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Effective Communication of Warnings in the Workplace: Avoiding Injuries in Working with Industrial Materials

Victor E. Schwartz and Christopher E. Appel***

I. INTRODUCTION

A principal purpose of product liability is to provide incentives for increasing product safety and better informing consumers, workers, and other end-users so that they may avoid potential hazards. To meet this goal, the law generally places liability on the entity best able to prevent the potential harm posed by a product.¹ Product warnings offer a relatively low cost means of informing the product's user of potential hazards – in effect, recasting the user as the least-cost avoider of injury.² Because there may be many risks associated with a product's use, some more probable or more serious than others, and because users have limits on what they will read and remem-

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1. See generally Richard Posner, *A Theory of Negligence*, 1 J. LEGAL STUD. 29, 32-36 (1972); VICTOR E. SCHWARTZ ET AL., PROSSER, WADE & SCHWARTZ'S CASES AND MATERIALS ON TORTS 737 (11th ed. 2005) (rationale for strict liability); George L. Priest, *Products Liability Law and the Accident Rate*, in LIABILITY: PERSPECTIVES AND POLICY 185 (Robert E. Litan & Clifford M. Winston eds., 1988) (recognizing that the goal of product liability is to reduce the accident rate).

2. See DAVID W. BARNES & LYNN A. STOUT, CASES & MATERIALS ON LAW AND ECONOMICS 85 (1992) (“[T]ort law allocates the costs of accidents to those in the best position to minimize those costs.”).

ber, sound product liability law delicately balances the practicality and comprehensiveness of warnings. This balance furthers the overriding policy objective of preventing harm to the product's user. It also indicates who should bear responsibility for communicating warnings.³ In many instances, the product liability system appropriately and efficiently allocates liability; however, sometimes it proves ineffective in cases involving industrial materials, such as chemicals, metals, sand or plastics, which can have numerous uses in the workplace and are incorporated into various products. Courts, in some instances, have held manufacturers and suppliers of such raw materials liable for warning end-users to the same degree as manufacturers of consumer products.⁴ This has occurred despite considerable differences in the ability of these manufacturers and suppliers to effectively warn end-users.

For example, courts have held bulk manufacturers of liquid propane liable for failing to warn consumers of the risks associated with an additive used to detect propane's smell when that additive is introduced and mixed by an intermediary.⁵ Industrial suppliers have been held liable when, after shipping their product by the carload, the purchaser's individual drums used to store the product did not contain adequate warnings.⁶ Chemical manufacturers have even been held liable to consumers for defective warnings when their product is incorporated into other products to formulate different substances.⁷

Unlike manufacturers and suppliers of typical consumer products, those who make and sell industrial materials often do not have full knowledge of the purchaser's intended use of their products.⁸ Indeed, these manufacturers and suppliers may not even be able to ascertain what their product will ultimately become or who the end-user will be.⁹ Industrial materials regularly travel through intermediaries and can be sold like commodities, increasing

3. See Victor Schwartz & Russell Driver, *Warnings in the Workplace: The Need for a Synthesis of Law and Communication Theory*, 52 U. CIN. L. REV. 38, 39 (1983).

4. See, e.g., *Davis v. Wyeth Labs., Inc.*, 399 F.2d 121, 131 (9th Cir. 1968) (holding that the bulk manufacturer of polio vaccine had a responsibility to see that warnings reached the customer "either by giving warning itself or by obligating the purchaser to give warning"); *Jenkins v. T & N PLC*, 53 Cal. Rptr. 2d 642, 647 (Cal. Ct. App. 1996) (holding, as a matter of law, that the bulk supplier of raw asbestos fiber incorporated into a finished product can be held strictly liable for the exposure and injury to an employee of an intermediary manufacturer).

5. See *Donahue v. Phillips Petroleum Co.*, 866 F.2d 1008, 1012 (8th Cir. 1989) (affirming jury verdict against a bulk manufacturer of liquid propane).

6. See *Shell Oil Co. v. Gutierrez*, 581 P.2d 271, 279-80 (Ariz. Ct. App. 1978).

7. See *Polimeni v. Minolta Corp.*, 653 N.Y.S.2d 429, 431 (N.Y. App. Div. 1997).

8. See RESTATEMENT (THIRD) OF TORTS: PRODS. LIAB. § 5 cmt. c (1998); RESTATEMENT (SECOND) OF TORTS § 388 cmt. n (1965).

9. See RESTATEMENT (THIRD) OF TORTS: PRODS. LIAB. § 5 cmt. c (1998); RESTATEMENT (SECOND) OF TORTS § 388 cmt. n (1965).

the disconnect between manufacturer or supplier and the end-user.¹⁰ Even when sold to a particular industry, the materials can end up as part of a product that the original manufacturer or supplier could not have reasonably predicted.¹¹ Health risks associated with some industrial materials can also vary according to the state of the product at a given time or point in the supply chain.¹² Silica sand, for example, typically does not pose a health risk as sold, but can pose a health risk to workers if reduced to a respirable state during manufacturing and the employer does not provide employees with proper protective equipment.¹³

This Article provides a guide for participants in the supply chain to communicate product risks in the most effective manner to prevent injury where prevention is possible. It suggests how liability rules should be congruent with this same public policy goal. Part II of the Article details the special challenges inherent to effectively warning users of the potential dangers posed by industrial products, while Part III sets forth criteria for meeting these challenges in the workplace. Part IV considers the development of the law in industrial product warnings. Part V then analyzes workplace safety under the current liability structure, and recognizes that warnings are not the end-all, be-all for worker safety. Finally, Part VI examines the responsibilities of the relevant parties to maintain effective communication and prevent workplace injury.

The Article concludes that placing a duty to warn on raw material manufacturers and industrial suppliers regarding the potential dangers associated with the varied conceivable end uses of their products is both inefficient and impractical. Of equal importance, such an obligation subverts the goal of effectively educating the end-user of the product so that he or she avoids in-

10. *See, e.g.*, *Hunnings v. Texaco, Inc.*, 29 F.3d 1480, 1482 (11th Cir. 1994) (discussing the bulk sale of mineral spirits to a distributor who mixed the product in a holding tank and marketed a solvent to another distributor who sold the product to the plaintiff); *Bryant v. Technical Research Co.*, 654 F.2d 1337, 1340 (9th Cir. 1981) (chain of distribution involving multiple intermediaries in the production of lacquer thinner).

11. *See, e.g.*, *Walker v. Stauffer Chem. Corp.*, 96 Cal. Rptr. 803, 804, 806 (Cal. Ct. App. 1971) (sulfuric acid supplied in bulk comprised half of formula for consumer cleaning product).

12. *See* *Artiglio v. Gen. Elec. Co.*, 71 Cal. Rptr. 2d 817, 822 (Cal. Ct. App. 1998) (noting that the bulk silicone used in medical breast implants only became potentially dangerous for that medical use); *Bond v. E.I. DuPont De Nemours & Co.*, 868 P.2d 1114, 1120-21 (Colo. Ct. App. 1993) (“[T]here is little social utility in placing the burden on a manufacturer of component parts or supplier of raw materials of guarding against injuries caused by the final product when the component parts or raw materials themselves were not unreasonably dangerous.”).

13. *See, e.g.*, *Bergfeld v. Unimin Corp.*, 319 F.3d 350, 352 (8th Cir. 2003); *Haase v. Badger Mining Corp.*, 669 N.W.2d 737, 741 (Wis. Ct. App. 2003), *aff’d*, 682 N.W.2d 389 (Wis. 2004); *Damond v. Avondale Indus., Inc.*, 773 So. 2d 266, 267 (La. Ct. App. 2000).

jury. Injury prevention through effective warnings may also not be attainable in certain applications where proper training and safety equipment are essential. Existing legal principles, such as the sophisticated user, bulk supplier, learned intermediary and substantial change doctrines, recognize the importance of placing the responsibility of developing and communicating warnings with the party that is in the best position to do so.¹⁴ In the context of workplace hazards, that party is most often the employer.¹⁵ Thus, where the workers' compensation system, and its incident-based premiums, place responsibility on employers to protect their employees from hazards related to industrial materials, the product liability system should, in turn, avoid placing manufacturers and sellers of the materials in a position where they are compelled to provide redundant, incomplete, speculative, conflicting, or otherwise ineffective warnings.

II. SPECIAL CHALLENGES IN CONVEYING WARNINGS RELATED TO INDUSTRIAL PRODUCTS IN THE WORKPLACE

Differences in industrial materials compared with ordinary consumer products justify distinct treatment with regard to product warnings. Manufacturers and suppliers of industrial products do not, and, from a practical standpoint, cannot know all of the end uses of their products.¹⁶ They also cannot exercise control over the use of products in the purchaser's workplace.¹⁷ Industrial products, unlike consumer or other workplace products, are commodities, and in a commodity marketplace, the potential end-user may change multiple times. The product could be anything that incorporates the industrial material. In this environment, product packaging, labels, or inserts cannot reasonably be expected to effectively address all of these possibilities with a "one size fits all" warning.¹⁸ Furthermore, subsequent packaging changes in industrial products before they reach an intermediary or end-user may lead to

14. An entity in the workplace is in a position as an employer and as a manufacturer or seller. It is in this role as manufacturer or seller that product liability law has established defenses to limit liability for the communication of warnings. *See infra* Part IV.

15. *See Marshall v. H.K. Ferguson Co.*, 623 F.2d 882, 886 (4th Cir. 1980) (stating that the basic assumption behind the Restatement (Second) approach to warnings is that the manufacturing employer is in a position of superior knowledge regarding the product and potential dangers).

16. *See Cimino v. Raymark Indus., Inc.* 151 F.3d 297, 335 (5th Cir. 1998) (holding that it would create an unbearable burden on the manufacturer of the raw asbestos "building block" material later incorporated into insulating sheets by requiring the purchaser/employer to warn on every possible use); *see also supra* notes 8-13.

17. *See infra* notes 28-30.

18. *See Schwartz & Driver, supra* note 3, at 58 ("Even when feasible, a comprehensive warning may not be desirable.").

the loss of warnings originally provided with the product.¹⁹ Without proper training and equipment, use of the product may also be unsafe regardless of the warnings provided to users. Hence, the reality of industrial products is that they share little in common with the ordinary consumer products that product liability law seeks to safeguard through conspicuous warnings.²⁰

The traditional process by which an industrial supplier enters the supply chain is through shipment of material in barrels, vats, containers or railcars. The purchaser refines, incorporates, or otherwise uses the industrial material to make a product. In the absence of further transactions, the purchaser's employees represent the end-user of the material. In order to be effective, warnings related to industrial materials must, therefore, reach these employees and communicate potential hazards related to their intended use.²¹

Existing barriers, however, prevent consistency in or reliance on this method of injury prevention. As many courts have recognized, industrial material suppliers do not always know, nor are they able to predict, the end use of their product.²² This stems from considerations such as new technology developments, the purchaser's desire to protect trade secrets, changes in demand causing purchasers to sell off bulk inventory, and the existence of middlemen along the production cycle.²³ With changes in use come changes in risks. A material that is not inherently dangerous could become dangerous through the refinement process or when used in an unexpected way.²⁴ For example, Teflon is not an inherently dangerous substance and is used in a range of products including jet aircraft bearings, pipe lining, solar collectors, submarine piston rings, and, most commonly, nonstick coating for cooking pans.²⁵ Yet when incorporated into certain medical implants, it can create a risk of harm.²⁶ Warning of the dangers associated with every narrow, limited use of Teflon or a similar industrial material would place an "onerous bur-

19. See *Manning v. Ashland Oil Co.*, 721 F.2d 192, 196 (7th Cir. 1983) (holding that the bulk supplier of lacquer thinner did not owe a duty to inspect the labeling or packaging of a middleman).

20. See RESTATEMENT (THIRD) OF TORTS: PRODS. LIAB. § 2 cmt. i (1998).

21. See *Bergfeld v. Unimin Corp.*, 319 F.3d 350, 353 (8th Cir. 2003). "[W]hen the user is a professional who should be aware of the characteristics of the product," no duty to warn should be imposed. See *Vanelune v. 4B Elevator Components Unlimited*, 148 F.3d 943, 946 (8th Cir. 1998).

22. See *supra* notes 8-13 and accompanying text.

23. See *supra* notes 8-13 and accompanying text.

24. See *Manning*, 721 F.2d at 194 (concluding that the bulk supplier did not know or have reason to know that lacquer thinner would become dangerous for the use it was supplied).

25. See *In re TMJ Implants Prods. Liab. Litig.*, 872 F. Supp. 1019, 1022, 1028, 1033 (D. Minn. 1995) (finding Teflon manufacturer DuPont not liable under the raw materials supplier defense and bulk supplier doctrine for an allegedly defective warning on medical implants incorporating the product).

26. See *id.* at 1022.

den” on the supplier and likely lead to “severe enforcement problems.”²⁷ Conversely, a general warning could prove ineffective or misleading given the spectrum of completely benign applications to exceptionally dangerous ones.

An issue tied to the uncertainty of an industrial material’s use is the manufacturer’s lack of control. By not necessarily knowing what the finished product is or who the end-user will be, industrial product manufacturers have little control over how their product is used in the workplace. They are not in a position to evaluate employer warnings, supply employee training and procedures, or oversee the adequacy of a facility to prevent harm to workers beyond their view and direction.²⁸ Consideration of these factors is especially important if the material is inherently dangerous. Moreover, when it comes to some materials in the workplace, even the most effective warnings may not be enough to protect workers. Chronically toxic substances require proper safety devices such as respirators, radiation monitors, or protective clothing for use under any circumstances, and exposure to such chemicals frequently results in litigation.²⁹ Inadequacies in this employer-issued equipment could render any supplier-issued warning insufficient.³⁰

Even in the case where the industrial material manufacturer or supplier knows both the finished product and the end-user, its practical control remains limited. A Louisiana appellate court recognized this in the case of a silica sand supplier, stating that “while the sand supplier knew its sand would be used in sandblasting, it had no control over how Plaintiff’s employer would conduct its sandblasting operation, nor did it have any practical means of conveying any warning to the individual sandblasters.”³¹ In addition, industrial product manufacturers typically contract with only the immediate purchaser, meaning that subsequent users or intermediaries are not subject to any restrictions a seller may place on the material’s use or its warnings.³² For instance, if a material is known to be hazardous, industrial product manufacturers would naturally seek to limit the number of employees who work with it at any point in the supply chain. This control is lost through the purchaser’s use of an intermediary, such as a reseller, distributor or other manufacturer. The industrial product manufacturer’s only means of control over an intermediary’s use of the industrial material is through additional contractual agree-

27. *Groll v. Shell Oil Co.*, 196 Cal. Rptr. 52, 55 (Cal. Ct. App. 1983).

28. *See* *Schwoerer v. Union Oil Co.*, 17 Cal. Rptr. 2d 227, 231-32 (Cal. Ct. App. 1993) (analyzing the adequacy of a warning for the chemical solvent known as Stoddard’s solvent which explained that its safe industrial use could only be attained through adequate ventilation, respiratory equipment and protective clothing).

29. *See, e.g.,* *McConnell v. Union Carbide Corp.*, 937 So. 2d 148, 156 (Fla. Dist. Ct. App. 2006) (holding that a bulk manufacturer of asbestos had a duty to warn end consumers).

30. *See infra* notes 168-172 and accompanying text.

31. *See* *Cowart v. Avondale Indus., Inc.*, 792 So. 2d 73, 75 (La. Ct. App. 2001).

32. *See infra* note 35.

ments with the direct purchaser.³³ However, control provisions must account not simply for the intermediaries the purchaser uses, but for every potential intermediary down the supply chain if this process is to affect a meaningful result. This would, again, place an unreasonable burden on industrial product manufacturers to influence every facet of the supply chain in order to effectively warn users.³⁴ Such ubiquitous control is neither realistic nor desirable under product liability law.³⁵

The packaging, removal, and repackaging of industrial material warnings further distinguish industrial products from ordinary consumer and workplace products. As a general rule, product warnings must be posted in a conspicuous place.³⁶ The nature of some products makes this packaging requirement difficult, if not impossible, to perform in an effective manner.³⁷ For example, timber, coal and iron ore are not packaged in the traditional sense with a covering that can convey a warning; they are, like many industrial products, taken in their raw natural form, shipped in dump trucks or flat-bed trucks, unloaded at a worksite, and placed directly into an employer's

33. The option of the industrial material manufacturer contracting directly with an intermediary for a measure of control is not included. First, as a contract matter, it is the employer that owns the industrial product and the industrial material manufacturer is not in a position to offer value (i.e., consideration). If the industrial manufacturer did offer anything of value, then the intermediary, by definition, would no longer be an intermediary. The same applies if the industrial manufacturer contracts multilaterally with the employer and intermediary. Therefore, to affect control over an employer's subsequent intermediary, the supplier of the industrial material would have to contract through the employer.

34. See *Donahue v. Phillips Petroleum Co.*, 866 F.2d 1008, 1014-15 (8th Cir. 1989) (Ross, J., dissenting) ("The bulk wholesaler has no way of telling who the ultimate purchaser might be, and has no package on which to endorse any warning."); see also *infra* note 43.

35. The District Court of Nevada explained the concern with holding bulk suppliers liable for failure to warn as follows:

In the case of the bulk materials supplier and its vendee/intermediary who actually manufactures the finished product, it is almost always the case that the intermediary is in a better position to warn the ultimate consumer of dangers than is the bulk supplier. . . . It would be wasteful, and at times counter-productive, for courts to require the bulk supplier to duplicate these efforts.

Forest v. E.I. DuPont de Nemours & Co., 791 F. Supp. 1460, 1465, 1470 (D. Nev. 1992) (stating that the Nevada Supreme Court would adopt the bulk supplier doctrine, but denying summary judgment on the grounds that its application remained a jury question under the case facts).

36. See RESTATEMENT (THIRD) OF TORTS: PRODS. LIAB. § 2 cmt. i (1998).

37. See *Tasca v. GTE Prods. Corp.*, 438 N.W.2d 625, 629 (Mich. Ct. App. 1988) (discussing how canisters and labels used in the bulk shipment of cobalt were destroyed after the cobalt was mixed and that it was unlikely any of the purchaser's employees would see the labels because their grinding operations were housed in a separate facility a quarter-mile away).

production.³⁸ The speed and efficiency of these processes can make packaging unnecessary and overly cumbersome.³⁹

Where packaging is suitable for industrial materials, product warnings may at least reach the end-user irrespective of their effectiveness in preventing harm. A problem develops, however, when the purchaser removes packaging as part of the manufacturing and refinement process and other users exist further down the supply chain. These users may include other employees within the same facility not associated with the receiving and unpacking of bulk shipments or employees at other intermediaries working with the same materials. In this event, the content and effectiveness of a warning is rendered almost meaningless because only a select portion of users actually view the warning, no matter how effectively it is conveyed to the purchaser. Repackaging by an employer causes a similar effect in that subsequent users are exposed to either the employer's warning, which may be less effective,⁴⁰ or no warning at all, yet the industrial product manufacturer may still be subject to liability.⁴¹ Liability against the industrial product manufacturer can, therefore, occur in cases where the content of a particular warning was entirely effective – a result which undermines the public policy encouraging and promoting effective warnings that prevent harm.⁴²

The Massachusetts Supreme Court, in *Hoffman v. Houghton Chemical Corp.*, summarized the plight faced by bulk industrial suppliers:

[A]s a practical matter, the nature and function of bulk products are different from those of many other consumer and industrial goods and thus require separate consideration. Bulk products often are delivered in tank trucks, box cars, or large industrial drums, and stored in bulk by the intermediary, who generally repackages or reformulates the bulk product. Even if the product *could* be labeled by the supplier, any label warnings provided to the intermediary would be unlikely to reach the end user. . . . To impose on bulk suppliers a duty to warn all foreseeable end users *directly* where the product cannot readily be labeled for such users (if it can be labeled at all); where the intermediary is often in a different industry from that of the supplier, with different means of production; and

38. See *Hoffman v. Houghton Chem. Corp.*, 751 N.E.2d 848, 856-57 (Mass. 2001) (discussing the general shipping practices of bulk manufacturers).

39. See *id.*

40. An employer warning could be less effective than a manufacturer warning because of the current liability and incentive structure with regard to workplace warnings. An employer's potential to convey a more effective warning is superior to the manufacturer's potential. See *infra* notes 162-164 and accompanying text.

41. See *Shell Oil Co. v. Gutierrez*, 581 P.2d 271, 279-80 (Ariz. Ct. App. 1978).

42. See *Humble Sand & Gravel, Inc. v. Gomez*, 146 S.W.3d 170, 194 (Tex. 2004) (requiring inquiry into whether the supplier's warning would reach the consumer before determining the existence of a duty to warn).

where the end users themselves are a remote and varied lot would be unduly, indeed crushingly, burdensome.⁴³

The unique challenges presented in communicating effective warnings related to industrial materials illustrate that strict adherence to traditional consumer product liability guidelines is ineffective and unwise. Attempts at comprehensive warnings on industrial materials that could serve any one of a myriad of purposes add unnecessary complexity and confusion. The warnings could also be rendered meaningless where, as in the case of inherently toxic substances, injury prevention can only be accomplished by the employer's worksite safety controls. Hence, there is a potentially dangerous diffusion of responsibility among the industrial material supplier, intermediary, employer, and end-user. This translates into warnings that workers are both less likely to read and, when read, are less effective in preventing injury. Other employees and end-users may not be exposed to the content altogether. Given these considerations, a more systematic approach to the communication of warnings related to industrial materials is needed.

III. CONVEYING EFFECTIVE PRODUCT WARNINGS IN THE WORKPLACE

Effective communication of any product warning requires a comprehensive and process-based approach.⁴⁴ Communication theory examines how employers can transmit key information in a manner that leads employees to modify their behavior in the workplace. It breaks down the essential elements of effective warnings, designing improved processes and realigning the separate, independently operating participants towards the common goal of preventing harm.⁴⁵ The unique environment of workplace product warnings, as opposed to consumer warnings, makes this analysis vital because there are routinely multiple entities issuing some form of warning for the same unfin-

43. 751 N.E.2d at 856-57 (affirming summary judgment in favor of bulk suppliers of chemicals used in the production of ink).

44. See Schwartz & Driver, *supra* note 3, at 46; see also Michael Jacobs, *Toward Process Based Approach to Failure-to-Warn Law*, 71 N.C. L. REV. 121, 199 (1992) ("Failure-to-warn law needs a major overhaul. It is a doctrinal body with almost no working parts.").

45. Communication theory outlines six core elements that should, at a minimum, be addressed to convey effective warnings: process, transmission, media and channels, symbols, reception and meaning. These elements are used generally as a model to evaluate the effectiveness of a communication and closely resemble the criteria discussed in this Article for specific application to the workplace environment. See Schwartz & Driver, *supra* note 3, at 46-50.

ished product.⁴⁶ As the supply chain expands and participants attempt to insulate themselves from liability, the practical effect can be competing warnings that impair safety through user confusion or information overload.⁴⁷ The solution is to present a more unified, complementary approach to product warnings, which places the responsibility with the entity or entities in the best position to communicate an effective warning that prevents harm. Moreover, the guiding force in effective communications should not be a focus on the mere legal sufficiency of the warning, but rather the realistic effectiveness of the warning or warnings. Communication theory sets forth criteria to accomplish this through evaluation of the warning's (1) objective, (2) content, (3) sender characteristics, (4) receiver characteristics, (5) media and channels, and (6) context.⁴⁸

A. Objective

The design of a product warning begins with the determination of what the warning should accomplish beyond the generalized notion of injury reduction and what behavioral response is anticipated through compliance.⁴⁹ Few products (especially raw industrial materials) are capable of a comprehensive warning that addresses every conceivable risk in a simple, easy-to-understand format for the range of potential users.⁵⁰ For this reason, realistic objectives will likely fall short of total compliance, at least with regard to a particular warning.⁵¹ Conveying the necessary information to achieve total compliance may require multiple, targeted warnings and employee training. Objectives for workplace warnings should, therefore, balance the product's risks in the worker's specific application with the worker's ability to assimilate information given predictable variations in sophistication, experience, and language proficiency. Warnings that meet such tailored, application-specific objectives are likely the most effective in preventing harm.

46. See, e.g., *Gomez*, 146 S.W.3d at 179 (warnings on multiple sand supplier bags); *Tasca v. GTE Prods. Corp.*, 438 N.W.2d 625, 628-29 (Mich. Ct. App. 1988) (supplier and employer warnings).

47. See Howard Latin, "Good" Warnings, Bad Products, and Cognitive Limitations, 41 UCLA L. REV. 1193, 1211-13 (1994).

48. See Schwartz & Driver, *supra* note 3, at 51; see also Jacobs, *supra* note 44, at 177-78 ("[W]arning methodology would borrow heavily from five related fields: marketing, industrial design, injury prevention, communications, and focus group research.").

49. See Schwartz & Driver, *supra* note 3, at 51.

50. See Victor E. Schwartz, Mark A. Behrens & Andrew W. Crouse, *Getting the Sand Out of the Eyes of the Law: The Need for a Clear Rule for Sand Suppliers in Texas After Humble Sand & Gravel, Inc. v. Gomez*, 37 ST. MARY'S L.J. 283, 322 (2006).

51. See Schwartz & Driver, *supra* note 3, at 51.

The task of providing workplace warnings with a specific objective becomes more challenging as the number of users expands within a single workplace and through subsequent intermediaries. As a result, the industrial material supplier at the initial level of the supply chain is less likely to have the information necessary to define precise objectives. Rather, a supplier's ability to warn is limited to admonitory information conveying general hazards.⁵² The purchaser, in contrast, does know the specific work-related application of each of its employees and can better define targeted objectives to prevent foreseeable harms. Each subsequent employer that "substantially changes" the product is also in a more efficient and effective position to understand and define objectives to prevent risks from these applications.⁵³

B. Content

The content of workplace warnings is determined by the objective of the warnings and the degree of specificity needed to address that objective in a way that induces compliance.⁵⁴ This can range from general content that does not address any particular hazard, instead citing in broad terms that the product can be dangerous, to comprehensive information that attempts to detail every potential hazard associated with the product.⁵⁵ The effectiveness of the content can be expressed as a function of providing comprehensiveness and overcoming practical limitations. Limitations on content exist with respect to the media or channel of the warning,⁵⁶ location of the warning, size and length constraints, viewing distance, illumination level, time period within which to convey the warning,⁵⁷ and the retention abilities of the user.⁵⁸ In light of these limitations, the "manufacturer's dilemma" becomes what to impart that will, at least, prove adequate in the face of litigation.⁵⁹ Courts often evaluate the adequacy of a warning's content based on a consideration of related factors, including size, clarity, location, form, and the ability to catch the user's eye.⁶⁰

52. See *id.* at 52.

53. See *Artiglio v. Gen. Elec. Co.*, 71 Cal. Rptr. 2d 817, 822 (Cal. Ct. App. 1998).

54. See Schwartz & Driver, *supra* note 3, at 55-57.

55. See *id.* at 57-58.

56. See *infra* notes 83-84 and accompanying text.

57. See Mark Geistfeld, *Inadequate Product Warnings and Causation*, 30 U. MICH. L.J. REFORM 309, 322-23 (1997) (discussing the information costs for an individual to view a given warning and concluding that warnings should be evaluated based on the average effectiveness among receivers).

58. See Schwartz & Driver, *supra* note 3, at 55-56.

59. M. Stuart Madden, *The Duty to Warn in Products Liability: Contours & Criticism*, 89 W. VA. L. REV. 221, 296 (1987).

60. See *Shell Oil Co. v. Gutierrez*, 581 P.2d 271, 280-81 (Ariz. Ct. App. 1978) ("[T]he adequacy of a warning label is not determined solely by reference to the

Adherence to legal guidelines is only part of the calculus of a warning's content, as much legally adequate content may serve no practical purpose.⁶¹ Comprehensive, encyclopedic warnings often will not be read by busy employees just as bold warnings concerning obvious or commonly known risks receive little attention.⁶² The determination of content is a "tradeoff[] between the costs and benefits of selectivity."⁶³ Presented with the impossible task of creating a fully comprehensive warning, the content of workplace warnings should simply focus on three elements: (1) identifying the danger in a way that is understandable to the employee/user, (2) relating the consequence of non-compliance so that the gravity of risk can be appreciated, and (3) presenting the avoidance measure in clear, simple terms.⁶⁴

C. Sender Characteristics

The characteristics of the sender provide important insight in determining how a warning can most effectively communicate information. Differences or asymmetries in information available to the sender of a warning in the workplace affect both the warning's content and credibility. Without germane knowledge of the workplace environment, manufacturers cannot define objectives or formulate content with the specificity needed to most effectively prevent injury.⁶⁵ Industrial material suppliers face a significant burden in this area. On the other hand, employers know, or should know, the physical conditions existing in the workplace they control and operate, the

words on the label but also by reference to the physical aspects of the warning, such as conspicuousness, prominence, and relative size of print. All of these physical aspects must be adequate to alert the reasonably prudent person."); *Bryant v. Technical Research Co.*, 654 F.2d 1337, 1345-46 (9th Cir. 1981) (citing *Carmichael v. Reitz*, 95 Cal. Rptr. 381, 401 (Cal. Ct. App. 1971)) ("An important factor in evaluating the adequacy of a warning is the clarity of the warning. Misleading representations of safety accompanying a warning may render the warning inadequate."); see also *Hildy Bowbeer et al., Warning! Failure to Read This Article May Be Hazardous to Your Failure to Warn Defense*, 27 WM. MITCHELL L. REV. 439, 453-54 (2000).

61. Common factors taken into consideration to discharge a suppliers legal duty to warn the ultimate user of its product include: "1) the dangerous nature of the product; 2) the form in which the product is used; 3) the intensity and form of the warnings given; 4) the burdens to be imposed by requiring warnings; and 5) the likelihood that the warnings will be adequately communicated to the foreseeable users of the product." *Union Carbide Corp. v. Kavanaugh*, 879 So. 2d 42, 45 (Fla. Dist. Ct. App. 2004) (citing *Sowell v. Am. Cyanamid Co.*, 888 F.2d 802, 804 (11th Cir. 1989)).

62. See RESTATEMENT (THIRD) OF TORTS: PRODS. LIAB. § 2 cmt. j (1998).

63. Schwartz & Driver, *supra* note 3, at 61.

64. See *id.* at 56-57.

65. See *Childress v. Gresen Mfg. Co.*, 888 F.2d 45, 49 (6th Cir. 1989) ("[E]xtending the duty to make a product safe to the manufacturer of a non-defective component part would be tantamount to charging a component part manufacturer with knowledge that is superior to that of the completed product manufacturer.").

warnings and training already in place at facilities, and areas where improvements are needed based on previous injuries.⁶⁶ They are in the “best position” to adapt to changes in production risks or respond to hazards that would be unforeseeable by the industrial material supplier or another product manufacturer.⁶⁷ They are also, perhaps because of this more familiar knowledge, likely to convey warnings that are taken more seriously by their employees than a warning issued by remote manufacturers.⁶⁸

Furthermore, employers are in a position to attach additional consequences for failure to comply with warnings such as negative performance evaluations, demotion, loss of pay, or termination. While risks of personal injury alone should be enough incentive to induce compliance in rational users, the reality can be that these additional consequences help to combat apathy or inattentiveness among employees. Suppliers of industrial materials cannot hope to meet this level of awareness or credibility without an enforcement presence at every level of the supply chain – an unrealistic option in terms of cost and resources. Even if a supplier could attain such a presence, there is no guarantee it would match the control level of the employer. Product liability law seeks to place liability with the entity in the best position to prevent the harm, and, in the workplace, the sender in the best position to effectively communicate a warning that prevents harm is the direct employer. Effective workplace communications should, therefore, center on the employer and responsibility should be allocated accordingly.

D. Receiver Characteristics

Communication of effective product warnings also requires evaluation of the receiver’s characteristics as it is the receiver who ultimately must process and retain the risk information. In the workplace, the receiver is the employee who uses the product. Although employees make up a smaller segment of the population compared to consumers, the differences in sophistication and the range of potential hazard exposure make them a more diverse and complex group. Employees working with hazardous chemicals, for instance, are exposed to greater types of injury than consumers who purchase a

66. See *Marshall v. H.K. Ferguson Co.*, 623 F.2d 882, 886 (4th Cir. 1980) (stating that the basic assumption behind the Restatement (Second) approach to warnings is that the manufacturing employer is in a position of superior knowledge regarding the product and potential dangers).

67. See *Taylor v. Monsanto Co.*, 150 F.3d 806, 808 (7th Cir. 1998) (discussing that the intermediary employer’s “in-house knowledge about PCBs was so sophisticated that the company participated in federal and industry task forces and working committees on PCBs”); *Beale v. Hardy*, 769 F.2d 213, 214 (4th Cir. 1985) (characterizing a silica foundry’s knowledge as “nothing less than extensive”).

68. See *Latin*, *supra* note 47, at 1247. *But see* Kenneth Ian Weissman, *A “Comment J” Parry to Howard Latin’s “Good” Warnings, Bad Products and Cognitive Limitations*, 70 ST. JOHN’S L. REV. 629, 682 (1996).

finished product incorporating those same chemicals. Also, some employees may have a degree in chemistry or significant experience using the substance while others may not. This creates a wide range of sophistication among workers, limiting the effectiveness of some warnings. In the case of industrial materials, the products are incorporated into a finished product, which can involve different forms of the material and further alter the types and degrees of risks.⁶⁹ Communications with employees must account for these variations in risks and sophistication, in addition to overcoming other communication barriers common to all receivers.

Employees in the workplace who use industrial materials, similar to consumers, cannot always read English and may not possess functional literacy.⁷⁰ For example, a 2003 report by the National Center for Education Statistics estimated that eleven million adults in the United States are not English literate.⁷¹ A 2000 report by the U.S. Census Bureau further estimated that roughly forty-seven million people in the United States do not speak English in their home.⁷² Individuals in this group are likely to hold many unskilled industrial jobs such as the unloading of trucks or freight, facility maintenance, “odd jobs,” basic assembly line production, or waste disposal. The unskilled nature of the work often puts these employees in positions that deal with industrial products at the employer’s initial production stage. Conveyance of warnings to these employees could be ineffective unless through illustrations, universal symbols, or availability of the warnings in other languages.⁷³ For example, in *Hubbard-Hall Chemical Co. v. Silverman*, the United States Court of Appeals for the First Circuit held that an insecticide manufacturer’s warning to an employer/purchaser through English-language bag labels was insufficient when it was foreseeable that an insecticide would be used by Spanish-speaking semiliterate farm laborers.⁷⁴ For them, an unmistakable

69. See *Gideon v. Johns-Manville Sales Corp.*, 761 F.2d 1129, 1143 (5th Cir. 1985) (stating that all asbestos products are not inherently dangerous and that the hazards must be determined by the specific qualities of that product); *Celotex Corp. v. Copeland*, 471 So. 2d 533, 538 (Fla. 1985) (“Asbestos products . . . have widely divergent toxicities, with some asbestos products presenting a much greater risk of harm than others.”).

70. See Latin, *supra* note 47, at 1207.

71. NAT’L CTR. FOR ECON. STATISTICS, U.S. DEP’T OF EDUC., NCES 2007-480, LITERACY IN EVERYDAY LIFE: RESULTS FROM 2003 NATIONAL ASSESSMENT OF ADULT LITERACY 13 (2007), available at http://nces.ed.gov/Pubs2007/2007480_1.pdf.

72. U.S. CENSUS BUREAU, U.S. DEP’T OF COMMERCE, NO. C2KBR-29, LANGUAGE USE AND ENGLISH-SPEAKING ABILITY: 2000 2 (2003), available at <http://www.census.gov/prod/2003pubs/c2kbr-29.pdf>. The report additionally stated that roughly fifty-five percent of United States residents were capable of speaking English even if not spoken in the home. See *id.*

73. See Craig A. Kelley et al., *The Use of Vivid Stimuli to Enhance Comprehension of the Content of Product Warning Messages*, 23 J. CONSUMER AFF. 243, 259 (1989) (stating that warning symbols helped people to remember warning messages).

74. 340 F.2d 402, 405 (1st Cir. 1965).

symbol like a skull and cross-bones was required.⁷⁵ Such considerations create additional limitations on content.⁷⁶ Unskilled workers, regardless of literacy, are also part of predictably inattentive groups.⁷⁷ These workers may be unable or unwilling to devote the time and effort needed to read detailed warnings.⁷⁸ The media and content of warnings must be additionally designed to draw their attention.

When understood, workplace warnings are only effective to the degree that they are internalized by employees. Human retention is limited and warnings from a multitude of sources can cause information overload, leading to employee confusion and paralysis.⁷⁹ Hence, senders may succeed in producing a comprehensive, otherwise sufficient warning, but not an effective warning that prevents harm.⁸⁰ Effective warnings must also overcome the related issue of cognitive dissonance, which leads receivers “to reject or underemphasize information inconsistent with their beliefs and actions.”⁸¹ Additional barriers include receivers’ overconfidence in their ability to avoid hazards and their reflex actions in emergency situations, as well as their disregard for low-probability risks.⁸² Because these receiver characteristics vary among the employees within any business, it is again the direct employer who is in the most effective position to identify these barriers and prevent injury to a receiver.

In comparison, an industrial material supplier that is not involved in the end use of its product has virtually no knowledge of the specific degree of risk to which workers will be exposed or the sophistication of the user, which could range from illiterate to the recipient of an advanced degree. Holding the industrial product manufacturer liable, even jointly, when the employer

75. See *id.*; see also R. Geoffrey Dillard, *Multilingual Warning Labels: Product Liability, “Official English,” and Consumer Safety*, 29 GA. L. REV. 197, 198-99 (1994) (positing the degree of liability for failing to include multi-lingual warnings when it is probable non-English speakers will use the product).

76. See *supra* notes 56-58 and accompanying text.

77. See Latin, *supra* note 47, at 1208; see also Weissman, *supra* note 68, at 647-49 (addressing concerns that the communication of “good” warnings may nevertheless be ineffective or ignored).

78. Latin, *supra* note 47, at 1208; see also Victor E. Schwartz, *See No Evil, Hear No Evil: When Clear and Adequate Warnings Do Not Prevent the Imposition of Product Liability*, 68 U. CIN. L. REV. 47, 62 (1999).

79. See Latin, *supra* note 47, at 1211; see also Michael D. Green, *When Toxic Worlds Collide: Regulatory and Common Law Prescriptions for Risk Communication*, 13 HARV. ENVTL. L. REV. 209, 223 (1989).

80. See J. Scott Dutcher, Comment, *Caution: This Superman Suit Will Not Enable You to Fly – Are Consumer Product Warnings Labels Out of Control?*, 38 ARIZ. ST. L.J. 633, 638 (2006) (analyzing failure-to-warn cases requiring arguably excessive warnings).

81. Latin, *supra* note 47, at 1234.

82. See *id.* at 1243-45.

has a superior informational advantage in every respect is inefficient, less effective, and could produce confusing or even contrary warnings.

E. Media and Channels

Consideration of the objective, content, and characteristics of the parties to a workplace warning guides the decision of the most effective transmission media or communication channel. For example, greater precision in the objective of a warning leads to increased flexibility in the communication channels with which to convey the warning just as content requiring considerable length to effectively communicate risks limits the media options. The range in sophistication and risks among receivers might further warrant that dangers be conveyed through multiple, complimentary channels with separate content to maximize effectiveness. Moreover, to be effective, workplace product warnings should reach users through several avenues that account for barriers denying access to the warning and counteract ineffective or incomplete content of other warnings. A unified effort is needed to effectively prevent workplace injury that does not encourage every industry participant – suppliers, manufacturers, sellers and distributors – to independently present warnings out of fear of liability, rather than a desire to effectively prevent harm.

Industrial product manufacturers and suppliers enter the workplace environment severely limited in accessible channels to convey an effective warning because they do not own or control the premises to which the industrial product is shipped or the worksites of subsequent intermediaries. Consequently, they cannot control the warnings conveyed at the worksite or the risk training of the employee/user. Their opportunity to warn is generally limited to written warnings that are either on the industrial product packaging or accompanying a bulk shipment. Conveyance of warnings through this written media may not always be the most effective, or even an effective, form of communication.⁸³ Direct employers, in contrast, have the gamut of transmission media at their disposal including written warnings around the workplace, instructional videos, audio announcements, and, most importantly, individual hands-on training. They are in the most effective position to employ the optimal media to actually minimize harm.⁸⁴

83. See *O’Neal v. Celanese Corp.*, 10 F.3d 249, 254 (4th Cir. 1993) (stating that certain products do “not lend [themselves] to the typical warning label”).

84. See James T. O’Reilly, *Risks of Assumptions: Impacts of Regulatory Label Warnings Upon Industrial Product Liability*, 37 CATH. U. L. REV. 85, 108-09 (1987) (describing the hazardous material employers’ “flexibility to select from several possible approaches such as brochures, package labels, or material safety data sheets”).

F. Context

Evaluation of workplace warnings demonstrates the superior position of the employer to effectively convey a warning under each element of communication theory. These elements interrelate to identify the most effective output, or warning, given consideration of each of the other inputs. The conveyance of a warning is not an act or an event, but a process, and, like all processes, it can and should be refined.⁸⁵ Here, context is significant. Warnings must not be viewed in isolation, but rather with regard to other warnings issued for the purpose of maximizing their cumulative effectiveness. This process should operate to remove ineffective warnings from the workplace and supplant them only if doing so increases overall harm prevention.

Warnings issued by industrial material suppliers can, in virtually any instance, be more effectively conveyed by the purchaser/employer who has more knowledge, credibility, control, and channels within which to communicate. Because employers are the least cost avoider of injury through warnings and the most effective senders, it follows that they should bear the costs and responsibility of providing warnings. This is the premise behind much of product liability law.⁸⁶ Courts have applied various doctrines to recognize these differences in position; however, application is not uniform.⁸⁷

IV. DEVELOPMENT OF THE LAW OF WARNINGS WITH RESPECT TO INDUSTRIAL MATERIALS

Product liability law has developed certain doctrines to limit the liability of industrial material suppliers and component part manufacturers. They include the “bulk supplier” or “raw materials doctrine,” the “sophisticated user doctrine,” the “learned intermediary doctrine,” and the “substantial change in condition” doctrine. These limiting principles, which have been adopted in numerous states through court decisions or by statute, recognize unique situations in which manufacturers are unable to efficiently and effectively convey warnings in the workplace.⁸⁸ In many respects, these principles

85. See Schwartz & Driver, *supra* note 3, at 46.

86. See *supra* notes 1-2 and accompanying text.

87. See, e.g., *Dole Food Co., v. N.C. Foam Indus., Inc.*, 935 P.2d 876, 884 (Ariz. Ct. App. 1997) (holding that an issue of material fact existed regarding the adequacy of a bulk foam manufacturer’s warnings and the application of the knowledgeable intermediary doctrine).

88. See, e.g., *Stuckey v. N. Propane Gas Co.*, 874 F.2d 1563, 1568 (11th Cir. 1989) (stating that “a supplier’s duty to warn an ultimate consumer can be discharged by a warning given to an intermediary”); *Kealoha v. E.I. DuPont De Nemours & Co.*, 82 F.3d 894, 899-90 (9th Cir.1996) (applying Hawaii law); *Jacobs v. E.I. DuPont De Nemours & Co.*, 67 F.3d 1219, 1239 (6th Cir.1995) (applying Tennessee law); *Hunnings v. Texaco, Inc.*, 29 F.3d 1480, 1483 (11th Cir. 1994) (applying Florida law); *Mason v. Texaco, Inc.*, 862 F.2d 242, 247-48 (10th Cir. 1988) (applying Kansas law).

are a product of the same reasonableness analysis provided by the Learned Hand calculus that balances the predictability of the risk and the seriousness of risk against the burden on a party to prevent a risk. That burden should fall on the party who can best handle it both in terms of cost and predictability.

Courts have occasionally confused application of these doctrines or treated the related defenses as a singular doctrine, but they are analytically distinct and apply only to specific circumstances.⁸⁹ The rationales of these doctrines are also applied on occasion without specific reference to their purpose.⁹⁰ Such confusion is likely a result of judicial attempts to curb the search for “deep pockets.” For example, lawyers for employee plaintiffs, limited in actions against their employers under state workers’ compensation laws, seek additional remedies through product liability claims against other participants in the supply chain.⁹¹ Industrial material suppliers are commonly a target.⁹² Courts are generally aware of the predicaments industrial material suppliers face in providing a warning and invoke this battery of defenses to reach the just result.⁹³ In doing so, the evolution has been to appropriately broaden the scope of these doctrines.⁹⁴

89. See Rebecca Korzec, *Restating the Obvious in Maryland Products Liability Law: The Restatement (Third) Of Torts: Product Liability and Failure to Warn Defenses*, 30 U. BALT. L. REV. 341, 344 (2001); see also *Artiglio v. Gen. Elec. Co.*, 71 Cal. Rptr. 2d 817, 820 (Cal. Ct. App. 1998) (“Although the [bulk supplier and sophisticated user] doctrines are distinct, their application oftentimes overlaps and together they present factors which should be carefully considered in evaluating the liability of component suppliers.”); *Dole Food Co.*, 935 P.2d at 880 n.3 (“Many names have been applied to this doctrine, including ‘knowledgeable user defense’ and ‘bulk supplier defense.’ Some courts distinguish them as separate, but they are essentially the same when applied to intermediaries between the seller and the end user.”).

90. See *Gray v. Badger Mining Corp.*, 676 N.W.2d 268, 276 (Minn. 2004) (citing *Minneapolis Soc’y of Fine Arts v. Parker-Klein*, 354 N.W.2d 816, 821-22 (Minn. 1984) for the proposition that the reasoning of the learned intermediary defense was applied without reference to the doctrine).

91. See Carole A. Cheney, *Not Just For Doctors: Applying the Learned Intermediary Doctrine to the Relationship Between Chemical Manufacturers, Industrial Employers, and Employees*, 85 NW. U. L. REV. 562, 575 (1991).

92. See Melissa Shapiro, *Is Silica the Next Asbestos? An Analysis of Silica Litigation and the Sudden Resurgence of Silica Lawsuit Filings*, 32 PEPP. L. REV. 983, 996 (2005) (“Once a court found the manufacturer liable to the ultimate user, the floodgates of litigation opened.”).

93. See generally *In re TMJ Implants Prods. Liab. Litig.*, 872 F. Supp. 1019 (D. Minn. 1995).

94. See *Whitehead v. Dycho Co.*, 775 S.W.2d 593, 597 (Tenn. 1989) (expanding to learned intermediary doctrine to discharge a chemical manufacturers duty to warn an intermediary’s employee users when warnings were conveyed to the knowledgeable intermediary employer); see also Cheney, *supra* note 91, at 594.

A. Bulk Supplier or Raw Materials Doctrine

The bulk supplier or raw materials doctrine is a product of the Restatement (Second) of Torts section 388.⁹⁵ The doctrine provides that a bulk supplier's or raw material manufacturer's duty to warn consumers, or other end-users, of the risks of its product is discharged by warning the product's immediate purchaser.⁹⁶ The rationale underlying this doctrine is that liability should not be imposed against the bulk supplier when faced with the difficult or impossible burden of adequately warning all users.⁹⁷ As expressed throughout this Article in the context of providing effective warnings, these burdens include the lack of knowledge over the product's end use or end-user, lack of control over the manufacturing process, and difficulty in communicating a warning through media that reaches the user.⁹⁸ For example, a bulk fuel supplier cannot readily attach a warning label when its product is used to heat a consumer's water-heater.⁹⁹

Most courts have ruled that suppliers of industrial materials are not liable to remote users where the supplier has no control over the finished product.¹⁰⁰ Comment c of section 5 of the Restatement of the Law, Third: Products Liability explains that imposing a duty to warn on industrial suppliers "would require the seller to develop expertise regarding the magnitude of different end products and to investigate the actual use of raw materials by [purchasers] over whom the supplier has no control."¹⁰¹ Although the bulk supplier doctrine is relatively straight-forward in its applicability to consumers and end-users, courts have blurred, and arguably broadened, the doctrine with respect to other intermediaries.¹⁰² Some courts, for instance, have ap-

95. See RESTATEMENT (SECOND) OF TORTS § 388 cmt. n (1965); see also Hoffman v. Houghton Chem. Corp., 751 N.E.2d 848, 855 (Mass. 2001) (stating that the bulk supplier doctrine originates in the Restatement and applying it to deny liability for a bulk supplier of chemicals).

96. See Schwartz, Behrens & Crouse, *supra* note 50, at 299-300.

97. See *supra* notes 35-37.

98. See *supra* notes 16-20.

99. See Stoffel v. Thermogas Co., 998 F. Supp. 1021, 1026 (N.D. Iowa 1997) (granting summary judgment to supplier of propane for injuries suffered by a consumer of a propane-fueled waterheater).

100. See, e.g., Goodbar v. Whitehead Bros., 591 F. Supp. 552, 560-61 (W.D. Va. 1984), *aff'd sub nom.* Beale v. Hardy, 769 F.2d 213 (4th Cir. 1985); Rivers v. AT & T Techs., Inc., 554 N.Y.S.2d 401, 405 (1990) (granting summary judgment to bulk supplier of dimethylformamide (DMF) on failure to warn claim for exposure to the chemical solvent from the component part of a dataphone used by worker). This rationale leads to the same result in component part cases. See, e.g., Forest v. E.I. DuPont de Nemours & Co., 791 F. Supp. 1460, 1467 (D. Nev. 1992).

101. RESTATEMENT (THIRD) OF TORTS: PRODS. LIAB. § 5 cmt. c (1998).

102. In some instances, a bulk supplier, who has no package of its own on which to place a label, may satisfy its duty to warn ultimate users of its product by proving that the intermediary to whom it sells the product is adequately trained and warned,

plied the bulk supplier doctrine in conjunction with the theory behind the sophisticated user doctrine to hold that there is no duty to warn intermediaries or the immediate purchaser.¹⁰³ This merger of law suggests an evolution that broadens the scope of the defenses available to industrial material manufacturers and suppliers.

B. Sophisticated User Doctrine

The sophisticated user doctrine¹⁰⁴ is similarly a product of the Restatement (Second) of Torts section 388.¹⁰⁵ Unlike the bulk supplier or raw materials doctrine which focuses on the supplier's ability to warn, the sophisticated user doctrine analyzes the user's competency regarding the product.¹⁰⁶ The theory is simply that users with superior knowledge of the product are already aware of the product's risks.¹⁰⁷ Hence, the sophisticated user doctrine, like the bulk supplier doctrine, places liability with the party in the best position – defined here as the most knowledgeable or informed position – to prevent harm.¹⁰⁸

familiar with the propensities of the product and its safe use, and capable of passing its knowledge on to users in a warning. *Wood v. Phillips Petroleum Co.*, 119 S.W.3d 870, 874 (Tex. App. 2003).

103. See *Gray v. Badger Mining Corp.*, 676 N.W.2d 268, 280 (Minn. 2004) (referring to the bulk supplier defense as a “specialized version of the sophisticated intermediary defense”). But see *Hoffman v. Houghton Chem. Corp.*, 751 N.E.2d 848, 854-55 (Mass. 2001) (noting that the sophisticated user doctrine is a “conceptually discrete affirmative defense[]” from the bulk supplier doctrine).

104. The sophisticated user doctrine is also referred to by some courts as the “knowledgeable” or “responsible” user doctrine. See, e.g., *Rivers*, 554 N.Y.S.2d at 403 (employing the term “responsible intermediary”).

105. See RESTATEMENT (SECOND) OF TORTS § 388 (1965).

106. The sophisticated user defense can be broken down further into two components: the employer's reliability in transmitting information to its employees and the employer's knowledge of the dangerous propensities of the product. DAN DOBBS, LAW OF TORTS § 366 (2000); see also Kenneth M. Willner, Note, *Failures to Warn and the Sophisticated User Defense*, 74 VA. L. REV. 579, 587 (1988).

107. As the Eighth Circuit summarized,

[t]his rule of the “sophisticated user” is no more than an expression of common sense as to why a party should not be liable when no warnings or inadequate warnings are given to one who already knows or could reasonably have been expected to know of the dangers of [the product]. Otherwise, it would be an effort to shift liability to one who had no duty to act. We expect the law in ordinary circumstances to apply a common sense rule.

Crook v. Kanab Pipe Line Operating P'ship, 231 F.3d 1098, 1102 (8th Cir. 2000).

108. “[I]n alleged negligent failure to warn situations . . . if the danger related to the particular product is clearly known to the purchaser/employer, then there will be no obligation to warn placed upon the supplier.” *Goodbar v. Whitehead Bros.*, 591 F. Supp. 552, 560-61 (W.D. Va. 1984), *aff'd sub nom. Beale v. Hardy*, 769 F.2d 213

Placing liability on the sophisticated user provides a reasonable and commonsense approach tantamount to holding an expert to the standard of care expected of an expert.¹⁰⁹ For this reason, courts have characterized the defense as a corollary to the “‘open and obvious’ [danger] doctrine” in which no warnings are required for harms a user should appreciate.¹¹⁰ The effect on the tort system of allowing this affirmative defense is to place an incentive on users to take responsibility and become more informed of risks if they are going to be held to the expert standard for reasonableness.¹¹¹

Application of the sophisticated user doctrine varies depending on whether a jurisdiction bases its approach on a common law duty to warn or the duty approaches of the Second and Third Restatements.¹¹² In some jurisdictions, the scope of the defense may be limited to sophisticated ultimate consumers and not sophisticated intermediaries.¹¹³ The modern trend in courts, however, appears to be one of expansion of the doctrine to sophisticated intermediaries and their employees who possess the same level of knowledge as sophisticated users of the final product.¹¹⁴ Here, the sophisticated user doctrine, which is commonly analyzed in conjunction with the bulk

(4th Cir. 1985) (charging the purchaser/employer with the responsibility of warning its employee’s about exposure to the bulk product silica at the workplace in a class action brought by 132 foundry workers).

109. *See Carrel v. Nat’l Cord & Braid Corp.*, 852 N.E.2d 100, 113 (Mass. 2006) (stating that the jury instruction to hold the manufacturer to the standards of an expert in terms of foreseeing what possible uses might be made of this product and whether warnings are required demonstrated “thoughtful balancing”).

110. *See id.* at 109.

111. The incentive placed on users created by the sophisticated user doctrine is somewhat undercut in the workplace context by no-fault worker’s compensation laws. Still, in cases against non-employer entities such as suppliers of bulk materials, the incentive provided under the doctrine to encourage more informed users is maintained.

112. *See Willner, supra* note 106, at 589.

113. The sophisticated intermediary includes other manufacturers, refiners, sellers or distributors along a supply chain that, given the nature of the unfinished product, possess or should possess a level of knowledge and sophistication concerning the product’s safe handling. *See Gray v. Badger Mining Corp.*, 676 N.W.2d 268, 276 (Minn. 2004) (recognizing extension by some courts, and reluctance of others, of the rationale of the sophisticated user defense to sophisticated intermediaries); *see also Little v. Liquid Air Corp.*, 952 F.2d 841, 851 (5th Cir. 1992), *rev’d en banc*, 37 F.3d 1069 (5th Cir. 1994); *Donahue v. Phillips Petroleum Co.*, 866 F.2d 1008, 1012-13 (8th Cir. 1989).

114. *See generally Taylor v. Monsanto Co.*, 150 F.3d 806 (7th Cir. 1998) (affirming summary judgment for the bulk chemical supplier under the sophisticated intermediary defense where it was ruled that no reasonable jury could conclude the intermediary employer was not sophisticated given its resources used and presence on federal and industry task forces concerning the product).

supplier doctrine, further mixes with the rationale underlying the learned intermediary doctrine.¹¹⁵

C. Learned Intermediary Doctrine

Traditionally, the learned intermediary doctrine applied to warnings related to prescription drugs.¹¹⁶ Under the doctrine, the pharmaceutical manufacturer's duty to warn the end-user patient about the risks of use is supplanted by a duty to educate the patient's treating physician on the risks and benefits of the product.¹¹⁷ The reasoning is, again, allocation of liability on the party in the best position to effectively communicate warnings that prevent harm.¹¹⁸ A doctor is in the best position to evaluate the patient's treatment needs and provide risk information specific to the patient's medical and family history when prescribing a drug.¹¹⁹ The doctor is also in a superior

115. See *In re TMJ Implants Prods. Liab. Litig.*, 872 F. Supp. 1019, 1029 (D. Minn. 1995) ("Courts have described this basic analysis as the 'sophisticated purchaser' rule, the 'learned intermediary' rule, or the 'bulk supplier' rule. Although there may be shades of difference between these rules as they are applied by courts, the fundamental tenet is that a manufacturer should be allowed to rely upon certain knowledgeable individuals to whom it sells a product to convey to the ultimate users warnings regarding any dangers associated with the product.").

116. See, e.g., *Terhune v. A.H. Robins Co.*, 577 P.2d 975, 977-79 (Wash. 1978); *Nichols v. McNeilab, Inc.*, 850 F. Supp. 562 (E.D. Mich. 1993); *Wolfgruber v. Upjohn Co.*, 423 N.Y.S.2d 95, 96 (N.Y. App. Div. 1979), *aff'd* 436 N.Y.S.2d 614 (1980); see also Keith A. Laughery, *Warnings in the Workplace: Expanding the Learned Intermediary Rule to Include Employers in the Context of Product Manufacture/Employer/Employee Relationship*, 46 S. TEX. L. REV. 627, 633 (2005); Nancy K. Plant, *The Learned Intermediary Doctrine: Some New Medicine for an Old Ailment*, 81 IOWA L. REV. 1007, 1011 (1996).

117. See *Terhune*, 577 P.2d at 977.

118. See *Vitanza v. Upjohn Co.*, 778 A.2d 829, 846 (Conn. 2001) (acknowledging that a physician "is in the best position to convey adequate warnings based upon the highly personal doctor-patient relationship"); see also David P. Graham & Jeremy C. Vest, *Doctors, Drugs, and Duties to Warn*, 72 DEF. COUNS. J. 380, 381 (2005) ("The assumptions that underlie the doctrine are that patients rely upon the advice of their physicians, and physicians, in light of their experience and expertise, are in a better position than their patients to evaluate and communicate the manufacturers' warnings directly to the patients.").

119. "Prescription drugs are likely to be complex medicines, esoteric in formula and varied in effect. As a medical expert, the prescribing physician can take into account the propensities of the drug, as well as the susceptibilities of his patient. His is the task of weighing the benefits of any medication against its potential dangers. The choice he makes is an informed one, an individualized medical judgment bottomed on a knowledge of both patient and palliative." *Reyes v. Wyeth Labs.*, 498 F.2d 1264, 1276 (5th Cir.), *cert. denied*, 419 U.S. 1096 (1974); see also *West v. Searle & Co.*, 806 S.W.2d 608, 613-14 (Ark. 1991) (concluding that health care pro-

position to understand the complexities of drug risks and balance them against alternative treatments.¹²⁰ In other words, the physician's role parallels that of a sophisticated user.

Almost all jurisdictions follow the learned intermediary doctrine with regard to claims involving prescription drugs.¹²¹ The doctrine is supported by comment n of the Restatement (Second) of Torts section 388 and directly acknowledged in comment b of Restatement of the Law, Third: Product Liability section 6.¹²² Expansion of the doctrine into other areas, such as the workplace, has also met with some success.¹²³ Courts routinely analyze the doctrine when determining whether to apply the sophisticated user defense to an intermediary as the two incorporate the same rationale.¹²⁴ The result of

viders are the best assessor of relevant risks and benefits of a treatment course), *appeal on remand* 879 S.W.2d 412 (Ark. 1994).

120. *See id.*

121. *See In re Norplant Contraceptive Prods. Liab. Litig.*, 215 F. Supp. 2d 795, 806-09 (E.D. Tex. 2002) (concluding that forty-eight states, the District of Columbia and Puerto Rico have either applied or recognized the learned intermediary doctrine, and providing chart reflecting the same); *Vitanza*, 778 A.2d at 838 n.11 (finding that forty-four jurisdictions have adopted the learned intermediary doctrine including lower state courts and federal courts applying state law); *Larkin v. Pfizer, Inc.*, 153 S.W.3d 758, 767 n.3 (Ky. 2004) (observing that thirty-four states have specifically adopted the learned intermediary doctrine); *Cheney, supra* note 91, at 582 (noting that the Restatement (Second) of Torts and most jurisdictions follow the learned intermediary doctrine); *Sterling Drug, Inc. v. Cornish*, 370 F.2d 82, 85 (8th Cir. 1966) (first articulating the learned intermediary doctrine). West Virginia appears to be the only state to expressly decline adoption of the learned intermediary doctrine. *See State ex rel. Johnson & Johnson Corp. v. Karl*, 647 S.E.2d 899, 914 (W. Va. 2007). New Jersey does not apply the learned intermediary doctrine where the prescription drug manufacturer attempts to advertise directly to consumers and the consumer relies on that advertisement. *See Perez v. Wyeth Lab. Inc.*, 734 A.2d 1245, 1257-58 (N.J. 1999); *cf. MacDonald v. Othro Pharm. Corp.*, 475 N.E.2d 65, 68 (Mass. 1985) (recognizing an exception to the general application of the learned intermediary doctrine for oral contraceptives).

122. “[O]nly health-care professionals are in a position to understand the significance of the risks involved and to assess the relative advantages and disadvantages of a given form of prescription-based therapy.” RESTATEMENT (THIRD) OF TORTS: PRODS. LIAB. § 6 cmt. b (1998).

123. *Compare Adams v. Union Carbide Corp.*, 737 F.2d 1453, 1457 (6th Cir. 1984) (concluding the manufacturer of the toxic chemical could reasonably rely upon the purchaser/employer to convey information about the chemical's hazardous properties to its employees), *with Russo v. Abex Corp.*, 670 F. Supp. 206, 207 (E.D. Mich. 1987) (stating that the employer's risk of failing to warn its employees is imputed to the manufacturer as a matter of law). *See also Cheney, supra* note 91, at 588-90 (discussing the mixed results of the learned intermediary doctrine outside of the prescription drug context).

124. *See, e.g., Vitanza*, 778 A.2d at 845; *see also Smith v. Walter C. Best, Inc.*, 927 F.2d 736, 739 (3d Cir. 1990) (using the term “knowledgeable purchaser”); Phil-

this overlap has been the gradual development of a sophisticated intermediary doctrine that reallocates liability on the purchaser/employer in the best position to know the harms at a given supply stage and convey those harms to users.¹²⁵

D. Substantial Change in Condition Doctrine

A final exception to the general rule that manufacturers have a duty to warn end-users rests in the substantial change in condition doctrine.¹²⁶ This defense is embodied in the Restatement (Second) of Torts section 402A, which concerns strict liability for failure to warn, and requires for liability purposes that the product reach, or be expected to reach, the end-user “without substantial change in the condition in which it is sold.”¹²⁷ The basic principle is that it is unjustifiable to impose liability on a manufacturer or seller who lacks control over the altered product.¹²⁸ Comment p of Section 402A further explains that no liability should attach to the seller of raw materials having multiple end uses or that a duty to warn should exist.¹²⁹ A similar rationale applies to component parts under section 5 of the Restatement Third unless the integrated part “substantially participates” in the completed product design.¹³⁰ Courts applying this substantial change doctrine to industrial material or component part manufacturers are generally in agreement that there is no duty to warn end-users.¹³¹ There is also some overlap in the appli-

lips v. A.P. Green Refractories Corp., 630 A.2d 874, 884 (Pa. Super. Ct. 1993) (same); Higgins v. E.I. DuPont de Nemours, Inc., 671 F. Supp. 1055, 1061 (D. Md. 1987) (“knowledgeable industrial purchaser”).

125. See *Natural Gas Odorizing, Inc. v. Downs*, 685 N.E.2d 155, 162-63 (Ind. Ct. App. 1997) (acknowledging a sophisticated intermediary defense, but holding that an issue of fact existed as to whether it could be relied upon by the supplier of an odorant in natural gas to discharge a duty to warn consumers); *Whitehead v. Dycho Co.*, 775 S.W.2d 593, 597 (Tenn. 1989).

126. See Schwartz, Behrens & Crouse, *supra* note 50, at 300-01.

127. See RESTATEMENT (SECOND) OF TORTS § 402A (1965).

128. See RESTATEMENT (SECOND) OF TORTS § 402A cmt. p (1965).

129. See M. Stuart Madden, *Liability of Suppliers of Natural Raw Materials and the Restatement (Third) of Torts: Product Liability – A First Step Toward Sound Public Policy*, 30 U. MICH. J.L. REFORM 281, 290 (1997).

130. RESTATEMENT (THIRD) OF TORTS: PRODS. LIAB. § 5 cmt. e (1998). The Restatement (Second) of Torts expresses no opinion on the liability in failure to warn law for manufacturers of component parts used in the assembly of a defective product. See RESTATEMENT (SECOND) OF TORTS § 402A cmt. q (1965).

131. See *Haase v. Badger Mining Corp.*, 682 N.W.2d 389, 395-96 (Wis. 2004) (holding that the silica sand supplier could not be held liable for an employee/users injuries because the industrial sand sold had undergone a “substantial and material change” after leaving the suppliers possession and control by being converted into respirable particles); *Cothrun v. Schwartz*, 752 P.2d 1045, 1048 (Ariz. Ct. App. 1988) (stating a substantial change in state from the bulk supplier’s sale of raw asbestos to

cation of this doctrine and the other defenses available to industrial and component manufacturers, leading to judicial confusion and further blurring of the doctrines.¹³²

From a developmental standpoint, however, the doctrinal confusion has bottom line benefits because it has helped broaden legal principles furthering the objectives of product liability. The cross-over among defenses serves to limit liability or remove a duty where one ought not to be imposed, reallocate resources more efficiently, and provide incentives for safer practices. Thus, despite the analytical distinctions among doctrines, they hold a fundamental common rationale: liability for the effective communication of product warnings should be allocated to the entity in the best position, expressed as a function of product knowledge, control and opportunity and ability to warn, to prevent each user's injury.

V. THE CURRENT LIABILITY STRUCTURE DOES NOT ENHANCE WORKPLACE SAFETY

The general rule in products liability is that a seller must provide the user with all necessary warnings and instructions to prevent the product from being used in a manner that causes harm.¹³³ Failure to properly warn may be based on either negligence or strict liability.¹³⁴ While product liability laws have devised practical exceptions to this rule,¹³⁵ the system does not always achieve the most efficient and effective outcome in terms of preventing harm. In the workplace and along the product supply chain, the system is particularly ineffective in achieving its goal. Although their control over the product is limited or nonexistent, knowledge of specific harms inferior, and ability to

an employer mill which refined the raw asbestos into a hazardous dust); *Walker v. Stauffer Chem. Corp.*, 96 Cal. Rptr. 803, 806 (Cal. Ct. App. 1971) (holding that in light of the substantial changes made by the employer to sulfuric acid supplied in bulk, the supplier has no duty to protect or warn the manufacturer's employee). *But see Bowman v. Parker Hannifin Corp.*, Civil No. 04-0376, 2005 WL 1607302, at *3 (D. N.J. July 6, 2005) (rejecting application of substantial change doctrine for a hose shipped in bulk and incorporated into the construction of an aircraft).

132. *See Sara Lee Corp. v. Homasote Co.*, 719 F. Supp. 417, 424 (D. Md. 1989) (applying "sophisticated user" rule, yet concluding that the bulk supplier of polystyrene beads was not liable because the purchaser who transformed the product into another product was in the best position to warn the end-user); Laughery, *supra* note 116, at 640 ("The overlapping nature of the various affirmative defenses asserted by product manufacturers, combined with jurisdictional difference in their recognition and application, create an aura of uncertainty for both manufacturers/defendants and employee/plaintiffs.").

133. *See* RESTATEMENT (SECOND) OF TORTS § 388 (1965).

134. *See, e.g., Brooks v. Medtronic Inc.*, 750 F.2d 1227, 1229-30 (4th Cir. 1984); *DeChello v. Johnson Enters.*, 536 A.2d 1203, 1207 (Md. App. 1988).

135. *See supra* Part IV.

convey an effective warning impractical, industrial material suppliers and other intermediaries are increasingly the target of litigation from injured employees and other end-users.¹³⁶ This is because workers' compensation laws limit recovery against the user's employer, who, in most instances, is in the best position to warn its employees.¹³⁷

Against this backdrop, courts examine the adequacy of warnings related to industrial materials issued to intermediaries or workers. This determination is a question of fact generally addressed by a jury.¹³⁸ Therefore, the industrial supplier must defend at trial a warning that it is in an inferior position to convey, leading to significant costs and settlement pressures. Meanwhile, the employer who is in the superior position to warn is generally immune from tort liability under the shield of no-fault workers' compensation.¹³⁹ This outcome is inefficient and arguably unfair because it forces unnecessary costs on the supplier and may impose damages for a warning that could not effectively prevent the injury.¹⁴⁰ In *Fisher v. Monsanto Co.*, the District Court for the Western District of Virginia expressed these concerns where an employee machinist at a transformer manufacturing plant sued the industrial supplier of a dielectric fluid used in the manufacturing process:

This case falls within the all-too-frequent pattern of an employee sustaining a profound on-the-job injury and, because the Virginia Workers' Compensation Act bars a claim against his employer, he must search for a third party for recompense. The primary responsibility for a worker's safety falls to the employer. Thus, if it is society's will that employees should be compensated for these injuries, the proper solution is a liberalization of Virginia's Workers'

136. See *Shell Oil Co. v. Harrison*, 425 So. 2d 67, 70 (Fla. Dist. Ct. App. 1982) (failure to warn action brought against an industrial manufacturer of the chemical DBCP, which was sold to a formulator who used it as an ingredient of a soil fumigant, in which the court held that "labeling and packaging requirements necessarily differ depending upon the particular formulation and, thus, place the responsibility on the formulator for providing adequate warning").

137. See *supra* notes 142-144 and accompanying text.

138. See *Bryant v. Technical Research Co.*, 654 F.2d 1337, 1346-48 (9th Cir. 1981) ("[T]he adequacy of a bulk manufacturer's warning to those other than its immediate vendee is usually held to be a jury question.").

139. See *Cheney*, *supra* note 91, at 578; *Kudzia v. Carboley Div. of Gen. Elec. Co.*, 475 N.W.2d 371, 372 (Mich. Ct. App. 1991) (pursuing an intentional tort claim against employer for workplace exposure to cobalt in addition to a failure to warn claim against the bulk supplier). Employers still have an incentive to reduce workplace injury, however, because their workers' compensation insurance premiums increase as a result of accidents in their workplace. See Patricia M. Danzon & Scott E. Harrington, *Workers' Compensation Rate Regulation: How Price Controls Increase Costs*, 44 J.L. & ECON. 1, 11 (2001).

140. See *Wood v. Phillips Petroleum Co.*, 119 S.W.3d 870, 874 (Tex. Ct. App. 2003).

Compensation Act – not a tortured application of the law of torts and the law of sales. This would make the employer more responsible for and more responsive to the safety needs of his employees.¹⁴¹

The workers' compensation system, however, should not be viewed as a scapegoat in need of an overhaul. Like most liability systems, it is the result of carefully considered tradeoffs, and does, in fact, provide an incentive for employers to provide adequate training, supervision, and warnings to their employees who work with industrial materials.¹⁴² Workers' compensation premiums are based on the experience of the insured.¹⁴³ Like automobile insurance, if the workplace of an insured is prone to accidents, its premium cost will rise, sometimes substantially. This process provides a measure of deterrence against employers who fail to prevent injury or illness through adequate warnings, including those related to industrial products.¹⁴⁴

The cost of workers' compensation has increased steadily over the passed decade. For example, medical care costs paid through workers' compensation have increased by an average of 9.5% per year between 1997 and 2005.¹⁴⁵ The United States Department of Labor's Bureau of Labor Statistics also estimates that while workers' compensation comprises 1.7% of total employer costs for all workers, the percentage for producers of goods, which includes industrial manufacturers, is 2.8%, or nearly double.¹⁴⁶ Safer work-

141. 863 F. Supp. 285, 290 (W.D. Va. 1994) (holding the bulk manufacturer of polychlorinated biphenyls (PCBs) not liable for failure to adequately warn).

142. See Joan T.A. Gabel, *Escalating Inefficiency in Workers' Compensation Systems: Is Federal Reform the Answer?*, 34 WAKE FOREST L. REV. 1083, 1083-84 (1999) (explaining the quid pro quo principle underlying workers' compensation in which injured workers are guaranteed scheduled income benefits and medical coverage regardless of fault and employers and insurers receive, in exchange, immunity from litigation and insulation from compensatory and punitive damages).

143. See NATIONAL COUNCIL OF COMPENSATION INSURANCE, EXPERIENCE RATING UPDATE 1, available at https://www.ncci.com/ncci/media/pdf/Industry_Info_ER_update_07.pdf; Danzon & Harrington, *supra* note 139, at 11 (stating that workers' compensation insurance rates are calculated along occupational lines and experience-rating plans by the National Council on Compensation Insurance); Martha T. McClusky, *Insurer Moral Hazard in Workers' Compensation Crisis: Reforming Cost Inflation, Not Rate Suppression*, 5 EMP. RTS. & EMP. POL'Y J. 55, 64 (2001) (discussing how skyrocketing workers' compensation insurance premiums in the 1980's led safer businesses to self-insure).

144. McClusky, *supra* note 143, at 64.

145. See NATIONAL COUNCIL OF COMPENSATION INSURANCE, 2007 STATE OF THE LINE: ANALYSIS OF WORKERS COMPENSATION RESULTS 6, available at http://www.ncci.com/ncci/media/pdf/AIS_2007_SOL_Article.pdf.

146. See Bureau of Labor Statistics, United States Department of Labor, Employer Costs for Employee Compensation – June 2007 5, 12, available at <http://www.bls.gov/news.release/pdf/ecec.pdf>.

places reduce these costs and lower an employer's premiums, which can cost thousands of dollars per worker per year.¹⁴⁷ Hence, the problems under the current liability system do not lie exclusively in the lack of employer incentives, but rather the willingness of courts, intent on permitting additional recovery, to improperly extend product liability law where workers' compensation provides the correct means for recovery.

A. Case Study: Warnings Related to Use of Silica Sand in the Workplace

Supplier warnings for silica sand present an archetypal example of the difficulties under the current liability system, and one which has frequently been subject to litigation.¹⁴⁸ Silica sand, in its natural form, is not an inherently dangerous product.¹⁴⁹ On the other hand, respirable silica can cause disease if it is present in a breathing zone above certain limits, it is inhaled, and the inhalation occurs for a prolonged period (in the case of relatively low levels of over exposure, the prolonged period may be 20 years or more).¹⁵⁰ The disease most commonly associated with prolonged inhalation of respirable silica is silicosis, a scarring of the lung. A supplier of silica sand in its safe, non-respirable state often will be unable to know the precise end uses of a given bulk shipment.¹⁵¹ Sand could be incorporated into glassware, concrete, molds, semiconductors or any number of abrasives. It could also remain unprocessed and used as soil for crops such as watermelons, peaches and peanuts, or as sandbags for protection against floods, or used in the construction of golf courses or as a filtration media for water. The supplier cannot reasonably control the product as it travels through manufacturers and

147. See, e.g., Indiana Compensation Rating Bureau, Rate Filings, http://www.icrb.net/filings/rate_filings.htm (last visited March 26, 2008) (stating that minimum and maximum executive officer premiums range from \$17,472 to \$140,400 annually).

148. See, e.g., *Bergfeld v. Unimin Corp.*, 319 F.3d 350, 352 (8th Cir. 2003); *Haase v. Badger Mining Corp.*, 669 N.W.2d 737, 739 (Wis. Ct. App. 2003); *Gray v. Badger Mining Corp.*, 676 N.W.2d 268, 271 (Minn. 2004); *Humble Sand & Gravel, Inc. v. Gomez*, 146 S.W.3d 170, 172 (Tex. 2004); *Cowart v. Avondale Indus., Inc.*, 792 So. 2d 73, 74 (La. Ct. App. 2001); see also *Sand Seller, Foundry Hand Clash Over Warnings Duty in Ohio Suit*, 6:1 MEALY'S LITIG. REP.: SILICA 11 (Sept. 2007) (alleging sand suppliers duty to warn user exposed at purchaser's foundry).

149. See *Haase*, 669 N.W.2d at 746 (recognizing for the first time the sophisticated user defense and concluding that "the bottom line is that the sand [defendant] supplies is a raw material and in its natural form not unreasonably dangerous").

150. See *Gray v. Badger Mining Corp.*, 664 N.W.2d 881, 886 (Minn. Ct. App. 2003), *rev'd*, 676 N.W.2d 268 (Minn. 2004) ("The sand becomes hazardous when, during the foundry process, microscopic particles of silica are released into the air. Employees who breathe silica-laden air are exposed to the hazard, but those employees are not known to the supplier in advance of the use of the sand.").

151. See *id.*

other intermediaries. As one court noted, the bulk supplier “merely takes the sand from the earth, washes the sand, sizes the sand and delivers it to its customers.”¹⁵²

Purchasers of silica sand are in a position to know how the sand will be used and can be held accountable for knowledge of the risks associated with that use.¹⁵³ The dangers of silica dust inhalation are known among purchaser-employers and have been nationally recognized since the 1930s.¹⁵⁴ Furthermore, the Occupational Safety and Health Administration (OSHA) and the National Institute of Occupational Safety and Health (NIOSH) are charged with developing standards and enforcing safety equipment requirements for sand use along with other workplace products.¹⁵⁵ Despite knowledge of the risks of silica in the workplace and the duty of employers to provide protective equipment, workers at foundries and other sand refining facilities are still injured and are bringing an increasing number of lawsuits.¹⁵⁶ This situation is

152. See *Haase*, 669 N.W.2d at 746.

153. See *Bergfeld v. Unimin Corp.*, 226 F. Supp. 2d 970, 978 (N.D. Iowa 2002), *aff'd*, 319 F.3d 350 (8th Cir. 2003) (acknowledging that the employer had long been aware of, and appreciated, the risks of silicosis and took steps to ameliorate those risks for its employees).

154. See, e.g., *Goodbar v. Whitehead Bros.*, 591 F. Supp. 552, 562-63 (W.D. Va. 1984), *aff'd sub nom. Beale v. Hardy*, 769 F.2d 213 (4th Cir. 1985) (stating that the American Foundrymen’s Society, “which is an international technical organization comprised of individuals and businesses that is dedicated to the creation and dissemination of technical information related to the foundry industry . . . in their concise chronology of the history of the foundry industry’s knowledge of the silicosis problem from 1871, point out that the dangers of silicosis had been commonly known for some time prior to that date”); *Haase*, 669 N.W.2d at 745 n.2 (noting that the report on the National Silicosis Conference held in 1937, which featured the film “Stop Silicosis,” addressed silicosis prevention in industrial settings, recommending measures for employers to take on behalf of their workers); W.J. McConnell & J.W. Fehnel, *Health Hazards in the Foundry Industry*, 16 J. INDUS. HYGIENE 227-51 (July 1934) (recognizing the “harmfulness of silica dust” and the “firmly established” link between silica and silicosis); Henry N. Doyle, *The Federal Industrial Hygiene Agency: A History of the Division of Occupational Health*, U.S. Pub. Health Serv. (undated) (discussing other incidents including a 1910 investigation among lead miners near Joplin, Missouri, and a series of studies on Vermont granite workers from the 1920s to the 1950s); see also Shapiro, *supra* note 92, at 988; John M. Black, *Silicosis Still a Problem*, 18 TEX. LAW 35, 35 (2002), available at 11/25/2002 TEX. LAW. 35.

155. See 29 § C.F.R. 1910.1000 (2006) (air contaminant regulation); 29 § C.F.R. 1910.134 (2006) (respirator use requirements); *Bergfeld*, 226 F. Supp. 2d at 975.

156. At the same time, the number of silica-related deaths has declined dramatically. See *Silicosis Mortality, Prevention, and Control – United States, 1968-2002*, MMWR WKLY. (Ctrs. for Disease Control & Prevention, Atlanta, Ga.), Apr. 29, 2005, at 401, 401-05, available at <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5416a2.htm> (charting the steady decline of silicosis deaths from 1968-2002); NAT’L INST. FOR OCCUPATIONAL SAFETY & HEALTH, U.S. DEP’T OF HEALTH & HUMAN SERVS., PUBL’N NO. 2003-111, WORK RELATED LUNG DISEASE

more an indictment of their employers' training program and safety procedures at the workplace than a failure of the supplier to warn. Manufacturing practices that increase exposure risks, inadequate emergency procedures or operations conducted in poorly ventilated areas, all of which are in the employer's exclusive control, impact the employee/user to a greater extent than a general awareness of the risks of sand. Awareness of these specific work environment risks is most likely to enhance safety.¹⁵⁷ Moreover, warnings that convey the hazards of silica dust inhalation already known to workers serve little purpose regardless of the effectiveness of the communication.

Sand is typically shipped by truckload or railcar and, as a result, lends itself to limited media with which to communicate warnings. Written warnings on or attached to the shipment are often the only means of contact with the user. Through these media, the supplier is charged with warning sand users of every foreseeable application that reduces the product to a respirable state, which may or may not be relevant to a given user, in a way that attracts the user's attention so that he or she will appreciate the risk and understand what precautions to take.¹⁵⁸ The practical limitations of these media, the range and uncertainty of user characteristics, and the lack of knowledge of effective precautions for varied types of exposure make this warning difficult, if not impossible, to communicate in a way that advances workplace safety. The employer, in contrast, is armed with the knowledge and control over its particular sand production and has an arsenal of media at its disposal to convey the specific dangers.

By placing liability for workplace illnesses on the supplier, the employer, who is generally immune from tort liability, has less incentive to improve warning communications and workplace safety suffers.¹⁵⁹ The employer may, even if it has been at fault, join an employee's lawsuit, and, through subrogation, shift the liability cost to a remote supplier of raw materials. Consequently, under the current liability system, workers may not receive the most effective warnings to educate them on injury prevention measures. Rather, industrial manufacturers and suppliers are pushed to provide

SURVEILLANCE REPORT 54 tbl. 3-1 (2002) (displaying the number of silicosis deaths from 1990 to 1999), available at <http://www.cdc.gov/niosh/docs/2003-111/pdfs/2003-111d.pdf>; NAT'L INST. FOR OCCUPATIONAL SAFETY & HEALTH, U.S. DEP'T OF HEALTH & HUMAN SERVS., PUBL'N NO. 2004-146, WORKER HEALTH CHARTBOOK 169 (2004), available at <http://www2a.cdc.gov/NIOSH-Chartbook/imagdetail.asp?imgid=234> (reporting the number of silicosis deaths).

157. See JUDY EDWORTHY & AUSTIN ADAMS, WARNING DESIGN: A RESEARCH PROSPECTIVE 2 (CRC Press 1996) (discussing the need to tailor warnings to particular effects for add value to the warnings).

158. See *supra* note 13.

159. Even under workers' compensation laws, employers are liable for intentional acts committed against employees.

warnings that are not effective in order to meet a court's adequacy analysis. They are forced to defend a duty to warn where one should not exist.¹⁶⁰

B. The Present and Future Path of Industrial Product Warnings

Product liability law has developed, and continues to develop, well-reasoned doctrines to either discharge or defend against the industrial supplier's duty to warn and place responsibility with the more appropriate entity; however, these doctrines are limited and not applied uniformly.¹⁶¹ In addition to uncertainty regarding how courts will apply the defenses available to industrial material suppliers, it is also unclear when a duty to warn will be present. In *Humble Sand & Gravel, Inc. v. Gomez*, for example, the Texas Supreme Court could not determine the threshold issue of whether a silica supplier had such a duty without evidence that warnings could effectively reach its customer's employees.¹⁶² This analysis misses the mark by determining the existence of an individual supplier's duty to warn after an injury occurs rather than establishing the scope of such a legal duty, if any, prior to litigation. It, therefore, provides greater ambiguity as to the existence of a duty to warn, and, as the dissent states, "establishes a dangerous precedent that severely undermines worker safety."¹⁶³

Simply put, in some jurisdictions, the current liability system fails on several fronts with respect to industrial material warnings: (1) liability is not imposed on the entity in the best position to prevent harm, (2) uncertainty exists as to the supplier's duty to warn, and (3) less effective warnings are encouraged and produced by not targeting warnings to the specific users and applications in the individual workplace, allowing multiple and potentially conflicting warnings from different entities. Inefficient and unnecessary litigation costs provide further collateral damage in this system which enables an employee, after recovery of workers' compensation, to file a failure to warn claim against the supplier of the industrial material. Lost in the system is whether these warnings are actually effective, compared with what the employer can accomplish, and whether failure to warn claims are brought against industrial product suppliers simply as a "deep pocket" to sue. As long as this avenue remains open, the communication of warnings will remain less effective and workplace safety will suffer.

The future of this liability system is on a precarious path. Plaintiffs' lawyers representing workers will likely continue to sue other entities in the

160. See Schwartz, Behrens & Crouse, *supra* note 50, at 299-300.

161. See *supra* Part IV.

162. 146 S.W.3d 170, 192-93 (Tex. 2004); see also *U.S. Silica Co. v. Tompkins*, 156 S.W.3d 578, 579 (Tex. 2005).

163. *Gomez*, 146 S.W.3d at 198 (O'Neill, J., dissenting).

supply chain who are in a difficult position to warn.¹⁶⁴ Industrial material suppliers will likely strive in vain to make warnings more effective as limitations in their knowledge of the user, control, and media make this goal unattainable. The threat of increased liability exposure for industrial material suppliers could also drive suppliers from markets and lead to shortages in essential materials.¹⁶⁵ Fear of liability for inadequate warnings already presents a major issue for some industrial product manufacturers, such as those supplying the raw materials needed for medical implants.¹⁶⁶

While these potential effects portray a dim view, the real loss is to the workers. Additional recovery against an industrial material supplier is a small consolation when juxtaposed with having the means to safely prevent a deadly disease or serious injury through an effective warning. Placing an exclusive duty to warn on the employer for adequately training and warning its workers is the most effective method of enhancing and encouraging workplace safety. Hence, each entity in the production process, including industrial product manufacturers, should be solely liable for providing warnings to its own employees.¹⁶⁷ Liability to consumers should remain largely undisturbed and fall on the entities manufacturing, selling or distributing the completed product. Moreover, if failure to warn law seeks harm prevention as the ultimate goal, then allocation of workplace duties to warn should, either through statute or judicial expansion of the available doctrines, adjust to the reality of workplace conditions.

C. Warnings Cannot Do It All

Of critical importance in the evaluation of the present liability system is whether adding or redesigning a warning is always the answer or the sole answer. In some cases, such as the silica example discussed, an effectively designed warning by the party in the best position to warn – the employer – may still not further prevention of injury or disease. Rather, safety mechanisms, products and other tools in place at the worksite provide the only practical means to accomplish this goal. For instance, an employee casting molten metal is unlikely to benefit from a warning of the potential dangers of the product unless provided safety goggles, protective gloves and heat-resistant

164. See *Hunnings v. Texaco, Inc.*, 29 F.3d 1480, 1487 (11th Cir. 1994) (rejecting market share liability as a theory of recovery against a manufacturer).

165. See Gregory Harper, *An Analysis of the Potential Liabilities and Defenses of Bulk Suppliers of Titanium Biomaterials*, 32 GONZ. L. REV. 195, 198 (1997) (discussing the shared fears among bulk manufacturers and the potential economic and market effects of expanding litigation against bulk suppliers).

166. See *id.*; Frederick Baker, *Effects of Products Liability on Bulk Suppliers of Biomaterials*, 50 FOOD & DRUG L. J. 455, 455 (1995) (stating that medical implant manufacturers have been unable to purchase critical raw materials due to supplier fears of product liability litigation).

167. See *infra* Part VI.

clothing to actually prevent injury.¹⁶⁸ Similarly, employees warned of all of the hazards of asbestos inhalation are in no better position to prevent injury from the harmful release of asbestos particles if adequate dust ventilation or proper respirators are not provided.¹⁶⁹ These safety features are outside the scope of warnings, but essential to the prevention of any injury involving the product. They are also in the employer's exclusive control.

OSHA regulations and OSHA's Hazard Communication Standard mandate a comprehensive industrial hygiene program for employers using harmful products in the workplace.¹⁷⁰ These regulations detail Permissible Exposure Limits (PELs), require employee training including the use of material safety data sheets, and provide employer enforcement procedures.¹⁷¹ Required warnings on product containers and in designated work areas play only a small part in this comprehensive industrial hygiene scheme. These workplace warnings operate as a supplement, and, in certain applications, the effect of the warnings will be marginalized regardless of who provides them or how effectively they are communicated.

In *Wood v. Philips Petroleum Co.*, for example, the Texas Court of Appeals concluded that "protecting workers from the ill effects of benzene exposure could be accomplished, if at all, *only* by minimizing such exposure with engineering controls (such as devices to keep benzene contained and work areas well ventilated), personal protective and respiratory equipment, and

168. See, e.g., *Whitehead v. St. Joe Lead, Co.*, 729 F.2d 238, 242 (3d Cir. 1984) (safety precautions at a lead smelting plant included protective gloves which needed to be replaced twice a day due to acids wearing holes in them).

169. See, e.g., *In re Asbestos Litig.*, Nos. 01C-11-239, 02C-03-219, 01C-06-151, 02C-08-093, 2007 WL 1651968, at *4 (Del. Super. Ct. May 31, 2007) (employer instituted dust control plan required all workers to wear respirators).

170. OSHA's hazard communication standard applies to any chemical known to be present in the workplace and covers situations to which an employee might be exposed. See 29 C.F.R. § 1910.1000 (2006) (listing substances to which the OSHA regulations apply). The hazard communication outlines separate requirements and responsibilities for suppliers, employer/purchasers, distributors and employees. There are also reasonable exceptions for workplace products with the same risks as consumer products, exceptions for certain drugs, and for trade secrets. See Hazard Communication, 29 C.F.R. § 1910.1200 (1994); Kristen Ocker, *OSHA's Hazard Communication Standard*, 25 IDAHO L. REV. 619, 625-28 (1989); Mark Goldstein, *Hazard Communication in the Workplace*, 7 HOFSTRA LAB. & EMP. L.J. 303, 319 (1990).

171. Goldstein, *supra* note 170, at 319. Courts have also held that if an employer knows from reasonable experience that a danger exists beyond the terms of the OSHA standard, the employer must meet the OSH Act's "general duty" clause in addition to the terms of the specific standard. See, e.g., *Int'l Union, United Auto., Aerospace & Agric. Implement Workers of Am. v. Gen. Dynamics Land Sys. Div.*, 815 F.2d 1570, 1576 (D.C. Cir. 1987).

environmental and medical monitoring.”¹⁷² OSHA places such responsibility for improved safety mechanisms on the employer and grants the employer leeway in the method and manner of implementation.¹⁷³ This performance-oriented standard requires the employer to design its own training and safety programs to meet OSHA regulations, in part, because it is in the most effective and efficient position to do so.¹⁷⁴ It is, therefore, the employer’s duty to take on the full range of safety precautions in its industrial hygiene program, which are unrelated to product warnings.

Where the only method of injury prevention is through some form of industrial safety control or device, liability for workplace injury under a failure to warn theory is inappropriate. In essence, it is the employer’s failure to furnish and require use of safety devices that causes the injury; the warning is inconsequential. This is the case whether the warning is issued by the employer, an industrial materials supplier or another entity.¹⁷⁵

When the practical effectiveness of product warnings is superseded by total reliance on worksite safety mechanisms, the already distant role of the industrial materials supplier becomes even more protracted. Supplier-provided warnings, at best, can communicate general hazards which are not tailored to a specific worksite application or particular safety device’s use.¹⁷⁶ Warnings dependent on this information for every type of harm prevention are rendered meaningless without it. In fact, it could be misleading for a supplier to attempt to include in its product warning a recommendation for a specific safety mechanism for use when handling or using its products because its knowledge is so limited. For instance, it would be imprudent for the bulk supplier of silica to recommend a type of respirator given the range of industrial exposures or even include a warning that a respirator is needed because it would not apply to many situations.

In areas where safety mechanisms play such a controlling part in injury prevention, such as with highly toxic substances, it is clear that product warnings alone are far from a complete solution. They are one piece of an industrial hygiene program that includes employee training, safety devices and

172. 119 S.W.3d 870, 874 (2003) (emphasis added); *see also* Morgan v. Brush Wellman, Inc., 165 F. Supp. 2d 704, 714 (E.D. Tenn. 2001) (recognizing that beryllium could only be used safely through precautions such as glove boxes, vacuuming and wet-washing of surfaces and the use of respirators when the material is in dust form).

173. *See* O’Reilly, *supra* note 84, at 98.

174. *See id.* at 98-99; *see also* Scarangella v. Thomas Built Buses, Inc., 717 N.E.2d 679, 682-83 (N.Y. 1999) (stating that the manufacturer of the product, a bus, was in the best position to determine adequate safety devices).

175. A failure to warn claim against the manufacturer of the safety device could be warranted if the device itself results in injury, and would be addressed under traditional product liability principles. *See, e.g.*, Dillard v. Pittway Corp., 719 So. 2d 188, 193 (Ala. 1998) (product liability claim against manufacturer of smoke detector).

176. *See supra* note 52.

hazard procedures. Importantly, all of these other pieces are in the sole control of the employer. Only with regard to product warnings does the liability system expand workplace responsibilities to include outside entities. As this Article shows, employers are far better positioned to communicate the most effective warnings that prevent harm in the industrial workplace and, as a result, the liability system should operate to limit liability to those entities.¹⁷⁷

A corollary is that sometimes there is no effective warning that prevents injury. Here, injury prevention falls within a different realm of the industrial hygiene program, where it is the employer's exclusive duty to institute the proper safety mechanism. The current liability system does not always respect this situation, which compounds the difficulties faced elsewhere in promoting workplace safety and the weary outlook for suppliers and other entities issuing a warning.¹⁷⁸

VI. A GUIDE TO EFFECTIVE WARNINGS IN THE WORKPLACE

Presented with a flawed liability system, responsibility rests with the participants in the supply chain to see past the limits of their legal obligations and make a concerted effort to prevent harm in the workplace. Direct employers should take on the greatest role. Moral obligations aside, there are tangible benefits to effective warning communication unrelated to liability exposure. For example, workplace productivity can increase from less employee absenteeism or turnover due to injury and employers with higher safety records can more easily attract job applicants and hold on to valued employees. There is also the reduced administrative hassle of processing workers' compensation claims. Hence, employers are stakeholders and have an incentive to more effectively communicate warnings even though this incentive is not fully reflected in the current liability system.

The responsibilities of the stakeholders, whether based in moral obligations, liability reduction, increased worker productivity, or other benefits, should be guided by the principle that the party in the best position to develop and convey effective, injury-preventing warnings should do so.¹⁷⁹ Again, this determination of "best position" is based on the objective of the warning, content to be presented, characteristics of potential senders and receivers, and available media and communication channels.¹⁸⁰ In the workplace context, the supervising employer at each stage in the production cycle will be in the position to exercise the most control over a product's manufacture, knowledge of the specific risks involved in that process, and media options to con-

177. See *supra* Part III.

178. See *supra* notes 162-66 and accompanying text.

179. See *Newson v. Monsanto Co.*, 869 F. Supp. 1255, 1261 (E.D. Mich. 1994) ("The ultimate inquiry is whether the supplier or purchaser/employer is in the best position to warn the ultimate users of a product's dangers.").

180. See *supra* Part III.

vey warnings. With this as a starting point, the responsibility of an entity as a manufacturer or seller and as an employer can be more appropriately delineated.

A. *The Responsibility of the Manufacturer or Supplier*

Manufacturers and suppliers have a duty to inform the purchaser of foreseeable risks not already known to the purchaser.¹⁸¹ In such situations, the manufacturer or supplier is in the best position to communicate an effective warning that prevents harm. The informational disparity between the parties, without more, justifies imposition of the responsibility. Analyzed under the criteria for effective communications, the purchaser/employer lacks the basis to identify the objective of the warning or the content to be presented. Manufacturers and suppliers must, therefore, convey the warning regardless of hardships or deficiencies in the other criteria.

The responsibility of a manufacturer or supplier should end when the purchaser is made aware of the product's risks.¹⁸² This applies to unfinished and finished products alike, provided there are no significant changes in the product's use or condition that require additional warnings to be effective. In the consumer context, for example, the manufacturer of a finished product ready to be sold has the duty to warn the consumer of potential hazards.¹⁸³ Product liability law correctly imputes a duty on intermediary sellers or distributors who are in the same position to most effectively convey warnings on the unchanged product they have selected to market and sell.¹⁸⁴ For these

181. See RESTATEMENT (THIRD) OF TORTS: PRODS. LIAB. § 2 cmt. j (1998); RESTATEMENT (SECOND) OF TORTS § 388 cmt. k (1965); see also *Jones v. Hittle Serv., Inc.*, 549 P.2d 1383, 1394 (Kan. 1976) (holding that a bulk manufacturer “fulfills his duty to the ultimate consumer when he ascertains that the distributor to whom he sells is adequately trained, is familiar with the properties of the [product] and safe methods of handling it, and is capable of passing on his knowledge to his customers”).

182. See David A. Fischer, *Product Liability: A Commentary on the Liability of Suppliers of Component Parts and Raw Materials*, 53 S.C. L. REV. 1137, 1140 (2002) (“[C]ourts should apply, as the normal rule, the principle that suppliers of raw materials and component parts should be exempt from liability unless the component or material is clearly defective.”); see also *Newson*, 869 F. Supp. at 1260 (“[I]f the purchaser/employer has not been warned of the product’s dangers, either directly by the supplier or constructively by available literature in the public domain on the product’s hazards, it is unreasonable, if not impossible, for a supplier to rely on the employer to warn its employees of the product’s dangers.”).

183. See RESTATEMENT (THIRD) OF TORTS: PRODS. LIAB. § 2 cmt. i (1998); RESTATEMENT (SECOND) OF TORTS § 388 cmt. c (1965).

184. An additional rationale for placing the cost of product failures, which includes failure to warn, on the manufacturer or seller of the completed product is economic in nature. The manufacturer can most easily insure against liability by adding the cost of insurance to the price of the product and spreading it over the general public. By imputing this cost on all manufacturers and seller of the completed product,

consumer products, written warnings in the form of labels or instructional manuals are likely an effective method of communication with the user to prevent injury.¹⁸⁵

Unfinished products along the production cycle require a more complex analysis of the manufacturer and seller responsibility. Many products have different stages of production, and the risks involved at each of these stages would be most effectively conveyed through separate warnings.¹⁸⁶ Industrial material suppliers are at the initial stage of this process and provide the clearest example of the need for separate warnings to subsequent manufacturers and intermediaries. Because of the varied uses of, or changes to, industrial materials, manufacturers' and suppliers' responsibility to warn should extend only to the immediate entity with whom they transact. The manufacturer has a measure of control over the product when entering into the transaction and is in the superior position to know the risks associated with the product in its initial state. Subsequent manufacturers or sellers have a responsibility to similarly warn the entity with whom they transact, and so on through the production cycle until the finished product is completed.¹⁸⁷ Responsibilities of the manufacturer or supplier are, therefore, allocated to the party in the best position to warn at all times during the production process. The linear relationship further eliminates uncertainty as to which manufacturers or sellers need to warn others at different production stages. This reduces the potential for duplicative or contrary warnings. Greater clarity in the identity of the entity to be warned also leads to more targeted and effective warning communications.

B. The Responsibility of the Employer

Where the product risks are known or made known through warnings to the employer, responsibility shifts to the employer to translate those warnings to the product's specific uses in the workplace. This responsibility stems from the employer's superior position to effectively communicate the injury-prevention warning on all fronts. Employer's control over the product's use and facility safety procedures place them in the most knowledgeable position to define a unified set of warning objectives and content for specific uses and users. The employer's warnings should supplement the training and safety

the consumer is also more likely to have an entity to seek recovery from. In the production cycle where the users are the manufacturers employees, this rationale is less of a concern. The user, by virtue of his employment, knows who to seek recovery from and the employer already insures against injury through workers compensation. See SCHWARTZ ET AL., *supra* note 1, at 737.

185. See Schwartz & Driver, *supra* note 3, at 69.

186. See Willner, *supra* note 106, at 580 ("Products liability law can encourage warning of end users . . . by relying on the chains [of distribution] and requiring each purchaser to warn the next in line . . .").

187. See *id.*

procedures already existing in the workplace. With certain products, like inherently toxic materials, OSHA and other government agencies mandate employee training and safety precautions that may be the only practical means of injury prevention.¹⁸⁸ Where possible, however, warnings designed to build off of the employer's training are more likely to be understood and taken seriously. Leaving the responsibility to manufacturers or sellers unaware of these particular workplace procedures can result in overly general or conflicting warnings, or too many warnings which overload the recipient. The responsibility is on the employer to balance the spectrum of its warnings to achieve the most effective cumulative result.

Employer control over the set of warnings is facilitated by its knowledge of the receiver and options of communication. The employer is the most educated on the characteristics of the employee receivers, which include knowledge of the literacy, education and skill level of users who serve different roles in the production process. The employer has a responsibility to tailor communications to its employees' ability to understand and internalize information. In addition, employers are not limited to written warnings on or attached to the product in the same way as many manufacturers or sellers. Unlike the consumer context in which such written warnings are likely the most practical and effective media, products in the workplace can benefit from various other channels.¹⁸⁹ Video and audio materials, used in conjunction with written warnings, can increase comprehension and retention.¹⁹⁰ Person-to-person warnings are also likely to be more effective because the receiver can ask for clarification at that time.¹⁹¹ In the workplace, employers are the only entity that can realistically provide warnings of this nature and use them in a way that effectively compliments and enhances other warnings to prevent injury.

The overall responsibility of the employer can be summarized as one of ownership over that which it controls. In the workplace, the employer's control is pervasive and exclusive; its responsibility should be pervasive and exclusive. Sharing the responsibility, as seen through the current liability system, leads to an outcome inefficient in its allocation of resources and ineffective in its prevention of injury. Exclusive responsibility over known workplace hazards is also the just result from a fairness perspective. All entities are both manufacturers or sellers and employers. They have responsibilities as each. No entity is shortchanged to the detriment of another. The industrial material supplier has the same responsibility to effectively communicate warnings to its own employees as its direct purchasers or the next manu-

188. See *supra* notes 168-74 and accompanying text.

189. See generally Michael B. Mazis & Louis A. Morris, *Channel*, in *WARNINGS AND RISK COMMUNICATION* 99 (Michael S. Wogalter et al. eds., 1999).

190. See EDWORTHY & ADAMS, *supra* note 157, at 101 (discussing the regular use of auditory warnings in high-stress working environments).

191. See Mazis & Morris, *supra* note 189, at 104.

facturer or intermediary. It also has the responsibility to inform direct purchasers of the product's foreseeable risks in that state. In the silica example discussed, that responsibility to warn is fulfilled because the purchasers are aware of the risks. That safety devices are necessary to prevent any injury also suggests that a supplier warning would not be effective in injury prevention. Attaching liability to the sand supplier does not further the objectives of product liability. Rather, it could hinder injury prevention by forcing less effective warnings and allowing employers to take less ownership over their workplace. Responsibility for communicating effective workplace warnings that prevent injury must, therefore, lie with employers.

VII. CONCLUSION

Through establishment of clear responsibilities throughout the supply chain, warnings can be made the most effective and workplace injuries can be prevented.¹⁹² Communication theory serves as the tool to appropriately define these responsibilities so that warnings are placed in the hands of the entity in the best position at every level to communicate and meet the paramount objective of harm prevention. In meeting this goal within the context of industrial materials, communication theory also provides a more resource-efficient and ethically just outcome. Courts have, in most instances, appropriately addressed the difficulties faced by industrial material suppliers ill-positioned to effectively warn and prevent injury. Greater uniformity and certainty in application, however, is still necessary. The law should never divert responsibility from employers fully aware of a product's risks and specific uses and impute it on an entity that is not. Such a result is antithetical to tort law. Otherwise, warnings may just as well be written in the sand.

192. *See, e.g.,* Ocker, *supra* note 170, at 628 (discussing how the drafting of responsibilities for chemical manufacturers, employers and employees has lead to better employee education).

