pease, Identifying Chemical Hazards for Regulation: The Scientific Basis and Regulatory Scope of California's Proposition 65 List of Carcinogens and Reproductive Toxicants, 3 Risk 127, 130 (1992). See also infra note 36.


17. See Order Denying Cross-Motions for Summary Judgment, Citizens for a Better Environment v. Sawyer of Napa, Inc., No. 61687 (Napa County Super. Ct. Dec. 13, 1991), slip op. at 6 (interpretation of "intentionally" to mean voluntary or deliberate acts or omissions is consistent with the goals of statutes designed to protect public health). The order issued after the trial in the case did not adopt this definition of "intentionally," but the court's discussion of the term is rather muddled. See id., Statement of Decision, ¶ 1(b)(8), (9) (May 28, 1992). The case was affirmed in an unpublished decision that did not address this issue. Citizens for a Better Environment v. Sawyer of Napa, Inc., No. A058829 (Ct. App. Apr. 21, 1994). The regulations that define "knowingly" make clear that negligent acts are covered by the statute. See CAL. CODE REGS. tit. 26, § 22-12201(d) (1995) (act or omission does not violate statute where it has occurred "through misfortune or accident and without evil design, intention or negligence").

18. CAL. HEALTH & SAFETY CODE § 25249.11(b) (West 1992).

19. Id. § 25249.10(c). The warning requirement also does not apply to exposures that take place less than twelve months subsequent to the listing of the chemical in question. Id. § 25249.10(b).

statute sets the thousandfold safety factor for reproductive toxicants. Regulations also specify the exposure levels that satisfy the “no significant risk” level and the 1/1000th of the NOEL for certain chemicals. They further detail methods for determining these levels in instances where the State has not set a specific level. These methods reflect standard risk assessment methodology. While critics have frequently faulted Proposition 65 for dealing with marginal risks, the warning threshold for carcinogens is consistent with or less stringent than levels for many other regulated exposures, and was a deliberate compromise between levels favored by industry advocates and environmental groups. Moreover, many exposures subject to the statute pose risks well above the warning threshold.

21. See id. §§ 22-12705, 22-12805. Businesses remain free to develop their own numeric standards for these chemicals provided they use methods of equal scientific validity. Id. §§ 22-12701(a), 22-12801(a).

22. Id. §§ 22-12703(a), 22-12711, 22-12803. In addition to these methods, businesses are free to use other risk assessment methodologies of comparable scientific validity. Id. §§ 22-12701(a), 22-12801(a).


24. *Id.* at 954. See Ingredient Communication Council v. Lungren, 4 Cal. Rptr. 2d 216, 224 n.8 (Ct. App. 1992) (stating that the warning level is less stringent than the thresholds used by other regulatory agencies to impose substantive restrictions on carcinogens); 40 C.F.R. § 131.36 (1994) (EPA criteria for priority toxic pollutants set at levels based on cancer risk to humans of one in one million).

25. This is true for all types of exposures subject to the statute:

(1) Consumer product exposures


(2) Environmental exposures

Emmissions of ethylene oxide (Eto) from several facilities in Los Angeles exposed hundreds of thousands of persons above the warning threshold, some at levels over 100 times the warning level. Jill Stewart, *4 Sterilization Firms Sued On Emissions of Carcinogenic Gas*, L.A. TIMES, July 19, 1990, at A1, A29. Eto emissions from a spice manufacturer in Santa Maria resulted in an increase in cancer risk of 278 per 100,000 persons (equal to 278 times the warning level). William S. Pease, *Chemical Hazards and the Public’s Right-to-Know: How Effective is California’s Proposition 65?*, 33 ENVIRONMENT 12, 18 (1991) [hereinafter Pease, *Chemical Hazards*]. Hexavalent chromium emissions from an aerospace manufacturer in Los Angeles produced risks close to $200 \times 10^5$ (impacting tens of thousands of persons). Memorandum of Points and Authorities in Opposition to Defend-
Although the warning requirement is central to the statute, warnings themselves were given scant attention by the drafters of Proposition 65. The statute does not define the term "warning," nor does it specifically discuss what a warning should look like. The statute provides only the following general guidance, explaining that a warning:

need not be provided separately to each exposed individual and may be provided by general methods such as labels on consumer products, inclusion of notices in mailings to water customers, posting of notices, placing notices in public news media, and the like, provided that the warning accomplished is clear and reasonable. Thus, the task of implementing this key statutory provision was left to be developed through HWA regulations. Given the generality of the statutory language, the HWA had considerable discretion in drafting warning provisions. It incorporated some of the general warning methods suggested by the statute, borrowed language from other federal labeling laws, and improvised elsewhere. The agency's efforts were also shaped significantly by then-Governor George Deukmejian's hostility toward the statute. This hostility led the State, under intense pressure from regulated industry, to attempt unsuccessfully to limit the reach of the statute in several key areas.

(3)Workplace exposures

Occupational exposures subject to Proposition 65 warnings may be as high as $3 \times 10^3$ for benzene, $1 \times 10^4$ for nickel, and $2.6 \times 10^6$ for vinyl chloride. William S. Pease et al., *Risk Assessment for Carcinogens Under California's Proposition 65*, 10 *Risk Analysis* 255, 262-63 (1990).


27. Then-Governor George Deukmejian designated the HWA as the lead agency for adopting regulations that "implement the provisions of [Proposition 65] [and] further its purposes." See id. § 25249.12 (West 1992). In 1991, this authority was transferred to the Office of Environmental Health Hazard Assessment ("OEHHA") within Cal/EPA.


29. Governor Deukmejian originally refused to include animal carcinogens on the Proposition 65 list despite the clear statutory directive to include all chemicals identified as carcinogens by the International Agency for Research on Cancer (IARC), which include animal carcinogens. The HWA largely exempted from the warning requirement carcinogens in products that comply with the federal Food, Drug and Cosmetic Act. The HWA also refused to utilize the statutory provision which provides for mandatory listing of chemicals determined to be carcinogens or reproductive toxicants by scientific bodies identified as "authoritative" by the State's qualified experts. Finally, the California Occupational Safety and Health Standards Board refused to incorporate the warning provisions of Proposition 65 into the State's Occupational Safety and Health (OSHA) Plan and thereby shield it from claims of preemption by the U.S. Occupational Safety and Health Administration's Hazard Communication Standard. All four of these actions were successfully challenged by labor and environmental groups. See AFL-CIO v. Deukmejian, 260 Cal. Rptr. 479 (Ct. App. 1989); AFL-CIO v. Deukmejian, No. 502541 (Sacramento County Super. Ct. filed May 31, 1988); AFL-CIO v. Deukmejian, No. 359223 (Sacramento County Super. Ct. filed June 22, 1988); Cal. Labor Fed'n v. Occupational Safety & Health Standards Bd., 271 Cal. Rptr. 310 (Ct. App. 1990).
The regulations adopted by HWA differentiate among three broadly drawn categories of exposure: consumer products exposures, occupational exposures, and environmental exposures. A "consumer product exposure" results from the reasonably foreseeable use of a consumer good or from receiving a consumer service. An "occupational exposure" is an exposure by an employer to an employee in the workplace. An "environmental exposure" is any other type of exposure, covering the range of exposures that "may foreseeably occur" from any form of contact (ingestion, inhalation, skin contact) with an environmental medium. For each type of exposure, the regulations adopt a "safe harbor" format (i.e., they identify certain warning methods and messages that by regulation are deemed legally adequate but that do not preclude other approaches). Unfortunately, as discussed in part IV, the regulations do not sufficiently tailor the warnings to fit the characteristics of the various audiences that receive these different types of warnings.

B. Enforcement of Proposition 65

Once a chemical is listed and the statutory grace period elapses, Proposition 65's warning provisions take effect without specific administrative standards that specify acceptable levels of exposure. This contrasts with most environmental statutes, and reverses the usual industry incentives to delay the setting of administrative standards. Proposition 65 can be enforced by public prosecutors (the California Attorney General, district attorneys, and certain city attorneys) or by

31. Id. § 22-12601(b).
32. Id. § 22-12601(c).
33. Id. § 22-12601(d). This includes exposure that may foreseeably occur from contact with ambient air, indoor air, drinking water, standing water, running water, soil, vegetation, or man-made or natural substances. Id.
34. Id. § 22-12601(a).
36. See David Roe, An Incentive-Conscious Approach to Toxic Chemical Controls, 3 Econ. Dev. Q. 179, 180-81 (1989). Thus, over 250 numeric standards for listed chemicals (setting acceptable exposure levels) have been adopted under Proposition 65—a pace described by the California Environmental Protection Agency as equivalent to "100 years of progress" by federal standards—and not a single standard has been challenged by regulated entities. See Memorandum from Charles M. Shulock, Assistant Secretary, California Environmental Protection Agency ('Cal/EPA'), to Proposition 65 Review Panel, Cal/EPA § 1.1-2 (Feb. 20, 1992) (on file with author).
“any person in the public interest.” There is, however, no administrative agency responsible for enforcing the law.

In an enforcement action, the defendant bears the burden of proving that an exposure is exempt from the statute, another notable departure from other environmental laws. There are two main reasons underlying this provision. The first is that industry is in the best position to know about the chemicals it uses and the levels at which they are harmful. The second is that industry, rather than the public, should bear more of the risk of harm from chemicals about which there is limited knowledge.

Remedies for a Proposition 65 violation are injunctive relief and civil penalties of up to $2,500 per day. Twenty-five percent of the penalties collected go to the plaintiff initiating the enforcement action.

37. CAL. HEALTH & SAFETY CODE § 25249.7(c),(d) (West 1992). A private party acting in the public interest can bring suit under Proposition 65 if (i) 60 days' notice is given to the defendant, the Attorney General, the district attorney, and any city attorney in whose jurisdiction the violation is alleged to occur, and (ii) neither the Attorney General nor any district attorney nor any city attorney or prosecutor has commenced and is diligently prosecuting the alleged violation. Id. § 25249.7(d).

38. CAL. HEALTH & SAFETY CODE § 25249.7(c) (West 1992). The statute requires the Governor to designate a lead agency to implement the provisions of the statute. Id. § 25249.12. This was initially the HWA and is currently OEHHA. See supra note 27. The lead agency is responsible for writing implementing regulations but not for actually insuring statutory compliance.

39. CAL. HEALTH & SAFETY CODE § 25249.10(c) (West 1992).

40. John Applegate, The Perils of Unreasonable Risk: Information, Regulatory Policy, and Toxic Substances Control, 91 COLUM. L. REV. 261, 298-99 (1991) ("[I]ndustries that produce and use chemicals ordinarily are in the best position to provide or obtain toxicity and exposure data most cheaply and accurately. They have the greatest familiarity with their products' characteristics and the occasions for exposure to them, and they have the most opportunities to learn about the chemicals.").

41. Reports estimate that no toxicity data exists on 80% of the chemicals in use today. Id. at 289. See also Ellen K. Silbergeld, The Risks of Comparing Risks, 3 N.Y.U. ENVTL. L.J. 405, 413-14 (1995) ("Little has changed since the National Research Council (NRC) noted ten years ago that between seventy-three and eighty-nine percent of chemicals in commerce have almost no toxicity data upon which even a qualitative identification of hazard can be made . . . ."); CALIFORNIA'S EXPERIENCE, supra note 6, at 31 ("[One] tradition in American politics is that the burden of proof rests with the public . . . . The recent performance by regulatory agencies indicates that public institutions simply cannot stay apace with industry's production of chemicals with unknown effects. Proposition 65 has provided an indication that the American electorate may no longer be willing to adhere to [these] time-honored political traditions.").

42. CAL. HEALTH & SAFETY CODE § 25249.7(a) (West 1992).

43. Id. § 25249.7(b).

44. Id. § 25192(a).
II
RATIONALES FOR INFORMATION DISCLOSURE
REQUIREMENTS AND OBJECTIVES OF
PROPOSITION 65'S WARNING PROVISION

A. Rationales for Information Disclosure Requirements

Laws utilizing information disclosure requirements—warnings, informational labeling, worker training and notification, and community reporting and disclosure—are based on several important, albeit diverse, rationales. The most common rationale is that such laws improve the efficient functioning of the market. Traditional microeconomic theory assumes consumers have perfect information. Where such information is lacking and will not be produced by the market, disclosure laws help insure that the market functions properly by bridging the information gap. As Professor Mary Lyndon points out, the market is unlikely to generate data about the toxicity of products on its own. Individual firms will not produce or release toxicity data about their products because of the negative implications surrounding such information, and third parties are not likely to produce it because of the "public good" nature of such information. Making information available to the public can lead to improved consumer decisionmaking, as well as product reformulation, as consumers signal their preferences for products that are safer or have other desirable attributes. Comparable benefits can result from providing information to workers. Better-informed workers can negotiate for less toxic working conditions, demand wage premiums for risky jobs, or alter

45. Because of the broad set of underlying rationales, information disclosure laws enjoy support across the political spectrum. Pease, Chemical Hazards, supra note 25, at 12. See also John M. Mendeloff, The Dilemma of Toxic Substance Regulation 209-10 (1988) (Consumer advocates like Ralph Nader favor more information as a right, as well as a tool, that enables individuals to protest and protect their interests. Conservative economists prefer such laws over direct government regulation because they rely on the efficiency and power of market forces).

46. Like other public goods such as national defense or clean air, it is difficult to limit the benefits of this information to individual "purchasers," and as a result, the costs of producing it cannot be recouped through multiple individual sales. Other disincentives to the production of toxicity data include the expense and the inexact nature of the information produced. Mary L. Lyndon, Information Economics and Chemical Toxicity: Designing Laws to Produce and Use Data, 87 Mich. L. Rev. 1795, 1810-17 (1989). In addition, the self-correcting function of the market, in which consumers learn about product attributes and make adjustments through repeated product usage, does not work with toxicity data, since toxic chemicals have health impacts that are long delayed and difficult to diagnose. See Michael B. Mazis et al., A Framework for Evaluating Consumer Information Regulation, 45 J. Marketing 11, 12-13 (1981).

47. Mazis et al., supra note 46, at 12. As Lyndon illustrates, the absence of toxicity data about products means that buyers cannot judge the quality (toxicity) of the products, thus removing any incentive for manufacturers to differentiate between toxic and nontoxic products. The result is a higher level of toxicity in products than would otherwise result if toxicity were disclosed. Lyndon, supra note 46, at 1814.
their willingness to accept risky jobs.\textsuperscript{48} Relying on the power of the market, economists tout information disclosure laws as more efficient and less constraining than direct regulation, imposing lower costs on both business and regulators.\textsuperscript{49}

In addition, information disclosure laws are also premised on an entitlement rationale, as reflected in the title of recent "right-to-know" laws.\textsuperscript{50} The underlying notion is that members of the public have a "fundamental right to know" what chemicals are "out there" and the chemicals to which they are being exposed.\textsuperscript{51} Information promotes individual autonomy by providing individuals with knowledge of the risks involved in their choices and allowing them to decide whether or not to encounter these risks.\textsuperscript{52}

Information disclosure laws also promote citizen power and advance democratic decisionmaking.\textsuperscript{53} Professor and regulatory expert

\begin{itemize}
    
    \item \textsuperscript{49} Because risk preferences vary considerably across the population, banning a product imposes costs on consumers who are willing to bear risks that they perceive are outweighed by the benefits of a product. James R. Bettman et al., Cognitive Considerations in Designing Effective Labels for Presenting Risk Information, 5 J. Pub. Pol'y & Marketing 1, 2 (1986). Informational policies allow users of hazardous products with different susceptibilities to the hazard, different preferences regarding risk, different product needs, and different usage rates to select the combination of risk, product efficacy, and usage rates best for each individual. W. Kip Viscusi et al., The Effect of Risk Information on Precautionary Behavior, in Learning About Risk, supra note 48, at 60, 60-61 (1987). The same benefits accrue to workers who receive risk information. See Mendeloff, supra note 45, at 217 (arguing in favor of an information provision that allows workers to choose their jobs based on their preferences for low-risk or high-risk jobs; direct regulation, by contrast, constrains worker choice, and, since willingness to take risky jobs is inversely related to wealth, may impinge most on low-income workers). But see Lars Noah, The Imperative to Warn: Disentangling the "Right to Know" from the "Need to Know" About Consumer Product Hazards, 11 Yale J. on Reg. 293, 296-97 (1994) (contending that the costs of warning programs, in the form of dilution of more serious warnings and consumer overreaction to warnings about relatively insignificant risks, are often overlooked by regulators).
    
    
    \item \textsuperscript{51} Applegate, supra note 40, at 295 (describing congressional purpose in adopting EPCRA); Hadden, A Citizen's Right to Know, supra note 8, at 15. See also Keith Schneider, For Communities, Knowledge of Polluters is Power, N.Y. Times, Mar. 24, 1991, § 4, at 5 (quoting Representative Gerry Sikorski, sponsor of EPCRA: "It was a philosophical leap of faith, kind of a heartfelt belief that people in communities have an absolute, fundamental right to know what goes into the air their kids breathe, the water they drink, and the ground they play on.").
    
    \item \textsuperscript{52} See Cass R. Sunstein, Informing America: Risk, Disclosure, and the First Amendment, 20 Fla. St. U. L. Rev. 653, 655 (1993) ("If people are unaware of the consequences of their choices, they are, to that extent, less free.").
    
    \item \textsuperscript{53} Committee on Risk Perception and Communication, National Academy of Sciences, Improving Risk Communication 111 (1989) [hereinafter National Academy of Sciences] (communicating information about risk can increase the desire of citizens to participate in government decisions); Paulette L. Stenzel, Right-to-Know Provi-
Cass Sunstein argues that "without better information [provided by such laws], neither deliberation nor democracy is possible."\textsuperscript{54} Armed with more information, citizens can make better-informed decisions and are thus in a better position to bargain with private corporations and government.\textsuperscript{55}

Utilitarian rationales also support disclosure requirements. For example, disclosure requirements provide indirect incentives for industry to undertake self-regulation and thereby reduce risky activities.\textsuperscript{56} Congress recently relied on this rationale when it sought to influence consumer purchase decisions and create an incentive for manufacturers to shift to safer alternatives by requiring warnings on products containing ozone-depleting chemicals.\textsuperscript{57} Disclosure requirements also help the government determine the need for additional regulation.\textsuperscript{58} Other important utilitarian rationales, such as avoiding accidents and facilitating emergency planning, also support information disclosure requirements.\textsuperscript{59} Information disclosure laws have inherent limitations as well.\textsuperscript{60} The marketplace model assumes markets in which there is an elastic demand for products and there are readily available product substitutes. It is also premised on the existence of perfectly rational consumers who seek information regarding alternatives of California's Proposition 65: The Naivete of the Delaney Clause Revisited, 15 Harv. Envtl. L. Rev. 493, 508 (1991) (arguing that the democratic form of government requires informing citizens about public policy decisions).

\begin{itemize}
  \item[54.] Sunstein, supra note 52, at 658; see also Hadden, A Citizen's Right to Know, supra note 8, at 15-17; Green, supra note 8, at 235-36 (arguing that information helps promote the democratic ideal of a vigorous, informed citizenry).
  \item[55.] Hadden, A Citizen's Right to Know, supra note 8, at 15-17 (arguing that right-to-know laws can alter the balance of power in society); Paulette L. Stenzel, The Need for a National Risk Assessment Communication Policy, 11 Harv. Envtl. L. Rev. 381, 404-05 (1987).
  \item[56.] Hadden, A Citizen's Right to Know, supra note 8, at 15; Hirschorn, supra note 8, at 337 ("[E]nvironmentalists have found the lever to force industry to give them and the general public improved quality. That lever is data, and more data, especially about chemical use, manufacturing operations, products, and environmental claims.").
  \item[57.] Noah, supra note 49, at 308.
  \item[58.] See Michael DeCourcy Hinds, As Warning Labels Multiply, Messages Are Often Ignored, N.Y. Times, Mar. 5, 1988, at 1 (arguing that consumer leaders press for warnings to build pressure for safer products and to force government to act).
  \item[59.] Information alerts consumers and workers to product hazards and helps them avoid dangers, thereby reducing the number and costs of accidents. Green, supra note 8, at 215. See Victor E. Schwartz \& Russell W. Driver, Warnings in the Workplace: The Need for a Synthesis of Law and Communication Theory, 52 Cincinnati L. Rev. 38, 39 (1982) (arguing that on a risk utility basis, the cost of almost any serious injury justifies the relatively minor cost of providing warnings). It helps local emergency planners prevent or respond more safely to chemical accidents. Melinda Haig, Proposition 65's Right-To-Know Provision: Can it Keep Its Promise to California Voters?, 14 Ecology L.Q. 685, 688-89 (1987). Information can also make it easier for workers or others to file tort actions or worker compensation claims by helping them establish that they have been exposed to hazardous chemicals and the identity of the chemicals. Applegate, supra note 40, at 295-96.
  \item[60.] See generally Hadden, supra note 7, at 211-27.
\end{itemize}
tives when making decisions, make trade-offs that allow them to compute utilities for every alternative, and select the alternatives that maximize utility. However, these conditions are often not satisfied. Consumers may lack the time or interest to seek out information. Many may have difficulty understanding certain information, especially information about risks. In particular, less educated and limited-English speaking individuals are less likely to be able to read, understand, and use warning information. Even when individuals read and comprehend warnings, they often do not change their behavior in response to the information they receive. Workers, for instance, may disregard the seriousness of the risks to which they are

62. See HADDE, supra note 7, at 211-227 (criticizing assumptions underlying model of consumer as rational actor).
63. See Nordenstam & DiMento, supra note 35, at 353 (stating that in general, American consumers are not information-seekers: only ten to twenty percent of Americans seek information, and these people generally have high incomes, high media use, and high confidence in scientific test data); see also Bettman et al., supra note 61, at 71 (arguing that persons of lower socioeconomic status acquire less information than persons of higher socioeconomic status in making consumer choices); The Unpredictable (and Only Sometimes Green) Green Consumer, GREEN MARKETALERT, Mar. 1, 1994, available in WESTLAW, GRMRKTAL database (surveys suggest that “green consumers” are predominantly female, affluent, and well-educated).
64. See infra part III.B.2.b.ii. See also Bettman et al., supra note 61, at 53-57 (discussing the limitations on consumers’ ability to process information); Wesley A. Magat et al., Consumer Processing of Hazard Warning Information, 1 J. RISK & UNCERTAINTY 201, 229-31 (1988) (concluding that there is an upper bound on individuals’ abilities to process risk information, which is often exceeded by chemical warning labels).
65. Hadden, Regulating Product Risks, supra note 8, at 101 (1991). See 2 PLANNING, POLICY AND EVALUATION, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL EQUITY: REDUCING RISK FOR ALL COMMUNITIES 47 (1992) [hereinafter ENVIRONMENTAL EQUITY] (persons with low literacy skills or whose first language is not English may have trouble understanding warning labels; high rates of illiteracy among minorities and low-income groups compounds communication problems with these groups); NATIONAL ACADEMY OF SCIENCES, supra note 53, at 69 (information made available to the public is typically utilized more readily by those with high socioeconomic status who have a higher level of education, enabling them to understand technical data more easily). The elderly also may not be able to benefit from warning information because of limited optical abilities. Hadden, Regulating Product Risks, supra note 8, at 100; BLAIR M. BREWSTER ET AL., WHITE PAPER ON SAFETY SIGN COMPONENTS 12 (1995) (one in six Americans age 45 or older report some sort of vision impairment).
66. See Vincent T. Covello et al., Risk Communication: A Review of the Literature, 3 RISK ABSTRACTS 171, 172-75 (1986) (various problems complicate the task of changing behavior, including lack of interest and motivation, a reluctance to make necessary trade-offs, or excessive fear and anxiety); David W. Stewart & Ingrid M. Martin, Intended and Unintended Consequences of Warning Messages: A Review and Synthesis of Empirical Research, 13 J. PUB. POL’Y & MARKETING 1, 10 (1994) (consumers may not understand a warning or find it credible, or may choose not to act on a warning after evaluating the costs and benefits of complying, particularly if consequences of not complying are more distant in time, or if they believe themselves more careful or more skilled than the average consumer).
exposed when they perceive the risks as involuntary or out of their control.67

Furthermore, some workers may be powerless to demand or effect change, especially in the absence of a unionized workforce.68 Workers of color and low-wage workers are more likely than the rest of the population to work in jobs with higher exposure to toxic chemicals.69 They are the most economically vulnerable, largely because they perceive great risks in complaining to their employers.70 This is particularly true for recent immigrant workers who are frequently unorganized, face substantial language and cultural barriers, and fear employer retaliation not only in terms of potentially losing a job but also their immigration status.71

Moreover, persons exposed to chemicals in the environment have no traditional "market" in which they can express their preferences.72 Additionally, conveying information about environmental exposures is much more difficult because there is no single point of purchase, as with consumer products, or even a single point of exposure, as in the workplace.

68. See Thomas O. McGarity & Sidney A. Shapiro, Workers at Risk 208 (1993). (stating that workers lack sufficient power to make real choices about acceptability of workplace risks); Hadden, supra note 7, at 99 (choices of workers may be limited by high cost of alternate employment, either because there are no jobs or because of high penalties incurred for leaving a job). See also James C. Robinson, Toil and Toxics: Workplace Struggles and Political Strategies for Occupational Health 141 (1991) (reporting that the vast majority of private sector workers are employees-at-will and enjoy limited protections for asserting their rights).
69. George Friedman-Jíménez, Achieving Environmental Justice: The Role of Occupational Health, 21 Fordham Urb. L.J. 604, 606-07 (1994). Among other findings, Friedman-Jíménez cites two studies of workers in California, one showing that 46% of adults with blood lead levels above 60 micrograms per deciliter (a toxic level requiring immediate removal from worker) were Hispanic; the other showing that Hispanic and black workers had higher risks of occupational disease and injury than whites. Id. at 611. See also Michael Fisher, Environmental Racism Claims Brought Under Title VI of the Civil Rights Act, 25 Env'l L. 285, 297-98 (1995) (citing studies showing that overwhelming majority of migrant farmworkers are ethnic minorities, and that these workers suffer highest incidence of toxic poisoning of any occupational group).
70. Friedman-Jíménez, supra note 69, at 615-16.
71. See Flora Chu, Asian Workers at Risk, Race, Poverty & Env't, Spring 1992, at 10, 12; Young-Im Yoo, Asian Immigrant Women Advocates, Race, Poverty & Env't, Spring 1992, at 11; Friedman-Jíménez, supra note 69, at 615-16; Equal Rights Advocates & The Coalition for Immigrant and Refugee Rights and Services, How Employer Sanctions Undermine the Enforcement of Federal Labor Laws: A Study 4 (1991) (copy on file with author) (stating that immigrant workers are afraid to complain about workplace health and safety violations due to fear of employer retaliation).
72. Community residents may theoretically sell their homes and leave the area, but this is not a realistic option for most people, and in any case, it does not exert economic pressure on the entity responsible for the exposures. One commentator argues that "[K]nowledge about hazardous substances in the community seldom brings with it the ability to do anything about them . . . [because] citizens [are] generally in a much poorer position to reduce risk." Applegate, supra note 40, at 296-97.
Despite these limitations, it is important to note that only a small number of motivated persons—e.g., attentive, information-seeking consumers, unions, or environmental organizations—actually needs to use information to accomplish some of the desired benefits of information disclosure laws. A small group's energetic attention to warnings or other information can force product reformulation, safer workplace conditions, or reductions in community exposures that benefit large numbers of consumers, workers, or other individuals.\textsuperscript{73}

\textbf{B. Objectives of Proposition 65's Warning Requirement}

Consistent with the rationales underlying information disclosure statutes, Proposition 65 has two broadly expressed purposes: 1) to inform the public about exposures to toxic substances, and 2) to reduce exposures to toxic substances.\textsuperscript{74} As to the former, the statute is clearly intended to promote informed individual choice and decision-making. As explained by the HWA, the intent of voters was to "receive warnings which will enable them to make informed choices."\textsuperscript{75} This is consistent with the Act's goals of correcting market imperfections, promoting personal autonomy, and satisfying the public's "right to know," all of which may have motivated voters. The language of entitlement, however, figures most prominently in the statutory materials. The ballot argument\textsuperscript{76} reads:

Proposition 65 also tells businesses: Don't expose us to any [listed] chemicals without first giving us a clear warning. We each have a right to know, and to make our own choices about being exposed to these chemicals.\textsuperscript{77}

\textsuperscript{73} See Mazis et al., \textit{supra} note 46, at 12 (stating that a minority of consumers voting their preferences can lead producers to modify their products, benefitting all consumers); Lyndon, \textit{supra} note 46, at 1831-32 (arguing that it is not necessary for all consumers to actively use information to benefit; energetic "comparison shoppers" can have significant effects for all consumers).

\textsuperscript{74} See Nordenstam & DiMento, \textit{supra} note 35, at 341 (stating that proponents of Proposition 65 identified need for greater protection from, and more information about, the growing number of hazards present in their environment); Kara Christenson, \textit{Interpreting the Purposes of Initiatives: Proposition 65}, 40 \textit{HASTINGS L.J.} 1031, 1053 (1989) (arguing that the fundamental purpose of Proposition 65 is to provide protection and information to the public regarding carcinogens and reproductive toxicants).


\textsuperscript{76} California courts interpreting voter initiatives rely on ballot arguments as the primary source of voter intent. AFL-CIO v. Deukmejian, 260 Cal. Rptr. 479, 484 (Ct. App. 1989). For a general discussion about interpreting California initiatives, see Christenson, \textit{supra} note 74, at 1040-51.

\textsuperscript{77} \textit{BALLOT PAMPHLET, supra} note 6, at 54.
The statutory preamble likewise declares the people’s right “[t]o be informed about exposures to chemicals that cause cancer, birth defects or other reproductive harm.” This rationale has broad, powerful appeal. It was marshalled, for example, by former EPA Administrator William Reilly in defending Proposition 65 against strenuous efforts by the food industry to preempt the statute:

The law simply warns people about their exposure to carcinogenic or reproductively toxic chemicals at levels exceeding ‘no significant risk.’ It is hard to argue with providing information to the public.

Proposition 65 was also designed to reduce exposure to toxic chemicals. The statutory preamble describes public concern with exposure to these chemicals and frustration at the ineffectiveness of existing regulatory programs. Specifically, it notes that “[t]he people of California find that hazardous chemicals pose a serious potential threat to their health and well-being [and] that state government agencies have failed to provide them with adequate protection.”

This concern is further reflected in the supporting ballot argument, which states:

[O]ur present toxics laws aren’t tough enough. Despite them, polluters contaminate our drinking water and expose us to extremely toxic chemicals without our knowing it. The health of innocent people is jeopardized.

Thus, beyond simply informing people, Proposition 65 was intended to provide a “compelling incentive” for industry to remove nonessential carcinogens and reproductive toxins from its products and processes. This strategy, as noted approvingly by former EPA Administrator Reilly, “uses market incentives rather than command and

78. CAL. HEALTH & SAFETY CODE § 25249.5 (West 1992) (historical note) (emphasis added); see also Final Statement, supra note 75, at 22 (analogizing purpose of warning requirement to purpose of informed consent doctrine).


81. BALLOT PAMPHLET, supra note 6, at 54.

82. See Roberts, supra note 6, at 307 (quoting David Roe, one of the statute’s principal authors, as stating that most companies would prefer to find a new safer chemical rather than provide a warning if given the choice). See also Stenzel, supra note 53, at 498 (reporting that the drafters believed that toxics reduction would result from two factors: market pressure from consumers would cause manufacturers to switch to nontoxic products, and manufacturers would withdraw their products due to public pressure and the desire to avoid tort suits); Kristen Stevens, Regulating Toxics at the State Level: Proposition 65’s Warning Requirement, 9 STAN. ENVTL. L.J. 84, 88-89 (1990) (arguing that the warning requirement was intended to help remove dangerous toxics from the marketplace through consumer choice, publicity, and threat of penalties).
control mechanisms to reduce consumers' exposure to toxic chemicals (e.g., food importers have switched away from lead-soldered cans)."

III

EVALUATING THE EFFECTIVENESS OF PROPOSITION 65 WARNINGS

A. Introduction

Given Proposition 65's objectives, two criteria should be used to evaluate how well the warning requirement has effectuated statutory purposes. First, it is necessary to analyze whether warnings required by the statute effectively communicate information about toxic chemical exposure—in particular, whether the warnings provide individuals with sufficient information to facilitate meaningful choice, promote better-informed decisionmaking, and satisfy the entitlement goals of the statute. This requires examining how noticeable, comprehensible, and accurate the warnings are, questions particularly informed by the cognitive psychology and risk communication disciplines.

Second, evaluation of Proposition 65's effectiveness requires an analysis of whether warnings, or the warning requirement, have achieved the statute's objective of reducing exposures to toxic chemicals. This question requires a study of the empirical evidence regarding the warning requirement's impact on business products and processes.

83. Letter from William K. Reilly to Louis Sullivan, supra note 79, at 1. Reilly noted that "[t]his is consistent with [President Bush's] call for more economically-oriented regulatory programs." Id. (The reference to lead-soldered cans being eliminated is discussed infra at notes 213 and 214). Not all observers think that promoting toxics reductions is an appropriate goal for a warning statute such as Proposition 65. See, e.g., Viscusi, supra note 7, at 134-35 (arguing that the objective of warnings should be to allow individuals to make informed choices, not necessarily to prompt drastic reductions in the use of products, and that if the goal of society is to constrain severely or eliminate product use, a product ban, rather than a warning, is the appropriate measure); Noah, supra note 49, at 296-97 (arguing that warning statutes should not be used to foster product reformulation, but reserved for providing precautionary information about avoiding acute hazards, and that either public education campaigns or direct regulation are more appropriate for dealing with chronic health risks posed by consumer products).

84. This is distinct from whether the warning has changed behavior. See National Academy of Sciences, supra note 53, at 80 ("Although risk messages are sometimes judged against a criterion of behavior change, this is not an appropriate test of whether an individual has made an informed choice. It is possible for an individual, fully informed of the risks, to choose to engage in hazardous behaviors such as smoking, skydiving, or leaving seat belts unbuckled.")).
B. Do Proposition 65 Warnings Satisfy the Informational Objectives of the Statute?

1. Introduction

Borrowing generally from the framework used by cognitive psychologists, this Part evaluates how effectively Proposition 65 warnings communicate information to the public. The analysis begins by determining whether individuals actually notice the warnings. For this to occur, individuals must be “exposed” to warnings (i.e., come into contact with them) in the first place; the warnings must then attract their attention. The next question is whether the warnings will be read. Even when individuals “see” warnings they may not attend to them. Consumer responses often depend upon the physical appearance of the warnings and how interesting or personally relevant the contents appear. Finally, to be effective, warnings must communicate adequate and accurate information in a manner that is readily understandable. With respect to this last measuring stick, two questions are of particular import. First, do the warnings contain sufficient information for individuals to understand that they are actually being exposed to chemicals that cause cancer or reproductive harm—the underlying message of the statute? Second, will individuals understand the level of risk to which they are being exposed?

The remainder of this Subpart evaluates warnings provided for consumer products, workplace exposures, and environmental exposures. Each section analyzes the specific regulations applicable to each type of exposure, examines the warnings that businesses have actually provided to the public, and assesses how effectively the warnings communicate information to the public based on the above criteria. Subpart C evaluates the extent to which Proposition 65's warning provision has reduced exposures to hazardous substances. Last, Part

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85. See generally Stewart & Martin, supra note 66, at 4 (recommending that effects of warnings should be evaluated at several stages in communications process); Mazis et al., supra note 46, at 14 (describing similar framework for evaluating effectiveness of communications); Michael Wogalter, Factors Influencing the Effectiveness of Warnings, 1994 Proc. of Pub. Graphics, Univ. of Utrecht, Netherlands 2, 4-5 (recommending similar model for evaluating warnings).

86. Nordenstam & DiMento, supra note 35, at 359-60.

87. See Stewart & Martin, supra note 66, at 4.

88. Warnings are also often evaluated based on whether they change consumer behavior in the desired direction. See Stewart & Martin, supra note 66, at 2-4 (warnings have multiple definitions, multiple purposes, and multiple criteria for effectiveness; some are designed to merely inform, while others are judged by whether they alter behavior). Proposition 65, however, appears to have been primarily designed to inform consumers rather than to trigger specific behavioral responses.
D discusses whether Proposition 65 has led to overwarning, i.e., the provision of unnecessary warnings.89

2. Consumer Product Warnings

a. Presentation of Warnings

The HWA implementing regulations identify four types of "safe harbor" warning methods90 for consumer product exposures. The first two are product labeling and shelf signs.91 A third method resulted from a quasi-negotiated rulemaking between alcohol industry representatives and the HWA, and calls for a very detailed protocol for shelf, table, and wall signs for alcoholic beverages sold in retail stores or at bars and restaurants.92

The last method is a toll-free information service and represents the most far-reaching attempt to enfeeble the warning provision.93 It stemmed from a proposal by the Grocery Manufacturers of America (GMA) to allow warnings to be given through an 800-number telephone system, which consumers would theoretically call if they wished to discover whether a particular product carried a Proposition 65 warning. The regulations endorsed the concept of a toll-free information service, so long as the system provided "clear and reasonable warnings" (i.e., satisfied the basic statutory mandate), under the "safe harbor" regulations.94 GMA and its members initiated an 800 "warning" system operated by the nonprofit Ingredient Communication

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89. This analysis is illustrative rather than exhaustive, given the absence of comprehensive empirical data about what warnings have been provided. Nonetheless, the author has been able to gather sufficiently representative data from a number of sources to draw general conclusions. This includes extensive information provided by OEHHA, the California Attorney General's Office, and the California Occupational Safety and Health Administration ("Cal/OSHA"); hundreds of Proposition 65 newspaper warnings published over the past seven years; and the results of a 1992 survey of businesses about Proposition 65 conducted by Cal/EPA.

90. See infra part III.B.2.b for discussion of safe harbor warning methods.

91. CAL. CODE REGS. tit. 26, § 22-12601(b)(1)(A),(B) (1995). The warnings must be presented "with such conspicuousness... as to render [them] likely to be read and understood by an ordinary individual under customary conditions of purchase or use." Id. § 22-12601(b)(3).

92. Id. § 22-12601(b)(1)(D). Unlike other consumer product warning methods, in which ultimate responsibility for providing warnings to consumers is shared by manufacturers, distributors, and retailers, this provision specifically provides that liability for failure to provide warnings rests with the manufacturers or distributors, absent affirmative interference by a retailer with a manufacturer's efforts to post and maintain such signs. Id. § 22-12601(b)(2).

93. Id. § 22-12601(b)(1)(C). The regulation provides for "[a] system of signs, public advertising identifying the system, and toll-free information services, or any other system, that provides clear and reasonable warnings." Id.

94. See id. In contrast, compliance with the other consumer product warning methods—product labels, shelf signs, or signs for alcoholic beverages—is by itself deemed to be clear and reasonable and sufficient to satisfy the statute. Cf. id. § 12601(b)(1)(A),(B),(D).
Council (ICC) and publicized by in-store grocery signs and newspaper advertisements. The system allowed callers to hear a consumer product warning provided they precisely identified the product for which they sought a warning. The store signs and advertisements completely failed to alert consumers as to which products were subject to a warning. Several dozen companies included their products in the system, guaranteeing invisibility for their consumer product warnings. This was demonstrated by the system's first year of operation, in which fewer than 500 warning messages to consumers were delivered in a state with 10-15 million households. The ICC's system was subsequently invalidated on the ground that it merely invited consumer inquiries instead of providing a warning that consumers were likely to see.

Since then, most consumer product warnings have been located on product labels. (One exception is warnings for alcoholic beverages.) Although the regulations state that warnings must be presented with "such conspicuousness as to render them likely to be read and understood by an ordinary individual under customary conditions of purchase or use," in practice this general requirement has imposed few limitations on businesses and has done little to insure that warnings are noticed. Many Proposition 65 warnings are inade-

96. See id. at 224. Although the regulation remains in place, it appears highly unlikely that another 800-number system will be attempted.
97. Telephone Interview with Craig Thompson, Supervising Deputy Attorney General, California Attorney General's Office (Aug. 25, 1995); Telephone Interview with Catharine Caraway, Senior Hazardous Material Specialist, OEHHA (Sept. 7, 1995). The most notable consumer products bearing Proposition 65 warnings are cigars, pipe tobacco, and roll-your-own tobacco products. These products are exempt from federal cigarette labeling requirements. The warnings resulted from an enforcement action filed soon after Proposition 65 became effective. Richard Paddock, Warnings to Come Soon on Cigars, Pipe Tobacco, L.A. TIMES, Oct. 19, 1988, at A25.
99. Id., § 22-12601(b)(3). There are, however, detailed regulatory criteria for alcoholic beverage warnings.

The disjunctive nature of this requirement—that warnings be read prior to purchase or use—is unfortunate, because it potentially allows warnings that do nothing to inform consumers about exposures prior to purchase, thus frustrating their ability to make informed choices. See Nordenstam & DiMento, supra note 35, at 360 ("Research indicates that once a consumer purchases a product, the consumer psychologically becomes committed to the purchase, and risk information may not change a decision on a product's use. This finding provides additional support for the need to provide adequate risk information at the point of purchase.").
100. In this respect, Proposition 65 is similar to many other federal warning programs, which do not specify the placement, format or content of warnings. See Viscusi, supra note 7, at 154 (providing examples of other such programs). An exception is warnings for pharmaceutical products required by FDA. See id. at 149-54. For a criticism of many existing warning labels, see Hadden, Regulating Product Risks, supra note 8, at 97-100.
quately designed to attract attention. Like most other “warning environments,” the consumer product marketplace is cluttered. Consequently, experts have found that for product warnings to be seen, they must possess characteristics that make them stand out from their background.

Research shows that numerous design features can make warnings more conspicuous, such as using a high color contrast relative to the background; using large, legible, bold-face characters; placing warnings prominently; using symbols or icons; and using signal words. However, except for employing the signal word “WARNING,” the great majority of Proposition 65 warnings have none of these characteristics. The very few warnings that use symbols or other icons have resulted from Proposition 65 enforcement actions.

Proposition 65 warnings have appeared on the back of product labels, on the underside of product cans, or on the inside of lids covering product cans and boxes. Some have been in small print and dull type, sometimes squeezed onto labels already crowded with information. The size and placement of warnings have rarely been challenged. One notable exception is a case in which a jury found that warnings in small type on the back of cans of paint strippers containing methylene chloride were not clear and reasonable. In that case,

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101. Telephone Interview with Thompson, supra note 97.
102. See HADDEN, supra note 7, at 219 (“Shoppers in grocery stores are exposed to thousands of labeled products in the course of a half-hour trip . . . . The print and broadcast media are filled with advertisements about the same products. In an environment so rich in information that is often unhelpful and distracting, warning labels must be able to grab and hold attention in order to fulfill their purpose.”); see also Wogalter, supra note 85, at 5.
103. Stewart & Martin, supra note 66, at 8; Wogalter, supra note 85, at 5; Don Oldenburg, Words of Warning, WASH. POST, Mar. 17, 1992, at B5; Hadden, Regulating Product Risks, supra note 8, at 98. See also Eddie M. Clark & Timothy C. Brock, Warning Label Location, Advertising, and Cognitive Responding, in ATTENTION, ATTITUDE AND AFFECT IN RESPONSE TO ADVERTISING 287, 296 (Eddie M. Clark et al. eds., 1994) (discussing experiments to assess effect of variations in the format of warnings).
104. Telephone Interview with Caraway, supra note 97. For instance, the manufacturers of ceramic tableware containing lead are required by a consent judgment to provide warnings by posting yellow triangles on or near their products (along with in-store warnings). See Prop. 65 Litigation, supra note 15, at 15. As a result of another settlement, warnings posted in dentists’ offices for some dental fillings containing mercury include a yellow triangle. Jane Kay, Dentists To Post Warnings on Mercury, S.F. EXAMINER, Dec. 14, 1993, at Al. (There is currently no widely accepted symbol for conveying cancer or reproductive toxicity risks. See infra notes 112-14 and accompanying text.)
105. See Warning for Zymolyet Speed-E-Namel.
106. See Warning for Reefer Galler’s “No-Moth” mothballs.
107. See Warnings for Benjamin Sheridan bullet cartridges; Winchester bullet cartridges.
108. See Warning Label for SecondWind Shoe Goo.
109. Environmental Defense Fund v. Parks Corp., No. 941281 (S.F. Super. Ct. filed Mar. 11, 1992), summarized in Prop. 65 Litigation, supra note 15, at 27-28. The plaintiffs’ expert in that case testified that the warnings were inconspicuous because they were placed
jurors reported being struck by the fact that the defense's own expert witness, when presented with a huge poster-sized blowup of the defendant's paint stripper label, could not locate the warning without help from defendant's lawyer. The failure of companies to place warnings in more conspicuous locations greatly reduces the number of people who see them, since most consumers are not likely to actively seek information about products.

b. Content of Warnings

i. Communication of Exposure Information

Proposition 65 does not require any specific warning language, but the regulations do set forth "safe harbor" warning messages, which have been used on virtually all consumer product warnings. The basic safe harbor message for a consumer product warning states: "WARNING: This product contains a chemical known to the State of California to cause cancer [birth defects or other reproductive harm]." The warning message does not use symbols, despite a great deal of evidence that in addition to increasing the attractiveness of a warning, symbols facilitate the ability of consumers to process warning information. Symbols are especially desirable given the substantial

on the back of the can, printed in small type, and surrounded with other information. Todd Woody, Prop 65 Faces Ist Jury Test, Record, Feb. 24, 1994, at 1. The expert also testified that the warning message provided by the defendant, which referred to the carcinogenicity of methylene chloride in laboratory animals, implied a lower risk to humans. Id.

110. Dennis Pfaff, Company Fined $210K for Prop. 65 Breach, L.A. Daily J., Mar. 8, 1994, at 3. In another case, warnings for brass kitchen faucets were provided on warranties or on other product instructions stuffed inside the boxes in which faucets are packaged. Despite hearing evidence that close to fifty percent of consumers do not install their own faucets, and thus likely never see these warnings, a superior court judge refused to require the manufacturers to provide more noticeable forms of warning, such as a hang tag from the faucet, or a sticker embossed on the faucet. See People v. American Standard, No. 948017 (S.F. Super. Ct. filed Dec. 15, 1992); NRDC v. Price Pfister, No. 948024 (S.F. Super. Ct. filed Dec. 15, 1992).

111. See Nordenstam & DiMento, supra note 35, at 353-54 ("A risk communication program which requires active information seeking by the consumer will reach only a small minority of the intended audience.").

112. Cal. Code Regs. tit. 26, § 22-12601(b)(4)(A)-(B) (1995). For fresh fruits, nuts, and vegetables, the warning instead reads: "This product may contain a chemical known to the State of California to cause cancer, or birth defects or other reproductive harm." Id. § 22-12601(b)(4)(D) (emphasis added).

A separate "safe harbor" message for alcoholic beverages also exists: "WARNING: Drinking Distilled Spirits, Beer, Coolers, Wine and Other Alcoholic Beverages May Increase Cancer Risk, and, During Pregnancy, Can Cause Birth Defects." Id. § 22-12601(b)(4)(E).

113. Bettman, supra note 49, at 14. Bettman and his colleagues argue that symbols should be used whenever possible to depict the type and degree of hazard posed by a product. Id.; see also Haden, Regulating Product Risks, supra note 8, at 98 (graphical presentation is one method of improving understanding of warning messages). But see Stewart & Martin, supra note 66, at 8-9 (suggesting that because symbols can take many
portion of the population that cannot read, is functionally illiterate, or cannot read English.\textsuperscript{114}

The safe harbor warning statement also does not inform individuals that use of the product will expose them to a listed chemical. Rather, it simply contains the less informative message that the product contains a listed chemical. This inadequacy directly hinders communication of the statute's central message. It also makes the warning less personally relevant to recipients and more likely to be overlooked, since, not surprisingly, consumers are more likely to attend to warnings that they find personally relevant.\textsuperscript{115}

In adopting this language, HWA took the position that communicating the presence of a listed chemical is normally sufficient to imply the certainty of potential exposure.\textsuperscript{116} This presumption is clearly flawed for consumer products where the circumstances of exposure are not obvious. It seems improbable, for example, that consumers warned that a brass kitchen faucet contains lead will understand that they actually ingest lead when they drink from the faucet. Moreover, consumers are less likely to read warnings if they believe a product is not hazardous.\textsuperscript{117} Since consumers regard most products in common usage as safe,\textsuperscript{118} they are not likely to pay close attention to a warning, like the safe harbor message, that does not challenge these existing assumptions.

Notably, state regulators have subsequently acknowledged that the safe harbor language "lacks the information that a recipient expects to receive," and leaves recipients unsure about "whether there is an exposure, the identity of the chemical, and the source of the exposure."\textsuperscript{119} The safe harbor language, however, has not been changed.

\begin{footnotesize}
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  \item \textsuperscript{114} A 1992 national assessment found that 21\% of U.S. adults, age 16 and over, lacked the ability to understand and use printed textual material in English, as tested by the ability to locate a single item of information within a short text. \textsc{Irwin S. Kirsh}, U.S. \textsc{Department of Education}, \textsc{Adult Literacy in America} 16-17, 73-75 (1993), reprinted in \textsc{Thomas D. Snyder \& Charlene M. Hoffman}, U.S. \textsc{Department of Education}, \textsc{Digest of Educational Statistics} 392, 408 (1994).
  \item \textsuperscript{115} Stewart \& Martin, \textit{supra} note 66, at 5; \textit{see also} \textsc{National Academy of Sciences}, \textit{supra} note 53, at 165-66 (emphasizing the importance of making risk information personally relevant to recipients).
  \item \textsuperscript{116} See \textit{Final Statement}, \textit{supra} note 75, at 24-25.
  \item \textsuperscript{117} Wogalter et al., \textit{Consumer Product Warnings: The Role of Hazard Perception}, 22 \textit{J. Safety Res.} 71, 72-75 (1991); Hadden, \textit{Regulating Product Risks}, \textit{supra} note 8, at 98 ("[I]n the world of labeling, familiarity with a product does appear to breed contempt of risk, and contempt of the need to read and use warnings and instructions.").
  \item \textsuperscript{118} See Ingredient Communication Council, Inc. \textit{v. Lungren}, 4 Cal. Rptr. 2d 216, 225 (Ct. App. 1992) (in the absence of Proposition 65 warnings, most consumers assume that products they purchase are safe).
  \item \textsuperscript{119} California Health and Welfare Agency, \textit{Initial Statement of Reasons}, \textit{Notice of Proposed Rulemaking, Amendments to Section 12601}, at 3 (1991) \textit{[hereinafter Initial}
\end{itemize}
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Proposition 65 warnings also fail to identify the specific chemicals causing an exposure. The HWA reasoned that this would make warnings too congested and cumbersome to read.\textsuperscript{120} This logic seems faulty. While many chemical names mean little to most of the public, identifying the specific names of harmful chemicals promotes more fully informed disclosure and decisionmaking.\textsuperscript{121} Listing chemical names enables interested individuals to determine the relevant health effects of exposures on their own, and facilitates their ability to seek treatment for injuries or compensation through the tort system.\textsuperscript{122}

The warnings also fail to convey other useful information for informed decisionmaking, such as the means of exposure (inhalation, ingestion, or absorption), or information about steps that can be taken to reduce exposures. The statutory language and accompanying ballot arguments of Proposition 65 indicate that stimulating precautionary behavior by consumers is not a primary objective of the statute. Providing some precautionary information in warnings, however, would be beneficial to consumers and would certainly be consistent with its broad statutory purposes.\textsuperscript{123}

\textit{ii. Communication of Risk Information}

A Proposition 65 warning essentially warns that there is some level of risk associated with a product. However, the safe harbor warning message does not provide the consumer with any basis for evaluating the level or nature of the risk posed by individual exposures.\textsuperscript{124} The consumer knows only that the product contains a chemical known to cause cancer or reproductive toxicity. A warning that more accurately explains that the product exposes the consumer to a

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{120} Final Statement, \textit{supra} note 75, at 4, 25.
\item \textsuperscript{121} Where there are multiple chemicals in a product causing exposures above the warning level, requiring identification of only the 2 or 3 causing the highest exposures would prevent the warnings from becoming cluttered with information. This suggestion was made by OEHHA as part of its unsuccessful reform proposals. \textit{See infra} part IV.A.
\item \textsuperscript{122} Moreover, the failure to require inclusion of chemical names has contributed to the problem of overwarning; businesses that warn solely as a hedge against liability can more easily hide behind a generic warning if they do not have to disclose the name of the chemical(s) responsible for the supposed exposure. \textit{See infra} notes 143-46 and accompanying text.
\item \textsuperscript{123} For example, faucet warnings could state that lead exposures can be dramatically reduced if users run their water for 30 to 60 seconds before use. Likewise, after a settlement with the Attorney General's Office, wine manufacturers instructed users that wiping the lip of a wine bottle with a towel before pouring the wine reduces lead exposures. Prop 65 Litigation, \textit{supra} note 15, at 13.
\item \textsuperscript{124} \textit{See} Stenzel, \textit{supra} note 53, at 515; W. Kip Viscusi, \textit{Predicting the Effects of Food Cancer Risk Warnings on Consumers}, 43 \textbf{FOOD DRUG COSM.} L.J. 283, 296 (1988).
\end{itemize}
\end{footnotesize}
specific chemical would still fail to describe the level of risk posed by the exposure.

The extensive literature in this area confirms that communicating information about risks to the public effectively is not an easy task.\textsuperscript{125} Most individuals have difficulty making sense of risk information, which is often presented in complex scientific terms.\textsuperscript{126} People also tend to distort risks by relying on heuristics\textsuperscript{127} or by allowing common psychological factors and other personal experiences to affect their risk perceptions.\textsuperscript{128}

Nonetheless, Proposition 65’s “one-size-fits-all” safe harbor message, which fails to provide the public with any guidance in evaluating the level of risk (or distinguishing among products with different risk levels), further decreases the probability that consumers will accurately judge the risks involved.\textsuperscript{129} This is particularly true given that certain qualitative dimensions of Proposition 65 risks and heuristics are likely to lead to exaggerated risk perceptions, while others may cause an underestimation of the risks involved.

For example, risks of cancer or reproductive harm have certain characteristics that are generally known to cause people to increase

\begin{footnotes}
\footnote{125} Bettman et al., supra note 49, at 12-13. The literature describing how risk information is communicated and how it is perceived by the public is considerable. See generally NATIONAL ACADEMY OF SCIENCES, supra note 53; Paul Slovic, Perception of Risk, 236 SCIENCE 280 (1987); Covello et al., supra note 66; JUDGMENT UNDER UNCERTAINTY: HEURISTICS AND BIASES (Daniel Kahneman et al. eds., 1982) [hereinafter JUDGMENT UNDER UNCERTAINTY]; see Nordenstam & DiMento, supra note 35 (reviewing variety of social science research about risk communication relevant to right-to-know laws, including Proposition 65). The divergence between public perceptions of risk and those of scientific experts has been the source of much recent commentary. See Clayton Gillette & James Krier, Risk, Courts, and Agencies, 138 U. PA. L. REV. 1027, 1071-85 (1990); STEPHEN BREYER, BREAKING THE VICIOUS CIRCLE: TOWARD EFFECTIVE RISK REGULATION (1993).

\footnote{126} See HADDEN, supra note 7, at 215 (“The evidence that people do not understand risk information very well is nothing less than overwhelming.”).

\footnote{127} Heuristics are rules of thumb or strategies for systematically simplifying the search through available information about a problem; they function by disregarding some of the information. Bettman et al., supra note 49, at 9-10. Although heuristics are a basic principle of human information processing, they can distort risk perceptions. Id. at 10. For a discussion of heuristics that people use to evaluate risk, see Amos Tversky & Daniel Kahneman, Judgment Under Uncertainty: Heuristics and Biases, in JUDGMENT UNDER UNCERTAINTY, supra note 125, at 3.

\footnote{128} The public evaluates risk based on a range of qualitative factors other than the probability of a hazard occurring. See Slovic, supra note 125, at 282-83; NATIONAL ACADEMY OF SCIENCES, supra note 53, at 51-52; Mary L. Lyndon, Risk Assessment, Risk Communication and Legitimacy: An Introduction to the Symposium, 14 COLUM. J. ENVTL. L. 289, 299 (1989) (risks have more physical and social characteristics than mortality or morbidity numbers; they have dimensions that are emotional, moral, political, and economic); ENVIRONMENTAL EQUITY, supra note 65, at 39 (public is particularly concerned about “outrage factors” that offend a sense of fairness).

\footnote{129} See Viscusi, supra note 124, at 296 (criticizing Proposition 65 warnings as equivalent to a store grading all eggs as “jumbo”).}
their perception of riskiness—they are dreaded, involve delayed im-
pacts, affect children, and are not well understood (compared to, for
example, an automobile accident). People also tend to perceive the
probability of a hazard occurring based on how easy it is to imagine or
recall that particular threat. Known as the “availability” heuristic,
dramatic or sensational hazards or those subject to frequent media
coverage are commonly perceived as the most likely to occur. Some evidence suggests that this heuristic causes people to overesti-
mate the likely occurrence of cancer.

Warning specialist Kip Viscusi argues that consumers will signifi-
cantly overestimate the risks associated with Proposition 65 warnings
because they use the signal word “Warning,” because they do not
provide information about specific risks associated with them, and be-
cause the public has difficulty interpreting probabilistic
information.

On the other hand, other factors may lead consumers to under-
react to Proposition 65 warnings. For example, consumer products for
which Proposition 65 warnings are required largely entail risks which

130. See Slovic, supra note 125, at 282-83; National Academy of Sciences, supra
note 53, at 97; Vincent T. Covello, Communicating Right-to-Know Information on Che-
miCal Risks, 23 EnvTL. SCI. & TECH. 1444, 1447 (1989); Arthur C. Upton, Carcinogenic Risk
Assessment in Proper Perspective, 4 TOXICOLOGY & INDUS. HEALTH 443, 448-49 (1988)
(reporting that the average American considers cancer to be uncommon—despite the fact
that one in every four persons in the United States develops cancer, and one in every five
eventually dies of the disease—because the public perception of the risk of cancer is
colored by emotion).

131. Paul Slovic et al., Facts Versus Fears: Understanding Perceived Risk in Judgment
Under Uncertainty, supra note 125, at 463, 465-70.

132. Viscusi, supra note 124, at 290-98. Viscusi goes on to conclude that “[p]erhaps the
best case outcome possible is that consumers will disregard the labeling effort altogether as
being irresponsible and without informational content.” Id. at 303. This broad condemna-
tion of the statute is not warranted for a number of reasons. First, Viscusi concludes that
the safe harbor message is too strong for exposures posing risks at or near the warning
threshold. See id. Many consumer product exposures, however, (as well as environmental
and occupational exposures) pose risks well above the warning level. Second, Viscusi’s
critique is strongly colored by his belief that the statutory warning threshold is unduly
protective, see id. at 288 (the 1 in 100,000 level is “too low a risk level to pose a truly
significant risk for individual decisions”), but it is less stringent than other thresholds used
to impose substantive restrictions on carcinogens. Viscusi also believes that Proposition
65’s risk assessment methodology is too stringent. See id. In fact, it reflects standard risk
assessment methodology. Finally, Viscusi argues that “Warning” is too severe a signal
word for Proposition 65 warnings because it is used to convey the second-highest degree of
human hazard (intermediate between “Danger” and “Caution”) in standards developed by
the American National Standards Institute (ANSI) (a widely followed private standard-
setting organization). Id. at 290. But research suggests that in practice people do not ap-
npreciate this hierarchy, and that “[i]f anything, ‘Warning’ often has a legal connotation of
‘Notice’ or ‘take heed before you get penalized’ and not one of safety hazard.” Brewster
et al., supra note 65, at 21, 24-25; see also Michael S. Wogalter & N. Clayton Silver,
Arousal Strength of Signal Words, 3 Forensic Reports 407, 409, 417 (1990) (people do
not perceive differences between signal words “Warning” and “Caution”).
are voluntary and are likely to be perceived as within an individual’s control, factors that tend to decrease the level of perceived risk.\footnote{See Slovic, supra note 125, at 282-83; National Academy of Sciences, supra note 53, at 97; Covello, supra note 130, at 1447.}

Likewise, people have a tendency to maintain their prior beliefs despite later evidence to the contrary (known as the “anchoring” heuristic).\footnote{Paul Slovic et al., Informing the Public About the Risks from Ionizing Radiation, in \textit{Judgment and Decision Making: An Interdisciplinary Reader} 114, 118 (Hal R. Arkes & Kenneth Hammond eds., 1986).} Changing these initial risk perceptions requires persuasive warnings.\footnote{See Viscusi and O’Connor, supra note 48, at 123-24; Wesley A. Magat & W. Kip Viscusi, \textit{Implications for Economic Behavior}, in \textit{Learning About Risk}, supra note 48, at 125, 129; Hadden, \textit{Regulating Product Risks}, supra note 8, at 98-100 (given that people’s risk perceptions are difficult to change and that warning labels are not very effective in providing information, it is not surprising that warning labels are not strong enough to change risk perceptions and invoke action).}

In some situations, the safe harbor warning is not sufficient to overcome preexisting beliefs about the general safety of consumer products—e.g., a warning that a kitchen faucet “contains” lead is unlikely to alter prior beliefs that use of the faucet causes no exposure to lead in tap water.\footnote{See Bettman, et al., supra note 49, at 5 (noting that consumers are likely to underestimate risks of familiar household products).}

In their review of risk communication research relevant to right-to-know laws, social scientists Brenda Nordenstam and Joseph DiMento point out that people’s reliance on stereotypical information to judge the likelihood of something occurring, rather than on actual rates of occurrence (known as the “representativeness” heuristic), may lead to underestimations of Proposition 65 risks.\footnote{Nordenstam & DiMento, supra note 35, at 363.} Individuals who do not believe that they possess certain stereotypical features may incorrectly conclude that a particular activity subject to a Proposition 65 warning does not pose a serious risk. Nordenstam and DiMento also argue that other factors will likely result in under-reaction to risk information conveyed by right-to-know laws. These factors include: the lack of obvious immediate adverse effects from exposures to carcinogens (which in turn may ultimately undermine the impact and credibility of warnings about such exposures), the limited extent to which individuals seek out information, and the lack of concrete information in the warnings.\footnote{Id. at 363-65.}
statement as a safe harbor warning because it "may create the incorrect impression that chemicals for which only animal data exists pose less of a risk than chemicals for which there is human data." This judgment is sound; given the current knowledge base of most individuals and absent other interpretive data, such language is more likely to mislead consumers than to inform them accurately about risk levels. A jury reached the same conclusion in *Environmental Defense Fund v. Parks Corp.* In that case, the Proposition 65 warning at issue stated that "methylene chloride has been shown to cause cancer in certain laboratory animals." The jury found that the warning was not clear and reasonable based on expert testimony that most people think a laboratory animal warning implies a lower risk to humans.

Other businesses have sought to reduce perceptions of risk by using disclaimers that undermine or contradict the warning message or imply that the risk levels involved are trivial. For example, one consumer product warning reads:

**WARNING:** This product contains detectable quantities of chemicals known to the State of California to cause cancer, birth defects or other reproductive harm; however, the chemicals may not be in sufficient quantities to cause such cancer, birth defects, or other reproductive harm.

In another instance, a residential developer distributed warning materials stating that the presence of many Proposition 65 chemicals: may be negligible or nonexistent in our construction. [Proposition 65] does not regulate the amount of a substance that needs to be present in order to be considered an exposure, or the length of time a person needs to be in its vicinity. Any amount, no matter how negligible, necessitates a warning being posted.

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139. Final Statement, *supra* note 75, at 25. The Agency further explained that "the reference to testing in lab animals could be construed to mean that there is no real danger to humans, when in fact the potency of the chemical is high but there simply is no available epidemiologic data." *Id.* at 46.


141. *Jordan, supra* note 15, at 34 & n.176. The warning language has been approved for products containing methylene chloride by the Consumer Product Safety Commission for warnings required under the Federal Hazardous Substances Act.

142. Consumer product warnings that include language in addition to that specified in the regulations are not considered "safe harbor" warning messages. Final Statement, *supra* note 75, at 5. The regulations, however, do not restrict businesses from including other statements in the warnings.


144. *Proposition 65 and Your New Home* at 2 (Notice posted by Webb & Associates, on file with author). The notice goes on to say:

> You might also ask since many of these substances listed are commonly present in the environment whether a pregnant woman should indeed be anywhere but in a bubble with a controlled and protected environment.

> Obviously, if you are pregnant you need to be cautious, but our model homes and newly constructed homes probably do not pose any increased risk over the
Finally, other disclaimers downplay the risk levels by imposing the company's view of what is a "genuine" hazard or a "significant" health danger—an inherently subjective judgment—on the warning recipient. Thus, for example, one warning states:

WARNING: This product contains a chemical known to the State of California to cause cancer, birth defects or other reproductive harm. This notice in no way implies that we have any evidence or experience to indicate that any genuine hazard of cancer, birth defects, or reproductive harm results from the normal, proper handling described on our labels and related literature.145

Another deficiency in the warnings is that the current safe harbor message fails to alert recipients to the uncertainties involved in the risk assessment process itself.146 Underlying every warning is (or should be) a minimum determination that individuals exposed to a listed chemical face an additional risk of contracting cancer greater than 1 in 100,000, assuming lifetime exposure at the level in question (or a risk of reproductive harm greater than the statutory threshold). As critics on all sides have noted, this risk assessment process is filled with imprecision and scientific uncertainties.147 Thus, while warnings

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145. See Initial Statement, supra note 119, at 3. A warning provided for brass faucets includes an introductory paragraph, and the following statement, before the safe harbor message:

Preliminary industry tests have indicated that users of faucets made from brass face no significant health danger. Although brass has been used in faucets for at least sixty years, we are unaware of any proven harmful effects attributable to them since that time. Proposition 65, however, requires that we provide you with the following notice.

Warning provided by Universal-Rundle Corporation.

146. Stenzel, supra note 53, at 512-16. See also John P. Dwyer, Innovative Risk Regulation Under Proposition 65, PROP 65 NEWS, Feb. 1992, at 31 (calling Proposition 65 warnings "simple and simplistic"). The risk assessment process consists of four principal steps: (1) Hazard identification: determining whether a particular chemical is causally related to a health effect; (2) Dose-response assessment: determining the relationship between the magnitude of the exposure and the probability of occurrence of the health effect in question; (3) Exposure assessment: determining the extent of human exposure to a particular chemical; and (4) Risk characterization: describing the nature and magnitude of risk associated with exposure to the chemical. NATIONAL RESEARCH COUNCIL, RISK ASSESSMENT IN THE FEDERAL GOVERNMENT: MANAGING THE PROCESS 19-21 (1983) [hereinafter RISK ASSESSMENT IN THE FEDERAL GOVERNMENT].

147. For cancer risk assessments, these include, among many others, uncertainties about exposure information and assumptions, dose-response curves, scaling factors, confidence limits, exposure to especially sensitive populations, and cumulative and synergistic risks. An oft-cited study about risk assessment by the National Research Council identified 50 quantitative risk assessment "components," each with "inference options," requiring the risk assessor to select between different plausible scientific judgments about uncertain data or theoretical connections. RISK ASSESSMENT IN THE FEDERAL GOVERNMENT, supra note 146, at 28-33. At each point, the consequences of selecting one assumption over another are substantial. See Howard Latin, Good Science, Bad Regulation, and
should provide the public with some meaningful information regarding the level of risk from exposure, such warnings should simultaneously inform recipients of the uncertainties in the risk assessment process.

3. Environmental Warnings

a. Presentation of Warnings

Crafting warning regulations for environmental exposures presented the most difficult challenge for the HWA. There were few, if any, relevant precedents among regulatory warning programs. The scope of this category is also problematic because it encompasses a wide range of exposures—from the application of pesticides to a residential lawn, to exposures affecting visitors at a commercial facility, to industrial air emissions impacting a neighborhood two miles away.

The regulations identify three types of “safe harbor” warning methods and mandate that the “most appropriate” of the three under the circumstances be employed. The methods, drawn from the statute, are: signs in the affected area (i.e., facility signs); a quarterly mailed notice; and a quarterly public media announcement targeting the affected area.

The HWA was markedly ineffective in articulating specific guidance for ascertaining which methods should be employed in a particular instance, asserting that the determination was “case-specific.”

There are many similar uncertainties involved in reproductive toxicity risk assessments, including the critical assumption of a threshold for the dose-response curve for reproductive effects. See Carole A. Kimmel, *Approaches to Evaluating Reproductive Hazards and Risks*, 101 ENVTL. HEALTH PERSP. SUPP. 137, 138 (1993).


150. *Id.* §§ 22-12601(d)(1)(A)-(C).

151. HWA explained that signs may be appropriate where the exposure occurs on-site, or in surrounding neighborhoods, but at some point the distance from the source becomes too great for this to be effective. It added that “mailed warnings may be effective for off-site exposures, but the logistics of providing such warnings on a large scale may be prohibitive. Media warnings may be well-suited to warn large segments of the population, but not plant visitors.” Final Statement, *supra* note 75, at 41, 42.
to warn affected residents of offsite environmental exposures. \textsuperscript{152} Since individual mailings are by their nature far more likely to be seen and read than newspaper notices, this method dramatically reduces the visibility of the warnings. Only around sixty percent of the adult population reads daily newspapers. \textsuperscript{153} Of this group, only around forty-five percent view every page. \textsuperscript{154} Newspapers have hundreds of advertisements (advertising constitutes roughly sixty-five percent of newspaper space), \textsuperscript{155} and readers typically view only a fraction of them. \textsuperscript{156}

The regulations do not specify any format or design for environmental warnings. \textsuperscript{157} A general limitation similar to that for consumer product warnings applies; a warning must be provided in a conspicuous manner and "under conditions which make it likely to be read, seen, or heard and understood by an ordinary individual in the course of normal daily activity." \textsuperscript{158}

However, this restriction has generally been ignored by businesses, and most warnings are inconspicuous. Facility signs' size, placement, and noticeability have varied considerably. \textsuperscript{159} Some warnings are hidden behind counters or placed at foot level at building entrances. Few, if any, signs use design features to increase their salience. Likewise, almost all newspaper warnings have not been well designed to attract attention. \textsuperscript{156} Some of the warnings have been placed in the classified section of newspapers, and others in the legal notices section with bankruptcy notices and foreclosure announce-

\textsuperscript{152} Telephone Interview with Craig Thompson, supra note 97. Notable exceptions are major utility companies such as Pacific Gas & Electric (PG&E) and San Diego Gas & Electric (SDG&E), which have sent quarterly warnings with their customer bills. \textit{Id.}

\textsuperscript{153} Tim Jones, \textit{Newspapers Rush Across Technological Threshold To Secure a Future}, CHI. TRIB., Apr. 10, 1994, at Cl.

\textsuperscript{154} B. Stewart Tolley & Leo Bogart, \textit{How Readers Process Newspaper Advertising, in Attention, Attitude and Affect in Response to Advertising}, supra note 103, at 69, 70.

\textsuperscript{155} C. Edwin Baker, \textit{Advertising and a Democratic Press} 45 (1994).

\textsuperscript{156} See Tolley & Bogart, supra note 154, at 70-73. Moreover, even though eye camera studies demonstrate that readers technically "see" many advertisements, any particular ad will not be read unless the reader recognizes the topic as inherently interesting or useful. \textit{Id.} at 71, 73-74.


\textsuperscript{159} Telephone Interview with Craig Thompson, supra note 97; Telephone Interview with Caraway, supra note 97.

\textsuperscript{160} This discussion, and that in \textit{infra} part IV.B., is based largely on several hundred newspaper advertisements from 1988 to 1995 clipped by Burrelle's clipping service. Copies available through the author. \textit{See also} Telephone Interview with Catherine Caraway, supra note 97.
ments. Many warnings have physical characteristics that render them inconspicuous and difficult to read. Some design techniques for newspaper warnings include formatting the warning in small one-column listings or presenting the warning as one block of continuous copy, with no paragraphs, headings, or changes in type size. Others are single spaced, some are all capitalized, and many have small print. Only a handful use graphics or pictorials, and many do not use “Warning” as a signal word. Such inconspicuous warnings face the insurmountable task of competing with commercial advertisements, photographs and eye-catching headlines for the attention of newspaper readers.

b. Content of Warnings

i. Communication of Exposure Information

The regulations mandate “safe harbor” warning language only for facility signs (i.e., on-site exposures). This language, used in most facility signs, states: “WARNING: This area contains a chemical known to the state to cause cancer [birth defects or other reproductive harm].” Some warnings use the more abstruse phrase, “detectable quantities of chemicals” are found in the area.

There is no safe harbor language for off-site exposures, and businesses have been left free to devise their own warnings. The great majority of these warnings do not state that their facilities emit or release chemicals or that facility emissions result in human exposures. Standard warning language states that the facility “uses” or “contains” chemicals or that chemicals “are present” or “may be found” in or near the facility. A considerable number never even use the word “warning.” Most warnings also fail to demarcate the areas in which exposures occur. This radius could extend from a block to five miles from the facility site. Finally, the warnings often exclude other infor-

161. See James Wheaton & Susan Jordan, New Warning Regs: Better Regs for Better Business, 6 PROP 65 NEWS, Oct. 1992, at 7 (stating that some companies have “plac[ed] incomprehensible and virtually invisible ‘notices’ buried in classified sections where their presence is ‘reasonably calculated’ to be ignored”).
162. Warnings printed in all capital letters are harder to read than warnings with upper and lower case letters. BREWSTER, supra note 65, at 12.
164. See Initial Statement, supra note 119, at 4.
165. The regulations state only that all warnings for environmental exposures shall be “reasonably associated with the location and source of the exposure.” Id. § 22-12601(d)(2).
166. See Notice of Rohr, Inc.
167. See Notice of Chem-Tronics, Inc.
mation concerning the various means of exposure or precautionary measures to avoid or minimize the risks.\textsuperscript{168}

A substantial number of newspaper warnings, particularly warnings published jointly by companies within a single industry, do not identify the facility(ies) causing exposures.\textsuperscript{169} For example, one ongoing oil industry warning covers exposures from "gas stations, refineries, chemical plants, oil and gas wells, oil and gas treating plants, petroleum and chemical storage tanks, pipeline systems, tank trucks and cars, loading and unloading facilities."\textsuperscript{170} The warning is published on behalf of twenty-three oil companies and their subsidiaries operating throughout California, without providing an address or location for any of the thousands of facilities covered.\textsuperscript{171}

Rather than warn, almost all environmental warnings impart a message that is uninformative, personally irrelevant, and potentially confusing to the reader. For example, a warning in the lobby of a fifteen-story office building stating that the building "contains" listed chemicals, without any identification of the source and location of the chemicals, has little informational value to the recipient and is likely to be confusing.\textsuperscript{172} Likewise, after some home developers posted warnings stating that "this area contains [listed] chemicals," ostensibly warning persons about exposures to chemicals in materials used in new home construction, OEHHA received queries from puzzled recipients asking whether the warning meant that their housing tract was built on a hazardous waste site, whether the drinking water in the area was contaminated, or whether there was a nearby facility emitting toxic chemicals into the air.\textsuperscript{173} Thus, as with consumer products, the environmental exposure warnings do not convey the central information about exposure necessary to effectuate the informational objectives of the statute.

\textbf{ii. Communication of Risk Information}

As with consumer product warnings, environmental exposure warnings do not include any explanatory information about the level or nature of risk caused by exposures. Many contain additional infor-

\begin{itemize}
\item \textsuperscript{168} See supra notes 119-23 and accompanying text. See also Edward Black, \textit{California's Community Right-to-Know}, 16 ECOLOGY L.Q. 1021, 1049-50 (1989) (arguing that the public needs information about health effects, exposure levels, and how released chemicals interact with the environment to put EPCRA data into context).
\item \textsuperscript{169} See, e.g., Notice of the Southern California Paint & Coatings Association; Notice of Aggregate Material Producers in San Diego County.
\item \textsuperscript{170} E.g., Notice published in \textit{Los Angeles Times}, Aug. 26, 1991, at A17.
\item \textsuperscript{171} Id.
\item \textsuperscript{172} The same is true when persons living two miles from a facility read a newspaper ad stating that the facility "may contain" a listed chemical.
\item \textsuperscript{173} See Initial Statement, \textit{supra} note 119, at 7.
\end{itemize}
mation that affirmatively hinders accurate understanding of risk information. A considerable number of warnings explicitly disclaim the need to give a warning by stating that the company "is giving this notice even though we believe actual emission levels at our facility are within applicable regulatory limits." Some warning ads seek to minimize the risk levels by portraying the risks involved as "acceptable." One such ad states: "[Our] policy is to design, manufacture and distribute all products and to handle and dispose of all materials safely and without causing any unacceptable risks to health, safety or the environment." As discussed above, however, the "acceptability" of risk is an inherently subjective issue. When the risks are involuntary, outside of any individual's control, and unfair, (benefitting a particular company while imposing costs on a large community), the public is likely to evaluate risks from a much different perspective than that of the company.

In many warnings, the exposure notice is accompanied by disclaimers as well as lengthy introductions and self-serving statements about the company's health and safety record. For example, in one small warning ad, roughly half the text is devoted to a statement that avers: "The companies listed below independently declare their commitment to an environmentally safe and clean community, and separately, through each company's individual programs, continually strive to insure compliance with local, state and federal environmental, health and safety regulations."

A warning advertisement published by McDonnell Douglas Corporation bears the heading "McDonnell Douglas Corporation Wants You to Know," and states that: "as a longtime leader of aerospace manufacturing, McDonell Douglas Corporation (MDC) has always made safety and a clean environment among our top priorities. What you may not know is that MDC has an equal interest in the health and safety of you—our neighbors." This type of filler material dominates many notices, effectively turning off the reader's attention entirely or trivializing any risks involved. The net effect is that such warnings read like public relations promotions and frustrate the accurate comprehension of risk data.

175. Notice of Allied-Signal, Inc.
176. See Covello, supra note 130, at 1446-48; HADDEN, A CITIZEN'S RIGHT TO KNOW, supra note 8, at 149.
177. The notice then states that the "following facilities may contain chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm," and lists the names of the four companies (with no addresses). Public Notice, SAN DIEGO UNION-TRIB. (Oct. 12, 1994).
4. Occupational Warnings

a. Presentation of Warnings

HWA implementing regulations identify three types of “safe harbor” warning methods for occupational warnings. One is a label on products or substances used in the workplace. A second is a sign in the workplace. The third is a warning method that complies with the requirements of the Hazard Communication Standard (HCS) adopted by OSHA, or for pesticides, the comparable Pesticide and Worker Safety requirements of the California Food and Agriculture Code.

The HCS requires employers to provide information to their employees concerning hazardous chemicals through labels on hazardous products, Material Safety Data Sheets (MSDSs) about hazardous products, and training sessions to educate employees about the identity, use, and control of hazardous substances. Because many of the chemicals covered under Proposition 65 are already subject to the HCS, businesses have been able to rely largely on the above notification scheme to provide warnings. Where additional warnings are required, most employers have responded by posting a boilerplate sign stating, “This area contains chemicals known to the State of California to cause cancer [or reproductive harm].” As with warnings for other environmental media, the regulations do not prescribe size, location, or other specifics about the format of workplace warnings.

179. CAL. CODE REGS. tit. 26, § 22-12601(c)(1)(A) (1995). The warning must be displayed on the product or substance “under circumstances which make it likely that the warnings will be read and understood by employees ... prior to [ ] exposure.” Id.

180. Id. § 22-12601(c)(1)(B). The warning must be posted “under conditions [that] make it likely [that it will] be read and understood by employees ... prior to [ ] exposure.” Id.

181. Id. § 22-12601(c)(1)(C). While warning methods required by HCS are considered safe harbors under Proposition 65, the warning message is not.


183. For some chemicals, however, Proposition 65’s warning threshold is more stringent than the HCS. For example, if a carcinogen is present in a mixture, the HCS is triggered if the concentration of the carcinogen is greater than one-tenth of one percent. Proposition 65’s warning requirement, by contrast, is triggered by the actual level of worker exposure to the chemical.

184. This discussion of occupational warnings is based on telephone interviews with Len Walsh, Cal-OSHA Legal Unit, May 19, 1995; Mike Horowitz and Deborah Gold, Cal-OSHA San Mateo Dist. Office, May 19, 1995; Scott McAllister, Cal-OSHA Oakland Regional Office, May 19, 1995; Jerry Niesler, Cal-OSHA Southern California Regional Office, May 29, 1995; Joyce Simonowitz, Cal-OSHA Southern California Regional Office, June 1, 1995; and Joe Enos, United Auto Workers Ergonomics, Health & Safety Representative, New United Motors Inc. (NUMI), Fremont, CA, May 22, 1995.

185. Occupational warnings are subject to the same general requirements of conspicuousness as consumer product warnings, namely, that circumstances make it likely that the
Most employers post warnings at the main entrance to the facility or workroom; these warnings are generally visible to employees. Others appear on employee bulletin boards, or elsewhere in the facility. A few products in the workplace have small Proposition 65 warnings pasted on top of product labels, and some MSDSs also include the safe harbor message. Few warnings, if any at all, use symbols, icons, color graphics, print size, placement, or other means to capture workers' attention.

b. Content of Warnings

i. Communication of Exposure Information

The regulations identify two safe harbor warning messages for occupational exposures. For signs in the workplace, the warning language reads: "WARNING: This area contains a chemical known to the state to cause cancer [birth defects or other reproductive harm]." For warnings located on a product or substance label, the safe harbor language for consumer products applies. These messages have generally been used by businesses providing warnings.

The workplace sign safe harbor message does not effectively communicate exposure information to employees. The warning refers only to a general work area as "containing" listed chemicals, without focusing on any particular exposures. The message does not specify, either by generic or chemical name, the chemicals applicable to the warning, or even if exposure to more than one chemical is occurring. Thus, workers have no way of knowing whether the warnings refer to substances subject to the HCS or whether the message refers to additional Proposition 65 chemicals for which a warning is required. Workers are not likely to expend significant effort to obtain this data, since research indicates that employees' level of information-seeking is very low. Moreover, as with other warnings, the message fails to inform employees that they are actually being exposed to listed chemicals.

As noted above, the warnings do not include symbols or icons. This particularly hinders employee comprehension of occupational warnings, given estimates that approximately twenty percent of Amer-
ican workers are functionally illiterate and that a sizeable segment of the California workforce is non-English speaking or has limited English language skills. These workers are disproportionately concentrated in industries with high exposure to toxic chemicals.

ii. Communication of Risk Information

Occupational exposure warnings do not include other information that would give workers a better understanding of the risks they are encountering, such as that provided to workers when workplace exposures are covered by the HCS. This includes information such as chemical and physical characteristics of the substances, composition, ways to avoid exposure, health hazards from exposure, precautions to minimize harm from exposure, and treatments for harm from exposure. For exposures subject to the HCS, Proposition 65's warnings do not enhance what workers already know. Overall, Proposition 65 has had little tangible impact on informing workers about risks from occupational exposures.

5. Summary

Proposition 65's consumer product, environmental, and occupational warnings have been of very limited informational value. Many warnings go unnoticed, fail to inform the public adequately about its exposure to listed chemicals, and fail to communicate effectively the risk levels involved. Thus, all three types of warnings have poorly served the statute's goals of promoting informed choice and enhanced decisionmaking, and satisfying the public's right to know.

192. In California, for instance, it is estimated that 80% of migrant farmworkers are Latino. Many of these workers have limited education and read at about a fifth-grade level in their native language. Environmental Equity, supra note 65, § 6.2.1, at 48.
193. Friedman-Jiménez, supra note 69, at 606-07, 610. For example, Asian immigrant workers are overrepresented in the electronics industry, cosmetology, and drycleaning, in positions that involve exposure to toxic chemicals. Chu, supra note 71, at 10; Yoo, supra note 71, at 11.
194. See 29 C.F.R. § 1910.1200 (1994); Haig, supra note 59, at 714; Stenzel, supra note 53, at 520-23. The HCS is intended to serve broader training and educational purposes than Proposition 65.

The warnings are also unlikely to counter the denial mechanisms that may affect worker response to warnings. Research suggests that workers who do not view their exposures as voluntary tend to deny the level of risk to which they are exposed. This may very well be a psychological coping mechanism for workers who are required by economic necessity to remain at their jobs. See Nordenstam & DiMento, supra note 35, at 354-55. Workers who perceive that they have no control over the risks they face also may deny that any risk is present. See id. at 356.
C. Does Proposition 65 Satisfy Its Goal of Reducing Exposures to Hazardous Substances?

1. Consumer Product Exposures

Despite the prevalence of poor warnings, Proposition 65's warning requirement has stimulated significant consumer-product reformulation, due to a combination of industry concerns about liability and consumer reaction to warnings.\footnote{195} In some instances, the reformulations have been close to industry-wide, reflecting the competitive pressures that arise once a portion of the industry alters its products. Almost all the reformulated products are being sold nationwide, giving the statute national effect.\footnote{196} Moreover, the reported product reformulations probably represent only a portion of private businesses' actions. As one business columnist suggests, "most of the good arising from Proposition 65 remains hidden, in the form of companies that quietly assess what they're doing, and presumably, clean up their act to avoid the brouhaha that might arise from having to tell all the neighbors they're being poisoned."\footnote{197}

Enforcement actions have triggered many product reformulations. Nearly forty manufacturers of glazed ceramicware (china) have agreed to reduce lead levels in their flatware by fifty percent and in their hollowware by twenty-five percent within five years.\footnote{198} Two companies have become entirely lead-free.\footnote{199} The Environmental Defense Fund has estimated that the lead content of over 8000 patterns of china has been reduced.\footnote{200} This widespread reformulation has a

\footnote{195. See generally supra part II.B.}
\footnote{197. Daniel Akst, Quiet Legacy of Once-Hated Proposition 65, L.A. TIMES, Jan. 28, 1992, at D1, D5; see Cal/EPA Proposition Review Panel, Results of Proposition 65 Survey 28 (1992) [hereinafter Review Panel Survey] (informal survey of business attitudes and compliance efforts, on file with author) (most businesses surveyed agreed with "quiet compliance" characterization of Proposition 65); Randolph B. Smith, California Spurs Reformulated Products, WALL ST. J., Nov. 1, 1990, at B1 (reporting that some companies are quietly reformulating their products to avoid calling attention to chemicals in their old products); Beth Gaston, Living with Proposition 65, 21 CAL. J. 115, 118 (1990) (stating that companies are quietly reformulating their products in order to stay out of the news); Jordan, supra note 15, at 3, 4 (reporting anecdotal evidence that businesses are keeping their compliance efforts quiet because of embarrassment or pressure within the business community); Elliot Diringer, Prop. 65 Begins to Affect Products, Buying Habits, S.F. CHRON., Oct. 20, 1988, at A1, A8 (stating that companies prefer not to talk about product reformulations).}
\footnote{198. See Prop. 65 Litigation, supra note 15, at 15.}
\footnote{199. Hearings, supra note 5, at 146-47 (testimony of David Roe, Environmental Defense Fund).}
\footnote{200. Jane E. Allen, How California Led a Move To Cut Lead, PHILA. INQUIRER, Dec. 2, 1994, at F8 (quoting estimates of Environmental Defense Fund that over 8000 patterns of china now meet Proposition 65's standard for lead, while only 600 met the standard in 1992).}
significant national impact, since approximately 1.2 billion pieces of ceramicware are sold in the United States every year.\textsuperscript{201}

A large segment of the nail polish industry agreed to remove toluene from dozens of consumer and professional nail polish products.\textsuperscript{202} Manufacturers have agreed to reformulate dozens of automobile paints, coatings, adhesives, and related products.\textsuperscript{203} Approximately three hundred wineries, representing a large share of the domestic wine industry, agreed to phase out their use of lead foil caps on wine bottles.\textsuperscript{204}

Three major water pump companies agreed to remove lead from their submersible well water pumps.\textsuperscript{205} Several manufacturers developed paint strippers containing substances other than methylene chloride.\textsuperscript{206} The three major producers of typewriter correction fluids—Gillette Co., Wite-Out Co., and Wirth International—reformulated their typewriter correction fluids to remove trichloroethylene.\textsuperscript{207} In 1991, Dow Brand, Inc., agreed to reformulate K2r spot-remover to remove perchloroethylene.\textsuperscript{208} The manufacturers of Preparation H and Valu-Rite hemorrhoidal treatments eliminated phenyl mercuric nitrate (PMN) from their products, products commonly used by pregnant women.\textsuperscript{209} Baccarat, Inc. developed a “cementation” process for

\textsuperscript{201} Hearings, supra note 5, at 137 (testimony of David Roe) (quoting estimates of ceramicware industry); see also Donna Horowitz, Are Your Dishes Leaching Too Much Lead?, S.F. EXAMINER, June 28, 1995, at Z1 (manufacturers report that as time goes on, increasing numbers of tableware patterns do not require Proposition 65 warnings because of manufacturers’ efforts to implement improved technologies).

\textsuperscript{202} The agreements, however, provide that warnings may be given in lieu of reformulation.

\textsuperscript{203} Letter from Chanler & Associates to author (July 27, 1995) (on file with author); see also Makers of Auto Paint Finishes Agree To Reformulate Products, 5 Cal. Env’t Rep. (BNA) 143-44 (Mar. 10, 1993). The nonprofit organization that initiated these enforcement actions, As You Sow, estimates that overall seventy companies in the nail polish and paint industries have agreed to reformulate over 1000 different products, involving 10 million product units. Telephone Interview with Clifford Chanler, Attorney for As You Sow (May 30, 1995). This number is difficult to verify, since many of the agreements with these companies give them the option of paying civil penalties or providing warnings if they elect not to reformulate their products.

\textsuperscript{204} Prop. 65 Litigation, supra note 15, at 13; Telephone Interview with Robert Thomas, Investigator, California Attorney General’s Office (May 15, 1995).

\textsuperscript{205} Dennis Pfaff, Pump Makers Settle Lead Claim, S.F. DAILY J., Aug. 7, 1995, at 3. The pumps are used to draw out drinking water from private wells, and are used mostly in rural areas where residents are not hooked up to municipal drinking-water systems. Id.

\textsuperscript{206} Marina Gatti, Proposition 65: ‘Shoot First, Ask Questions Later’: Do the Bullets Really Work? Have We Shot the Wrong Party? Will They Call Out the Bazookas? 47 FOOD & DRUG L.J. 739, 741 n.14. Some companies simply stopped selling methylene chloride-containing paint strippers in California. Id.

\textsuperscript{207} See Prop 65 Litigation, supra note 15, at 4.

\textsuperscript{208} See id. at 24.

\textsuperscript{209} See id. at 17.
its leaded crystal decanter that prevents the leaching of lead into stored liquids ingested by consumers.\textsuperscript{210}

Most recently, twelve major manufacturers of brass faucets agreed to reduce substantially the lead content of their products and make ninety-five percent of their faucets virtually lead-free by 1999.\textsuperscript{211} These companies supply ninety percent of the California market and account for the bulk of faucet sales nationally.\textsuperscript{212}

Other reported instances of product reformulation have occurred absent direct enforcement. Old El Paso canned foods eliminated its use of lead-soldered cans,\textsuperscript{213} as did a Mexican canner/importer.\textsuperscript{214} Major Paint removed methylene chloride from forty-five of its Xy-nolyte Brand products.\textsuperscript{215} Sunoco reformulated the inks in plastic grocery bags to eliminate listed chemicals.\textsuperscript{216} Sears Roebuck & Company reported that its supplier reformulated dozens of products, including car wax and carburetor cleaner.\textsuperscript{217} An herbicide manufacturer altered its products to remove arsenic, a listed chemical.\textsuperscript{219}

The extraordinary steps taken by businesses to avoid consumer product warnings can be partially explained by liability concerns. In Proposition 65 enforcement suits, the California Attorney General's Office and private parties have been willing to forego imposing civil fines on defendant companies in exchange for product reformulation, and indeed have made this a goal of their enforcement policies.\textsuperscript{220}

\textsuperscript{210} See id. at 12.
\textsuperscript{212} Woody, \textit{ supra} note 211.
\textsuperscript{213} Smith, \textit{ supra} note 197, at B1.
\textsuperscript{214} \textit{CALIFORNIA'S EXPERIENCE}, \textit{ supra} note 6, at 27.
\textsuperscript{215} Telephone Interview with Thompson, \textit{ supra} note 97.
\textsuperscript{216} \textit{CALIFORNIA'S EXPERIENCE}, \textit{ supra} note 6, at 27.
\textsuperscript{217} Smith, \textit{ supra} note 197, at B1.
\textsuperscript{218} \textit{Id.}
\textsuperscript{219} Kristen Stevens, \textit{ supra} note 82, at 128. The company first acknowledged, then disputed, that the reformulation was prompted by Proposition 65. \textit{Id.} at 128 n.223.
\textsuperscript{220} See Jordan, \textit{ supra} note 15, at 32-33; Daniel Lungren, California's Attorney General, described the impact of his office's Proposition 65 enforcement policy as follows: "[T]hrough our Proposition 65 enforcement . . . we have pressed manufacturers who are in violation of the law to make some fundamental changes in their products—to go beyond posting warnings—by in many cases eliminating the presence of the toxic substance in their products altogether." Daniel E. Lungren, \textit{Proposition 65 — A Balanced Approach}, 6 \textit{PROP 65 NEWS}, Feb. 1992, at 1, 6 (emphasis in original); Woody, \textit{Painted into a Corner}, \textit{ supra} note 25, at 16 (quoting a public interest attorney involved in Proposition 65 litigation: "EDF has been willing to forgive back penalties in lieu of [toxics reductions]").
Facing statutory fines that can be enormous,221 many companies have consented to reformulate their products in order to reduce their potential liability. Other companies have reformulated as a prophylactic measure to avoid the possibility of a lawsuit entirely, given the statute's large penalties and the relatively unpredictable nature of citizen enforcement. Some, moreover, may worry that providing warnings could encourage the filing of tort actions.222 However, because Proposition 65 enforcement actions cannot force reformulation,223 and since businesses can avoid future liability by providing warnings rather than altering their products, other factors have also contributed to the reformulations.

More significant than the desire to minimize liability is corporate concern over consumer reaction to product warnings, and the power of green consumerism in the marketplace. Consumer demand can be extremely sensitive to the disclosure of adverse health and safety product information, particularly in food products.224 Businesses perceive the possibility of significant sales losses by disclosing toxic chemical presence in certain consumer products, and warnings for these products have, consequently, become anathema to business.225 Some

221. The statute imposes civil penalties of up to $2,500 per day per violation. CAL. HEALTH & SAFETY CODE § 25249.7(b) (West 1992). The courts are likely to interpret each exposure without an adequate warning (i.e., each person buying a consumer product without a warning) as a separate violation. This is similar to the view adopted by the courts under the penalty provisions of the Unfair Business Practices Act, BUS. & PROF. CODE §§ 17206(a), 17536(a) (West 1996). See People v. Toomey, 203 Cal. Rptr. 642, 655-57 (Ct. App. 1984).

222. There is no evidence to date that warnings have triggered any tort actions. The Proposition 65 regulations provide that the "no significant risk" levels established under the statute, shall not be construed to establish exposure or risk levels for other regulatory purposes, which includes tort actions. CAL. CODE REGS. tit. 26, § 22-12701(d) (1995). Moreover, in any tort action alleging failure to warn, a Proposition 65 warning could be used as a defense. Nonetheless, businesses may worry that a warning could increase the likelihood of tort suits by alerting consumers to exposures of which they would otherwise remain unaware.

223. Enforcing parties have not insisted on reformulation as an element of settlement. See Edward G. Weil, Proposition 65 Enforcement Activities and Policies of the Attorney General, 6 PROP 65 NEWS, Feb. 1992, at 48, 51 (product reformulation is not a precondition to settlement of actions brought by the Attorney General's Office).

224. The strong public reaction to reports about the cancer risks posed by Alar on red apples is one vivid, if extreme, illustration of public concern about food safety. See Scott Kilman, Safety First: Food Companies React to Consumers' Fears About What They Eat, WALL ST. J., Oct. 19, 1990, at A1 (wholesale apple prices dropped by 50% after reports of Alar use in apples). Another example is consumer response to Perrier's disclosure in 1990 that some of its bottled water had elevated levels of benzene. (The levels were 12.2 to 19.9 parts per billion, compared to the FDA's limit of 5 parts per billion. The FDA estimated these levels would result in an increased cancer risk of one in a million). After disclosure, Perrier lost close to 25% of its market share of bottled water, and its sales decreased by 40%. See HALE N. TONGREN, CASES IN CONSUMER BEHAVIOR 41-49 (1994).

225. Jay Matthews, California Uses "Legal Judo" on Toxics, WASH. POST, July 30, 1991, at A3 (corporations are uncomfortable with warning labels on their products); see also
argue that Proposition 65 warnings play on this consumer sensitivity by stigmatizing products with warnings likely to encourage consumer overreaction. In this view, overly simple warnings further the statutory goal of product reformulation.

Businesses also worry about the reaction of retailers, who may refuse to carry the products because of concerns about their own liability or because they believe the products will be unpopular with consumers. For example, major retailers have pressured tableware manufacturers to reformulate their products by informing them that they will not stock patterns requiring warnings. As a Williams-Sonoma manager explained:

From the beginning, our customers asked us about ceramicware. It was clear they didn’t want to be exposed to even a little bit of lead. . . . We saw the handwriting on the wall in the late ‘80’s and early ‘90’s. It was quite easy for us to offer ceramicware that doesn’t leach detectable lead.

Given the intense competition among thousands of consumer products for shelf space in retail stores, manufacturers rightfully fear the consequences of having retailers pull their products from the shelves for even brief periods.

At the same time, selling a reformulated product can lead to a competitive market advantage. The explosive growth of consumer

Stevens, supra note 82, at 126 (research cited by California Attorney General’s office indicates that consumers will shift to products without Proposition 65 warnings).

226. See Noah, supra note 49, at 295; Viscusi, supra note 124, at 289-96 (Proposition 65 warnings are unduly alarmist and consumers are likely to exaggerate risks posed by them); Gatti, supra note 206, at 760 (arguing that what he characterizes as misleading Proposition 65 labeling that heightens consumers’ fears can lead to greater product reformulation).

227. See Richard Reuben, Making a Business Out of Prop 65, CAL. LAW., Mar. 1992, at 18 (wholesalers and retailers have refused to carry products that do not have adequate Proposition 65 warnings); Robert Reinhold, California Supermarket Chain Bars Some Tobacco Products N.Y. TIMES, Oct. 5, 1988, at A1 (in response to a suit against tobacco companies for failure to warn, Vons, the largest supermarket chain in Southern California, pulls cigars, pipe tobacco and chewing tobacco products from its shelves; other supermarket chains give tobacco firms deadline for providing Proposition 65 labels or else products will be removed); George White, 5 Retailers Pull Spot Removers from Shelves, L.A. TIMES, July 12, 1990, at D2 (in response to an enforcement suit, five retail chains pull spot remover from shelves because it did not bear the Proposition 65 warning).

Retailers are especially reluctant to carry products for which warnings are provided on shelf signs because of the administrative burden involved in maintaining the warnings. Interview with Deputy Attorney General Edward Weil, California Attorney General’s Office, Oakland, CA (July 6, 1995).

228. Telephone Interview with Susan Chiang, Environmental Defense Fund, June 1, 1995; Horowitz, supra note 201, at Z1 (Williams-Sonoma and its Pottery Barn stores, Pier One Imports, and Cost Plus do not carry dishes requiring Proposition 65 warnings).

229. Horowitz, supra note 201, at Z1.

230. See Mark S. Albion, Advertising’s Hidden Effects 74-76, 86 (1983) (allocation of retail shelf space between products and product categories is one of most prominent decisions retailers make to maximize profits).

231. Smith, supra note 197, at B1.
interest in using everyday purchases as a means to achieve environmental goals has resulted in a rush by businesses to market environmentally sound products. Public opinion surveys show that a large majority of the public wishes to purchase environmentally safe products; one poll found that seventy-five percent of consumers considered the environmental reputation of the product or manufacturer to be an important purchasing factor. Nearly one in every two consumers has recently altered her purchases to help protect the environment.

Gillette is a well-known example of a company which has sought to use product reformulation as a marketing tool. In 1989, the State and environmental groups threatened the company with an enforcement action for failure to provide adequate warnings on its Liquid Paper correction fluid. The company promptly removed two listed chemicals, trichloroethylene (TCE) and lead, developed a new product, and began a national advertising campaign promoting the product as “New Improved” and one that “Complies With Proposition 65 Environmental Guidelines.”

Likewise, the retail store displays of two china manufacturers with reformulated tableware products “proudly point out that they no longer use lead in their dishes.” Potent market forces were also in evidence following a Proposition 65 lawsuit in 1994 and accompanying EPA advisory about lead in submersible water pumps. Within two weeks of the suit being filed, consumer demand for “Red Jacket” pumps, which have the lowest lead content

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233. Church, supra note 232, at 254. The number of products marketed with environmental claims has rapidly increased in recent years, as has the number of “green” product purchases. Id. at 277. The percentage of new products marketed in the United States with packages, labels, or advertising containing environmental claims increased from 5.9% in 1989 to 11.4% in the first half of 1992. The market for green products constituted $121.5 billion in 1993, and is expected to grow to $154 billion by 1997. Casey Bukro, ‘Green’ Goods Still Grab Green; Rising Consumer Demand Grows from Earth Day Seed, CHICAGO TRIB., Apr. 22, 1994, at 1. A 1994 poll by Roper Starch Worldwide, Inc. found a 70% jump in “green” product purchases from the prior year. Id. See also Adrian Higgins, Buying Green, WASH. POST., Jan. 19, 1995, at T5 (noting large increase in number of advertisers in National Green Pages).

234. Susan J. Stocker, Wite-Out Cleans Up Others’ Mistakes, WASH. BUS. J., Aug. 27, 1990, at 1. In some instances reformulation has resulted in products that are marketed as more effective as well as safer. Thus, in response to Gillette’s reformulation, as well as its own potential enforcement difficulties, Wite-Out (Gillette’s main competitor) also removed TCE and switched to another alternative that it could advertise as working on all materials—copy paper, faxes, and ink. Id.

235. Horowitz, supra note 201, at Z1.

236. See John Cushman, U.S. Urges Users of New Well Pumps To Drink Bottled Water, N.Y. TIMES, Apr. 19, 1994, at A1. April 19, 1994 marked both the issuance of the EPA warning and the filing of the Proposition 65 litigation. Id.
of any water pumps, doubled.\textsuperscript{237} A little more than a year later, the market pressure of competing with this company, as well as another manufacturer of lead-free pumps (Grundfos), forced three other water pump manufacturers to sell only lead-free products in California.\textsuperscript{238}

Proposition 65 has had notable success in reducing toxics in consumer products, although two caveats should be noted. First, reformulation may not always be completely beneficial. Products that are reformulated may substitute chemicals that pose other risks of equal or greater dimension than the Proposition 65 chemicals they replace.\textsuperscript{239} Likewise, a product may pose risks marginally above the warning threshold yet have important benefits that would be impaired by removing a listed chemical. From a risk/benefit perspective, reformulation in this instance would not be desirable.\textsuperscript{240} Second, reformulation may constrain the choices of consumers who would otherwise be willing to incur the added risk posed by a product.\textsuperscript{241}

From a policy perspective, these examples are most troubling if driven by exaggerated consumer fears of the risks posed by products, rather than consumers’ deliberate and well-informed decisionmaking. If the latter mechanism is responsible, then businesses are simply responding, appropriately, to the collectively expressed preferences of the market.

The above discussion has focused on products for which substitutes exist. Where there are no available substitutes, the marketplace has fared poorly as a mechanism for achieving toxics reductions. In these situations, businesses have provided warnings that exact little or no cost in terms of reduced consumer demand. Thus, gas stations throughout California contain warnings that “chemicals known to the state to cause cancer, birth defects, or other reproductive harm are found in gasoline, crude oil and many other petroleum products, and ether vapors, or result from their use.” Consumers do not have the option of using a “safer” gasoline, since all brands contain benzene, a listed carcinogen. Similarly, all mothball deodorizers sold contain

\textsuperscript{237} Marley Pump Expands Production of World’s Only NSF-Certified Water Pump, PR Newswire, Apr. 26, 1994, available in LEXIS, Nexis Library, PRNEWS File.

\textsuperscript{238} See Pfaff, supra note 205, at 3.

\textsuperscript{239} For example, under proposition 65 pressure, Gillette reformulated Liquid Paper by replacing trichloroethylene (TCE), a carcinogen, with trichloroethane (TCA). Stephen Barlas, Food Industry Tries To Kill Prop 65 in Washington, CPI PURCHASING, Apr. 1990, at 23. Trichloroethane, however, is considered to have short-term health impacts and also to contribute to depletion of the ozone layer. See James Glanz, CFC Replacements Technologies: Help Is on the Way, R & D, Dec. 1992, at 28.

\textsuperscript{240} See also Clifford, supra note 196 (critics argue that reformulation of nail polish, spurred by Proposition 65, addressed only marginal health risks to consumers from listed chemical toluene).

\textsuperscript{241} See supra note 84.
paradichlorobenzene, a listed carcinogen. Without the availability of alternative products, consumers most likely "filter out [these warnings] from their field of vision." 243

2. Environmental Exposures

Although the warnings for environmental exposures have been greatly flawed, the statute appears to have played some role in reducing toxic air emissions and other environmental exposures in California. Enforcement actions have stimulated some of the most notable reductions, as prosecuting parties have traded large penalties in exchange for emissions cutbacks. One series of lawsuits filed by the Attorney General's Office led to a forty percent reduction in statewide air emissions of ethylene oxide, a medical sterilant that is both a carcinogen and reproductive toxicant. In another enforcement action, a biotechnology company in Richmond (Contra Costa County) eliminated an estimated 60,000 pounds of chloroform per year after it was sued by public prosecutors under Proposition 65 and other statutes. An environmental group's enforcement efforts aimed at large lead emitters in southern California have forced numerous facilities to decrease their lead emissions by possibly several thousand pounds. Another lawsuit filed by a local community organization and the Attorney General in East Oakland led to a ninety-nine percent reduction in lead emissions by a brass and iron foundry, which previously

242. There are, however, alternative means of protecting clothing from moths, such as cedar shavings.
243. See Dwyer, supra note 146, at 31. Still, in cases where there are at present no substitute products, warnings can lead to a more informed public that can create pressure for alternatives or substitutes. Warnings also allow individuals to minimize or avoid exposures.
244. See Pease, Chemical Hazards, supra note 25, at 18-19.
246. California Earth Corps. v. Delco Remy, CV-94-2203 (C.D. Cal.) (company that was emitting 293 pounds of lead per year agreed to install 10 new baghouses with control efficiencies of 99.99+-%); California Earth Corps. v. Thakar Aluminum Corp., No. 254720 (Riverside County Super. Ct. filed Aug. 29, 1994) (recycling facility emitting close to 500 pounds of lead per year will install air knife system to shake out lead weights in recycled cans, eliminating most emissions); California Earth Corps v. Ramcar Batteries, BC109210 (L.A. County Super. Ct.) (battery manufacturing company that reported emissions of 229 pounds of lead agreed to major reductions); People v. GNB Batteries, Inc., No. BC079211 (L.A. County Super. Ct. filed July 13, 1994) and California Earth Corps v. GNB Batteries, Inc., No. BC079212 (L.A. County Super. Ct. filed July 13, 1994) (company that reported lead emissions of 319 pounds and 1039 pounds per year at battery manufacturing and battery recycling facility agreed to dramatic reductions); California Earth Corps v. Quenell Enters., No. BC086292 (L.A. County Super. Ct. filed July 1993) (company reduced lead emissions from a reported 3178 pounds to 109 pounds per year); Interview with Michael Freund, Counsel for California Earth Corps, Oakland, CA, July 12, 1995.
emitted over 800 pounds annually.\textsuperscript{247} There have been other, less dramatic instances of reductions triggered by enforcement actions as well.\textsuperscript{248}

Some more general, instructive data about air emissions subject to Proposition 65 also exist. An early study found that from 1987 to 1989, air emissions of forty-four Proposition 65 chemicals decreased by two-thirds in California. More than eighty percent of listed chemicals with emissions greater than 10,000 pounds decreased during this period.\textsuperscript{249} In the subsequent four years, air emissions of these chemicals have declined an additional sixty-three percent, in some instances dropping precipitously.\textsuperscript{250} Benzene emissions, for example, have declined by an additional sixty-one percent; perchloroethylene by an additional fifty-six percent; and ethylene glycol monomethyl ether by eighty-eight percent.\textsuperscript{251} Overall, air emissions of these chemicals dropped by approximately sixty-eight percent from 1987 to 1993.\textsuperscript{252}

While these figures show considerable reductions, it is difficult to separate the influence of Proposition 65 from two other information disclosure laws, both of which require industrial facilities to report publicly their emissions of hazardous chemicals. The first is EPCRA, which requires certain industrial facilities to report their routine annual releases of 650 hazardous chemicals, including air emissions.\textsuperscript{253} The second is California's Air Toxic "Hot Spots" Information and Assessment Act of 1987, which requires facilities emitting one of over 450 chemicals at certain levels to prepare health risk assessments ana-

\begin{itemize}
\item \textsuperscript{247} See People United for a Better Oakland (PUEBLO) v. American Brass & Iron Foundry, No. 708543-3 (Alameda County Super Ct. filed Nov. 17, 1992), summarized in Prop. 65 Litigation, supra note 15, at 29.
\item \textsuperscript{249} Pease, \textit{Chemical Hazards}, \textit{supra} note 25, at 16-17.
\item \textsuperscript{250} \textit{U.S. ENVTL. PROTECTION AGENCY, TOXICS RELEASE INVENTORY} (1990-93).
\item \textsuperscript{251} Between 1990 and 1993, benzene emissions declined from 314,366 pounds per year to 123,944 pounds; perchloroethylene emissions dropped from 3.83 million pounds to 1.7 million pounds; and ethylene glycol monomethyl ether emissions dropped from 132,978 pounds to 15,477 pounds. \textit{Id}.
\item \textsuperscript{252} \textit{Id}.
\end{itemize}
lyzing the effects of their emissions on neighboring receptors.\textsuperscript{254} A very recent analysis, however, finds that reductions in air emissions of Proposition 65 listed chemicals from 1987 to 1993 has been greater in California than in the rest of the country.\textsuperscript{255} These results provide strong evidence that Proposition 65 has had a significant independent impact on decreasing air emissions, although the study does not control for the effects of California's Hot Spots law or other State regulatory requirements.

While liability concerns account for some emissions decreases,\textsuperscript{256} two other factors offer a better explanation. One is that disclosure forces companies to inventory their emissions systematically, sometimes for the first time. The process frequently uncovers areas where emissions reductions can be made (often at substantial savings to the companies). As one observer commenting on the EPCRA process notes: "[p]eople in industry say this all the time—that they didn't realize themselves until they had to get the data that they were producing so much waste."\textsuperscript{257} While Proposition 65 requires far less detailed dis-

\textsuperscript{254} \textbf{CAL. HEALTH \\ & SAFETY CODE §§ 44300-44384 (West Supp. 1995).} Under the "Hot Spots" law, if a risk assessment shows that cumulative emissions from a facility pose a "significant risk" of cancer, as that term is defined by the local air pollution control districts, the facility is required to provide notification to affected residents. Most of the districts have defined significant risk in the same way as that term is defined under Proposition 65 (i.e., one excess cancer case per 100,000 persons exposed.) See, e.g., Joanna M. Miller, \textit{Pollutant Warnings Ordered}, \textit{L.A. TIMES}, May 6, 1992, at B1 [hereinafter Miller, \textit{Warnings Ordered}] (discussing Ventura County notification level). The form of notification is also left to the discretion of the local districts. \textbf{CAL. HEALTH \\ & SAFETY CODE § 44362(b) (West Supp. 1995)} ("Any notice shall be made in accordance with procedures specified by the district."). Most districts have required some type of mailed notice or community meetings. See, e.g., \textit{South Coast Companies Required To Notify Public of Cancer Risk from Toxic Air Emissions}, 23 Env't Rep. (BNA) No. 24, at 1560 (Oct. 9, 1992) ("[F]acilities posing a risk of 10 to 1 in a million would have to send notification letters and conduct public meetings."). The statute's requirements began to take effect at the same time Proposition 65's warning provision became effective. Both EPCRA and the Hot Spots Act cover many, but not all, of the same chemicals as Proposition 65. Proposition 65 also covers a broader range of facilities than either of these statutes.

Other laws which impose regulatory requirements on toxic air contaminants also have contributed to emissions reductions. These include the Tanner Act, \textbf{CAL. HEALTH \\ & SAFETY CODE §§ 39650-39668 (West 1992 & Supp. 1995)}, the Clean Air Act § 112, 42 U.S.C. § 7412 (1988 & Supp. V 1993), as well as some regulations imposed by local air pollution control districts.

\textsuperscript{255} Telephone Interview with Professor William Pease, Center for Occupational and Environmental Health, University of California (Aug. 11, 1995).

\textsuperscript{256} As in the consumer product context, a number of companies subject to enforcement actions have traded emissions reductions for lower penalties. It is unlikely that this has been a major factor in triggering reductions by other companies (i.e., those not sued), however, since businesses seeking a hedge against liability can provide warnings that are obscure and uninformative. Likewise, businesses are unlikely to worry that these obscure and uninformative warnings will encourage the filing of tort actions. See \textit{supra} note 221.

closure (and inventorying) than EPCRA or the Hot Spots law, the statute has prompted industry self-audits and source reduction.\(^{258}\) A 1992 Cal/EPA survey found that fifty-six percent of the businesses questioned had participated in an audit to determine Proposition 65 compliance;\(^{259}\) thirty-six percent of the businesses audited said that they would not have done so absent Proposition 65.\(^{260}\) The survey further found that eighty-five percent of businesses surveyed reported that they had taken action to reduce toxic releases or discharges.\(^{261}\) The director of industrial safety and health for the California Chamber of Commerce recently acknowledged that the statute had raised awareness in companies about the toxic chemicals that they use and "push[ed] technology" through companies seeking safer, alternative chemicals rather than having to provide warnings.\(^{262}\)

The second factor contributing to emissions decreases is public relations. As in the consumer product arena, there are strong corporate concerns about negative environmental publicity. As one author argues, information disclosure laws work because they "rely on corporate managers' aversion to shame."\(^{263}\) In a highly publicized example

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\(\text{Early Warning}\) ("Nobody knew what kind of emissions were coming from a lot of this stuff before this program," quoting Terri Thomas, Supervisor, Ventura County Air Toxics Program, regarding impact of Hot Spots statute); Keith Schneider, \textit{For Communities, Knowledge of Polluters Is Power}, \textit{N.Y. Times}, March 24, 1991, p. 5 ("Industrial executives and environmental groups agree that the law's most important contribution has been to cause companies to recognize the extent of their discharges and the effect they may have on public health."). \textit{Cf.} Jane Suchukoske, \textit{The Evolving Paradigm of Laws on Lead-Based Paint: From Code Violation to Environmental Hazard}, 45 S.C. L. REV. 510, 525-26 (1994) (criticizing traditional housing law regulation of lead-based paint hazards because it has allowed property owners not to know about the presence of lead hazards on their property).

\(^{258}\) \textit{See Memorandum from Charles M. Shulock, supra note 36, § 1.4; see also} Gaston, \textit{supra} note 197, at 117 (according to Chevron official, Proposition 65 has caused it to "verify that our products and plants were very safe and can meet Proposition 65 standards"); Kenneth W. Kizer et al., \textit{supra} note 23, at 955 (suggesting that industry should perform environmental audits of its processes that involve Proposition 65 chemicals).

\(^{259}\) \textit{Review Panel Survey, supra} note 197, at 12.

\(^{260}\) \textit{Id.} at 15.

\(^{261}\) \textit{Id.} at 16. Almost two-thirds of these businesses, however, thought that the corrective action was not worthwhile from their perspective. \textit{Id.} at 20-21 (24\% considered taking the action was "not cost effective" and an additional 40\% considered taking the action "a waste"). \textit{See also} Smith, \textit{supra} note 197, at B1 (early indications are that the law is changing some behavior in California and starting to have a national effect); see Reuben, \textit{supra} note 227, at 18 ("Entire industries have moved to improve their products . . . .").


\(^{263}\) \textit{See Celia Campbell-Mohn, Objectives and Tools of Environmental Laws, in Environmental Law: From Resources to Recovery § 4.2(1),} at 142 (Celia Campbell-Mohn et al. eds., 1993); John Holusha, \textit{Chemical Makers Identify a New Hazard: Their Image}, \textit{N.Y. Times}, Aug 12, 1991, at D7 (chemical industry spending $10 million on advertising and communications campaign to convince people that chemical plants are run by friendly, responsible people).
of how public exposure can command the attention of top corporate managers, Monsanto Corporation agreed to reduce its air emissions by ninety percent on the eve of the first national release of EPCRA data—data which revealed that the company emitted over 374 million pounds of toxic substances annually. Numerous other companies now regularly tout their significant emissions-reduction goals. For similar reasons, some businesses have sought to avoid any Proposition 65 community warnings, however inconspicuous and uninformative, for fear that they might tarnish the company's image.

If Proposition 65 warnings were made more visible and more informative, the statute could become considerably more effective. EPCRA is illustrative. EPCRA requires disclosure of more information than current Proposition 65 warnings, including names of chemicals, annual levels of emissions, some information characterizing the type of emissions, and, since 1990, facility source reduction practices, recycling activities, and projected chemical releases for future years. An equally important factor is that the government's release of EPCRA data is accompanied by widespread publicity, and the data is made easily available to the public, to government agencies, and to the media. EPCRA has had remarkable success in stimulating toxic emissions reductions. From 1987 to 1993, facilities reported a national drop of forty-three percent from an initial figure of seven billion pounds. While some of this decrease is attributable to more accurate reporting, changes in the estimation of releases, and more stringent regulation, the largest part reflects reductions triggered by reporting obligations. Senator Frank Lautenberg recently con-


EPCRA data also may have a direct impact on the value of corporations. A provocative recent analysis suggests that stockholders in firms reporting EPCRA pollution figures experienced negative returns upon the initial release of the information. These returns translated into an average loss of $4.1 million in stock value for these firms on the day the data was first released publicly. James T. Hamilton, Pollution as News: Media and Stock Market Reactions to the Toxics Release Inventory Data, 28 J. ENVTL. ECON. & MGMT. 98, 109 (1995).

268. See id. at A1 (most experts say that numbers accurately reflect the effect of the disclosure requirements).
cluded that "the right-to-know [EPCRA] has probably led to more voluntary pollution prevention efforts and more environmental cleanup than any other environmental law." EPCRA disclosures have also been credited with stimulating the passage of stricter environmental controls.

California's Hot Spots law has also produced notable emissions reductions. This law requires facilities to disclose the names of chemicals emitted, quantities of emissions, as well as the level of risks posed to surrounding community residents. The data is publicly available through the local air pollution control districts. More significantly, in some districts facilities creating the highest risks have been required to notify the public through individualized mailings or by holding public meetings. Although no database comparable to EPCRA exists to assess emissions trends under this program, State air quality regulators regularly report that many facilities have chosen to reduce emissions voluntarily rather than conduct risk assessments and provide community notifications.

The current Proposition 65 environmental warnings have very little informational content regarding chemicals involved, emissions levels, exposures, or risk levels, and have been largely imperceptible. Improving the content and visibility of these warnings would stimulate greater public interest, generate more pressure for toxics reductions, and empower citizen groups in their dealings with industry and government, as EPCRA and the Hot Spots law have both done. As discussed below, one method of accomplishing this would be to require businesses to specify the areas in which they are exposing individuals above the statutory thresholds and the levels of risk associated with those exposures.


270. Smith, supra note 265, at A1 (EPCRA reports lead to adoption of comprehensive air pollution statute in Louisiana and toxics-use reduction law in Massachusetts).
3. Occupational Exposures

In some respects, Proposition 65 has the greatest potential for toxics reductions in the workplace. Employee exposures to toxic chemicals are typically far higher than consumer or environmental exposures. In its comparative risk project, U.S. EPA ranked occupational exposures as among the risks deserving greatest regulatory attention. Nonetheless, workplace exposure limits have not been set at sufficiently stringent levels. Moreover, government enforcement of occupational health standards has often been less aggressive than enforcement of more general environmental requirements. Furthermore, workers do not have recourse to the types of citizen suit provisions available under other environmental statutes.

It has not been easy, however, to implement Proposition 65 in the workplace on top of an existing notification standard. Proposition 65 seems to have done little beyond what the current Hazard Communication Standard has already accomplished. Only a handful of lawsuits has been filed to enforce the warning requirement. In one case, a rubber stamp manufacturer agreed to hire a consultant to review training and warning programs dealing with hazardous chemicals and to implement the consultant’s recommendations after being sued for failure to provide warnings regarding toluene to its workers. Another lawsuit led to additional information being included on a MSDS for automotive coating products. Few other manifest changes in workplace conditions have been reported.

274. EPA Science Advisory Board, Reducing Risk (1990). Some studies suggest that approximately 50,000-70,000 deaths per year may be occurring as a result of toxic exposures in the workplace. See Finkel, supra note 147, at 307 n.60 (1994) (citing studies); Kizer et al., supra note 23, at 955 (workplace exposures under Proposition 65 will be considerably higher than other exposures).

275. William S. Pease et al., supra note 25, at 262-65 (occupational safety and health laws allow exposure of workers to chemicals at several orders of magnitude above Proposition 65 standards).

276. See Thomas O. McGarity & Sidney A. Shapiro, Reorienting OSHA: Regulatory Alternatives and Legislative Reform, 6 Yale J. on Reg. 1, 46 (1989) (arguing that Congress has helped EPA fulfill its mandate, while largely ignoring OSHA). The average fine imposed by OSHA for claims involving death or serious injury in 1990 was only $890. Moreover, because settlement agreements often exchange a reduction in fines for abatement, OSHA collects less than half of the fines levied. McGarity & Shapiro, supra note 68, at 217. See also Ralph Nader, Occupational Safety and Health Act, Address at New Challenges in Occupational Health Symposium (Mar. 4, 1994), in 31 Hous. L. Rev. 1, 2-9 (arguing that “we as a society do not take occupational health and safety seriously”).

277. Jordan, supra note 15, at 29. This is likely to increase, since until recently there was significant legal uncertainty as to whether Proposition 65’s warning requirements were preempted by federal law. See supra note 29.


Improved warnings, however, should make workers more knowledgeable about hazards not covered under the current Hazard Communication Standard, and could contribute to the reduction of workplace hazards. Information can stimulate workplace improvements through both "exit" and "voice" strategies. Workers who perceive greater job risks may demand and receive higher wages for risky occupations. These workers can also alter their willingness to enter into hazardous employment and seek better working conditions elsewhere. This "exit" strategy generates pressure on employers to reduce workplace risks. Workers may also adopt a "voice" strategy in response to information about hazardous exposures, responding with more open expressions of job dissatisfaction, absenteeism, discharges for cause, and both authorized and unauthorized strikes.

D. Has Proposition 65 Promoted Overwarning?

 Critics of Proposition 65 argued that the statute would lead to a proliferation of warnings. "We won't know what products are really dangerous anymore," they wrote in the ballot argument; "The warnings we really need will get lost in lots of warnings we don't need." Some commentators contend that these predictions have been realized and that Proposition 65 warnings have mushroomed, to the detriment of the public.

280. Viscusi & O'Connor, supra note 48, at 99-104; see also Mendeloff, supra note 45, at 44, 46 (weight of evidence of labor studies is that risk premiums are paid to workers in more hazardous jobs). But see McGarity & Shapiro, supra note 68, at 18-20 (questioning whether wage premiums occur).

281. W. Kip Viscusi, Risk by Choice: Regulating Health and Safety in the Workplace 157, 167 (1983); see also Mendeloff, supra note 45, at 212 (information can facilitate relatively efficient risk-reduction measures through voluntary bargaining and generate market pressure on employers to reduce risks because new risk perceptions alter attractiveness of certain jobs).

282. James C. Robinson, Worker Responses to Workplace Hazards, 12 J. Health Pol. Pol'y & L. 665, 668, 676 (1987). These responses may lead to improved health and safety conditions, but not without significant social costs. Id. at 676. But see supra notes 67-71 and accompanying text for a discussion of reasons why workers may be unable to demand or effect a reduction in workplace hazards even with additional information.

283. For purposes of this discussion, "overwarning" refers to the practice of providing warnings which are not required under the statute.

284. See Rebuttal to Argument in Favor of Proposition 65, in Ballot Pamphlet, supra note 6, at 54. They also predicted that owners of manufacturing processes and products might choose to create a "protective blanket of warnings" in order to avoid any prosecution under the statute. Senate Office of Research, Report to the State Senate of 1986, Analysis of Proposition 65, Safe Drinking Water and Toxic Enforcement Act, at 9 (1986).

To persons living in California, it may seem that Proposition 65 warnings are ubiquitous and that warning fatigue is inevitable. In fact, many of the most frequently encountered warnings are for very few products—in particular, warnings about alcoholic beverages in retail stores, bars, and restaurants where liquor is sold; warnings about second-hand smoke in bars, restaurants, commercial buildings, and other public facilities; and warnings about gasoline at gas stations. Consumers will likely start to tune out these continual warnings. Research suggests that consumer attention to individual warnings generally diminishes over time and that consumers are less likely to respond to messages that simply reinforce their existing knowledge rather than provide them with new information. This consumer tendency led the federal government to require cigarette manufacturers to periodically rotate the warnings on their packages. While diminishing public attention to repeated warnings has important public policy implications (suggesting the need to vary warnings or raising long-term questions about the utility of warnings in certain instances), it does not necessarily mean that the multitude of warnings desensitizes consumers to warnings in general.

There is no question, however, that many businesses have chosen to warn “protectively” by providing warnings when not required to do so. To some extent, this is a natural reaction by businesses to avoid liability, particularly when a business bears the responsibility for determining whether to warn. After all, there is no legal sanction for

286. See Christine Russell, California Is Getting Tough on Toxics, WASH. POST, May 23, 1989, at Z12, Z14 (Proposition 65 warnings “are present, but [they are] far from ubiquitous.”). Another source of warning “clutter” in California is the multitude of signs in small grocery and convenience stores left over from the 800-number “warning” system that was invalidated in 1989. See Maker of Liquid Paper Agrees To Remove Carcinogen, Pay Fine, S.D. UNION-TRIB., Sept. 29, 1989, at A4.

287. See Dwyer, supra note 146, at 31 (consumers filter out warnings from their field of vision that are not essential but culturally ingrained, such as warnings regarding the use of alcohol).

288. See Wogalter, supra note 85, at 7 (upon seeing a warning over time, it will attract less and less attention).

289. Stewart & Martin, supra note 66, at 6; see also Hadden, Regulating Product Risks, supra note 8, at 98.

290. Consumers may also become desensitized to individual warnings because no immediate consequences appear to follow from failure to heed repeated warnings—such as from smoking cigarettes—even though a long-term health risk is present. See Stewart & Martin, supra note 66, at 7.

291. See Weiner, supra note 284, at 8, 10-13 (overwarning results because of legal uncertainty over the meaning of the term “knowingly” and because of difficulties businesses encounter in determining whether exposures exceed the “no significant risk level”); Stevens, supra note 82, at 125-26 (companies may warn regardless of the amount present in order to avoid liability or avoid having to test for presence of chemicals or whether exposure poses significant risk). This type of conservative approach undoubtedly motivates protective warning in other contexts by businesses concerned about tort liability. See Viscusi, supra note 7, at 155-56. Some evidence also suggests that industry trade associations
providing unnecessary warnings. On the other hand, protective warnings have multiplied only in contexts where the warnings have no serious cost to businesses, such as where there are no available product substitutes, or more significantly, where the warnings provided are so vague and uninformative as to have little meaning to individuals. For example, there are probably thousands of generic warnings about unspecified chemicals located in commercial office buildings or at the entrances to industrial facilities. Usually, these warnings simply state that the “building” or “facility” may contain a chemical known to the State to cause cancer. While some warnings are in visible locations, many are not. The signs are routinely ignored (as they were likely designed to be) but they may help reduce a company’s future liability. By contrast, anecdotal evidence indicates that businesses have provided very few warnings on consumer or food products where they perceive any type of hazard warning as creating a serious drawback.

OEHHA has correctly concluded that the proliferation of unnecessary Proposition 65 warnings is largely due to flaws in the current warning regulations:

The “safe harbor” warnings may convey that a product or an area “contain” a listed chemical . . . without any further indication that an exposure may be occurring . . . . Some persons apparently prefer to issue warnings than to go to the trouble of ascertaining whether one is required. By allowing warnings which advise of the presence of, but not exposure to, a chemical, the existing regulation encourages this

have counseled their members to provide a warning on any product containing even trace amounts of a listed chemical, regardless of whether it actually poses a significant risk. See Roberts, supra note 6, at 308. Some observers contend that this has been done deliberately to undermine Proposition 65. Id.

292. As discussed, supra note 157, there is no standard format for warnings for environmental exposures.

293. See Akst, supra note 197, at D1, D5 (“Largely useless warnings of toxicity within now appear on some office buildings, hotels, pharmacies, and gas stations, no doubt contributing to public cynicism about risk.”).

Other pervasive warnings are the ones inserted quarterly into the bills received by customers of major utility companies, such as Pacific Gas & Electric (PG&E) and San Diego Gas and Electric (SDG&E). The PG&E warning is written in very small print and is technical, legalistic, and dense. It largely describes the general operations of the utility that use listed chemicals or whose combustion processes may generate listed chemicals as byproducts. It refers once to household applications, stating that “[u]se of natural gas in home or commercial appliances can also produce these combustion by-products.” It does not mention exposures occurring from any PG&E activities.

294. Interview with Weil, supra note 227; Telephone Interview with Catherine Caraway, supra note 97; see also Memorandum from Charles M. Shulock, supra note 36, § V.C.1 (in 1992 review, Cal/EPA found that no warnings had been provided for reproductive toxicants in food products).

295. See Stevens, supra note 82, at 124 (industries producing items that consumers will be less willing to buy if they have an associated warning, such as food items, tend not to overwarn).
practice. The result is a proliferation of warnings.... [t]hese so-called "warnings" do a disservice to the public and undermine the effectiveness of the Act.296

Amending the regulations to insure that warnings are provided only where a significant risk exists would reduce the current number of warnings.297

Two additional points about the overwarning argument should be considered. First, Proposition 65 warnings obviously represent only a small fraction of societal warnings. One author estimates that sixty-five percent of all goods and services now bear some kind of disclosure of negative effects or potentially negative effects.298 Second, little hard evidence exists to prove that increased societal warnings have actually resulted in consumer desensitization to warnings.299 In a recent comprehensive review of the literature on the effects of product warnings, marketing professors David Stewart and Ingrid Martin conclude that there is very little empirical evidence as to whether the ubiquity of warnings diminishes consumer attention to warning messages.300 Thus, while the overwarning problem is not insubstantial, and eliminating unnecessary Proposition 65 warnings is certainly desirable, broad claims about the harms resulting from too many statutory warnings cannot be proven.

296. Initial Statement, supra note 119, at 2-3. See recommendations infra part IV.B.
297. This was recommended by the Proposition 65 review panel. Memorandum from Charles M. Shulock, supra note 36, at § II.2. See also Stevens, supra note 82, at 124-25 (problem of overwarning can be reduced by limiting number of warnings that people see, so that warnings are more noticeable, or by requiring more information in warnings).
298. Oldenburg, supra note 103, at B5; see also Clark & Brock, supra note 103, at 298 ("The dollar value of products with warnings far exceeds the dollar value of products that are sold without warnings. We live in an era of warnings . . . . "). As one analysis recently noted, warnings are provided for alcoholic beverages, cigarettes, saccharin, tampons, over-the-counter medications, cleaning products, cosmetics and other personal care products, lawn mowers, automobiles, microwave ovens, power tools, and electrical appliances, as well as various service products, ranging from prospectuses for investment products to rides in amusement parks. Stewart & Martin, supra note 66, at 1.
299. Observers claim that the presence of too many warnings diminishes the attention paid to all warnings and reduces their overall effectiveness. See Stevens, supra note 82, at 124 (overwarning may cause consumers to ignore warnings, overrate risks associated with specific items, or conceal worse hazards); Michael Decourcy Hinds, As Warning Labels Multiply, Messages Are Often Ignored, N.Y. TIMES, Mar. 5, 1988, at A1 ("People are bombarded with an enormous number of warnings every day . . . . [s]o people just ignore the warnings and do what they want") (quoting sociologist Amitai Etzioni); Philip H. Abelson, California's Proposition 65, 237 SCIENCE 1553 (1987) ("[W]e have a nation on worry overload. One reaction is free-floating anxiety. Another is defensive indifference. If everything causes cancer, why stop smoking, wear seat belts, or do something about radon in the home . . . .") (quoting comments of Milton Russell, former Assistant Administrator, U.S. EPA Office of Policy Planning and Evaluation).
300. Stewart & Martin, supra note 66, at 7, 11.
As the above discussion illustrates, the current Proposition 65 warnings are flawed in key respects. They are frequently inconspicuous and fail to inform recipients of their exposure to listed chemicals or to communicate effectively the level of risks involved. Their vague language has contributed to overwarning. Improved warnings are needed to realize the ambitious underlying objectives of the statute.

A. Prior Efforts To Amend Regulations

Problems in Proposition 65 warning regulations have been apparent since they were first promulgated. Early on, public prosecutors required as part of settlement agreements that businesses provide warnings better than those required by the regulations. For example, settlements provided that consumer product warnings contain symbols that manufacturers state that using the product will expose consumers to a listed chemical, and that environmental warnings contain a map of the affected area or be mailed to affected residents.

In late 1990, the HWA began drafting revisions to the warning regulations, an effort continued by the OEHHA when it assumed responsibility for implementing Proposition 65 the next year. OEHHA directed its efforts at what it perceived to be the major flaws in the regulations: the failure of warnings to include exposure language and to identify the chemicals causing exposures; the widespread inclusion of disclaimers and other misleading information in warnings; and the large number of unnecessary warnings. In 1992, an outside panel convened by Cal/EPA to review the first five years of Proposition 65's
performance lent support to OEHHA's efforts, concluding that a need existed for better warnings.304

From 1991 to 1993, OEHHA circulated numerous proposals and convened extensive public hearings to discuss them. Regulated businesses lobbied intensely to derail the proposals, objecting to requirements that they meet minimum criteria in warnings, such as stating that a product will expose users to a listed chemical. Businesses also protested provisions requiring them to more carefully analyze potential exposures and provide more specific information in warnings.305 Businesses opposed these reforms because the current regulations offer them far greater leeway to lessen the impact of warnings by providing vague and uninformative warnings, while also providing substantial protection from liability in enforcement actions. Ultimately, Governor Wilson refused to support OEHHA in the face of this stiff political opposition, and OEHHA was forced to abandon its reform efforts.306

B. Specific Recommendations

Given the inherent limitations of information disclosure laws, not all of the problems with existing Proposition 65 warnings can be remedied with better warnings. In addition, it is not feasible to incorporate all of the desirable attributes of risk communication programs. Some inherent tensions exist among the different statutory goals of Proposition 65. For example, the goal of providing complete risk information may conflict with the objective of promoting reformulation. An overly simple warning that stigmatizes products may alarm consumers and prompt a quicker response by industry.307 Likewise, an explicit warning message may have a higher likelihood of being read and un-

304. Memorandum from Charles M Shulock, supra note 36, at § II.2. The Attorney General's Office also advocated more specific warning regulations. Letter from Theodora P. Berger, Assistant Attorney General, to George Dunn, Deputy Chief of Staff, Governor's Office, at 1 (Nov. 12, 1992) (on file with author). According to the Attorney General, these changes would improve compliance with the law, make enforcement easier and more certain, and reduce exposures to listed chemicals. Id.


306. No formal announcement withdrawing the regulations was made, but it is clear that the proposals were shelved because of industry opposition. See Strock Suggests Proposed New Warning Regulations in Jeopardy, PROP 65 News, June 1993, at 3 (Cal/EPA Secretary James Strock expresses doubt about status of amendments to warning regulations, pointing to "flood of opposition from the business community").

307. See Hadden, supra note 7, at 243, 255-56 n.8 (arguing that requiring specific and strong labels may cause manufacturers to substitute less hazardous ingredients rather than provide warnings, and citing evidence to this effect resulting from a voluntary warning program for art supplies).
derstood, albeit at the expense of omitting information about the uncertainties of risk assessment. While brief warnings may not include all the necessary risk information, lengthier warnings may not be read by consumers who are already overloaded with information.

Likewise, while as a normative matter it would be desirable for Proposition 65 warnings to provide comparisons with other products or activities, this is probably impractical to actually implement. Obtaining data about products or activities that are related closely enough in their qualitative characteristics or are sufficiently familiar to recipients to be meaningful baselines for comparison would be extremely difficult, especially for risks from environmental exposures and reproductive toxicants. Moreover, short of the State dictating the content of the comparisons (for which insufficient relevant data exists in any case), there is the significant danger that businesses will manipulate comparisons to bias recipients so that they will accept whatever risk is being disclosed in the warning. This has already occurred to some extent under Proposition 65.

A final concern with requiring additional information on consumer product warnings is whether additional information can fit on product labels, which are frequently crowded. Research suggests, however, that various ways exist to increase the size of a product label, affording greater surface area upon which to print information.

308. See Nordenstam & DiMento, supra note 35, at 361.
309. These can promote more informed choices and increase understanding of unfamiliar risks. Bettman et al., supra note 49, at 16-17; Covello, supra note 130, at 1445, 1449; National Academy of Sciences, supra note 53, at 96-98, 172-74; Stenzel, supra note 53, at 524-25.
310. Even then, the risks may not truly be comparable. See Ellen K. Silbergeld, The Risks of Comparing Risks, 3 N.Y.U. Envtl. L.J. 405, 408-10 (1995) (stating that different populations are at risk from different activities; the risk of most diseases varies by age category; risk comparisons overlook the fact that multiple environmental and genetic factors may interact to cause disease; there are limitations in our ability to quantify noncancer human health risks). For a discussion of how qualitative characteristics of risks affect risk perception, see supra notes 121-28 and accompanying text.
311. See Baruch Fischhoff, Understanding Long-Term Environmental Risks, 3 J. Risk & Uncertainty 315, 322 n.11 (1990) (little can be inferred from risk comparisons when actions being compared are different in various risks, benefits, and control options); Covello, supra note 130, at 1446-48 (risk comparisons may fail to incorporate the qualitative dimensions that underlie people's concerns about the acceptability of risk); National Academy of Sciences, supra note 53, at 97, 172 (different qualitative characteristics affect the way comparisons are viewed; comparisons can be distorted by selecting as a basis for comparison seemingly trivial risks or risks that the public is known to subjectively underestimate).
312. See supra notes 139-41 and 174-75 and accompanying text.
Warnings can also be posted on shelf signs, alongside price, quality, and nutritional information.314

Notwithstanding these various limitations, Proposition 65's warning regulations could be strengthened in ways that would substantially advance the various goals of the statute without unduly sacrificing others. The following eight specific recommendations can be feasibly implemented and will generate warnings that better achieve the Proposition's overall objectives.

1. **Warnings should contain design features that emphasize noticeability and readability**

Most individuals face a welter of stimuli in everyday life. Warnings that do not stand out from the background will not be noticed, particularly by people with no prior interest in the subject.315 Thus, warnings should be designed to attract attention. As one expert expressed, "[w]arnings [should] be as dynamic as advertising."316

A symbol or icon can significantly help attract attention to a warning.317 Symbols can also be very helpful in elucidating a warning, and can be especially useful for reaching people with limited literacy and language skills.318 Although no established symbol exists to indicate hazards of cancer or reproductive harm, other currently recognizable symbols or design shapes, such as triangles, can be used to arouse attention.319 Therefore, OEHHA should develop a symbol or icon that helps convey the warning message underlying Proposition 65.

Warnings should have color print or colored symbols that contrast with their background, because colors more effectively arouse attention.320 Warnings should be printed in a print size larger than

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314. *See* Viscusi, *supra* note 124, at 298-99 (prominent point of purchase display can be more effective than a nonprominent product label). A less desirable alternative would be to include an abbreviated warning on a product label that refers to more detailed information elsewhere, such as in a package insert or in-store compendium.

315. *National Academy of Sciences*, *supra* note 53, at 136 (people most likely to receive messages are those who already possess some information about the issues under question; "[t]he people who need information most seem to be the least likely to pay attention.").


319. The American National Standard Institute (ANSI) recommends that triangles be used to convey hazard alert messages on safety signs. *See* American National Standard Institute, *Criteria for Safety Symbols* 2 (ANSI Z535.3-1991); *see also* Had- den, *supra* note 7, at 233-34 (inverted triangles used to convey caution under Canadian government's hazard labeling system).

that immediately surrounding them.\footnote{321} Also, the regulations should contain more specific guidance about the placement of warnings to insure that they are noticeable.\footnote{322}

2. \textit{Businesses should be required to provide mailed notices when warning exposed individuals about offsite environmental exposures}

Mailed notices are far more likely to be seen and read than newspaper ads, since a small percentage of the population reads newspapers and an even smaller percentage reads advertisements. Proposition 65 warning regulations should be modified to require at least two of the required quarterly warnings for offsite environmental exposures be mailings to affected individuals.\footnote{323}

3. \textit{Warnings should inform recipients of their exposure to listed chemicals}

Proposition 65's current regulations allow businesses to provide vague and uninformative warnings. To better fulfill the underlying statutory purposes, warnings should expressly state that persons are exposed to listed chemicals, not merely that consumer products, workplaces, or facilities contain such chemicals.\footnote{324} For example, OEHHA proposed the following consumer product warning: "WARNING: Use of this product will expose you to a chemical known to cause cancer [birth defects or other reproductive harm]."\footnote{325}

\footnote{321. For an example of a recent California statute mandating some of these elements, see the asbestos notification provision enacted in 1994, \textsc{Cal. Health \& Safety Code} § 25916 (West 1992 & Supp. 1996) (requiring that printed warnings appear "in print which is readily visible because of its large size and bright color.")}

\footnote{322. Thus, for example, the regulations should specify that warnings on consumer product labels must be prominently displayed on the package, either in the front of the box or in another location likely to be examined by the shopper before purchase. See Viscusi, \textit{supra} note 124, at 299. Likewise, OEHHA should follow its earlier proposal that newspaper warnings must appear in the main news section or local news section of daily newspapers, and be approximately 1/4 page in size. See Office of Environmental Health Hazard Assessment, Notice of Proposed Rulemaking, Amendment to Section 12601, Aug. 25, 1992, § 12605(b)(3) [hereinafter 1992 NPRM].}

\footnote{323. The current regulatory guidance suggests that cost is a relevant factor in determining whether mailings or newspaper notices are an appropriate form of warning for community exposures. This has the perverse effect of allowing facilities whose emissions have the greatest geographic impact to use the least effective form of warning. Another possibility would be to require that mailings and newspaper warnings be used in combination; letters would be mailed to the households closest to the facilities, and newspaper notices would be used to warn populations farther away. See Wheaton \& Jordan, \textit{supra} note 161, at 12.}

\footnote{324. The current safe harbor warning language states, "This product [area] contains a chemical known to cause cancer [reproductive toxicity]." \textsc{Cal. Code Regs.}, tit. 26, §§ 22-12601(b)(4), (c)(3) (1995).}

\footnote{325. This language was proposed by OEHHA. See 1992 NPRM, \textit{supra} note 322, § 12603(e)(2).}
The above warning "more accurately reflect[s] the Act's requirement that warnings be provided when exposures are known to occur," and "also makes the warning personally significant to its recipient." Occupational warnings and warnings on facility signs should likewise state that the relevant activity "will expose" the warning recipient to the harmful chemical.

Warnings for offsite exposures must alert recipients to the specific area in which the exposures occur, giving the message personal relevance to the reader. OEHHA should adopt its proposal that warnings present the approximate geographic boundaries of the area in which the exposure occurs in terms familiar to the community. This could be done, for example, by using isopleths (maps with superimposed lines highlighting the affected area).

4. **Warnings should disclose the name of any listed chemical(s) triggering the warning requirement**

This requirement promotes more fully informed decisionmaking and should be viewed as a necessary component of what individuals are entitled to know.

5. **Warnings should disclose information about the approximate level of risk to which individuals are exposed**

Modifying the "one-size-fits-all" format of current warnings would have several benefits. First, it would allow individuals to better assess the particular risks posed by a business or product. Second, it would force businesses to determine the actual level of risk to which they are exposing individuals, thus reducing the number of unnecessary or protective warnings. This change would also allow the market to function more efficiently, since products containing the same listed chemicals may pose risks that vary considerably. For example, while until very recently all new brass kitchen faucets contained lead, they caused exposures ranging from an estimated 2.76 micrograms per

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327. These changes were also recommended by OEHHA, which additionally proposed similar language in a newly-created warning for new homes. *Id.* at 27, 31, 23.
328. *Id.* at 10-11, 32.
329. This also was proposed by OEHHA. *See id.* at 8. OEHHA also suggested that where there are multiple chemicals causing exposures above the warning level, only the 2 or 3 causing the highest exposures would have to be identified. *Id.*
330. OEHHA's draft proposals permitted, but did not require, warnings to describe the level of hazard posed by exposure to the product.
331. According to OEHHA's recommendations, this "would compel most businesses to thoroughly evaluate whether exposures which require a warning are in fact occurring prior to issuing a warning... This encourages analysis, rather than indiscriminate warning." Initial Statement, *supra* note 119, at 4. Companies are also more likely to warn unnecessarily if they can use vague language in their warnings.
day (five times the Proposition 65 warning threshold) to 124 micrograms per day (250 times the level). Consumer choice can be frustrated by a warning that does not describe these disparate risk levels. The benefits from mandating disclosure of risk levels are considerable, and outweigh the additional costs that may be incurred by businesses in calculating the risks posed by their products.

However, crafting a warning that meaningfully informs recipients about risk levels is very difficult. Most people are poor evaluators of probabilistic information, and have difficulty understanding extremely small or extremely large magnitudes. Thus, providing only the bare numerical risk levels, such as telling people that a consumer product poses a cancer risk of $3.5 \times 10^{-7}$, will not be very helpful. A better format would be to have the warnings express the risks posed by an exposure both in these absolute numerical terms (at least for carcinogens), and through comparisons with the risk levels that trigger warnings under the statute.

Warnings for carcinogens should provide the approximate risk level posed by a consumer, occupational, or environmental exposure. Environmental warnings about industrial emissions should have isopleths or other graphic representations to help demonstrate the varying risk levels faced by individuals. The warnings also should indicate how the risks compare to the warning threshold. Thus, for an occupational exposure posing a $5.3 \times 10^{-5}$ cancer risk, the warning should state that the risk of cancer is approximately five times the level at which Proposition 65 requires warnings to be provided.


333. In most cases, however, these additional costs should not be substantial. Businesses are required by other statutes to perform risk assessments for some exposures covered by Proposition 65; the California “Hot Spots” law, for example, requires this for certain industrial air emissions. See supra note 254. Other laws require businesses to calculate exposure levels to Proposition 65 chemicals, data which can be used to help determine risk levels posed by exposures. This information is required, for instance, by OSHA’s workplace exposure standards. See CAL. CODE REGS tit. 8, § 5155(c).

334. NATIONAL ACADEMY OF SCIENCES, supra note 53, at 1, 25 (“[P]resenting clear and understandable information is a tremendous challenge for message designers.”).

335. Id. at 131; Bettman et al., supra note 49, at 25; BREYER, supra note 125, at 36; W. Kip Viscusi, Do Smokers Underestimate Risks?, 98 J. POL. ECON. 1253, 1257-60 (1990).

336. NATIONAL ACADEMY OF SCIENCES, supra note 53, at 131, 167 (“Few people can meaningfully distinguish among small probabilities and may have no way of determining if such an assessment as “1-in-10,000 lifetime risk” is worth worrying about”); see also Hugh Crone, Editorial: Dose, Content, Risk: Can We Instruct the Public?, 8 REG. TOXICOLOGY & PHARMACOLOGY 1-3 (1988) (arguing that the public has difficulty in appreciating orders of magnitude: “A part per billion sounds very much like a part per million.”).

337. Baruch Fischhoff, Risk: A Guide to Controversy, in NATIONAL ACADEMY OF SCIENCES, supra note 53, at 211, 304 (risk may seem much worse when described in relative rather than absolute terms; the best approach is to present risk from both perspectives).
Warnings for reproductive risks should state the risk level by reference to threshold levels (which are not expressed as probabilities of contracting disease), i.e., the warning should state that the risk of reproductive toxicity is five times the level at which a warning is required.

6. **Warnings should alert recipients to the fact that risk assessment is an uncertain process**

Conveying this message in a succinct and neutral way is extraordinarily difficult. Perhaps the best approach would be to include language stating that “Due to the uncertainties involved in risk assessment, the risks may be somewhat greater or lower than those cited,” and make a more detailed explanation of the risk assessment process available to interested persons. This is hardly ideal, but the alternative of providing lengthier risk assessment information on every warning—particularly for consumer products—is unworkable.

7. **Warnings should contain standard warning language with limitations on additional statements**

The track record of loosely regulated warnings, particularly environmental warnings, demonstrates that limiting the content of warnings is essential to avoid inferior warnings. Moreover, comprehension of warnings is too sensitive to changes in warning content or form to allow businesses to create variability. The inclusion of disclaimers, lengthy “filler” material, or self-serving statements often distort or undermine the warning message.

The manner in which risks are expressed or framed also can have a major impact on how they are perceived. For example, an activity that increases the risk of death from 1 in 10,000 to 1.3 in 10,000 would probably be viewed as much more risky if it were described as resulting in a thirty percent increase in mortality risk.

338. *See* Stenzel, *supra* note 53, at 523-25 (arguing that warnings should describe the uncertain nature of the numbers presented and information about assumptions used in the risk assessment).

339. *See* National Academy of Sciences, *supra* note 53, at 129 (technical terminology of risk assessment is very difficult to understand).

340. *See* id. at 159-60 (recommendng that risk communicators prepare supporting technical documents that summarize relevant quantitative and qualitative information, data gaps, uncertainty about risk, and assumptions used). The warning message should also indicate the key exposure assumptions on which the risk assessment was based. *Id.* at 170-71.

341. *See* id. at 82-83 (which facts are highlighted in a message and how they appear significantly affects how messages are understood by recipients).

342. *Id.* at 48-50, 83, 130.

8. Copies of warnings and the risk assessments underlying them should be sent to OEHHA, which should maintain a central database available to the public.344

An OEHHA database would enable information-seeking consumers, community residents, and workers to obtain more detailed information about exposures than that provided on warnings. Government agencies, environmental organizations, the media and others could also access this information more easily (as is the case with EPCRA and the Hot Spots Act).

V
CONCLUSION

Proposition 65's warning provision set forth ambitious goals. It sought to promote personal choice and informed decisionmaking, and to satisfy the public's basic right to know. Its drafters envisioned the statute as a more stringent, alternative regulation that would create strong incentives for toxics reductions.

To realize all of these far-reaching goals, warnings must attract attention and effectively communicate information to the public. Yet the statute itself contains only sparse direction for determining how warnings should appear. Political opposition has also thwarted regulatory implementation of the warning requirement, which has led to inadequate regulatory guidance.345 Businesses have exploited the regulatory ambiguities by providing inconspicuous warnings and uninformative warning messages. This is not surprising, since it is not in their self-interest to fully disclose negative attributes about their products or activities.

Despite the prevalence of poorly designed warnings, the warning requirement appears to have influenced industry's approach to using carcinogens and reproductive toxicants, prompting closer business scrutiny of its products and resulting in increased preventive behavior. Its reliance on the marketplace has stimulated producers of numerous

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344. See Nordenstam & DiMento, supra note 35, at 367 (recommending that Proposition 65 warnings be provided through telephone sources or libraries, as well as on product labels and in retail stores); see also Stenzel, supra note 53, at 523-25 (arguing for provision of more information to analyze risks addressed by Proposition 65); HADDEN, supra note 7, at 239-42 (recommending that risk information be made available in computerized data base accessible to the public).

345. See Nordenstam & DiMento, supra note 35, at 373 (Proposition 65 regulations ignore "format and presentation of risk information, information processing, and other human characteristics").
consumer products, particularly those with available substitutes, to go beyond the statutory requirements and to slash their use of listed chemicals. The statute also appears to have prompted reductions in environmental exposures, although this impact is more difficult to pinpoint. In the workplace, where an extensive hazard communication program already exists, the statute has had little impact.

Given the intense anti-regulatory climate prevailing in Congress and elsewhere, information disclosure statutes like Proposition 65 will undoubtedly receive greater attention in the future. These laws offer something to all sides in the political debate: reliance on market mechanisms rather than direct regulation; strong indirect incentives to scale back toxic releases; and powerful appeal to the public's sense of entitlement to information about toxics in our food, everyday consumer products, neighborhoods, and work environments. The experience of Proposition 65 to date suggests that such statutes can be a quick and potent means to stimulate toxics reductions. Warnings must be carefully devised, however, to achieve the broader goals of promoting informed decisionmaking and individual choice. With these lessons in mind, Proposition 65 is an excellent illustration of the important contribution that information disclosure laws can make to protect the environment.

346. State and local bodies also have little appetite for extending toxics regulation. See, e.g., Marla Cone, AQMD Adopts Scaled-Back Pollution Rule, L.A. TIMES, Apr. 9, 1994, at A1 (South Coast Air Quality Management District significantly weakened long-delayed rule regulating existing sources of toxic air contaminants and set the regulatory threshold at a 1 in 10,000 risk of cancer, despite District estimates that toxic pollutant emissions total approximately 68 million pounds per year, and that 10,000 persons would develop cancer as a result of these emissions).