NOTES

PROVING CAUSATION IN TOXIC TORTS LITIGATION

INTRODUCTION

During the past thirty to forty years, the production and use of chemicals have become a major part of American industries. Such industries generate hazardous waste as a by-product of manufacturing goods such as medicines, textiles, petroleum products, leather, and paints. The Environmental Protection Agency has estimated that more than 54 million metric tons of hazardous waste are generated each year in the United States. Approximately ninety percent of this waste is handled improperly from the time it is generated with the result that many toxic substances have negatively affected the lives and health of unknowing victims. In fact, the problem of hazardous waste disposal has been described as "a public health nightmare of extraordinary dimensions."

Millions of Americans are unaware that they are encountering potentially serious health risks everyday. Most victims never con-

5. For example, in 1954, Hooker Chemicals and Plastics Corporation started to dispose hazardous waste into unlined pits in Montague, Michigan. The toxic substances migrated into the wells used by residents for drinking water. SENATE COMM. ON ENV’T AND PUBLIC WORKS, 96th Cong., 2d Sess., REPORT ON SIX CASE STUDIES OF COMPENSATION FOR TOXIC SUBSTANCES POLLUTION: ALABAMA, CALIFORNIA, MICHIGAN, MISSOURI, NEW JERSEY AND TEXAS 212-15 (Comm. Print 1980). Hazardous waste dumped in a New Jersey landfill and on a former chicken farm in 1971 contaminated the drinking water of nearby residents. Id. at 339-40.
7. Id. at 2.
They select their living environment unaware of the danger that may lurk underground. Because many hazardous waste disposal sites still have not been discovered,

there is a “chemical time bomb ticking beneath the earth” which could explode at any time causing devastation to innocent people.

The notorious incident at Love Canal brought the disastrous effects of improper toxic waste disposal to the forefront of public attention. The residents of the Love Canal homesites became innocent victims of the hazardous waste buried beneath their homes. They developed afflictions such as cancer, leukemia, liver tumors, and nervous system disorders, resulting in serious debilitation or death. Many pregnant women suffered miscarriages or bore children with birth defects.

Victims of toxic torts are usually unaware of their exposure to toxic substances. The substances often are invisible, tasteless, and odorless; they are transported through the air or by percolating surface or ground waters. The latency period between exposure and discovery of the injury is usually long. Detection and causation problems are complicated because manifestations of toxic substance contamination may vary with each victim and many illnesses or injuries, including cancers or miscarriages, have other possible causes. Furthermore, the harm-causing substance may be a combination of benign substances that were discharged by a number of industries.

The characteristics of toxic substances create a number of ob-

10. Id.
11. Love Canal takes its name from William T. Love who dug the canal in the 1890's. When the project was abandoned the partially dug canal was used as a landfill. Hooker Chemical and Plastics Corporation deposited 21,800 tons of chemical wastes from its plants in the canal between 1942 and 1953. When the canal reached its capacity, Hooker covered it up and conveyed the property to the City of Niagara Falls Board of Education in April 1953. An elementary school was built on that site and houses were built on the land surrounding the school. In the mid-1970s the first signs that the landfill was leaking were noticed and reported to local officials. In 1978, the hazards of the leachate were realized and people began to evacuate the area. N.Y. St. Dep't of Health, Love Canal: A Special Report to the Governor and Legislature 4-8 (Apr. 1981).
12. Id. at 21-23.
13. See Ginsberg & Weiss, supra note 8, at 921.
14. See id. (illness may not occur until quantities of contaminants have been ingested over time).
15. Id. at 923.
stacles that a toxic tort victim must surmount to obtain a judicial remedy. Among these are the statute of limitations, the expense and difficulties involved in accumulating data, and proof of causation. The causation problem is two-fold: First, the victim must determine the substance that caused the injury and second, the party responsible for discharging that substance must be identified. This note addresses the latter aspect of the causation issue relating to identification of the responsible party and examines how courts have dealt with this issue in toxic tort cases.

The burden of identifying the responsible party can be an impossible one to meet. The Love Canal situation is atypical because it was known that Hooker Electro Chemical Company generated and transported the hazardous waste to the canal. Furthermore, the canal was owned and operated as a disposal site by Hooker. Therefore, the management of the site and the bulk of the wastes buried there can be attributed to one party.

The typical hazardous waste disposal site involves many participants, who have been categorized as generators, transporters, and disposal site operators. To complicate the identification issue further, the substances disposed of in a site may have come from several different generators and the site may have had more than one owner. Generators often use the services of more than one transporter, and transporters typically carry the wastes of several generators to any number of disposal sites. Records by generators, transporters and site owners are rarely kept. Consequently, the plaintiffs, through no fault of their own, may not be able "to isolate a culpable

16. Id. at 920-21.
17. Id. at 924-25.
18. Id. at 922-24.
19. Id. at 922-23. Ascertaining the substance that caused the injury is very difficult and often impossible for a number of reasons. First, substances that escaped into the air or water may have combined with other substances forming a new compound. Id. Second, a substance may manifest itself in different ways depending upon the characteristics of the individual it contaminates. Id. Third, the latency period between exposure and injury may also vary with each individual. Id.
21. Ginsberg & Weiss, supra note 8, at 896.
22. Id.
23. Id.
24. Id. at 896-97.
25. Id. at 897.
26. See id. at 891 n.131.
party in the waste disposal chain."

Similarly, without proof of the precise cause of the injury, the plaintiff may not be able to meet the two traditional tests of causation: the "but for" and the "substantial factor" tests. Under the "but for" test, the defendant's conduct is not deemed to be the cause of the plaintiff's injury if the injury would have occurred in the absence of such action. A person exposed to a toxic substance that escaped from a hazardous waste landfill will encounter difficulties proving that his injury would not have occurred "but for" the defendant's conduct, particularly where the injury sustained has more than one possible medical cause.

The "substantial factor" test of causation would require the plaintiff to prove that the defendant's conduct was a "substantial factor" in bringing about the plaintiff's harm. In general, the characteristics of toxic substances are such that victims often face considerable difficulty in proving that a particular defendant's conduct was a substantial factor in causing their harm. Thus, although this test may be less burdensome than the "but for" test, as a practical matter, it is also generally inappropriate if the plaintiff is to be given any opportunity to recover.

Courts have alleviated the victims' burden of proving this aspect of causation in other toxic tort areas, such as asbestos-related diseases and DES injuries. This note examines the approaches taken by the courts in these areas and analyzes the applicability of these judicial approaches to hazardous waste victims.

CAUSATION THEORIES IN ASBESTOS LITIGATION

Background

Although the mineral asbestos has been known and utilized

27. Id. at 897.
29. Id.
30. See Ginsberg & Weiss, supra note 8, at 922-23.
31. W. PROSSER, supra note 28, at 240.
32. See supra text accompanying notes 13-15.
33. See infra text accompanying notes 75-84.
34. See infra text accompanying notes 36-130.
35. See infra text accompanying notes 147-217.
36. Asbestos is a mineral that can be separated into long, flexible fibers. Comment, Asbestos Litigation: The Dust Has Yet to Settle, 7 FORDHAM URB. L.J. 55, 57 (1978). The properties of asbestos satisfy many of the industrial needs of society. It can be spun and woven, it is resistant to heat and chemicals, and it is extremely durable. 4A R. GRAY, ATTORNEYS' TEXTBOOK OF MEDICINE ¶¶ 205C.03, 205C.10 (3d ed. 1981). Asbestos is used as an insulator
for centuries, its use did not become commonplace until the end of
the nineteenth century. During World War II, the use of asbestos
became extremely widespread. Nearly thirty-two million tons of as-
bestos had been used in the United States by 1978, with the bulk of
it used after 1940. During that period, a number of diseases be-
came linked with the inhalation of asbestos dust. The first asbestos-
related disease to be discovered was asbestosis, defined as pulmo-
nary fibrosis, which produces "fibrotic changes . . . in the lung
substance itself and in the pleura, the lining of the chest cavity that
also surrounds the lung tissue." It is an incurable disease whose
characteristics include scarring of the lung tissue, chronic coughing
and shortness of breath. As the disease progresses, the victim may
have difficulty breathing during exertion or even at rest. Asbestosis
is the cumulative result of long-term exposure to asbestos.

In the early 1970’s, mesothelioma also became associated with
asbestos inhalation. Mesothelioma produces a malignant tumor in
the lining of the chest, thorax, or abdomen. Unlike asbestosis, the
development of mesothelioma is not cumulative; one exposure to as-
bestos dust could result in the growth of the tumor. The disease
usually does not manifest itself until thirty to thirty-five years after
exposure.

Victims of asbestos-related diseases who seek judicial remedies
must prove legal causation (that the asbestos that caused the disease
originated with the defendant), and medical causation (that the af-
of electrical and thermal materials, as a structural reinforcer for substances such as cement
and asphalt, and as a packaging material. Id.

37. 4 A. R. Gray, supra note 36, ¶ 205C.10.
39. Id. at 342-43. Other diseases that have been related to exposure to asbestos are lung
cancer, gastro-intestinal cancer, cancer of the larynx and cancer of the kidneys. R. Gray,
supra note 36, ¶¶ 205C.73-74. "However, . . . medical research . . . has not progressed to the
point where any meaningful conclusion can be drawn" that would positively connect these
diseases with asbestos. Mehaffy, supra note 38, at 345.
40. Mehaffy, supra note 38, at 343.
41. R. Gray, supra note 36, ¶ 205C.00.
42. Id. ¶ 205C.30.
43. See id. ¶ 205C.40.
44. Mehaffy, supra note 38, at 344.
45. R. Gray, supra note 36, ¶ 205C.72.
46. N. Y. Academy of Sciences, Cancer and the Worker 50 (1977), cited with
rev'd on other grounds, 681 F.2d 334 (5th Cir. 1982).
47. R. Gray, supra note 36, ¶ 205C.72.
48. See, e.g., lb A. Larson, Workmen's Compensation Law § 41.64(C) (1981).
The burden of proving legal causation is a heavy one since it is difficult, if not impossible, to ascertain who exposed the plaintiff to the particular asbestos that caused his disease. Courts faced with asbestos litigation have taken various approaches towards this causation issue in an effort to lessen the plaintiffs' burden of proof. Medical causation is easily proved in cases of asbestosis and mesothelioma since the inhalation of asbestos dust is the only cause of these ailments. This is not the case, however, for a victim of lung cancer. While lung cancer can be contracted from breathing asbestos dust, studies have shown that cigarette smoking and asbestos dust have a synergistic effect. An asbestos worker who smokes has a much greater chance of contracting lung cancer than would a non-smoker, or a smoker who is not exposed to the mineral. An asbestos worker who smokes cigarettes, therefore, would find it more difficult to prove that his lung cancer is medically caused by asbestos than would a non-smoking victim of asbestosis or mesothelioma.

In cases where factors in addition to asbestos exposure affected the victim's health, some courts have held the asbestos to be a cause of the disability if the asbestos contributed to or accelerated the disability. In *Self v. Starr-Davis Co.*, the decedent had been employed by the defendant for twenty-two years, during which time he was continually exposed to asbestos dust. Upon learning that he had contracted asbestosis, the decedent immediately left his job with the defendant; subsequently, he died of a brain tumor. The decedent's wife filed a claim for workers' compensation death benefits and was ultimately awarded compensation. The hearing commissioner found that, although the primary cause of death was a brain tumor, which was not causally related to the asbestosis, the asbestosis had accelerated and contributed to the decedent's death.

The state court of appeals affirmed the finding of the commis-

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49. See, e.g., id.
50. See infra notes 54-130 and accompanying text.
51. See Mehaffy, supra note 38, at 343-44.
52. Id.
53. Id.
54. See, e.g., Crump v. Hartford Accident and Indem. Co., 367 So. 2d 300 (La. 1979) (holding that the plaintiff's age and weight did not negate asbestos causation of disability); *Self v. Starr-Davis Co.*, 13 N.C. App. 694, 187 S.E.2d 466 (1972) (holding that asbestos contributed to the plaintiff's death despite his malignant tumor).
56. Id. at 696, 187 S.E.2d at 468.
57. Id. at 696, 187 S.E.2d at 467.
sioner, stating that, although it was true that "asbestosis did not ag-
gravate the tumor and had no relation whatsoever to the tumor," the
asbestosis accelerated and contributed to the death of the decedent.68

In *Crump v. Hartford Accident & Indemnity Co.*,69 the Su-
preme Court of Louisiana also determined that the claimant was en-
titled to workers' compensation benefits. Crump, who contracted as-
bestosis, had worked for the National Gypsum Company for twenty-
eight years.60 He sued for benefits, naming National Gypsum and its
compensation insurer as defendants.61 At trial, conflicting medical
evidence was presented as to the cause of the plaintiff's disability.
The three physicians who examined Crump agreed that he was to-
tally disabled, but only one concluded that asbestosis was the sole
cause.62 The others testified that Crump's age and excessive weight
were the primary causes of his disability. The trial court applied the
"substantial factor" test of causation and determined that while the
claimant's age and weight contributed to his inability to work, the
asbestosis was "a substantial contributory cause" to his disability.63
Based upon the foregoing analysis, the Supreme Court of Louisiana
upheld the trial court's judgment that the defendants were liable.64

The more difficult questions of proof lie in the area of legal cau-
sation. Under traditional theories of legal causation, a person who
has been exposed to asbestos in more than one place would have dif-
ficulty proving which of the exposures caused his disease.65 In
*Yocom v. Gentry*,66 however, the Supreme Court of Kentucky allevi-
ated the plaintiff's evidentiary burden of proving which exposure
cause his injury. Gentry had worked with asbestos and fiberglass at
Ebonite Company for three and one half years. After he developed
asbestosis and became disabled, Gentry filed a claim against Ebonite
for workers' compensation benefits.67 Ebonite contended that since
"there is slight exposure to asbestos particles by the general public,"
the asbestos that caused Gentry's disease may not have come from

58.  *Id.* at 699, 187 S.E.2d at 470.
59.  367 So. 2d 300 (La. 1979).
60.  *Id.* at 302.
61.  *Id.* at 301.
62.  *Id.* at 303-04.
63.  *Id.* at 303.
64.  *Id.* at 304.
65.  See *Borel v. Fibreboard Paper Prods. Corp.*, 493 F.2d 1076, 1083 (5th Cir. 1973),
66.  535 S.W.2d 850 (Ky. 1976).
67.  *Id.* at 851.
Ebonite. The court rejected this argument and held Ebonite liable because Gentry's "only significant exposure . . . to the hazards of the disease was with Ebonite." The Yocom court had to determine, therefore, whether Gentry's disease was incident to his employment at Ebonite or the result of general exposure to asbestos.

The dilemma faced by the Yocom court is complicated greatly in situations where the victim was exposed to asbestos dust at more than one work place. In such cases, there is virtually no way to determine where the victim inhaled the asbestos that caused his harm. Fortunately, not all asbestos victims are left remediless simply because they cannot prove whose product caused their disease. A number of approaches have been used by the courts to lessen the victims' causation burden and to impose liability on the defendants. Courts have applied the "substantial factor" test, the market share liability theory, the last injurious exposure rule, and the duration and intensity approach.

"Substantial Factor" Test

The "substantial factor" test was applied by the court in Borel v. Fibreboard Paper Products Corp. Borel was the first asbestosis claim to be tried to a final verdict. Clarence Borel was employed as an industrial insulation worker from 1936 until 1969 when he became disabled from asbestosis. Because he was unable to determine which asbestos exposure had caused his disease, he brought suit against eleven manufacturers of asbestos insulation materials whose products he had been in contact with throughout his career.

Since each exposure to asbestos contributes to the harm and causes more tissue damage, the victim's condition is the result of past and recent exposures. Additionally, although the latency period usually varies from ten to twenty-five years, the disease has

68. Id. at 852.
69. Id.
71. See infra text accompanying notes 75-84.
72. See infra text accompanying notes 85-99.
73. See infra text accompanying notes 100-21.
74. See infra text accompanying notes 122-30.
75. 493 F.2d 1076 (5th Cir. 1973), cert. denied, 419 U.S. 869 (1974).
76. Mehaffy, supra note 38, at 345.
77. 493 F.2d at 1081-82.
78. Id. at 1083.
79. Id. at 1086.
80. Id. at 1083.
been known to manifest itself less than ten or more than twenty-five years after the initial exposure.\(^8\) The combination of these factors made it practically impossible to ascertain which exposure or exposures actually caused the plaintiff's injury.\(^8\)

Recognizing that legal causation could not be proved to an absolute certainty, the *Borel* court applied the "substantial factor" test of causation: "[A] defendant's conduct is the cause of the event if it was a substantial factor in bringing it about."\(^8\) Since Borel contracted asbestosis from inhaling asbestos dust to which he was exposed by each of the defendants on numerous occasions, and because the cumulative effect of exposure was undisputed, the court found enough circumstantial evidence to hold each defendant liable as a substantial factor in bringing about Borel's harm.\(^8\)

**Market Share Liability**

The *Borel* decision brought to the courts a barrage of asbestos-related cases.\(^8\) Fifty-seven of these cases were consolidated for determination of pretrial motions and were captioned *Hardy v. Johns-Manville Sales Corp.*\(^8\) Faced with the task of ruling on the consolidated discovery motion seeking information relating to the defendants' share of the asbestos market, a federal court in Texas had to determine whether the market share liability theory\(^8\) was applicable to asbestos-related litigation.\(^8\) The market share liability concept allows plaintiffs to recover damages notwithstanding the fact that they cannot identify a particular defendant whose product caused the harm.\(^8\) The plaintiff initially must come forward with proof of exposure to the product and proof of medical causation, i.e., that the product caused the injury. If the plaintiff satisfies this requirement,
the burden then shifts to the defendants to demonstrate that their product(s) could not have caused the plaintiff's harm. The defendants who cannot meet this burden are held individually liable for a portion of the judgment equal to their proportionate share of the market.

Because the cumulative nature of asbestosis and the long, indefinite latency period for asbestosis and mesothelioma may hamper a victim's ability to pinpoint the exact causative agent of the disease, the market share theory of liability appeared to the Hardy court to be a logical way of dealing with the causation issue. Furthermore, the Hardy court noted that the California court, which had created the market share theory, relied upon the alternative and concurrent liability theory set forth in Summers v. Tice, and that Summers had a precedential equivalent in Texas. For these reasons, the federal court in Hardy felt safe in assuming that a Texas state court faced with an asbestos-related claim would apply the market share liability theory and, thereby, relieve the plaintiff of the burden of proving causation. As a result, the court granted the discovery motion related to this theory. Although the market share liability approach appears to be an equitable solution in the context of asbestos injury litigation, its acceptance has been limited as exemplified by its codification in the workers' compensation law of only one state.

Last Injurious Exposure

The "last injurious exposure" rule is followed by the majority of jurisdictions faced with occupational disease cases, in workers' compensation contexts, where the exact cause of the disease is uncertain. In Mathis v. State Accident Insurance Fund, Mathis had

90. Id. at 672.
92. Id.
94. 509 F. Supp. at 1359.
95. See 33 Cal. 2d 80, 199 P.2d 1 (1948).
96. 509 F. Supp. at 1359.
97. Id.
98. Id.
99. CAL. LAB. CODE § 5500.5(e) (West Supp. 1982).
100. See, e.g., Ringeisen v. Insulation Servs. Inc., 539 S.W.2d 621 (Mo. Ct. App. 1976) (the plaintiff was unable to recover, however, because neither employer qualified as a "last employer"); Mathis v. State Accident Ins. Fund, 10 Or. App. 139, 499 P.2d 1331 (1972) (holding that conditions of the plaintiff's last employer were such as to have possibly caused
worked with asbestos for several employers for more than thirty years. He left his last position with Metalclad Insulation only four months after learning that he had contracted asbestosis.\textsuperscript{102} His claim against Metalclad and its insurance company for workers' compensation was denied because he failed to establish a causal link between his last employer and his disability.\textsuperscript{103} On appeal, the Oregon Court of Appeals adopted the "last injurious exposure" rule. This rule imposes full liability on a defendant/employer where the plaintiff was last exposed to the hazardous material during his employment with that defendant and the hazardous condition bears a causal relation to the disability.\textsuperscript{104} Legal causation need not be proved—the last employer will be liable as long as there is "sufficient evidence to support the general rule requirement that the conditions of the last employment were such that they could cause asbestosis over some indefinite period of time."\textsuperscript{105} To illustrate: Suppose $V$ was first employed by $A$ for thirty years and then by $B$ for twenty-five days. At both places $V$ worked in an asbestos-filled environment. He discontinued his employment with $B$ when he discovered that he had contracted asbestosis. According to the "last injurious exposure" rule, only $B$ will be liable for $V$'s harm if the conditions where $V$ was employed by $B$ could have caused asbestosis over that period of time.\textsuperscript{106}

\textit{Mathis} demonstrates that the general rule may present inequities to short-term employers. The Oregon Legislature, however, has given employers a means to protect themselves by allowing employers to require potential employees to submit to a medical examination.\textsuperscript{107} In this way, employers can avoid hiring workers who are suffering from advanced occupational diseases.\textsuperscript{108}

Other state legislatures have modified the "last injurious exposure" rule in a different manner to guard against the aforementioned

\begin{footnotesize}
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\item 101. 10 Or. App. 139, 499 P.2d 1331 (1972).
\item 102. \textit{Id.} at 142, 499 P.2d at 1332.
\item 103. \textit{Id.} at 141, 499 P.2d at 1332.
\item 104. \textit{Id.} at 145, 499 P.2d at 1334. The "last injurious exposure" rule has been codified in a number of jurisdictions. \textit{E.g.}, \textit{ARK. STAT. ANN. § 81-1314(6) (1976); DEL. CODE ANN. tit. 19, § 2329 (1979); N.Y. WORK. COMP. LAW § 44 (McKinney 1965); OR. REV. STAT. § 656.807 (1981).}
\item 105. 10 Or. App. at 150, 499 P.2d at 1336.
\item 106. \textit{Id.} at 149-50, 499 P.2d at 1335-36.
\item 107. \textit{OR. REV. STAT.} § 656.806 (1981).
\item 108. 10 Or. App. at 150 n.4, 499 P.2d at 1336 n.4.
\end{itemize}
\end{footnotesize}
problem. These states have set forth minimum periods of employment before the employer can be held liable.\textsuperscript{109} To recover, the plaintiff only must identify the last employer who exposed him to asbestos for more than the statutory period of time. In addition, the plaintiff must prove that he inhaled asbestos dust at that place of employment, that asbestos dust is the cause of his disease, and that he is disabled.\textsuperscript{110} This statutory scheme effectively removes the plaintiff's burden of proving legal causation.\textsuperscript{111}

The Missouri Court of Appeals, in \textit{Ringeisen v. Insulation Services, Inc.},\textsuperscript{112} has analogized the "last injurious exposure" rule to a "rule of convenience."\textsuperscript{113} The adoption of this rule in Missouri was precipitated by the finding that "any search for positive proof of causation among several employers in cases of occupational diseases was a futile search."\textsuperscript{114} In this jurisdiction the victim's last employer will be liable as long as the victim was exposed to the hazardous substance at that last place of employment.\textsuperscript{115} The last employer cannot be held liable, however, if the victim worked there for less than ninety days.\textsuperscript{116}

While \textit{Mathis} pointed out how inequitable the "last injurious exposure" rule can be to a short-term employer,\textsuperscript{117} \textit{Ringeisen} expressed its discontentment with the potential effects of the ninety day time constraint on injured workers who have not worked in any one place for that length of time.\textsuperscript{118} It was undisputed that the plaintiff in \textit{Ringeisen} had contracted asbestosis and that he had been exposed to asbestos dust both at Owens Corning Fiber Glass Corporation and at Insulation Services, Inc.\textsuperscript{119} Since he was not employed at either place for more than ninety days, however, the court could not compensate him because of the "clear meaning of the statute."\textsuperscript{120} The court suggested that the legislature should give this dilemma

\textsuperscript{110} See generally 4 A. Larson, supra note 48, § 95.21.
\textsuperscript{111} See supra text accompanying notes 48-50.
\textsuperscript{112} 539 S.W.2d 621 (Mo. Ct. App. 1976).
\textsuperscript{113} Id. at 624.
\textsuperscript{114} Id.
\textsuperscript{116} Id. § 287.063(2).
\textsuperscript{117} See supra notes 101-10 and accompanying text.
\textsuperscript{118} 539 S.W.2d at 625.
\textsuperscript{119} Id. at 623.
\textsuperscript{120} Id. at 625.
further consideration.\footnote{121}

\textit{Duration and Intensity}

Another approach to the causation problem was applied in \textit{Caudle-Hyatt, Inc. v. Mixon},\footnote{122} by the Virginia Supreme Court. The suit originated as a workers' compensation claim by Henry Mixon, and was pursued by his wife after he died of mesothelioma.\footnote{123} Mrs. Mixon was awarded death benefits and Caudle-Hyatt appealed to the Virginia Supreme Court.\footnote{124} One of the issues raised on appeal was the claimant's failure to prove causation. The defendants contended that although Mixon had been exposed to asbestos during his employment at Caudle-Hyatt, the exposure did not "cause, augment, or aggravate the disease."\footnote{125} For a Virginia employer to be liable, the Virginia workers' compensation statute requires that the employee have had "an exposure to the causative hazard of such disease which is reasonably calculated to bring on the disease in question."\footnote{126} The \textit{Caudle-Hyatt} court, holding in favor of Mixon, stated that actual causation need not be proved; the plaintiff need only show that the "aggravation of the disease or . . . the exposure was of such duration and intensity that it generally causes the disease in question, even though actual causation or aggravation cannot be established in the claimant's case."\footnote{127}

The \textit{Caudle-Hyatt} case demonstrates that a plaintiff afflicted with an asbestos-related ailment need not be denied relief simply because proof of actual causation is difficult or impossible to obtain. The plaintiff need only prove that his exposure was of a certain duration and intensity.\footnote{128} In this case, a medical expert testified that exposure to asbestos for one month could produce mesothelioma. In addition, Mixon's co-workers testified that Mixon worked for at least one month in an environment where asbestos dust and insulation remnants existed.\footnote{129} The court held that the evidence supported the conclusion that Mixon was "'injurally exposed'" to asbestos in that it was "'reasonably calculated to bring on the disease in

\footnotesize{\begin{itemize}
\item 121. \textit{Id.}
\item 122. 220 Va. 495, 260 S.E.2d 193 (1979).
\item 123. \textit{Id.} at 497, 260 S.E.2d at 194.
\item 124. \textit{Id.}
\item 125. \textit{Id.} at 499, 260 S.E.2d at 195.
\item 126. VA. CODE § 65.1-52 (Supp. 1982).
\item 127. 220 Va. at 500, 260 S.E.2d at 196.
\item 128. \textit{Id.}
\item 129. \textit{Id.}
\end{itemize}}
question."

These cases demonstrate that although people afflicted with asbestos-related diseases cannot prove with certainty which exposure to asbestos caused their disease, they are not always left without a remedy. The approaches to this problem vary in these jurisdictions, but the end result is the same: liability may be found even though legal causation is never proved.

**Application of Asbestos Causation Theories to Toxic Torts Arising from Hazardous Waste**

Victims of hazardous waste injuries often face comparable difficulties in proving the cause of their afflictions. First, the hazardous waste victim cannot always isolate the harm-causing substance. Second, once the substance is identified, it is often problematic for the victim to trace it to its specific source.

The first difficulty is analogous to that of the asbestos worker who contracted asbestosis but died from a brain tumor, or the asbestos worker whose age and excessive weight contributed to his disability. The courts allowed these plaintiffs to recover where asbestos accelerated or contributed to the victim's death or disability. Similarly, the judiciary could reach a comparable result by applying these modified causation theories (derived from asbestos litigation) to those hazardous waste cases where the victim cannot isolate the injurious substance.

The lenient approach of the *Caudle-Hyatt* court, where the plaintiff only had to prove that the duration and intensity of his exposure generally caused the injury he sustained, is an easier burden for a victim of an asbestos-related disease to meet than for a hazardous waste victim. Asbestos has been widely used since the end of the nineteenth century and its properties are well-known. It was first linked to various diseases in the middle part of this century and an abundance of information has accumulated regarding the nature and characteristics of the diseases. In contrast, toxic torts from

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130. *Id.*
132. Soble, *supra* note 20, at 706-07. See also *supra* text accompanying notes 28-33.
133. *See supra* text accompanying notes 55-58.
134. *See supra* text accompanying notes 51-64.
135. *See supra* text accompanying notes 54-64.
136. 220 Va. at 500, 260 S.E.2d at 196.
137. *See supra* text accompanying notes 36-47.
leaching hazardous waste were first brought to the forefront of public attention in the 1970's with the incident at Love Canal.\textsuperscript{138} Little is known about the injuries that may result from the chemicals that have been disposed of in landfills.\textsuperscript{139} Therefore, due to this relative disparity in knowledge, hazardous waste victims would have a greater burden to prove duration and intensity of exposure than the asbestos-related victims. If the hazardous waste victim can identify the substance that caused the harm, proving duration and intensity of exposure to that substance would be less burdensome. The victim would still have the difficult task of proving who disposed of the specific harm-producing chemical.

Lessening the plaintiff's burden may appear to be unjust to the defendant since the producer of a toxic substance may then be held liable for injuries suffered by the plaintiff despite the lack of direct proof that the defendant caused the harm. Moreover, the defendant may not be in a better position than the plaintiff to prove that the plaintiff's harm originated from another source. While this may seem to push the tort system past its limits,\textsuperscript{140} the plaintiff should not be denied compensation merely because other factors contributed to his injury as long as it still can be proved that the hazardous substance disposed of by the defendant may have contributed to or accelerated the harm. The defendant who exposes the plaintiff to the risk of harm by discharging the toxic substance should not escape liability simply because other factors also contributed to the plaintiff's injuries.

In the second situation where the victim can identify the substance that caused the injury and can trace it to a number of possible sources, the courts could apply the theories used in the asbestos cases so that innocent victims can be compensated without proof of the precise causal source. This would be analogous to the asbestos worker in \textit{Borel} who was exposed to the asbestos products of a number of manufacturers and could not determine which exposure was the actual cause.\textsuperscript{141} That court applied the "substantial factor" test of causation and allowed the plaintiff to recover without proving specifically which manufacturer's asbestos caused his disease.\textsuperscript{142} The cu-

\textsuperscript{138} See \textit{supra} note 11.
\textsuperscript{140} See id. at 141.
\textsuperscript{142} Id. at 1094. See \textit{supra} text accompanying notes 75-84.
mulative nature of asbestosis made the substantial factor test applicable since each asbestos product could conceivably have contributed to his injury.\footnote{143} The reasoning of the \textit{Borel} court could be applied to a hazardous waste case if the plaintiff can establish that his injury resulted from the cumulative exposure to the defendant's toxicant. To do so, however, the plaintiff must ascertain information as to the nature and characteristics of that substance. Since toxic torts resulting from hazardous waste disposal are relatively new\footnote{144} in comparison with asbestos-related diseases, such information would probably not be available to the plaintiff. Therefore, the "substantial factor" test of causation, as applied in \textit{Borel}, may not be useful to hazardous waste victims.

The court could apply the "last injurious exposure" rule when the plaintiff can identify the last defendant to discharge the hazardous substance causally related to the victim's injury. Although the inequities of this rule were observed in the asbestos cases,\footnote{145} it nevertheless was adopted in a number of jurisdictions.\footnote{146} This rule would allow the hazardous waste victim to recover without proving causation if he can identify the harm-causing substance and the last source of his exposure. Unless accurate records were kept by the defendants as to the quantity and time of discharges, the plaintiff would face the impossible task of proving who was the last to discharge the substance. Furthermore, where the "last injurious exposure" rule was applied to asbestos cases, the different exposures to asbestos were distinct events. This is generally not the case in the hazardous waste area, since the plaintiff is not moving from one place of exposure to another. In situations where multiple defendants disposed of hazardous substances in the same landfill, the issue of whoever dumped last would be irrelevant if the substances leached out several years after the last discharge occurred. The victim would be exposed to each defendant's toxicant at the same time. Therefore, the "last injurious exposure" rule, if used at all in the hazardous waste area, would not be applicable.

\footnote{143}{See supra text accompanying note 80. Two defendant companies contended that they should be absolved from liability because Borel's exposure to their asbestos products was recent and thus outside the 10 to 15 years latency period for asbestosis. The court noted that "even the most recent exposures could have added to or accelerated Borel's overall condition." 493 F.2d at 1094.}
\footnote{144}{See Podgers, supra note 139, at 139.}
\footnote{145}{See supra text accompanying notes 106, 118.}
\footnote{146}{See, e.g., statutes cited supra note 104. See also Ringeisen v. Insulation Servs. Inc., 539 S.W.2d 621 (Mo. Ct. App. 1976); Mathis v. State Accident Ins. Fund, 10 Or. App. 139, 499 P.2d 1331 (1972).}
waste area, would have very limited applications.

While the solutions to the causation problem in the asbestos cases could have an impact on hazardous waste cases, it is apparent that some modifications would be necessary to accommodate the special needs of hazardous waste plaintiffs. The approaches some courts have taken in the DES area may be of assistance to these victims.

CAUSATION THEORIES IN DES CASES

Background

DES refers to a group of synthetic estrogens which were prescribed to pregnant women from the late 1940's until 1971 for a variety of reasons, including the prevention of miscarriages. The drug, which was developed in England in 1938, was not patented by its inventor and, therefore, anyone could market it. In 1947, when the Food and Drug Administration (FDA) approved the use of DES for the prevention of certain complications during pregnancy, hundreds of pharmaceutical companies in the United States became involved in marketing the drug in subsequent years.

In 1971, the FDA indicated that DES was both ineffective and dangerous for use by pregnant women. Studies revealed a link between the use of DES during pregnancies and a form of gynecological cancer in daughters born from those pregnancies. By the time the FDA banned the use of DES during pregnancies, millions of women had consumed the drug while pregnant and many of their female offspring had been confronted with the possibility of developing vaginal and cervical cancer.

Approximately one thousand lawsuits have been commenced against DES manufacturers based on a products liability cause of action. One commentator noted that plaintiffs are able to prove

147. DES is the common abbreviation for diethylstilbestrol, dienestrol, and stilbestrol. See 7 AM. J. L. & MED. 213 (1981).
148. Note, supra note 89, at 668.
150. Id. at 963.
151. Id. at 964.
153. Comment, supra note 149, at 964.
154. Note, supra note 89, at 668.
155. Id. at 669.
156. Generally, to recover for injuries under a products liability theory, the plaintiff
that DES caused their injuries, that the defendant drug companies manufactured DES for the prevention of miscarriages, that the defendants knew or should have known that DES was carcinogenic, and that the defendants failed to warn the plaintiffs’ mothers of the hazards of the drug. 157 The plaintiffs, however, still have the burden of identifying which drug company manufactured the DES that their mothers ingested. 158 Establishing this causal link is extremely difficult, and perhaps, impossible, since the various brands of the unpatented and fungible DES pills were essentially interchangeable. 159 As a result, physicians often prescribed it without specifying a particular brand and pharmacists often dispensed it with whatever brand they happened to have had in stock at the time. 160 Records of which brand filled a particular prescription are usually unavailable. 161

A number of plaintiffs have been precluded from recovering damages for their injuries because they failed to identify the specific drug company that manufactured the DES that caused their injury. 162 Other courts, cognizant of the difficulties in applying traditional causation theories to DES cases, have allowed plaintiffs to recover notwithstanding their inability to prove a causal connection between their injury and a particular manufacturer. 163

Market Share Liability

In Sindell v. Abbott Laboratories, 164 the daughters of women who had ingested DES while pregnant brought a class action suit against eleven pharmaceutical companies that produced DES. The plaintiffs claimed that their cancerous or precancerous conditions re-

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158. Id. at 669-70.
160. Id. at 466.
161. Id.
sulted from in utero exposure to DES. They identified the drug that caused their injuries and alleged negligence on the part of the defendants for inadequately testing the drug and failing to warn users of its potential dangers. The trial court dismissed the complaint, however, for failure to identify the precise manufacturer of the actual pill that caused their harm.

On appeal, the Supreme Court of California found that it could not apply any existing exception to the traditional causation theories to allow the plaintiffs to recover; it did not, however, leave the victims without a remedy. Instead, the court fashioned a theory of market share liability, based on the reasoning in Summers v. Tice, that "as between an innocent plaintiff and negligent defendants, the latter should bear the cost of the injury." The Sindell court noted:

In our contemporary complex industrialized society, advances in science and technology create fungible goods which may harm consumers and which cannot be traced to any specific producer. The response of the courts can be either to adhere rigidly to prior doctrine, denying recovery to those injured by such products, or to fashion remedies to meet these changing needs.

In addition, according to the court, not only were the defendants in a better position than the innocent plaintiffs to bear the financial burden that resulted from their defective products, but the imposition of liability would encourage the defendants to manufacture safer products.

165. Id. at 594-95, 607 P.2d at 926, 163 Cal. Rptr. at 134.
166. Id. at 593, 607 P.2d at 925, 163 Cal. Rptr. at 133.
167. Id.
168. Id.
169. Id. at 598, 607 P.2d at 928, 163 Cal. Rptr. at 136.
170. Market share liability is a modification of the alternative liability rule established in Summers v. Tice, 33 Cal. 2d 80, 199 P.2d 1 (1948). In Summers, two hunters fired their guns in the direction of the plaintiff, who was injured by one of the bullets. The plaintiff was able to recover damages even though he could not identify which of the two negligent defendants fired the shot that harmed him. Id. at 84, 199 P.2d at 2. For a discussion of the theory of alternative liability, see infra text accompanying notes 198-240. The difference between market share and alternative liability is the way in which damages are apportioned among the defendants. In the former, each defendant is liable for that portion of the judgment proportionately representative of its market share. Sindell, 26 Cal. 3d at 612, 607 P.2d at 937, 163 Cal. Rptr. at 145. In the latter, each defendant is jointly and severally liable for the entire judgment. Id. at 599, 607 P.2d at 928, 163 Cal. Rptr. at 136.
171. 26 Cal. 3d at 610-11, 607 P.2d at 936, 163 Cal. Rptr. at 144 (citing Summers v. Tice, 33 Cal. 2d 80, 199 P.2d 1 (1948)).
172. Id. at 610, 607 P.2d at 936, 163 Cal. Rptr. at 144.
173. Id. at 611, 607 P.2d at 936, 163 Cal. Rptr. at 144.
The market share theory requires that the plaintiffs join a "substantial percentage" of the manufacturers which may have produced the defective product. The burden of proving causation then shifts to the defendants, who must demonstrate that they could not have manufactured the product that caused the plaintiff's harm. Each defendant that cannot exculpate itself is "liable for the proportion of the judgment represented by its share of [the] market . . . ."

A number of problems in implementing the market share approach were left unanswered by Sindell. The court did not specify what would constitute a "substantial percentage" of the market, opining that "[w]hile 75 to 80 percent of the market is suggested as the requirement . . . we hold only that a substantial percentage is required." Additionally, the court determined that any difficulties that the plaintiffs may encounter in specifying the relevant market and in ascertaining the defendants' share of that market, would be left for the trial court to consider as matters of proof. As a result, it is unclear what a future plaintiff would have to prove with respect to the defendants' market shares to satisfy her burden.

**Alternative Liability**

Other jurisdictions have allowed DES victims to recover without adopting the market share approach enunciated in Sindell. A New Jersey court, faced with a DES causation dilemma, held for the plaintiffs in Ferrigno v. Eli Lilly & Co. on the theory of alternative liability. In that case, eight women brought suit against twenty-two manufacturers and distributors of DES. The court relied on Anderson v. Somberg for the proposition that where plaintiffs, through no fault of their own, cannot pinpoint which of a group of negligent defendants caused their harm, the burden shifts to the defendants to exculpate themselves. Those who cannot disprove their liability remain jointly and severally liable.
The question on appeal was whether the defendants could be held jointly and severally liable even though it was uncertain that the specific causative agent was one of the defendants before the court.\footnote{182} The Sindell court, concerned with this precise issue, chose to modify the alternative liability rule by requiring that the plaintiff need only join a substantial percentage of all potential defendant-manufacturers.\footnote{183} The Ferrigno court, however, relying upon Anderson,\footnote{184} held that all possible defendants need not be before the court for the alternative liability rule to apply in an unmodified form.\footnote{185} In Anderson, the court could neither discern who was responsible for the plaintiff's harm, nor guarantee that the wrongdoer was among the defendants.\footnote{186} The court nevertheless imposed joint and several liability upon the defendants.\footnote{187}

Although Ferrigno recognized that Anderson intended to limit its holding to similar cases,\footnote{188} Ferrigno found a number of parallels between the plaintiffs in the two cases and, therefore, applied the principles of Anderson to the DES case.\footnote{189} The Ferrigno court found: (1) the defendants were members of a group where all members could be at fault; (2) the defendants owed a special responsibility to the plaintiffs as manufacturers of a potentially dangerous drug; (3) the plaintiffs were totally innocent; (4) the harm to the plaintiffs was not reasonably foreseeable to them and was not related to the purpose for which their mothers ingested DES; and (5) the plaintiffs' inability to identify the exact cause was the fault of the defendants for marketing a fungible drug.\footnote{190} Furthermore, the latency period compounded the plaintiffs' inability to identify the cause, since any records their mothers may have kept would reasonably have been discarded by the time their daughters' injuries surfaced.\footnote{191} Based on the principles of Anderson and the strong policy in New Jersey favoring recovery by innocent plaintiffs—as opposed to the exoneration of culpable defendants—where the plaintiffs cannot identify the

\begin{footnotes}
\footnote{182}{Id. at 565, 420 A.2d at 1312.}
\footnote{183}{See supra note 170.}
\footnote{184}{175 N.J. Super. at 565-70, 420 A.2d at 1312-14.}
\footnote{185}{Id. at 569, 420 A.2d at 1314; contra Namm v. Charles E. Frosst & Co., 178 N.J. Super. 19, 427 A.2d 1121 (1981) (rejecting the alternative liability theory because all possible defendants were not before the court).}
\footnote{186}{Anderson, 67 N.J. at 304, 338 A.2d at 8.}
\footnote{187}{Id.}
\footnote{188}{Ferrigno, 175 N.J. Super. at 567, 420 A.2d at 1313.}
\footnote{189}{Id.}
\footnote{190}{Id. at 567-68, 420 A.2d at 1313-14.}
\footnote{191}{Id. at 568, 420 A.2d at 1314.}
\end{footnotes}
cause of their injuries, the court will hold for the plaintiffs.

In Abel v. Eli Lilly & Co., the plaintiffs were similarly situated to the Sindell and Ferrigno plaintiffs. The Michigan Court of Appeals recognized two existing theories under which the plaintiffs stated a cause of action without proof of the precise causative agent and, therefore, found no need to adopt the market share theory. Like the Ferrigno court, the Michigan Court of Appeals recognized that the alternative liability rule that Sindell modified to create the market share theory could be applied in its original form to Abel. Alternative liability is applicable where independent acts by two or more tortfeasors [exist], all of whom have acted wrongfully, but only one of whom has injured [the] plaintiff. Joint and several liability is imposed, not because all are responsible for the damage, but because it is impossible to tell which one is responsible. Rather than deny the innocent plaintiff his recovery because he cannot prove which of two or more wrongdoers injured him, the courts impose joint liability on all wrongdoers.

Under this theory, the plaintiffs “must establish . . . that each defendant breached its duty of care in producing the product, that the harm to each plaintiff was the result of ingestion of DES by her mother, and that one or more of the named defendants manufactured the DES so ingested.” The burden then shifts to each of the defendants to prove that it did not produce the pill that injured the plaintiff.

Unlike the court in Sindell, the Michigan court did not believe that an injustice would be served by holding the defendants jointly and severally liable instead of apportioning damages according to the defendants’ proportionate share of the market. The court refused to increase the plaintiffs’ burden by requiring production of evidence

192. Id. at 569, 420 A.2d at 1314.
194. The plaintiffs in Abel developed cancer because their mothers consumed DES while pregnant with the plaintiffs. They could not identify the manufacturer of the DES ingested by their mothers. Id. at 67, 289 N.W.2d at 22.
195. Id. at 71, 289 N.W.2d at 24.
196. See supra text accompanying note 170.
198. Id. at 73, 289 N.W.2d at 25.
199. Id. at 76, 289 N.W.2d at 26-27 (footnote omitted).
200. Id. at 74, 289 N.W.2d at 25.
201. Id. at 76-77, 289 N.W.2d at 26-27.
concerning the defendants' percentages of the DES market. It is possible that this refusal stemmed from the fact that in *Abel*, unlike *Sindell*, every DES manufacturer that distributed the drug in the state during the relevant time period was named as a defendant, so that the chance that the causative agent would escape liability was minimal. As a result, the *Abel* court held that the plaintiffs need not apportion damages among the defendants in order to state a claim for recovery based on an alternative liability theory.

**Concerted Action**

The second theory discussed by the *Abel* court upon which relief could be granted is the concerted action theory under which all those who, in pursuance of a common plan or design to commit a tortious act, actively take part in it, or further it by cooperation or request, or who lend aid or encouragement to the wrongdoer, or ratify and adopt his acts done for their benefit, are equally liable with him.

Express agreement is not necessary, and all that is required is that there be a tacit understanding . . .

In short, if the plaintiffs can establish that the defendants engaged in concerted activity, all of the defendants are liable even though only one directly caused the harm. As in the alternative liability situation, the burden of proving causation shifts to the defendants to disprove their liability. The court concluded that the plaintiffs' allegations that the defendants acted in concert by wrongfully producing and marketing a dangerous drug without adequate testing or warnings were sufficient to state a cause of action without identifying the precise cause of their harm.

In *Bichler v. Eli Lilly & Co.*, a New York court modified the concerted action theory to allow the plaintiff to recover notwithstanding her inability to identify with certainty the causative agent of her harm. The plaintiff, seeking recovery under the concerted ac-

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202. *Id.* at 77, 289 N.W.2d at 27.
203. *Id.* at 67, 289 N.W.2d at 22.
204. *Id.* at 76, 289 N.W.2d at 26.
205. *Id.* at 71-73, 289 N.W.2d at 24.
207. 94 Mich. App. at 72, 289 N.W.2d at 24.
208. *Id.* at 73, 289 N.W.2d at 25.
209. *Id.* at 72, 289 N.W.2d at 25.
tion theory, brought suit against only one manufacturer of DES.\textsuperscript{211} The defendant, Eli Lilly and Company, was a major producer of DES at the time the plaintiff’s mother ingested the drug.\textsuperscript{212} Since Lilly, acting in concert with other makers of DES, wrongfully tested and marketed the drug without warning consumers of its hazards,\textsuperscript{213} the plaintiff alleged that Lilly should be held jointly and severally liable for the resulting injuries.\textsuperscript{214}

The \textit{Bichler} court agreed with the \textit{Abel} decision that “the law, especially in the products liability area, was not so rigid as to preclude an injured party, with an otherwise valid claim, from a remedy” solely because she could not discern the cause of her harm.\textsuperscript{215} For this reason, \textit{Bichler} upheld the trial court’s modified definition of concerted action, under which the defendants are deemed to have acted in concert even though they “‘act[ed] independently of each other in committing the same wrongful act, [if] their acts ha[d] the effect of substantially encouraging or assisting the wrongful conduct of the other, which, in this case, was the alleged failure to adequately test.’”\textsuperscript{216} The court concluded that “[i]t does not strain one’s sense of fairness to allow a limited expansion of the doctrine of concerted action to cover the type of circumstances faced in a DES case where the traditional evidentiary requirements of tort law may be insurmountable.”\textsuperscript{217} As a result, the plaintiff was able to recover without proving causation.

\section*{APPLICATION OF DES CAUSATION THEORIES TO TOXIC TORTS ARISING FROM HAZARDOUS WASTE}

Victims of hazardous waste face problems in proving causation similar to those encountered by DES victims. Since their injuries are caused by fungible goods, they confront the initial problem of identifying the cause of their injuries. Assuming that hazardous waste vic-

\begin{thebibliography}{99}
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\bibitem{211} Id. at 319, 436 N.Y.S.2d at 627.
\bibitem{212} Id. at 319-20, 436 N.Y.S.2d at 627. Expert testimony was presented at trial that Lilly comprised approximately 45% of the DES market in 1953, the year in which the plaintiff's mother ingested the drug. Id. at 320 n.1, 436 N.Y.S.2d at 627 n.1.
\bibitem{213} Although the F.D.A. approved the marketing of DES, its decision was based on tests performed by a committee of pharmaceutical companies that was chaired by Lilly. 55 N.Y.2d 571, 576, 436 N.E.2d 182, 183-84, 450 N.Y.S.2d 776, 777-78 (1982).
\bibitem{214} 79 A.D.2d at 320, 436 N.Y.S.2d at 628.
\bibitem{215} Id. at 328, 436 N.Y.S.2d at 632.
\bibitem{216} Id. at 326, 436 N.Y.S.2d at 631.
\bibitem{217} Id. at 329, 436 N.Y.S.2d at 632.
\end{thebibliography}
tims can pinpoint the substance that caused their harm, they are left with the burden of proving who allowed the particular injury-causing substance to leach out into the environment.

The theories applied by the courts in the DES cases to shift the burden of proving causation to the defendants may be useful to courts faced with hazardous waste injury cases. Like DES victims, hazardous waste victims are usually not certain of who caused their exposure to the toxic substance at the root of their injuries. To determine which theory of causation should be applied, the circumstances surrounding the injury must be examined. Where a person is contaminated by an identifiable substance emanating from a dumpsite, he may be able to trace it to a number of defendants. The victim could then bring an action against all those that allowed the toxic substance to escape.

If the market share theory is applied, numerous difficulties would be encountered. First, if all those responsible for the leaching of the harm-causing substance constitute the "market," the victim would have to join a "substantial percentage" of those producers to maintain a suit under the market share theory. Since "substantial percentage" was inadequately explained in Sindell, it is not known if the plaintiff must join a substantial percentage of the site owners, generators, or transporters of the substance, or, alternatively, a substantial percentage of all three combined. If the defendants include all three categories of actors, determining their proportionate market share would be nearly impossible since they are parts of different markets. The fact that accurate records were rarely kept by generators, transporters and site owners compounds the problems of finding all possible defendants and ascertaining what constitutes their percentage of the market. Furthermore, a manufacturer's percentage of dumping may not be equal to its percentage of the market. For example, one paint producer may generate more of a substance than its competitor; or one manufacturer may recycle more of its waste than another. It is likely that not all those responsible for discharging the substance will be known to the victim; this, however, would not deter

218. Identifying the harm-causing substance can be the most difficult burden to overcome. See supra notes 19-20 and accompanying text.
219. See Soble, supra note 20, at 706.
221. See Sindell v. Abbott Labs., 26 Cal. 3d at 612, 607 P.2d at 937, 163 Cal. Rptr. at 145.
222. See id.; see also supra notes 164-77 and accompanying text.
a court from applying the market share theory since the named defendants would only be liable in proportion to their percentage of the market. As a result of these complications, the market share theory as set forth in Sindell\(^2\)\(^2\)\(^3\) may not be the best available doctrine upon which hazardous waste victims should seek recovery.

A concerted action theory of liability might be better suited where the plaintiff cannot identify which defendant caused his injury. If the plaintiff alleges that the defendants acted in concert by wrongfully discharging hazardous chemicals into a common dumpsite without adequately providing for their containment, the court, following Abel v. Eli Lilly & Co.,\(^2\)\(^2\)\(^4\) could find that a cause of action exists notwithstanding the lack of identification of the precise cause. Alternatively, the modification of concerted action in Bichler v. Eli Lilly & Co.,\(^2\)\(^2\)\(^5\) might aid the toxic tort plaintiff to recover. The plaintiff could argue that, although the defendants acted independently, their acts of dumping the substance encouraged or assisted the wrongful behaviors of the other defendants. The named defendants would be jointly and severally liable unless they could exonerate themselves. The possibility that every wrongdoer is not before the court should not preclude the plaintiff from recovering damages. The defendants could either join as third party defendants other culpable parties not named by the plaintiff, or commence a separate action against such parties for contribution.\(^2\)\(^2\)\(^6\)

The expanded theory of concerted action, if applied to the hazardous waste situation, might allow the victims to be compensated without proving the specific cause of their injuries. Although this may appear inequitable to the defendants, they engaged in a hazardous activity that exposed the plaintiffs to serious risks. The equities, therefore, weigh in the victims' favor, and the courts should adopt this theory for such cases.

Application of the alternative liability approach may vary with the jurisdiction, depending upon which view is followed with respect to whether all possible defendants must be joined. Sindell stated that alternative liability cannot be utilized unless every potential wrongdoer is before the court.\(^2\)\(^2\)\(^7\) Ferrigno, however, disagreed with

\(^{223}\) Id. at 611-13, 607 P.2d at 936-38, 163 Cal. Rptr. at 144-46.
\(^{224}\) See supra text accompanying notes 205-09.
\(^{225}\) See supra text accompanying notes 210-17.
\(^{226}\) RESTATEMENT (SECOND) OF TORTS § 886A comment i (1979).
\(^{227}\) 26 Cal. 3d at 603, 607 P.2d at 931, 163 Cal. Rptr. at 139.
In *Ferrigno*, recovery was permitted under the alternative liability theory even though the court was not positive that the precise wrongdoer was before it. Following *Ferrigno*, if the plaintiff establishes that the defendants breached their duty of care in disposing of the toxicant, that the plaintiff's harm resulted from the substance, and that the defendant produced that type of toxic substance, then the burden of proving causation shifts to the defendants. Those defendants who cannot meet this burden will be held jointly and severally liable. A hazardous waste victim who can bring suit under an alternative liability theory would have a chance to recover even where it is not possible to name all potential wrongdoers.

Shifting the burden of proving causation onto the defendants may seem unfair since the defendants may not be in a better position than the plaintiffs to prove whose substance caused the plaintiffs' harm. The defendants, however, contributed to the identification problem by inadequately disposing toxic substances at the same landfill. Furthermore, while it may be true that the adoption of an alternative liability theory for hazardous waste torts may cause traditional concepts and basic principles of tort law to be distorted or abandoned, the hazardous waste tort is not a "traditional" injury. Rather, it is the result of our industrialized society. Therefore, our traditional legal notions must evolve to keep up with our progressing society.

**CONCLUSION**

Courts have been willing to dispense with traditional causation tests to allow victims of asbestos and DES-related injuries to recover without having to prove who manufactured the product that caused the injury. The approaches these courts have utilized vary with respect to what the plaintiffs must prove in order to recover, but they all share a common denominator—the burden of proving causation shifts to the defendants. Although none of the tests set forth in the asbestos or DES cases could be applied to hazardous waste cases without some modifications, the courts could alleviate these victims' difficulties by shifting the burden of proof to the defendants. The plaintiffs would be required to prove (1) that they have sustained an

228. 175 N.J. Super. at 569-70, 420 A.2d at 1314.
229. *See id.*
231. *See id.* at 34, 427 A.2d at 1128.
injury, (2) that the injury was caused by exposure to toxic substances, (3) that the defendants produced and disposed of such substances, and (4) that they were exposed to the substance. The burden of proof would then shift to the defendants to exonerate themselves by either disproving the plaintiffs' offer of proof or by establishing that the particular substance they produced could not have injured the plaintiff.

Although the plaintiff would still have some obstacles to overcome, his burden of proof would no longer be impossible to meet. The victim may still bear the financial burden of having tests and studies conducted, but even this burden may be lessened in time. As in asbestos litigation, the first few plaintiffs had to present medical and scientific evidence regarding the effects of asbestos inhalation. Subsequent plaintiffs, however, had this data available to them. As more is learned about the characteristics of specific toxic substances, plaintiffs' expenditures to collect data for proof will decrease. In time, collateral estoppel may even eliminate the need for such proof.

At the same time, this proposal is not unfair to the defendants who, by producing and inadequately disposing of a fungible item, have created the situation where innocent plaintiffs are harmed and are unable to trace the injury-causing substance back to its source. Furthermore, the defendants are given the chance to exculpate themselves; lessening the victims' burden of proof, therefore, is justified.

Traditional notions of causation were developed before the existence of toxic torts was acknowledged. Applying these tests to toxic tort cases is analogous to placing a square peg into a round hole—it just will not fit. The courts have realized this dilemma in the asbestos and DES cases and have modified causation theories accordingly. The same should be done for hazardous waste cases. By shifting the burden of proof of causation to the defendants, the courts would be placing the burden into the hands of those responsible for creating the problem in the first place.

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232. See Mehaffy, supra note 38, at 346.