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**Judicial Scrutiny of Expert Testimony in
Environmental Tort Litigation**

Alani Golanski*

I. Introduction

A currently heated issue debated primarily in environmental tort litigation concerns the extent to which courts should scrutinize proffered expert testimony in determining the admissibility of such evidence. This determination, which arises under Federal Rule of Evidence 703 or analogous state evidentiary law principles, is frequently outcome determinative because a party's proof on a material element will often consist solely of the expert testimony at issue. Further, where a cutting edge environmental tort case is at stake, involving a substance newly alleged to be toxic, the viability of an entire line of cases may hinge upon the Rule 703 determination. This article begins by reviewing the split in authority regarding the appropriate level of judicial scrutiny of expert testimony. After then examining a particular controversy arising recently in asbestos litigation, the article ultimately suggests a

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standard and method of analysis that may best comport with the greater scheme underlying the Federal Rules of Evidence.

By way of explanation, one "liberal" line of cases holds that expert opinion testimony is admissible if the expert is generally qualified in his field, if there is some factual basis for his opinion, and if the facts or data underlying his methodology meet a threshold criterion of reliability.¹ Another "restrictive" line of cases stands for the proposition that trial judges should proceed further and independently scrutinize the quality and appropriateness of the expert's data, methodology, and conclusions to determine whether these are actually reliable.²

Although such case law, for the most part, deals with the standard to be applied to the admissibility of testimony by experts regarding causation in fact in the toxic tort setting, courts face the same question of how strictly to scrutinize an expert's methodology and underlying data in respect to a variety of issues. Increasingly, expert economic testimony has been called upon in attempting to resolve liability issues in complex tort cases involving massive environmental and personal injuries. In particular, courts and litigants have relied upon market share analyses in seeking to apportion responsibility. This approach is most closely associated with the so-called "DES" litigation, but has also recently appeared in asbestos litigation, which currently commands unparalleled attention upon the dockets of federal and state courts across the nation.

After examining one court's evaluation of proffered market share testimony in asbestos litigation, this article ultimately concludes that the liberal approach to the level of judicial scrutiny comports with the spirit of the Federal Rules of Evidence and ensures greater consistency and scrutability of judicial analysis on the issue of admissibility. While perhaps posing more of an intellectual challenge for courts, the restrictive approach has engendered a hodgepodge of standards that often reduce to a substitution of the court's judgment on sci-

1. See *infra* notes 18-114 and accompanying text.

2. See *infra* notes 115-63.

entific or technical matters for that of the expert. Accordingly, this article supports that level of scrutiny whereby proffered expert testimony is presumed admissible, pursuant to Rules 702 and 703 of the Federal Rules of Evidence, if the expert witness is generally qualified in his field, if his opinion testimony derives from his specific field of expertise, if there is some factual basis for the testimony, and if the underlying data are of a type reasonably relied upon by experts in the particular field.³

Yet this article argues that satisfaction of the liberal standard results only in a rebuttable presumption, and not a guarantee, of admissibility of the challenged evidence. This presumption may be overcome upon demonstrating, under Rule 403, that the probative value of the proposed testimony is "substantially outweighed" by the danger of confusion of the issues or misleading the jury.⁴ This danger must permeate the proffered evidence and inhere in misleading or flawed assumptions that systematically favor a particular result and that are substantially likely to thwart the jury's understanding or determination of a fact in issue. However, the balance under Rule 403 should be struck in favor of admission.⁵

Consequently, the standard proposed in this article is, in effect, an intermediate standard because it does entail a second level of scrutiny of proffered expert testimony. However, the ability ultimately to exclude such evidence is limited. Unlike the restrictive approach, this independent judicial examination occurs in the context of the Rule 403 standard, and does not gauge reliability under Rule 703. Accordingly, under this intermediate standard, expert testimony that satisfies the liberal interpretation of Rule 703 and, when viewed as a system of assumptions, is not substantially likely to confuse the issues or mislead the jury, will be admitted, even if such testimony does not fulfill the court's particular standard of reliability.

3. See FED. R. EVID. 702 & 703. As will be shown, it is the expert himself who may be in the best position to make the latter determination.

4. See FED. R. EVID. 403.

5. See *United States v. Finestone*, 816 F.2d 583, 585 (11th Cir. 1987).

II. Overview of Judicial Approaches to Expert Testimony

Federal Rule of Evidence 703 provides that:

[t]he facts or data in the particular case upon which an expert bases an opinion or inference may be those perceived by or made known to the expert at or before the hearing. If of a type reasonably relied upon by experts in the particular field in forming opinions or inferences upon the subject, the facts or data need not be admissible in evidence.⁶

The facts or data relied upon by experts under Rule 703 may be derived from three possible sources. First, an expert may base his opinion on firsthand observation. The treating physician is the paradigmatic expert illustrating reliance upon firsthand information.⁷ Second, a source of expert opinion may be the evidentiary presentation at trial. "The technique may be the familiar hypothetical question or having the expert attend the trial and hear the testimony establishing the facts. Problems of determining what testimony the expert relied upon, when the latter technique is employed and the testimony is in conflict, may be resolved by resort to [Federal Rule of Evidence] 705."⁸ Third, data reviewed by the expert outside of court and acquired other than by his own perception may also be relied upon by an expert.

6. FED. R. EVID. 703.

7. See Paul D. Rheingold, *The Basis of Medical Testimony*, 15 VAND. L. REV. 473, 489 (1962). Whether such an expert must first relate his observations is treated in Federal Rule of Evidence 705, which provides that "[t]he expert may testify in terms of opinion or inference and give reasons therefor without prior disclosure of the underlying facts or data, unless the court requires otherwise. The expert may in any event be required to disclose the underlying facts or data on cross-examination." FED. R. EVID. 705.

8. FED. R. EVID. 703 advisory committee's note, 56 F.R.D. 183, 283. Under common law tradition, the bases of an expert's opinion were restricted to these two sources, personal knowledge or knowledge gained at trial. These common law bases remain permissible under Rule 703, but this Rule adds the third source: data reviewed by the expert outside of court, and acquired other than by his own perception. See generally 3 JACK B. WEINSTEIN & MARGARET A. BERGER, WEINSTEIN'S EVIDENCE ¶ 703[01], at 703-04 (1991); *Zenith Radio Corp. v. Matsushita Elec. Indus. Co.*, 505 F. Supp. 1313, 1322 (E.D. Pa. 1981).

This article will concern the third source of the data underlying expert testimony. "In this respect the rule is designed to broaden the basis for expert opinions beyond that current in many jurisdictions and to bring the judicial practice into line with the practice of the experts themselves when not in court."⁹ It is clear that Rule 703 "allows an expert to base his opinion on information made known to him outside the court and obtained through other than his own perception, whether admissible or not."¹⁰

9. FED. R. EVID. 703 advisory committee's note, 56 F.R.D. 183, 283:

Thus a physician in his own practice bases his diagnosis on information from numerous sources and of considerable variety, including statements by patients and relatives, reports and opinions from nurses, technicians and other doctors, hospital records, and X rays. Most of them are admissible in evidence, but only with the expenditure of substantial time in producing and examining various authenticating witnesses. The physician makes life-and-death decisions in reliance upon them. His validation, expertly performed and subject to cross-examination, ought to suffice for judicial purposes.

Id.; Rheingold, *supra* note 7, at 531; EDWARD W. CLEARY ET AL., MCCORMICK ON EVIDENCE § 15 (3d ed. 1984)[hereinafter CLEARY].

10. See PAUL LIACOS, HANDBOOK OF MASSACHUSETTS EVIDENCE 125 (5th ed. 1981). The prescription of Rule 703 "grew out of an exception to the hearsay rule which had been employed in a number of jurisdictions." *Zenith Radio Corp.*, 505 F. Supp. 1313, 1322 (E.D. Pa. 1981)(quoting *United States v. Williams*, 447 F.2d 1285, 1290 (5th Cir. 1971), *cert. denied*, 405 U.S. 954 (1972)):

Expert witness testimony is a widely recognized exception to the rule against hearsay testimony. It has long been the rule of evidence in the federal courts that an expert witness can express an opinion as to value even though his opinion is based in part or solely upon hearsay sources The rationale for this exception to the rule against hearsay is that the expert, because of his professional knowledge and ability, is competent to judge for himself the reliability of the records and statements on which he bases his expert opinion. Moreover, the opinion of expert witnesses must invariably rest, at least in part, upon sources that can never be proven in court. An expert's opinion is derived not only from records and data, but from education and from a lifetime of experience. Thus, when the expert witness has consulted numerous sources, and uses that information, together with his own professional knowledge and experience, to arrive at his opinion, that opinion is regarded as evidence in its own right and not as hearsay in disguise.

Id.; see also *United States v. Aluminum Co. of Am.*, 35 F. Supp. 820, 823 (S.D.N.Y. 1940); *G. & C. Merriam Co. v. Syndicate Pub. Co.*, 207 F. 515, 518 (2d Cir. 1913); see generally *Birdsell v. United States*, 346 F.2d 775 (5th Cir. 1965), *cert. denied*, 382 U.S. 963 (1965); *Jenkins v. United States*, 307 F.2d 637 (D.C. Cir. 1962) (hearsay exception permitting physician to testify based in part upon information received from nurses, patients, and various medical specialists); *United States v. 1,516.90 Acres of Land*, 405 F.2d 913 (6th Cir. 1968), *cert. denied*, 395 U.S. 909 (1969); *United*

A. Determinations of Causation in Fact in Toxic Tort Cases

The split in authority over what standard should be applied by courts in evaluating the admissibility of proffered expert testimony under Rule 703 has been most pronounced when such testimony has concerned causation in fact in cases involving injuries allegedly caused by toxic chemicals and substances. Because scientific research with respect to any particular toxic substance is often spurred by, hence subsequent to, the first attempts at litigation, scientific opinions at such early stages are often amorphous and unresolved, sometimes ill-researched and occasionally tailored to the needs of the paying client.¹¹ Consequently, some courts have reasonably felt the burden of examining proposed scientific testimony to ensure that juries will be presented only with reliable evidence.

On the other hand, other courts have recognized that, when questions regarding the injurious consequences of toxic substances stand at the frontier of current medical and epidemiological inquiry, experts who are willing to do so should be allowed to testify regarding their opinions on the links between such substances and particular diseases, and it is for the jury to decide whether to credit such testimony. That another jury might reach the opposite conclusion or that science would require more evidence before conclusively considering the causation question resolved has been considered by such courts irrelevant to the issue of legal sufficiency.

Thus, while it is hornbook law that it is the role of the court to determine whether expert testimony has a sufficient foundation,¹² this role is counterbalanced by the principle that

States v. 60.14 Acres of Land, 362 F.2d 660 (3d Cir. 1966) (hearsay information involving land valuation based upon comparable sales); *Standard Oil Co. v. Moore*, 251 F.2d 188 (9th Cir. 1957), *cert. denied*, 356 U.S. 975 (1958) (expert testimony on valuation of businesses based upon diverse background sources, including accounting data).

11. See generally Paul C. Giannelli, *The Admissibility of Novel Scientific Evidence: Frye v. U.S., A Half-Century Later*, 80 COL. L. REV. 1197 (1980)[hereinafter *Novel Scientific Evidence*].

12. See generally *In re Japanese Elec. Prod. Antitrust Litig.*, 723 F.2d 238, 275-78 (3d Cir. 1983), *rev'd on other grounds*, 475 U.S. 574 (1986); *McKiernan v. Caldor, Inc.*, 438 A.2d 865 (Conn. 1981); *Moore, Kelly & Reddish, Inc. v. Shannondale, Inc.*, 165 S.E.2d 113 (W. Va. 1968); *Housman v. Fiddymont*, 421 S.W.2d 284 (Mo. 1967);

"a court should accord 'proper deference to the jury's role as the arbiter of disputes between conflicting opinions.'"¹³

In his opinion in *Agent Orange*,¹⁴ Judge Jack B. Weinstein explained the resulting divergent approaches to Rule 703:

[T]he courts have adopted two general approaches [in determining] the adequacy and reliability of the basis and sources of an expert's opinion [under] . . . Rule 703: one restrictive, one liberal The more restrictive view requires the trial court to determine not only whether the data are of a type reasonably relied upon by experts in the field, but also whether the underlying data are untrustworthy for hearsay or other reasons. The more liberal view allows the expert to base an opinion on data of the type reasonably relied upon by experts in the field without separately determining the trustworthiness of the particular data involved.¹⁵

The liberal approach discussed by Judge Weinstein rests principally upon the conviction that "[p]ublic policy dictates that both science and law strive to recognize the causal nexus

Allan H. McCoid, *Opinion Evidence and Expert Witnesses*, 2 U.C.L.A. L. REV. 356, 362-63 (1955).

13. *Christophersen v. Allied Signal Corp.*, 902 F.2d 362, 364-65 (5th Cir. 1990) (quoting *Viterbo v. Dow Chem. Co.*, 826 F.2d 420, 422 (5th Cir. 1987)) [hereinafter *Christophersen I*].

14. The *Agent Orange* controversy resulted in voluminous litigation which was litigated before Judge Weinstein in the Eastern District of New York. For convenience the cases were consolidated and are all reported under the case name, *In re Agent Orange Product Liability Litigation*. In order to distinguish between cases, this article will refer to them as follows:

Agent Orange I, 597 F. Supp. 740 (E.D.N.Y. 1984)

Agent Orange II, 611 F. Supp. 1221 (E.D.N.Y. 1985)

Agent Orange III, 611 F. Supp. 1223 (E.D.N.Y. 1985)

Agent Orange IV, 611 F. Supp. 1267 (E.D.N.Y. 1985)

Agent Orange V, 611 F. Supp. 1285 (E.D.N.Y. 1985)

Agent Orange VI, 611 F. Supp. 1296 (E.D.N.Y. 1985)

Agent Orange VII, 611 F. Supp. 1396 (E.D.N.Y. 1985)

Agent Orange VIII, 611 F. Supp. 1452 (E.D.N.Y. 1985)

Agent Orange IX, 603 F. Supp. 239 (E.D.N.Y. 1985)

15. *Agent Orange III*, 611 F. Supp. 1223, 1243-44 (E.D.N.Y. 1985), *aff'd*, 818 F.2d 187 (2d Cir. 1987).

between a toxic substance and injury at the earliest possible stage in order to protect the health and well-being of the public at large."¹⁶ The restrictive approach, on the other hand, seeks to filter out and keep away from the jury data determined to be unreliable, but which has the aura of trustworthiness simply because it is offered by an expert. Those courts adopting the restrictive interpretation of Rule 703 have subjected "the assumptions which form the basis for the expert's opinion, as well as the conclusions drawn therefrom . . . , to rigorous examination."¹⁷

1. The Liberal Approach

Three cases are most often cited as illustrative of the liberal approach to deciding the admissibility of expert opinion testimony: *Ferebee v. Chevron Chemical Co.*¹⁸, *Wells v. Ortho Pharmaceutical Corp.*¹⁹, and the first of two decisions by the Court of Appeals for the Fifth Circuit in *Christophersen v. Allied-Signal Corp.*²⁰ In these cases, this evidentiary issue was resolved through examination of the facts or data underlying the proffered expert opinion only to the extent necessary to make a Rule 703 determination on whether they are of the

16. Christopher M. Placitella, *Toxic-Tort Litigation Shapes New Expert-Witness Role*, N.J.L.J., Sept. 20, 1990, at 81 and at 95.

17. *In re Japanese Elec. Prod. Antitrust Litig.*, 723 F.2d 238, 277 (3d Cir. 1983), *rev'd on other grounds*, 475 U.S. 574 (1986)(quoting *Zenith Radio Corp. v. Matsushita Elec. Indus. Co.*, 505 F. Supp. 1313 (E.D. Pa. 1981)). "The restrictive interpretation of Rule 703 is uniformly advocated by industry in an effort to eliminate as many claims as possible and has found acceptance in some courts, particularly in drug cases." Placitella, *supra* note 16, at 93; *see, e.g.*, *Ealy v. Richardson-Merrell, Inc.*, 897 F.2d 1159 (D.C. Cir. 1990); *Brock v. Merrell Dow Pharmaceuticals, Inc.*, 874 F.2d 307 (5th Cir. 1989), *modified*, 884 F.2d 167 (5th Cir. 1989); *Richardson v. Richardson-Merrell, Inc.*, 857 F.2d 823 (D.C. Cir. 1988); *Lynch v. Merrell Nat'l Lab.*, 830 F.2d 1190 (1st Cir. 1987), *aff'g* 646 F. Supp. 856 (D. Mass. 1986); *Turpin v. Merrell Dow Pharmaceuticals, Inc.*, 736 F. Supp. 737 (E.D. Ky. 1990); *Thomas v. Hoffman-La Roche*, 731 F. Supp. 224 (N.D. Miss. 1989); *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 727 F. Supp. 570 (S.D. Cal. 1989); *Hull v. Merrell Dow Pharmaceuticals, Inc.*, 700 F. Supp. 28 (S.D. Fla. 1988); *Agent Orange III*, 611 F. Supp. 1223; *In re Paoli R.R. Yard PCB Litig.*, 706 F. Supp. 358 (E.D. Pa. 1988).

18. 736 F.2d 1529 (D.C. Cir. 1984), *cert. denied*, 469 U.S. 1062 (1984).

19. 788 F.2d 741 (11th Cir. 1986), *cert. denied*, 479 U.S. 950 (1986).

20. 902 F.2d 363 (5th Cir. 1990); *See supra* note 13.

type reasonably relied upon by experts in the field. The analysis of these courts, in following the liberal approach, did not include a separate determination regarding the trustworthiness of the particular data involved, for such an assessment is left for the factfinder. An explication of these cases should clarify the roots, policy considerations, and applications of the liberal approach.

a. *Ferebee v. Chevron Chemical Co.*

In *Ferebee v. Chevron Chemical Co.*, the estate of Richard Ferebee, who had been an agricultural worker, claimed that its decedent had "contracted pulmonary fibrosis as a result of long-term skin exposure to dilute solutions of paraquat, a herbicide distributed in the United States solely by defendant Chevron."²¹ The plaintiff's theory of the case was that Chevron's failure to label paraquat in a manner that adequately informed ultimate users that long-term skin exposure to its product could cause serious lung disease made Chevron strictly liable for the injuries of the decedent.²²

When the jury returned a wrongful death verdict in favor of the plaintiff, Chevron argued on appeal, *inter alia*, that the jury's finding that Richard Ferebee's exposure to paraquat had caused his chronic lung inflammation and death was not supported by sufficient evidence. The District of Columbia Circuit panel rejected Chevron's argument, noting that two expert witnesses had refuted this argument, and that the jury was entitled to believe those experts.²³ This refutation had primarily consisted of the conclusions proffered by the expert witnesses, who were "eminent specialists in pulmonary medicine," that paraquat poisoning was the cause of Ferebee's illness and death.²⁴ In support of his conclusion, one of the experts had further identified three other cases he felt were similar to that of the decedent.²⁵

21. *Ferebee*, 736 F.2d at 1531-32.

22. *Id.* at 1532-33.

23. *Id.* at 1535.

24. *Id.*

25. *Id.*

At trial Chevron had introduced its own experts, who stated that Ferebee's illness had not been caused by paraquat. Nevertheless, according to the District of Columbia Circuit, the experts on both sides had relied on essentially the same diagnostic methodology, differing solely on the conclusions they drew.²⁶ The *Ferebee* court stated that "[t]he case was thus a classic battle of the experts, a battle in which the jury must decide the victor."²⁷

Seeking battle on a different field, Chevron asserted the rule that expert opinion testimony must be generally accepted in the scientific community before it can be introduced as evidence. Chevron argued that the views of plaintiffs' experts, while not rejected by the scientific community, were still too novel to be admissible.²⁸

The court in *Ferebee* disagreed, opining that any such argument based on novelty could prevail only if the scientific techniques and methodologies, and not merely the scientific

26. *Id.*

27. *Id.* (citing *Jenkins v. United States*, 307 F.2d 637, 646 (D.C. Cir. 1962)).

28. *Ferebee*, 736 F.2d at 1535. Chevron cited the case of *Reed v. State*, wherein the Maryland Court of Appeals held that, "before a scientific opinion will be received as evidence at trial, the basis of that opinion must be shown to be generally accepted as reliable within the expert's particular field." *Reed*, 391 A.2d 364, 368 (Md. 1968). A special rule for scientific evidence was first applied in *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923), wherein the District of Columbia Circuit Court stated that:

Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone the evidential force of the principle must be recognized, and while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.

Id. at 1014; see generally *Kaminski v. State*, 63 So.2d 339, 340 (Fla. 1952); *Boeche v. State*, 37 N.W.2d 593, 597 (Neb. 1949); *Henderson v. State*, 230 P.2d 495, 502-05 (Okla. Crim. App. 1951), *cert. denied*, 342 U.S. 898 (1952). Professor McCormick has detailed the erosion and rejection of the *Frye* standard in his treatise, noting that:

[t]he adoption of the Federal Rules of Evidence has only intensified this process. These rules do not explicitly distinguish between scientific and other forms of expert testimony, and they permit experts to rely on facts or data not otherwise admissible into evidence as long as they are "reasonably relied upon by experts in [the] particular field."

CLEARY, *supra* note 9, § 203, at 607. Professor McCormick concludes that, "[p]lainly, 'reasonable reliance' is not synonymous with general acceptance." *Id.*

opinions and conclusions, were themselves novel. Thus, asserted the court,

a cause-effect relationship need not be clearly established by animal or epidemiological studies before a doctor can testify that, in his opinion, such a relationship exists. As long as the basic methodology employed to reach such a conclusion is sound, such as use of tissue samples, standard tests, and patient examination, products liability law does not preclude recovery until a "statistically significant" number of people have been injured or until science has had the time and resources to complete sophisticated laboratory studies of the chemical.²⁹

The court next set forth its rule that, "[i]n a courtroom, the test for allowing a plaintiff to recover in a tort suit of this type is not scientific certainty but legal sufficiency."³⁰ Thus, in the case before the court, if reasonable jurors *could* have concluded from the expert testimony that paraquat more likely than not caused Ferebee's injury, "the fact that another jury might reach the opposite conclusion or that science would require more evidence before conclusively considering the causation question resolved is irrelevant."³¹

b. *Wells v. Ortho Pharmaceutical Corp.*

In *Wells v. Ortho Pharmaceutical Corp.*,³² the Eleventh Circuit reviewed a \$5.1 million judgment in favor of plaintiffs based on the severe birth defects of plaintiff Katie Wells. These birth defects had allegedly resulted from her mother's use, for approximately four weeks after conception, of a sper-

29. *Ferebee*, 736 F.2d at 1535-36.

30. *Id.* at 1536; see also Troyen A. Brennan, *Helping Courts With Toxic Torts: Some Proposals Regarding Alternative Methods for Presenting and Assessing Scientific Evidence in Common Law Courts*, 51 U. PITT. L. REV. 1, 4 (1989); Troyen A. Brennan & Robert F. Carter, *Legal and Scientific Probability of Causation of Cancer and Other Environmental Disease in Individuals*, 10 J. HEALTH POL. POL'Y & L. 33 (1985).

31. *Ferebee*, 736 F.2d at 1536.

32. *Wells v. Ortho Pharmaceutical Corp.*, 788 F.2d 741 (11th Cir. 1986), cert. denied, 479 U.S. 950 (1986).

micidal jelly manufactured by defendant Ortho.³³

On appeal, Ortho argued that the "plaintiffs had failed to prove causation to a reasonable degree of medical certainty."³⁴ Ortho contended that the scientific and medical studies introduced by the plaintiff were inconclusive, and that the oral testimony of the plaintiffs' experts was not based on opinions with scientifically reliable foundations.³⁵

The *Wells* court rejected Ortho's appellate contentions, referring to the several epidemiological studies presented by the plaintiffs "that indicated an association between spermicide use and deleterious effects on the fetus."³⁶ The court stated that, although the district court had indeed found the various studies presented by each side to be inconclusive, a clear causal relationship need not be established as a requisite to the admissibility of expert opinion that such a relationship exists.³⁷ Instead, the court relied upon *Ferebee* in labeling the conflicts in the studies presented by each side a "'battle of the experts.'"³⁸

The *Wells* court concluded that the plaintiffs' burden on the issue of causation "'did not necessarily require them to produce scientific studies showing a statistically significant association between spermicide and congenital malformations in a large population.'"³⁹ Rather, "a distinction exists between legal sufficiency and scientific certainty . . ."⁴⁰ "[I]t does not

33. *Id.* at 742-43. This case was tried by the district court after the parties waived a jury. *Id.* at 743. Consequently, in the appeal, the Court of Appeals for the Eleventh Circuit examined the district court's factual findings under the clearly erroneous standard. *Id.*; see FED. R. Civ. P. 52(a); *Anderson v. City of Bessemer City*, 470 U.S. 564, 572 (1985); *Zenith Radio Corp. v. Hazeltine Research, Inc.*, 395 U.S. 100 (1969).

34. *Wells*, 788 F.2d at 743 (citing *Robinson v. Emory Univ. Hosp.*, 611 F.2d 604, 608 n.13 (5th Cir. 1980); *Parrott v. Chatham County Hosp. Auth.*, 243 S.E.2d 269, 270 (Ga. App. 1978)).

35. *Wells*, 788 F.2d at 744.

36. *Id.*

37. *Id.* at 745 (quoting *Ferebee v. Chevron Chem. Co.*, 736 F.2d 1529, 1535-36 (D.C. Cir. 1984)).

38. *Id.* (quoting *Ferebee*, 736 F.2d at 1535).

39. *Id.* at 745 (quoting the district court opinion, *Wells v. Ortho Pharmaceutical Corp.*, 615 F. Supp. 262, 292 (N.D. Ga. 1985)).

40. *Id.* (citing *Ferebee*, 736 F.2d at 1536).

matter in terms of deciding the case that the medical community might require more research and evidence before conclusively resolving the question. What matters is that this particular factfinder found sufficient evidence of causation in a legal sense in this particular case, and that that finding is not clearly erroneous."⁴¹

c. *Christophersen v. Allied-Signal Corp.*

In perhaps the most salient explication of the liberal approach, the Court of Appeals for the Fifth Circuit, in its first decision in the case of *Christophersen v. Allied-Signal Corp.*,⁴² set forth certain policy considerations underlying that approach. A detailed review of the *Christophersen* case may further reveal, in practical terms, the way in which the liberal and restrictive approaches conflict, for in that case the Court of Appeals analyzed and, upon its initial review, overturned the restrictive scrutiny practiced by the district court.

In *Christophersen*, the decedent, Albert Roy Christophersen, had worked for the Marathon Manufacturing Company at its plant in Waco, Texas, where the company produced nickel/cadmium batteries. Although he was never directly involved in the production of these batteries, Christophersen was required by the job to visit that part of the plant in which the batteries were manufactured. During these visits, Christophersen was exposed to the fumes containing particles of nickel and cadmium that were spewed in the manufacturing process.⁴³

In their complaint, the plaintiffs alleged that the decedent's exposure to these fumes caused the cancer that led to his death. When the defendants moved for summary judg-

41. *Id.* Perhaps in circumlocutious fashion, the Eleventh Circuit, as well as the district court, stated in *Wells* that the standard of legal sufficiency is met when the plaintiff has shown causation to a reasonable degree of medical certainty. *Id.* (citing *Wells*, 615 F. Supp. at 295); see *Parrott v. Chatham County Hosp. Auth.*, 243 S.E.2d 269, 271 (Ga. App. 1978); *Robertson v. Emory Univ. Hosp.*, 611 F.2d 604, 608 n.13 (5th Cir. 1980); *Watson v. United States*, 346 F.2d 52, 54 (5th Cir. 1965), *cert. denied*, 382 U.S. 976 (1966).

42. *Christophersen I*, *supra* note 13.

43. *Id.* at 363.

ment, the district court examined the proposed testimony of the plaintiffs' expert witness, Dr. Lawrence Miller, who had concluded that Christophersen's exposure to nickel and cadmium at Marathon caused his disease and death. Evidently an adherent of the restrictive approach to the evaluation of proposed expert testimony, the district court "undertook an in-depth review of the bases for [the expert's] conclusion and determined that his opinion should be excluded."⁴⁴ The district court based its decision to exclude the causation evidence on its determination that Dr. Miller's conclusion was unreliable.⁴⁵

i. The First *Christophersen* Opinion

In its first review of the district court's ruling, the Fifth Circuit Court in *Christophersen I* sought to determine whether such ruling had been manifestly erroneous.⁴⁶ Guiding the court's review regarding the admissibility of expert testimony, however, was its commitment to the principle that a court should accord "'proper deference to the jury's role as the arbiter of disputes between conflicting opinions. As a general rule, questions relating to the bases and sources of an expert's opinion affect the weight to be assigned that opinion rather than its admissibility and should be left for the jury's consideration.'"⁴⁷ Thus, stated the *Christophersen I* panel, "a court should exclude an expert opinion only if it is 'fundamentally unsupported' and 'would not actually assist the jury in arriving at an intelligent and sound verdict.'"⁴⁸

The court in *Christophersen I* then proceeded to examine the proffered expert testimony, as well as the district court's method of analysis leading to the exclusion of such testimony. The court first noted that, in an affidavit submitted to the

44. *Id.* at 364.

45. *Id.*

46. *Id.*; see *Washington v. Armstrong World Indus.*, 839 F.2d 1121, 1122 (5th Cir. 1988); *Viterbo v. Dow Chem. Co.*, 826 F.2d 420, 422 (5th Cir. 1987).

47. *Christophersen I*, *supra* note 13, at 364 (quoting *Viterbo*, 826 F.2d at 422); see also *Dixon v. International Harvester Co.*, 754 F.2d 573, 580 (5th Cir. 1985) (noting that once a witness is "properly admitted as an expert, the jury [is] at liberty to accept or reject his testimony, and to judge his credibility").

48. *Christophersen I*, *supra* note 13, at 364 (quoting *Viterbo*, 826 F.2d at 422).

district court, Dr. Miller had reached the following conclusion:

Based upon my review of the medical records, research literature, my education and experience, it is my opinion that, more likely than not, the metastatic cancer which caused the death of Mr. Christophersen was caused by his exposure to toxic nickel and cadmium fumes during his lifetime. I have reached this opinion after conducting extensive research and investigation into this matter and my opinion is based upon reasonable medical probability.⁴⁹

The Fifth Circuit next noted that the district court, in its memorandum opinion, had focused its analysis on three types of information that Dr. Miller had relied on in forming his conclusions. The first of these was evidence of exposure. Most of the information that Dr. Miller had received regarding Christophersen's exposure to nickel and cadmium came from the affidavit of a former employee at Marathon's Waco plant. This affidavit indicated that over a fourteen-year period Christophersen's duties required him regularly to visit areas of the Marathon plant in which he was exposed to " 'many fumes and gases,' including 'airborne particles of cadmium and nickel alloys.' " ⁵⁰ Dr. Miller had relied on these statements and other information from plaintiffs' counsel in concluding that Christophersen's employment history at Marathon " 'included extensive exposure to nickel and cadmium fumes.' " ⁵¹

The district court, however, closely scrutinized Dr. Miller's analysis, and "took issue with [his] conclusion," ⁵² "primarily because there was no indication of the chemical composition of the fumes in the plant or the level of exposure." ⁵³ Accordingly, the district court found that " 'Dr. Miller

49. *Id.* at 365.

50. *Id.* (quoting affidavit of Edgar G. Manoliu, a former employee at Marathon's Waco plant).

51. *Id.* (quoting affidavit submitted to the district court by Dr. Lawrence Miller).

52. *Id.*

53. *Id.*

could not base a reliable opinion solely upon the information provided in the [former employee's] affidavit.'"⁵⁴

The Fifth Circuit agreed that "evidence concerning the chemical composition of the fumes in the Marathon plant and the level of exposure would [have been] helpful,"⁵⁵ but held that the district court had erred in determining that "the absence of such information rendered Dr. Miller's opinion unreliable."⁵⁶ The court stated that the expert "was entitled to rely on the information provided him in formulating his opinions . . . , and he apparently determined that the information was sufficient to allow him to make a finding."⁵⁷ The *Christophersen I* court continued that, at trial, the defendants would be able to "challenge the factual basis for Dr. Miller's conclusions and argue that additional information was necessary in order to make an accurate finding on causation, but these arguments go to the weight to be accorded Dr. Miller's opinion and not to its admissibility."⁵⁸

The second type of information that the expert relied on in forming his conclusions was the "pathogenesis of small cell carcinoma."⁵⁹ "Christophersen's medical and autopsy records indicat[ed] that he [had] died as the result of small cell carcinoma of the colon that metastasized to his liver."⁶⁰ "In his deposition, Dr. Miller [had] testified that small cell carcinoma is an unusual form of cancer that has been linked to changes in the genetic material in cells caused by exposure to toxic substances."⁶¹ "When these altered cells replicate, the resulting or daughter cells may retain the genetic alteration and become cancerous."⁶² Dr. Miller had indicated an association between that small cell carcinoma in the lung and nickel and

54. *Id.*

55. *Id.*

56. *Id.*

57. *Id.*; see *Peteet v. Dow Chem. Co.*, 868 F.2d 1428, 1432 (5th Cir. 1989), *cert. denied*, 493 U.S. 935 (1989).

58. *Christophersen I*, *supra* note 13, at 365.

59. *Id.*

60. *Id.*

61. *Id.*

62. *Id.*

cadmium exposure.⁶³ He had further suggested that, “[b]ased on what’s known about the biochemical nature of small-cell carcinoma, ‘the same sorts of chemicals and exposures that are associated with small-cell carcinoma of the lung are likely to be associated with small-cell carcinoma elsewhere in the body.’ ”⁶⁴

“The district court again took issue with the basis of Dr. Miller’s analysis,”⁶⁵ and stated that he had “‘present[ed] no authority for his opinion that a primary small cell cancer of the colon has the same pathogenesis as a primary small cell cancer of the lung simply because their appearance is similar.’ ”⁶⁶ The Fifth Circuit found that such characterization of the testimony distorted Dr. Miller’s analysis, and that the expert had in fact engaged in a “more sophisticated line of reasoning.”⁶⁷

The Fifth Circuit Court of Appeals did acknowledge that the record contained the affidavits of several physicians who were critical of Dr. Miller’s conclusions.⁶⁸ These “affidavits primarily address[ed] the need for epidemiological and animal studies specifically linking nickel and cadmium exposure to colon cancer.”⁶⁹ One defense expert concluded, for instance, that “‘Dr. Miller’s presumption that nickel and cadmium have been associated with a certain type of cell in lung cancer and therefore should be associated with a similar type of cell in the colon has no support in medical science and is without foundation.’ ”⁷⁰ Another expert had opined that Dr. Miller’s analysis was “‘without basis in fact and has no scientific merit.’ ”⁷¹

Nevertheless, the Fifth Circuit stated that such competing expert testimony “create[d] at best a conflict between ex-

63. *Id.*

64. *Id.* at 366.

65. *Id.*

66. *Id.*

67. *Id.*

68. *Id.*

69. *Id.*

70. *Id.* (quoting the affidavit of Dr. Sherwood Gorbach).

71. *Id.* (quoting the affidavit of Dr. Richard Rudders).

perts.”⁷² The *Christophersen I* court then rebuked the district court for having relied upon the “conclusory statements” of the defense experts and upon “its own interpretation of the testimony” in calling Dr. Miller’s analysis “‘not scientifically correct.’”⁷³ In a revealing assessment, the appellate panel concluded that, “[i]n so holding, the court, on the basis of affidavits and thus without the benefit of development of the opinions through cross-examination, simply chose sides in this battle of the experts and thereby usurped the role of the jury in evaluating the evidence and the credibility of expert witnesses.”⁷⁴

The third and final type of information that the expert relied on in forming his conclusions was the medical literature. Relying upon the affidavits submitted by the defense experts, “the district court [had] concluded that Dr. Miller’s opinion was inadmissible because it was not based on epidemiological, animal, or in vitro studies showing a statistically significant link between colon cancer and exposure to nickel and/or cadmium.”⁷⁵

While conceding “that he was not aware of any articles or studies specifically linking nickel and cadmium exposure to small cell cancer of the colon,”⁷⁶ Dr. Miller nevertheless had stated that, “based upon a more likely than not standard, he could conclude”⁷⁷ from the state of medical knowledge “that Christophersen’s exposure to nickel and cadmium at Marathon [had] caused his cancer.”⁷⁸ “In support of his conclusions, Dr. Miller noted that nickel and cadmium are known to be carcinogenic in humans.”⁷⁹ He further took “into consideration the duration of Christophersen’s exposure to nickel and cadmium,”⁸⁰ as well as “the absence of evidence of exposure

72. *Id.*

73. *Id.*

74. *Id.*

75. *Id.*

76. *Id.* at 366-67.

77. *Id.*

78. *Id.*

79. *Id.* at 367.

80. *Id.*

to other potentially carcinogenic substances such as asbestos or alcohol.”⁸¹

The *Christophersen I* court asserted that Dr. Miller’s analysis had incorporated “methodologies that physicians traditionally rely on in diagnosing the cause of a particular patient’s cancer.”⁸² According to the Fifth Circuit, the district court “should have permitted plaintiffs to present their causation evidence to the jury, which could then ‘determine the appropriate weight to be given to the testimony.’”⁸³ The court noted that it is not necessary that “the proof or expert testimony concerning causation in toxic tort cases be supported by epidemiological studies establishing a cause-effect relationship.”⁸⁴

The court in *Christophersen I* remarked that a toxic tort plaintiff is not limited to any one method for establishing causation. It restated the ruling in *Ferebee* that “the test for allowing a plaintiff to recover in a tort suit . . . is not scientific certainty but legal sufficiency.”⁸⁵ The court additionally stated that it was simply applying its own traditional position that “[a]n expert’s opinion need not be generally accepted in the scientific community before it can be sufficiently reliable

81. *Id.*

82. *Id.* (citing *Osburn v. Anchor Lab., Inc.*, 825 F.2d 908, 915-16 (5th Cir. 1987), *cert. denied*, 485 U.S. 1009 (1988)).

83. *Id.* at 367 (quoting *In re Japanese Elec. Prods. Antitrust Litig.*, 723 F.2d 238, 278 (3d Cir. 1983), *rev’d in part on other grounds*, 475 U.S. 574 (1986); *Osburn*, 825 F.2d at 915 (holding that “medical expert opinion testimony that is controversial in its conclusions can support a jury finding of causation as long as the doctor’s conclusory opinion is based upon well-founded methodologies”)).

84. *Christophersen I*, *supra* note 13, at 367 (citing *City of Greenville v. W.R. Grace & Co.*, 827 F.2d 975, 980 n.2 (4th Cir. 1987); *Wells v. Ortho Pharmaceutical Corp.*, 788 F.2d 741, 745 (11th Cir. 1986), *cert. denied*, 479 U.S. 950 (1986); *Ferebee v. Chevron Chem. Co.*, 736 F.2d 1529, 1535-36 (D.C. Cir. 1984), *cert. denied*, 469 U.S. 1062 (1984)). The *Christophersen I* Court then noted that “the exception from this rule is this court’s recent holding that absent statistically significant epidemiological proof that the drug Bendectin is a human teratogen, a plaintiff’s proof that the drug caused her child’s birth defects was insufficient.” 902 F.2d at 367 (citing *Brock v. Merrell Dow Pharmaceuticals, Inc.*, 874 F.2d 307 (5th Cir. 1989), *modified*, 884 F.2d 166 (5th Cir. 1989), *cert. denied* 494 U.S. 1046 (1990)). The *Brock* Court, however, specifically declined to hold that “epidemiologic proof is a necessary element in all toxic tort cases.” 874 F.2d at 313.

85. *Christophersen I supra* note 13, at 367 (citing *Ferebee*, 736 F.2d at 1536).

and probative' to be submitted to the jury and perhaps support a jury finding."⁸⁶

In conclusion, the *Christophersen I* court held, at least initially, that Dr. Miller's analysis had not been "so 'fundamentally unsupported' that [it] would be of no assistance to the jury in reaching a verdict."⁸⁷ The questions "defendants raise concerning the bases for the conclusions are issues properly presented to and considered by the jury, but they do not render the opinion unreliable and therefore inadmissible."⁸⁸

ii. Opinion of the En Banc Panel

The Fifth Circuit in *Christophersen II* subsequently granted defendants' petition for rehearing en banc.⁸⁹ The court reiterated that "a trial court's ruling regarding admissibility of expert testimony is 'protected by an ambit of discretion and must be sustained unless manifestly erroneous.'"⁹⁰ In its effort to guide district courts in their approach to proffered expert testimony, the court set forth a four step analysis to be followed.⁹¹

First, the court must determine "whether the witness is qualified to express an expert opinion"⁹² pursuant to Federal Rule of Evidence 702. Second, a Rule 703 inquiry must focus upon whether the facts relied upon are of "the same type as those relied upon by other experts in the field."⁹³ Third, under *Frye v. United States*,⁹⁴ the court must determine whether the expert, in reaching his conclusion, used a "well-founded methodology."⁹⁵ And fourth, assuming that the expert's testimony has passed muster under the Rule 702, Rule

86. *Id.* (quoting *Osburn*, 825 F.2d at 915).

87. *Id.*, 902 F.2d at 367.

88. *Id.*

89. *Christophersen v. Allied-Signal Corp.*, 939 F.2d 1106, 1109 (5th Cir. 1991) [hereinafter *Christophersen II*].

90. *Id.*

91. *Id.* at 1110.

92. *Id.*

93. *Id.*

94. 293 F. 1013 (D.C. Cir. 1923).

95. *Id.*

703 and *Frye* tests, it must be determined whether, under Federal Rule of Evidence 403, the proposed "testimony's potential for unfair prejudice substantially outweighs its probative value."⁹⁶

Applying such analysis in review of the district court's exclusion of Dr. Miller's proffered testimony, the court first found that, although certain aspects of this witness's qualifications may have been suspect, this Rule 702 consideration had not been the basis for the district court's disallowance of the testimony.

The *Christophersen II* court did now hold, however, that the district court had not abused its discretion in precluding Dr. Miller's testimony on Rule 703 and *Frye* grounds. The court recollected that, as stated, most of the information that Dr. Miller had received regarding Christophersen's exposure to nickel and cadmium came from the affidavit of a former employee at Marathon's Waco plant.⁹⁷ The court now found reasonable the district court's criticism that this affidavit was "inaccurate and incomplete."⁹⁸ "Particularly telling," said the court, was the affiant's concession "that he did not know the chemical composition of the fumes [or] the mix of chemicals in the impregnation and soak tanks."⁹⁹

The court further stated that Dr. Miller had not always relied upon the accurate data contained in the affidavit.¹⁰⁰ For instance, while the affidavit had correctly indicated that Christophersen worked at the Waco plant for fourteen years before his death, Dr. Miller based his opinion on the assumption of a twenty-year work period.¹⁰¹

Further, in respect to the *Frye* inquiry, the court noted that Dr. Miller had stated that "the kinds of evidence most often used to establish causation are human epidemiological studies, live animal testing, and *in vitro* testing."¹⁰² The court

96. *Christophersen II*, *supra* note 89, at 1110.

97. *Id.* at 1113.

98. *Id.*

99. *Id.*

100. *Id.*

101. *Id.*

102. *Id.* at 1115.

held the district court to have been within its discretion in finding it to be improperly inconsistent "for Dr. Miller, on the one hand, to conclude that these are the main methodologies and, on the other hand, to concede that he did not effectively rely on any of them."¹⁰³ Instead, Dr. Miller had opined that "the same sorts of chemicals and exposures . . . associated with small-cell carcinoma of the lung are likely to be associated with small-cell carcinoma elsewhere in the body."¹⁰⁴

The *Christophersen II* en banc panel did not explicitly vitiate its language in the *Christophersen I* opinion that a trial court must not simply choose sides in the battle of the experts and thereby usurp the role of the jury in evaluating the evidence and the credibility of expert witnesses. However, it did appear to credit the district court's preference for the conclusion of the defense expert, Dr. Sherwood Gorbach, over that of Dr. Miller. Dr. Gorbach had opined that "'Dr. Miller's presumption that nickel and cadmium have been associated with a certain type of cell in lung cancer and therefore should be associated with a similar type of cell in the colon has no support in medical science and is without foundation.'"¹⁰⁵

In his concurring opinion, Chief Judge Clark stated that both the district court and the en banc majority had incorrectly interpreted and applied Rule 703.¹⁰⁶ He felt, nevertheless, that the district court's exclusion of Dr. Miller's opinion testimony was not manifest error under Rule 403, which allows a court to exclude relevant evidence when "'its probative value is substantially outweighed by the danger of unfair prejudice.'"¹⁰⁷ Chief Judge Clark stressed that "Rule 703 does not authorize a court to approve or disapprove the expert's conclusion."¹⁰⁸ Because the district court had attempted to determine whether experts in the field of cancer research would have reasonably relied on the *particular* facts and data used by Dr. Miller, Clark found its Rule 703 analysis im-

103. *Id.*

104. *Id.* (quoting *Christophersen I*, *supra* note 13, at 365-66).

105. *Christophersen I*, *supra* note 13 at 366.

106. *Christophersen II*, *supra* note 89, at 1117.

107. *Id.* at 1120.

108. *Id.* at 1118.

proper.¹⁰⁹ "Rule 703 only asks the court to determine whether experts in the field of cancer research would have reasonably relied on facts or data of this 'type' in forming opinions or inferences 'upon the subject' of cancer causation."¹¹⁰

In dissent, Circuit Judge Reavley, joined by Circuit Judges King, Johnson and Wiener, harked back to the first Fifth Circuit opinion in *Christophersen I*. Accordingly, Judge Reavley found unacceptable both the en banc majority and concurring analyses. Judge Reavley stated that the majority opinion "effectively allows judges to decide the reliability, weight, and relative merit of expert opinions, at least in toxic tort cases."¹¹¹ He continued that such opinion "confuses the admissibility of evidence with the sufficiency of evidence, changes the rules of evidence without benefit of amendment, denies Mrs. Christophersen her right to trial by jury, and eliminates substantive rights in tort cases where federal courts have only diversity jurisdiction."¹¹²

In respect to Judge Clark's application of Rule 403, the dissent stated that, under such application, "[j]udges may weigh contradictory evidence and exclude *any* proffered evidence considered unreliable. The judge's opinion about the contested evidence determines unreliability. The force of the proffered evidence on the very point at issue becomes the prejudice."¹¹³ Noting that the "unfair prejudice" to which Rule 403 refers is "an undue tendency to suggest decision on an improper basis," the dissent then asked, "[w]hat is the improper basis or prejudice here, unless a judge simply assumes that Dr. Miller is wrong and the defendants' affiants are right? That assumption has not been a predicate in the past for Rule 403 exclusion."¹¹⁴

It seems apparent that the en banc determination in *Christophersen II* has not clarified, but has muddled, any at-

109. *Id.*

110. *Id.* at 1119.

111. *Id.* at 1122.

112. *Id.*

113. *Id.* at 1135.

114. *Id.* (citing *Dollar v. Long Mfg., N.C. Inc.*, 561 F.2d 613, 618 (5th Cir. 1977), *cert. denied*, 435 U.S. 996 (1978)).

tempt at discerning the Fifth Circuit's current interpretation of Rules 703 and 403, and the interrelated application of such Rules. It is apparent that the Circuit is itself deeply divided on the issue of the level and nature of judicial scrutiny of proffered expert testimony that is appropriate under such Rules.

2. The Restrictive Approach

As shown, the opinions of the Fifth Circuit Court of Appeals in *Christophersen I*¹¹⁵ and *Christophersen II*¹¹⁶ reflect the tension existing between the liberal and restrictive approaches. Interestingly, even in its first opinion which adopted the liberal approach under Rule 703, the Fifth Circuit itself, like the district court, had to undertake a somewhat rigorous examination of the proposed expert testimony. Examining Dr. Miller's analysis "of the biochemical reaction that results in the development of small cell carcinoma,"¹¹⁷ the court was able to conclude that "[t]he district court's simplistic characterization has no relevance to this more sophisticated line of reasoning."¹¹⁸ Thus, the *Christophersen I* panel, as well as the dissenting members of the later en banc panel, were able to return to their philosophical theme and conclude that the district court had simply chosen sides in this battle of the experts, and had thereby usurped the role of the jury.¹¹⁹

Plainly, both *Christophersen* cases, especially the first appellate manifestation, reveal one of the dangers inherent in a court's use of the restrictive approach. That is, the possibility that a party will be deprived of critical and proper expert testimony based upon the court's incorrect appraisal or understanding of the expert's methodology. After all, when it comes to the evaluation of scientific testimony, the court will often stand in the shoes of a layperson. Yet the question remains whether appellate review of such potentially flawed as-

115. 902 F.2d 362 (5th Cir. 1990).

116. 939 F.2d 1106 (5th Cir. 1991).

117. *Christophersen I*, *supra* note 13, at 365-66.

118. *Id.* at 366.

119. *Id.* at 366; *Christophersen II*, *supra* note 89, at 1128-29.

assessment is preferable to an outright rejection of rigorous scrutiny.

The restrictive approach, however, does have some positive aspects. The value of this approach can best be understood by examining the views of courts adopting it. The leading opinions advocating and implementing a rigorous judicial scrutiny of proposed expert testimony were those authored by Judge Weinstein in the *Agent Orange* product liability litigation.¹²⁰ The *Agent Orange* lawsuits were brought by Vietnam veterans and members of their families who alleged that the veterans' exposure to Agent Orange, a herbicide manufactured by the defendants, had caused serious health problems.¹²¹ The defendants moved for summary judgment, contending that the plaintiffs could not prove that their injuries had been caused by exposure to Agent Orange.¹²²

The *Agent Orange* court determined that "all reliable studies of the effect of Agent Orange on members of the class so far published provide no support for plaintiffs' claims of causation."¹²³ The court concluded that "[a] number of sound epidemiological studies have been conducted on the health ef-

120. See *supra* note 14; *Agent Orange III*, 611 F. Supp. 1223 (E.D.N.Y. 1985), *aff'd on other grounds*, 818 F.2d 145 (2d Cir. 1987); *Agent Orange IV*, 611 F. Supp. 1267 (E.D.N.Y. 1985), *aff'd on other grounds*, 818 F.2d 187 (2d Cir. 1987), *cert. denied*, 487 U.S. 1234 (1988); *Agent Orange I*, 597 F. Supp. 740 (E.D.N.Y. 1984), *aff'd on other grounds*, 818 F.2d 145 (2d Cir. 1987).

121. Judge Weinstein noted that "[o]ver 2.6 million veterans from the United States, Australia, and New Zealand served in Vietnam during the relevant period The number of persons from that group believed to have had some chance of exposure to Agent Orange has been variously estimated as between 600,000 and 2,400,000." See *Agent Orange I*, 597 F. Supp. 740, at 756. "The class size is far larger since it includes family members of the exposed veterans." *Agent Orange III*, 611 F. Supp. at 1230.

122. See *Agent Orange III*, 611 F. Supp. at 1228-29. Under the Federal Rules of Civil Procedure, a party moving for summary judgment must show "that there is no genuine issue as to any material fact and that the moving party is entitled to a judgment as a matter of law." FED. R. CIV. P. 56(c); see also *Adickes v. S.H. Kress & Co.*, 398 U.S. 144, 157 (1970). The moving party having done so, the burden shifts to the party opposing summary judgment to demonstrate that a genuine issue in respect to a material fact does exist. *United States v. One Tintoretto Painting Entitled "The Holy Family with Saint Catherine and Honored Donor,"* 691 F.2d 603, 606 (2d Cir. 1982).

123. *Agent Orange III*, 611 F.Supp at 1231 (citing *Agent Orange IX*, 603 F. Supp. 239 (E.D.N.Y. 1985)).

fects of exposure to Agent Orange. These are the only useful studies having any bearing on causation. All the other data supplied by the parties rests on surmise and inapposite extrapolation from animal studies and industrial accidents."¹²⁴

Judge Weinstein then set forth his detailed analysis of the proffered evidence on the causation issue.¹²⁵ The evidence included the affidavits of Dr. Barry M. Singer, a physician board certified in internal medicine, hematology (study of blood diseases), and oncology (study of tumors).¹²⁶ These affidavits were accompanied by statements made by 282 individual veteran plaintiffs regarding their exposure to Agent Orange and their illnesses.¹²⁷ In these statements, the veterans alleged that they " 'saw spraying of Agent Orange, entered defoliated areas and consumed local food and water.' "¹²⁸

The veterans' statements then described their diagnosed medical problems and referred to an attached "checklist" of symptoms which they attributed to exposure to Agent Orange in Vietnam.¹²⁹ The *Agent Orange* court stated that "[a] perusal of the checklists reveals that plaintiffs believe they suffer most frequently from 'behavioral' disorders: memory loss, increased irritability, anger and anxiety, insomnia, confusion, depression, and tremors."¹³⁰ The statements submitted by the veteran plaintiffs further described their individual medical history, as well as any tobacco, alcohol or drug use.¹³¹ The plaintiffs also alleged that they had not been exposed to any toxic chemical other than Agent Orange.¹³²

Based on his examination of such statements, and on his review of the literature regarding the biomedical effects of Agent Orange, Dr. Singer analyzed the various ailments suffered by the plaintiffs. He noted at the outset that the princi-

124. *Id.*

125. *Id.* at 1231-39.

126. *Id.* at 1235-38.

127. *Id.* at 1235.

128. *Id.* at 1235.

129. *Id.*

130. *Id.*

131. *Id.*

132. *Id.*

pal chemical agent contained in the Vietnam herbicide Agent Orange, 2,4-D,2,4,5-T and 2,3,7,8 tetrachlorodibenzo-p-dioxin, "are potent and toxic agents *capable of inducing* a wide variety of adverse effects both in animals and in man.'"¹³³ Singer also stated that liver disorders have developed in humans after industrial exposure, and in dogs, rats, mice, and primates after subacute and chronic exposure.¹³⁴ He further relied upon animal and industrial exposure studies in concluding that "elevated cholesterol or triglyceride levels . . . 'are compatible with' exposure to polychlorinated herbicides" such as Agent Orange, and in concluding that "many neurological symptoms complained of by the plaintiffs are 'clearly compatible with' the known effects of dioxin on the human nervous system."¹³⁵

Singer proceeded in a similar manner to link numerous additional symptoms complained of by the veteran plaintiffs to the reported effects of exposure to the herbicide Agent Orange. Ultimately, Singer opined:

'Assuming the truth of the [veterans' statements], and absent any evidence of pre-existing, intervening, or superseding causes for the symptoms and diseases complained of . . . , it is my opinion to a reasonable degree of medical probability (that is, more likely than not) that the medical difficulties described by the affiants were proximately caused by exposure to Agent Orange.'¹³⁶

The court in *Agent Orange* rejected the validity of such proffered expert testimony.¹³⁷ Judge Weinstein had initially noted that only two diseases, chloracne and porphyria, have been recognized by Congress as having a possible connection to Agent Orange exposure, but that the plaintiffs had not established their affliction with such diseases.¹³⁸ Discussing the

133. *Id.* at 1236 (quoting Singer Aff. ¶ 5)(emphasis in original); see also *Agent Orange I*, 597 F. Supp. at 750.

134. *Agent Orange III*, 611 F. Supp. at 1236.

135. *Id.*, 611 F. Supp. at 1236.

136. *Id.* at 1237 (quoting Singer Aff.)(emphasis in original).

137. *Id.* at 1238.

138. *Id.* (citing *Agent Orange I*, 597 F. Supp. 740, 856 (E.D.N.Y. 1984); Veterans Administration, Adjudication of Claims Based on Exposure to Dioxin or Ionizing Ra-

specific analysis of Dr. Singer, Judge Weinstein next noted that "[o]ne need hardly be a doctor of medicine to make the statement that if X is a possible cause of Y, and if there is no other possible cause of Y, X must have caused Y."¹³⁹ The court further asserted that it had "reviewed these and other like studies dealing with animal laboratory studies, industrial accidents, and other products. They suggest that dioxin *may cause* diseases in animals, including man. They are not correlated to those exposed to Agent Orange in Vietnam. At most, they collectively have the probative force of a scintilla of evidence."¹⁴⁰ The court also explained that laboratory animal studies "require making the assumption that chemicals behave similarly in different species."¹⁴¹

Turning to a legal discussion of the standards governing the admissibility of expert opinion, the *Agent Orange* court recognized that, in a mass tort case such as *Agent Orange*, epidemiological studies on causation assume a role of critical importance.¹⁴² The court further acknowledged the widespread approval given by scholars to the growing judicial reliance on such scientific evidence.¹⁴³ This approval appeared consistent with the rule, noted by Judge Weinstein, that doubts about whether proffered expert testimony would be helpful to the trier of fact "should be resolved in favor of

diation, 50 Fed. Reg. 15848, 15849-50 (1985)).

139. *Agent Orange III*, 611 F. Supp. at 1238.

140. *Id.*; see also *Agent Orange I*, 597 F. Supp. at 783 ("This litigation presents quite a different picture from one where long term repeated exposure to a highly toxic substance leads a number of acknowledged experts to state flatly that the exposure caused the disease"); cf. STEPHEN KARNOW, *VIETNAM: A HISTORY* 25 (1983) ("Thousands of soldiers in Vietnam were exposed to Agent Orange, a chemical herbicide, which may have afflicted them with cancer, skin disease, and other disorders").

141. *Agent Orange III*, 611 F. Supp. at 1241 (quoting Khristine L. Hall & Ellen K. Silbergeld, *Reappraising Epidemiology: A Response to Mr. Dore*, 7 HARV. ENVTL. L. REV. 441, 442-43 (1983)).

142. *Agent Orange III*, 611 F. Supp. at 1239-40.

143. *Agent Orange III*, 611 F. Supp. at 1240 (citing Bert Black & David E. Lilienfeld, *Epidemiologic Proof in Toxic Tort Litigation*, 52 FORDHAM L. REVIEW 732 (1984); *Symposium on Science and the Rules of Evidence*, 99 F.R.D. 187 (1983); *Novel Scientific Evidence supra* note 11, at 1197 (1980); Harold L. Korn, *Law, Fact and Science in the Courts*, 66 COLUM. L. REV. 1080 (1966)).

admissibility."¹⁴⁴

Accordingly, Judge Weinstein saw as one principal basis for the liberal attitude towards the admissibility of relevant expert testimony Rule 702 of the Federal Rules of Evidence. Rule 702 provides for opinion testimony by experts "if scientific, technical or other specialized knowledge will assist the trier of fact to determine a fact in issue" and the witness is "qualified as an expert by knowledge, experience, training or education."¹⁴⁵ Thus, stated Judge Weinstein, courts have adopted the liberal attitude embodied in Rule 702, which counsels admissibility whenever the proposed expert testimony would be helpful to the trier.¹⁴⁶

The *Agent Orange* court noted that, until recently, courts had applied the more restrictive *Frye* test of general acceptance in the relevant scientific community.¹⁴⁷ Now, however, the assessment of novel testimony involves a balancing of the relevance, reliability and helpfulness of the evidence against the likelihood of waste of time, confusion and prejudice.¹⁴⁸ Nevertheless, the court stated, "[w]hen either the expert's qualifications or his testimony lie at the periphery of what the scientific community considers acceptable, special care should be exercised in evaluating the reliability and probative worth of the proffered testimony under Rules 703 and 403."¹⁴⁹ The

144. *Agent Orange III*, 611 F. Supp. at 1242 (citing *In re Japanese Elec. Prods. Antitrust Litig.*, 723 F.2d 238, 279 (3d Cir. 1983), *rev'd on other grounds sub nom. Matsushita Elec. Indus. Co. v. Zenith Radio Corp.*, 475 U.S. 574 (1986); *Kline v. Ford Motor Co.*, 523 F.2d 1067, 1070 (9th Cir. 1975)).

145. FED. R. EVID. 702.

146. *Agent Orange III*, 611 F. Supp. at 1242.

147. *Id.*; *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923).

148. *Agent Orange III*, 611 F. Supp. at 1242; *see United States v. Downing*, 753 F.2d 1224 (3d Cir. 1985); *United States v. Williams*, 583 F.2d 1194, 1198 (2d Cir. 1978), *cert. denied*, 439 U.S. 1117, 99 S. Ct. 1025 (1979); *but cf. Lucinda E. Minton, Note, Expert Testimony Based on Novel Scientific Techniques: Admissibility Under the Federal Rules of Evidence*, 48 GEO. WASH. L. REV. 774 (1980) (arguing that modified *Frye* test is preferable to balancing adopted in *Williams*).

149. *Agent Orange III*, 611 F. Supp. at 1242 (citing *Downing*, 753 F.2d at 1239 (qualifications and professional stature of expert as well as non-judicial uses to which the scientific technique is put may constitute circumstantial evidence of the technique's reliability); Peter Huber, *Safety and the Second Best: The Hazards of Public Risk Management in the Courts*, 85 COLUM. L. REV. 277, 333 (1985) ("a Ph.D. can be found to swear to almost any 'expert' proposition, no matter how false or foolish");

court agreed that, under Rule 703, "the assumptions which form the basis for the expert's opinion, as well as the conclusions drawn therefrom, are subject to rigorous examination."¹⁵⁰ "Rigorous examination," is especially important in the mass toxic tort context where presentation to the trier of theories of causation depends almost entirely on expert testimony."¹⁵¹

It was with such propositions as his point of departure that Judge Weinstein embarked upon a rigorous scrutiny of the proposed testimony of Dr. Singer and other experts offered on behalf of the *Agent Orange* plaintiffs. It is significant that Judge Weinstein found that, under Rule 702, Singer's testimony should be admitted. "His general scientific technique . . . of making an inference from epidemiologic data and animal studies . . . has been accepted by a sufficient number of courts to allow judicial notice to be taken of its general acceptance."¹⁵² The court further stated that "[t]he method of drawing inferences employed by Dr. Singer could withstand the flexible approach to Rule 702 admissibility followed in the Second and Third Circuits."¹⁵³

However, for the court in *Agent Orange*, the further screen provided by Rule 703 precluded the admissibility of Dr. Singer's proposed testimony. Specifically, the court found that the statements and "checklists"¹⁵⁴ provided by the veteran plaintiffs and relied upon by Singer "are not material that experts in this field would reasonably rely upon and so

William A. Donaher et. al., *The Technological Expert in Products Liability Litigation*, 52 TEX. L. REV. 1303, 1311-12 (1974)).

150. *Agent Orange III*, 611 F. Supp. at 1244 (quoting *Zenith Radio Corp. v. Matsushita Elec. Indus. Co.*, 505 F. Supp. 1313, 1328 (E.D. Pa. 1981)); see also *Wilder Enter., Inc. v. Allied Artists Pictures Corp.*, 632 F.2d 1135, 1143-44 (4th Cir. 1980); Ronald L. Carlson, *Collision Course in Expert Testimony: Limitations on Affirmative Introduction of Underlying Data*, 36 U. FLA. L. REV. 234, 240-41 & n.26 (1984) (trial court tests appropriateness of expert's reliance upon out-of-court data).

151. *Agent Orange III*, 611 F. Supp. at 1244.

152. *Id.* at 1243 (citing FED. R. EVID. 201; *United States v. Downing*, 753 F.2d 1224, 1237 (3d Cir. 1985)).

153. *Id.* at 1243.

154. *Id.* at 1246.

must be excluded under Rule 703."¹⁵⁵ The *Agent Orange* court stated that it was taking judicial notice, "based on hundreds of trials that no reputable physician relies on hearsay checklists by litigants to reach a conclusion with respect to the cause of their afflictions."¹⁵⁶

Additionally, the court held that Rule 403 also barred the proffered testimony. The court stated that "[a] false aura of scientific infallibility, coupled with low probative value increases resistance to admitting evidence since it multiplies the hazards of misleading a jury."¹⁵⁷ Because "speculation and unfounded assumptions"¹⁵⁸ underlay the proposed testimony of Dr. Singer and similar experts, the probative value of their testimony was reduced "perhaps to the level of the gossamer."¹⁵⁹ Thus, said the court, "[t]here is a strong probability that the doctors' testimony would mislead and confuse at least some members of the jury."¹⁶⁰

Based on such analysis and the exclusion of plaintiffs' proffered expert testimony on the issue of causation, Judge Weinstein ruled that there was no genuine issue of fact in respect to causation¹⁶¹ and, accordingly, granted defendants' motion for summary judgment and dismissed the cases of the *Agent Orange* plaintiffs.¹⁶² His opinions in the *Agent Orange*

155. *Id.*

156. *Id.*; (citing, *United States v. Downing*, 753 F.2d 1224, 1238 n.18 (3d Cir. 1985); *cf. Mannino v. Int'l Mfg. Co.*, 650 F.2d 846, 853 (6th Cir. 1981) (experts often rely on studies, literature and tests in testifying)).

157. *Agent Orange III*, 611 F. Supp. at 1256; *see New York v. Pullman, Inc.*, 662 F.2d 910, 915 (2d Cir. 1981), *cert. denied*, 454 U.S. 1164 (1982); *In re Air Crash Disaster at John F. Kennedy Int'l Airport on June 24, 1975*, 635 F.2d 67, 73 (2d Cir. 1980); *Marx & Co., Inc. v. Diners' Club, Inc.*, 550 F.2d 505, 511-12 (2d Cir.), *cert. denied*, 434 U.S. 861 (1977).

158. *Agent Orange III*, 611 F. Supp. at 1256.

159. *Id.* (quoting *American Bearing Co. Inc. v. Litton Indus.*, 729 F.2d 943, 950 n.14 (3d Cir.), *cert. denied*, 469 U.S. 854 (1984)).

160. *Id.*

161. *Id.* at 1260.

162. *Id.* at 1264; *see also id.* at 1267 (because expert's proposed testimony on causation was excludable under Rule 703, plaintiff widow of Vietnam veteran failed to establish that her husband's exposure to Agent Orange had caused his lymphosarcoma and coronary artery disease and resulting death, and thus summary judgment was granted in favor of defendants); *Agent Orange I*, 597 F. Supp. 740, 782-95 (E.D.N.Y. 1984) (during the settlement phase of the litigation, Judge Weinstein

litigation illustrate the restrictive approach to the admissibility of proposed expert testimony applied by various courts.¹⁶³

B. Admissibility of Expert Economic Testimony

Although the conflict between the liberal and restrictive approaches to the admissibility of proposed expert testimony has been primarily associated with medical issues of causation in the toxic tort setting, this debate has also surfaced, to some extent, in the context of proposed economic testimony. The

examined the problematic methodology and assumptions underlying the expert testimony on causation upon which plaintiffs would have to rely).

163. See *Johnston v. United States*, 597 F. Supp. 374 (D. Kansas 1984):

[w]hen a court of law determines responsibility for human suffering and awards damages, it must do so based upon reasonable evidence, not upon speculation or hypothesis [A]n informed court must guard against using hypotheses for more than what they really are. Speculation is not valid and trustworthy evidence even though that speculation is conservative, and comes from eminent scientists. Lawsuits must be resolved by reasonable conclusions based on the evidence, not by educated guesses.

Id. at 393-94; *Emigh v. Consolidated Rail Corp.* 710 F. Supp. 608 (W.D. Pa. 1989) (adopting the *Agent Orange* independent scrutiny of proffered expert's methodology and factual bases); see also *United States v. Esle*, 743 F.2d 1465, 1474 (11th Cir. 1984) ("Where, as here, the basis of the expert's opinion has been thoroughly impeached, the court, as fact finder, is thus plainly authorized to reject the opinion entirely"); *Barrel of Fun, Inc. v. State Farm Fire & Cas. Co.*, 739 F.2d 1028, 1033 (5th Cir. 1984) ("[w]e hold today that [psychological stress evaluation] evidence, whether in the form of raw data or expert opinion interpreting or extrapolating upon that data, is inherently suspect"); *United States v. Cox*, 696 F.2d 1294, 1297 (11th Cir.), *cert. denied*, 464 U.S. 827 (1983).

It is interesting to note that the Fifth Circuit has seemed in conflict with itself in respect to the level of scrutiny to be applied. Compare *Washington v. Armstrong World Indus.*, 839 F.2d 1121, 1123 (5th Cir. 1988); and *Viterbo v. Dow Chem. Co.*, 826 F.2d 420, 422 (5th Cir. 1987) (allowing independent scrutiny of reliability); with *Christophersen v. Allied-Signal Corp.* I, 902 F.2d 362, 364 (5th Cir. 1990), and *Peteet v. Dow Chemical Co.*, 868 F.2d 1428, 1432 (5th Cir.), *cert. denied*, *Dow Chem. v. Greenhill*, 493 U.S. 935 (1989) (both embracing the liberal approach). Further, the District of Columbia Circuit has also applied a version of the restrictive approach, in *Richardson v. Richardson-Merrell, Inc.*, 857 F.2d 823, 829-32 (D.C. Cir.), *cert. denied*, 493 U.S. 935 (1989). The *Richardson* Court opined that, in making a Rule 703 determination, a court must "look behind [an expert's] ultimate conclusion . . . and analyze the adequacy of its foundation." *Id.* at 829. However, the court held that, because the epidemiological data regarding the drug Bendectin has thus far not concluded that the drug is teratogenic (causing malformation of the fetus), "an opinion refuting this scientific consensus is inadmissible for lack of an adequate foundation." *Ealy v. Richard-Merrill, Inc.*, 897 F.2d 1159, 1162 (D.C. Cir. 1990).

principal case addressing the issue of the proper level of scrutiny required under Rule 703 in respect to intended economic evidence is *In re Japanese Electronic Products Antitrust Litigation*.¹⁶⁴ While dealing with proposed economic testimony in the context of antitrust litigation, *Japanese Antitrust* is analogous to the Fifth Circuit's first opinion in the *Christopher-sen I* case, because in *Japanese Antitrust* the court of appeals also overruled the use of the restrictive approach by the district court.

In the district court, where the case was called *Zenith Radio Corp. v. Matsushita Electronic Industries Co.*,¹⁶⁵ Judge Edward R. Becker had addressed the admissibility of several lengthy reports submitted by plaintiffs' expert witnesses. Judge Becker acknowledged that Rule 703 "permits an expert to base his opinion upon materials which would otherwise be inadmissible"¹⁶⁶ However, Judge Becker was concerned that the Rule may not sanction an expert's reliance upon materials that have been independently excluded from evidence by the court on hearsay grounds or because of irrelevance.¹⁶⁷

The district court in *Zenith Radio* noted the plaintiffs' argument that Rule 703 incorporates a recognition that "one facet of an expert witness's expertise is his ability to sift reliable from unreliable information and to analyze the information before him with full understanding of the extent of its validity."¹⁶⁸ More significantly, the court acknowledged the

164. 723 F.2d 238 (3d Cir. 1983), *rev'd on other grounds sub nom.* Matsushita Elec. Indus. Co. v. Zenith Radio Corp., 475 U.S. 574 (1986).

165. *Zenith Radio Corp. v. Matsushita Elec. Indus. Co.*, 505 F. Supp. 1313 (E.D. Pa. 1980).

166. *Id.* at 1320.

167. *Id.*

168. *Id.* See EDWARD W. CLEARY ET AL., MCCORMICK ON EVIDENCE § 15, at 40 (3d ed. 1984), stating that the view embodied in Rule 703 of the Federal Rules of Evidence, that an expert witness may give an opinion on the basis of reports that are not in evidence or are inadmissible under the hearsay rule, "is justified on the ground that an expert in a science is competent to judge the reliability of statements made to him by other investigators or technicians." See also FED. R. EVID. 703 advisory committee note, 56 F.R.D. 183, 283, stating, in part, that "a physician in his own practice bases his diagnosis on information from numerous sources and of considerable variety The physician makes life-and-death decisions in reliance upon them. His valida-

submission by plaintiffs' experts of uncontradicted affidavits certifying that the information upon which they relied in preparing their reports "was of a type generally relied upon by experts in their respective fields."¹⁶⁹ Nevertheless, the court, asserting that "the question of 'reasonable reliance' is one for judicial determination,"¹⁷⁰ proceeded to analyze in great detail the proffered evidence and to make "individualized rulings as to admissibility."¹⁷¹

Initially, however, in attempting to develop a standard to guide such analysis and rulings, the court examined the hearsay exception which had evolved into Rule 703. The court noted that such exception "was originally restricted to a limited group of cases," involving, for example, medical testimony based on information received from nurses and specialists, or land or business valuation testimony.¹⁷² Consequently, the *Zenith Radio* court called this limited group of cases the "mainstream" cases, and stated that these were "a logical outgrowth of the traditional exception to the hearsay rule for expert opinion"¹⁷³

Judge Becker then proposed and implemented a stan-

tion, expertly performed and subject to cross-examination, ought to suffice for judicial purposes." (citing *Rheingold*, *supra* note 7, at 531). See generally *Schooler v. State*, 175 S.W.2d 664 (Tex. Civ. App. 1943) (geologist testimony based, in part, upon geological reports); *Trinity Universal Ins. Co. v. Town of Speedway*, 210 N.E.2d 95, 98 (Ind. App. 1965) ("an expert is competent to judge the reliability of statements made to him by other persons and taking these statements made to him by other persons together with his own first hand observations comprises a sufficient basis for a direct examination his own professional opinion"); *Buckler v. Commonwealth*, 541 S.W.2d 935, 940 (Ky. 1976) (expert may opine "based upon information supplied by third parties which is not in evidence, but upon which the expert customarily relies in the practice of his profession").

169. *Zenith Radio*, 505 F. Supp. at 1320.

170. *Id.* at 1324. The court further stated:

We view the question of reasonable reliance to be a preliminary determination of admissibility under [Federal Rule of Evidence] 104(a), analogous to the question of qualification of the witness. We do not consider the affidavits submitted by plaintiffs' experts to the effect that the material upon which they relied in forming their opinions is of a type generally relied upon by experts in their respective fields as in any way determinative of the issue.

Id. at 1325-26.

171. *Id.* at 1321.

172. *Id.* at 1322.

173. *Zenith Radio*, 505 F. Supp. at 1326.

dard, consisting of a series of factors, by which to determine the reasonableness of reliance in cases outside the "mainstream" of Rule 703:

1. The extent to which the opinion is pervaded or dominated by reliance on materials judicially determined to be inadmissible, on grounds of either relevance or trustworthiness;

2. The extent to which the opinion is dominated or pervaded by reliance upon other untrustworthy materials;

3. The extent to which the expert's assumptions have been shown to be unsupported, speculative, or demonstrably incorrect;

4. The extent to which the materials on which the expert relied are within his immediate sphere of expertise, are of a kind customarily relied upon by experts in his field in forming opinions or inferences on that subject, and are not used only for litigation purposes;

5. The extent to which the expert acknowledges the questionable reliability of the underlying information, thus indicating that he has taken that factor into consideration in forming his opinion;

6. The extent to which reliance on certain materials, even if otherwise reasonable, may be unreasonable in the peculiar circumstances of the case.¹⁷⁴

Because the proffered expert reports in *Zenith Radio*

174. *Id.* at 1330. See also *American Bearing Co. v. Litton Indus. Inc.*, 540 F. Supp. 1163, 1169-71 (E.D. Pa. 1982) (adopting Judge Becker's standard and then "carefully examin[ing] the underlying assumptions, inferences drawn and conclusions reached by plaintiff's economist").

were outside the "mainstream" contemplated by Judge Becker, he applied his set of standards for determining reasonable reliance. In undertaking his evaluation, Judge Becker "proceed[ed] step by step through the report[s], examining the bases for the opinions rendered according to the principles [underlying Federal Rule of Evidence] 703 . . . , as well as analyzing the assumptions, inferences, and conclusions as an aid to considering whether the opinion assists the jury as required under Rule 702."¹⁷⁶ The *Zenith Radio* court concluded that the major, critical opinions presented in the plaintiffs' expert reports were inadmissible because the underlying data relied upon by the experts were "faulty" and the assumptions created by the experts "invade[d] the province of the fact-finder."¹⁷⁸

When the district court consequently entered final summary judgment in favor of the antitrust defendants, the plaintiffs appealed to the United States Court of Appeals for the Third Circuit. In *In re Japanese Electronic Products Antitrust Litigation*, the Third Circuit concluded that the district court had erred in using its improvised set of standards to substitute its own determination of what materials experts would reasonably rely on for the contrary determination of the experts themselves.¹⁷⁷

The court in *Japanese Antitrust* stressed that "[t]he proper inquiry is not what the court deems reliable, but what experts in the relevant discipline deem it to be."¹⁷⁸ The court maintained that, under such a proper Rule 703 inquiry, it was critical that the *Zenith Radio* record included the "unequivocal and uncontradicted affidavits from each of the experts that the data they relied on in forming their opinions were of a type reasonably relied upon by experts in their respective

175. *Zenith Radio*, 505 F. Supp. at 1336.

176. *Id.* at 1380.

177. 723 F.2d 238 (3d Cir. 1983), *rev'd on other grounds sub nom Matsushita Elec. Indus. Co. v. Zenith Radio Corp.*, 475 U.S. 574 (1986).

178. *Japanese Antitrust*, 723 F.2d at 276 (citing *Wilder Enterprises v. Allied Artists Pictures*, 632 F.2d 1135, 1143-44 (4th Cir. 1980); *Bauman v. Centex Corp.*, 611 F.2d 1115, 1120 (5th Cir. 1980); *United States v. Genser*, 582 F.2d 292, 298 (3d Cir. 1978), *cert. denied*, 444 U.S. 928 (1979)).

fields.”¹⁷⁹ Indeed, once it is determined that the underlying data is of a type reasonably relied upon by experts in the field, “the rigorous examination should be conducted in the cross-examination for which Rule 705 makes explicit provision. In that setting the fact-finder can be expected to determine the appropriate weight to be given to the testimony.”¹⁸⁰

However, according to the *Japanese Antitrust* court, instead of adhering to the language and intent of Rule 703, the district court substituted its own set of standards for determining reasonable reliance.¹⁸¹ “In substituting its own opinion as to what constitutes reasonable reliance for that of the experts in the relevant fields the trial court misinterpreted Rule 703.”¹⁸² This approach involved “fundamental legal error because, as a matter of law, the district court must make a factual inquiry and finding as to what data experts in the field find reliable. There is no discretion to forbear from making this inquiry and finding.”¹⁸³ The court consequently held that

179. *Japanese Antitrust*, 723 F.2d at 276. See *In re Paoli R.R. Yard PCB Litig.*, 916 F.2d 829, 846 (3d Cir. 1990) (rejecting view of district court, 706 F. Supp. 358, that “an expert’s opinion on the reasonableness of his or her own data could not be dispositive or Rule 703’s limitation would be meaningless”).

180. *Japanese Antitrust*, 723 F.2d at 277-78. Rule 705 of the Federal Rules of Evidence provides that “[t]he expert may testify in terms of opinion or inference and give his reasons therefor without prior disclosure of the underlying facts or data, unless the court requires otherwise. The expert may in any event be required to disclose the underlying facts or data on cross-examination.” FED. R. EVID. 705.

181. 723 F.2d at 278.

182. *Id.* at 277. See also *Mannino v. International Mfg. Co.*, 650 F.2d 846 (6th Cir. 1981):

The purpose of Rule 703 is to make available to the expert all of the kinds of things that an expert would normally rely upon in forming an opinion, without requiring that these be admissible in evidence. Under the Rule, the expert is free to give his opinion in his area of expertise. In short, through Rule 703, the law is catching up with the realities of professional life.

Id. at 851. The *Mannino* Court further states that “[g]reat liberality is allowed the expert in determining the basis of his opinions under Rule 703.” *Id.*

183. *Japanese Antitrust*, 723 F.2d at 277. The Third Circuit quoted Professor McCormick:

[i]t is reasonable to assume that an expert in a science is competent to judge the reliability of statements made to him by other investigators or technicians. He is just as competent indeed to do this as a judge and jury are to pass upon the credibility of an ordinary witness on the stand. If the statements, then, are attested by the expert as the basis for a judgment upon

the trial court had erred in excluding the expert opinion evidence on the ground that such evidence was based on materials not reasonably relied upon.¹⁸⁴

III. Asbestos Litigation

The doctrinal tensions discussed above implicate the nature of any preliminary judicial assessment of proffered expert testimony. The party seeking to have such testimony excluded will itself present the court with a rigorous examination and critique of the proposed testimony and underlying methodology. Such a rigorous critique will either be adopted by the court, in letter or spirit, if the court favors a restrictive interpretation of Federal Rule of Evidence 703, or presented directly to the jury in the form of cross-examination if the expert evidence has been deemed admissible. In either event, lawyers and judges, who are usually laypersons in respect to technical or scientific matters, must undertake, or become familiar with, the critical dissection of expert methodology and proffered expert testimony.

Such is the case in asbestos litigation, a wide ranging species of environmental litigation in which courts are increas-

which he would act in the practice of his profession, it seems that they should ordinarily be a sufficient basis even standing alone for his direct expression of professional opinion on the stand

723 F.2d at 277 (quoting CHARLES TILFORD MCCORMICK, MCCORMICK ON EVIDENCE § 15, at 35-36 (2d ed. 1972)). "It was this view which the drafters incorporated in Rule 703. They did so over significant opposition." *Id.* (citing COMMITTEE ON THE FEDERAL COURTS OF THE NEW YORK COUNTY LAWYERS ASSOC. REPORT (April 1970)). Thus, the Third Circuit Court in *Japanese Antitrust* continued that "[w]hat the trial court did in effect was to reject the decision of the Judicial Conference, the Supreme Court, and Congress and adhere to an unusually restrictive view as to the basis on which an expert's opinion may be laid." *Id.*

184. *Id.* at 278. Finally, the Court in *Japanese Antitrust* turned to an examination of the admissibility of the proffered expert opinion evidence under other rules of evidence. The Court concluded that, considering the complexity of the economic issues involved, exclusion under Rule 702 "of an opinion clearly based on expert judgment as unhelpful to the factfinder was an abuse of discretion." *Id.* at 280.

The Court further indicated the propriety of then turning to an examination of the admissibility of the proposed evidence under Rule 403. *Id.* However, the Court noted that, because the trial court had not made a Rule 403 determination and defendants had not urged exclusion under that Rule, the Court had no occasion to consider whether exclusion under Rule 403 would be an abuse of discretion. *Id.* at 284.

ingly being asked to address the relatively novel issue, at least in the context of that litigation, of the propriety of market share liability evidence. The use of a market share liability approach has been most closely associated with litigation concerning the drug diethylstilbestrol ("DES"). In such litigation, use of market share theory by plaintiffs has been deemed appropriate because DES was produced pursuant to one formula, and consequently a defendant's market share will tend accurately to reflect its culpability.¹⁸⁵

In asbestos litigation, however, courts have overwhelmingly rejected use of such market share analysis.¹⁸⁶ This is because such an approach usually fails to account for the fact that the toxicity of any particular asbestos-containing product varies depending on the specific nature of the asbestos component. Unlike the drug DES, asbestos products may contain one or more of various asbestos silicates.¹⁸⁷ Each type of fiber has a different toxicity. In addition, other significant variables include "the physical properties of the product itself, the percentage of asbestos used in the product,"¹⁸⁸ the form of the product and the amount of dust it generates.¹⁸⁹ The greater

185. See generally *Hymowitz v. Eli Lilly & Co.*, 539 N.E.2d 1069 (N.Y. 1989), cert. denied, 493 U.S. 949 (1989) (adopting market share theory); *Sindell v. Abbott Labs.*, 607 P.2d 924, (Ca. 1980), cert. denied, 449 U.S. 912, (1980) (market share); cf. *Collins v. Eli Lilly & Co.*, 342 N.W.2d 37 (Wisc. 1983), cert. denied, 469 U.S. 826 (1984) (risk share theory).

186. See, e.g., *Menne v. Celotex Corp.*, 861 F.2d 1453, 1468 n.24 (10th Cir. 1988); *Vigilto v. Johns-Manville Corp.*, 826 F.2d 1058 (3d Cir. 1987); *Bateman v. Johns-Manville Sales Corp.*, 781 F.2d 1132 (5th Cir. 1986); *Blackston v. Shook & Fletcher Insulation Co.*, 764 F.2d 1480 (11th Cir. 1985); *Thompson v. Johns-Manville Sales Corp.*, 714 F.2d 581 (5th Cir. 1983); *Marshall v. Celotex Corp.*, 651 F. Supp. 389 (E.D.Mich. 1987); *Hannon v. Waterman Steamship Corp.*, 567 F. Supp. 90 (E.D.La. 1983); *Prelick v. Johns-Manville Corp.*, 531 F. Supp. 96 (W.D.Pa. 1982); *In re Related Asbestos Cases*, 543 F.Supp 1152 (N.D.Cal. 1982); *Starling v. Seaboard Coast Line R.R. Co.*, 533 F. Supp. 183 (S.D.Ga. 1982); *Tidler v. Eli Lilly and Co.*, 95 F.R.D. 332 (D.C.D.C. 1982); *Gaulding v. Celotex Corp.*, 772 S.W.2d 66 (Tex. 1989); *Case v. Fibreboard Corp.*, 743 P.2d 1062 (Okla. 1987); *Goldman v. Johns-Manville Sales Corp.*, 514 N.E.2d 691 (Ohio 1987); *Nicolet, Inc. v. Nutt*, 525 A.2d 146 (Del. 1987); *Celotex Corp. v. Copeland*, 471 So.2d 533 (Fla. 1985); *Mullen v. Armstrong World Inds.*, 200 Cal. App.3d 250, 246 Cal. Rptr. 32 (1988).

187. See *Celotex Corp. v. Copeland*, 471 So.2d 533, 537-38 (Fla. 1985).

188. *Celotex* at 538.

189. *Id.*

the "product's [tendency] to produce airborne fibers, the greater. . ." the likelihood that the fibers will be ingested and produce disease.¹⁹⁰

Nevertheless, it has been suggested, for purposes of relieving the docket and streamlining the massive asbestos litigation, that the scope of such litigation might be limited by "[t]he conduct of 'single issue trials' to determine market share."¹⁹¹ Such an approach would be one "means of allocating responsibility between different defendants on a uniform basis in all cases."¹⁹² Indeed, faced with the massive asbestos docket in his court and aware of the situation nationally, Judge Jack B. Weinstein, during proceedings in the Brooklyn Naval Shipyard Joint Asbestos Litigation, opined that

[t]he percentage of responsibility problem should be eliminated One possible way is either through a massive trial to ascertain defendant/corporation shares of the New York market, possibly by analogy to the case of *Hymowitz v. Eli Lilly & Co.* To accomplish this result, it might be necessary to consolidate all cases for a single issue trial on percentage of liability while proceeding simultaneously or consecutively with separate trials on exposure and damages. There are serious questions about this approach. However, it must be considered. If we can reduce the issues solely to exposure and damages, we can use an assembly line type system either with "professional" jurors who would be impaneled for many cases, or by stipulation¹⁹³

Although such offensive use of a market share approach in asbestos litigation, while extremely controversial, thus may loom on the horizon, the defensive use of this approach has already occurred in numerous asbestos trials nationwide. As will be shown, the asbestos defendants, seeking to present

190. *Id.*

191. *Id.*

192. Daniel Wise, *Verdicts of \$31 Million In Asbestos Lawsuits*, 205 N.Y.L.J., 1, 1-2 (Jan. 25, 1991).

193. Transcript of Proceedings, *In re: New York Asbestos Litigation (Brooklyn Navy Yard)*, CV 90 9999, at 10-11 (E.D. & S.D.N.Y. Jan. 24, 1991).

such a market share defense in the Brooklyn Naval Shipyard litigation before Judge Weinstein, recently stood at a crossroads. Use of such a defense promised to relieve major defendants of vast shares of responsibility for having caused the illnesses and deaths of scores of workers nationwide who had been exposed to asbestos-containing dust. As will be further explained, the court's choice of a restrictive or liberal approach to proffered market share testimony directly provided the key to the success of this defense.

A. Overview of Asbestos Litigation and the Market Share Defense Theory

By way of overview, it should be noted that the massive asbestos docket arises from the fact that there are currently pending in the federal courts approximately 35,000 cases in which claims are made for personal injuries or wrongful death resulting from exposure to asbestos and asbestos-containing products.¹⁹⁴ Additionally, approximately 70,000 similar cases are pending in various state courts.¹⁹⁵ These lawsuits have named several hundred companies as defendants for their roles in having manufactured, processed, distributed, marketed and sold products containing asbestos. These actions comprise the current phase of the national "asbestos scene, an unparalleled situation in American tort law."¹⁹⁶

194. Stephen Labaton, *Lawyers Clash on Plan to Hear Asbestos Cases*, N.Y. TIMES, May 31, 1991, at D2, col. 5.

195. *Id.* at D2, col. 5. A report issued by a committee of Federal judges appointed by Chief Justice William H. Rehnquist to study the role of the courts in resolving asbestos cases "predicted that the number of asbestos cases, which are already clogging dockets across the nation, would grow by 50 percent within three years." Stephen Labaton, *Judges See A Crisis in Heavy Backlog of Asbestos Cases*, N.Y. TIMES, Mar. 6, 1991, at A1, col. 3. The New York Times further stated that, "[i]n the year ended June 30, [1990], an average of 1,140 asbestos suits were filed monthly in Federal district courts, with some districts facing dockets that are more than one-third filled with asbestos cases." *Id.* at D18, col. 3. Moreover, "[f]or every asbestos case settled or tried, nearly two new ones are being filed." *Id.* at A1, col. 3.

196. *Racich v. Celotex Corp.*, 887 F.2d 393, 394 (2d Cir. 1989); *In re School Asbestos Litig.*, 789 F.2d 996, 1000 (3d Cir.), *cert. denied*, 479 U.S. 852 (1986); *see also Johnson v. Celotex Corp.*, 899 F.2d 1281, 1283 (2d Cir. 1990); *Jackson v. Johnson-Manville Sales Corp.*, 750 F.2d 1314 app. at 1338-39 (5th Cir. 1985) (*en banc*), *on reh'g*, 781 F.2d 394 (5th Cir.), *cert. denied*, 478 U.S. 1022 (1986).

The complaints in these lawsuits usually allege that the defendants are liable because they negligently failed to warn of the extreme and inherent dangers of exposure to asbestos,¹⁹⁷ of which the defendants knew or, with the exercise of

The magnitude of this situation flows from the fact that, [w]hile the use and manufacture of asbestos products have declined in the last decade, injuries from more than half a century of exposure are only beginning to become apparent. Experts predict that by the end of the century as many as 200,000 deaths in the United States will have been caused by asbestos-related diseases and that the number will rise to 265,000 by the year 2015.

Stephen Labaton, *Judges See A Crisis in Heavy Backlog of Asbestos Cases*, N.Y. TIMES, Mar. 6, 1991, at A1, col. 3.

197. Asbestos is a white or light gray natural mineral, obtained through mining processes chiefly from actinolite and amphibole, occurring in long slender needles or fibrous masses that historically (and profitably) has been woven into acid-resisting, nonconducting, and fireproof articles. As early as 1935, however, asbestos was widely recognized as a mortal threat affecting a large proportion of those who had regularly worked with the material. Because most asbestos materials are highly friable (easily crumbled), the fibers are easily airborne and consequently may be inhaled. Although the disease process does not become evident for the first few, or even the first several, years no matter how intense the exposure, lung scarring is inevitable as the mineral fibers accumulate in the lungs. See generally BARRY I. CASTLEMAN, *ASBESTOS: MEDICAL AND LEGAL ASPECTS* 16-32 (2d ed. 1986) [hereinafter, CASTLEMAN]; I. SELIKOFF & DAVID LEE, *ASBESTOS AND DISEASE* 23 (1978); Allan Lanza, et al., *Effects of the Inhalation of Asbestos Dust on the Lungs of Asbestos Workers*, 50 PUBL. HEALTH REP. 1-12 (1935); Allan Lanza et al., *Industrial Dusts and the Mortality from Pulmonary Disease*, 39 AMER. REV. TUBERC. 419-38 (1939).

Two incurable diseases that may result from exposure to asbestos are asbestosis and mesothelioma. A unique aspect of asbestosis that distinguishes it from other occupational or environmental lung diseases, such as silicosis, coal-worker's pneumoconiosis, and berylliosis, is the presence of asbestos bodies and fibers predominantly in lung tissue. The symptoms most commonly associated with this disease include breathlessness and dry cough, although these rarely occur before a decade following initial exposure, when the asbestosis is already well-entrenched. Other common problems are clubbing of the fingers, as well as impaired blood oxygenation and severe alterations in the pulmonary circulation.

Malignant pleural mesothelioma, a particular type of lung cancer whose only known cause is exposure to asbestos, frequently develops twenty to thirty-five years following the initial exposure. Mesothelioma usually results in severe and extreme chest pain and shortness of breath caused by compression of the lung by the enlarging tumor and related pleural effusion (or accumulation of fluid around the lungs). The chest pain may be localized or diffuse, afflicting the shoulders and upper abdomen as well. A victim of this disease will also experience persistent coughing, abdominal cramps and pain, swelling of the abdomen, extreme weight loss (especially accompanying chemotherapy), and pleural hemorrhaging. See Leon S. Gottlieb, *The Range of Medical Abnormalities Resulting from Asbestos Exposure*, reprinted in

ordinary care, should have known.¹⁹⁸ The complaints often

SOURCEBOOK ON ASBESTOS DISEASES: MEDICAL, LEGAL, AND ENGINEERING ASPECTS — ASBESTOS DISEASE UPDATE 1-35 (Special Supp. March 1989); see generally Karen Hamm Antman, *Malignant Mesothelioma*, 303 N. ENG. J. MED. 200-02 (1980); James Brenner, et al., *Malignant Mesothelioma of the Pleura: Review of 123 Patients*, 49 CANCER 2431-35 (1982); David Grant et al., *Computed Tomography of Malignant Pleural Mesothelioma*, 7 J. COMP. ASS. TOM. 626-32 (1983); Irving J. Selikoff, Jacob Churg & E. Cuyler Hammond et al., *Asbestos Exposure and Neoplasia*, 188 J.A.M.A. 22-26 (1984).

It is telling that, by the 1960's, mesothelioma cases were being seen in people who had been only briefly and casually exposed to asbestos, such as household companions of asbestos workers or those who lived in the neighborhood of an asbestos facility. James Wagner et al., *Diffuse Pleural Mesothelioma and Asbestos Exposure in the North Western Cape Province*, in PROCEEDINGS OF THE PNEUMOCONIOSIS CONFERENCE HELD AT THE UNIVERSITY OF WITWATERSRAND, JOHANNESBURG (1960); Michael Newhouse et al., *Epidemiology of Mesotheliomal Tumors in the London Area*, 132 ANNALS N.Y. ACAD. SCI. 674-79 (1965).

198. Perhaps the most infamous of numerous pieces of evidence establishing knowledge on the part of the asbestos industry generally, since as early as the 1930's, regarding the health hazards attendant to exposure to asbestos is the 1982 Affidavit of Charles H. Roemer, formerly a prominent Paterson, New Jersey attorney and chairman of the Paterson Industrial Commission. In that affidavit, Roemer described a particular meeting he had arranged and attended at the New York City corporate headquarters of the Johns-Manville Corporation, the world's largest asbestos company, with 25,000 employees and more than fifty factories and mines in the United States and Canada. Roemer's affidavit reads, in part, as follows:

3. Sometime in 1942-43, I was advised by my cousin, Dr. Jacob Roemer, that in the course of reviewing chest X-rays of employees at the Union Asbestos and Rubber Company's Paterson plant he had observed a significant number with lung changes which he believed were due to exposure to asbestos. Dr. Roemer suggested that the men be advised of his findings and that they secure outdoor employment which did not involve exposure to asbestos dust. Dr. Roemer said unless this was done immediately the men would suffer from painful asbestos diseases.
4. Immediately I reported what Dr. Roemer said to Robert Cryor, the Union Asbestos and Rubber Company Plant Manager, and Edward Shuman, the Assistant Plant Manager.
5. I was then informed that in accordance with the labor union contract, the 5 or 6 employees in question could not be discharged without the consent of the union. The union refused to consent to their dismissal.
6. I then suggested that since Johns-Manville was the largest asbestos company in the country, we should set up an appointment to see how they were handling the asbestos health problem.
7. Mr. Cryor and Mr. Shuman set up an appointment with Johns-Manville. Shortly thereafter, Mr. Cryor, Mr. Shuman and I met with Vandiver Brown, General Attorney for Johns-Manville and the President of the corporation, at Johns-Manville corporate headquarters in New York City.
8. We advised the Johns-Manville officials of Dr. Roemer's findings and

further allege that the defendants are strictly liable, regard-

asked them if Johns-Manville's physical examination program had turned up similar findings and, if so, what Johns-Manville was doing about it.

9. In response, Vandiver Brown stated that Johns-Manville's physical examination program had, indeed, also produced findings of X-ray evidence of asbestos disease among workers exposed to asbestos and that it was Johns-Manville's policy not to do anything nor to tell the employees of the X-ray findings. Vandiver Brown went on to say that it was foolish for us to be concerned and that if Johns-Manville's workers were told, they would stop working and file claims against Johns-Manville, and that it was Johns-Manville's policy to let them work until they quit work because of asbestosis or died as a result of asbestos-related diseases.

Affidavit of Charles H. Roemer, U.S. Bankruptcy Court, Southern District of New York, *In re Johns-Manville Corporation et al.*, Debtors Civ. No. 465-83C/1-84C/688-83C (Sept. 29, 1982), reprinted in CASTLEMAN, *supra* note 197, at 152-54 [hereinafter Roemer Affidavit].

"At a subsequent deposition taken in April of 1984, Roemer remembered that he had said, 'Mr. Brown, do you mean to tell me you would let them work until they dropped dead?' [and that Brown had replied,] 'Yes, we save a lot of money that way.'" CASTLEMAN, *supra* note 197 (citing Deposition of Charles H. Roemer at 28, U.S. Ct., Johns-Manville v. United States Civ. No. 465-83C/1-84C/688-83C (April 25, 1984)).

Additionally, as more evidence has come to light, juries have increasingly awarded plaintiffs punitive damages, finding that defendants acted with wanton and reckless disregard of the known risks of asbestos exposure. See, e.g., *Johnson v. Celotex Corp.*, 899 F.2d 1281 (2d Cir. 1990) (upholding combined punitive damages assessments against Celotex Corporation in the amount of \$2,000,000, against Raymark Corporation in the amount of \$2,000,000, and against the Owens-Illinois Company in the amount of \$1,800,000); *Simpson v. Pittsburgh Corning Corp.*, 901 F.2d 277 (2d Cir. 1989), *cert. dismissed*, 111 S. Ct. 27 (1990) (upholding punitive damages award of \$2,300,000 against the Pittsburgh Corning Corporation); *Passentino v. Raymark Indus.*, 896 F.2d 544 (2d Cir. 1990) (upholding \$500,000 punitive damages award against Owens-Illinois); *Racich v. Celotex Corp.*, 887 F.2d 393, 395 (2d Cir. 1989) (upholding \$100,000 punitive damages award against the Celotex Corporation); *In re A.H. Robins Co. Inc.*, 89 B.R. 555, 557-58 (E.D. Va. 1988) (upon declaring bankruptcy in 1985, A.H. Robins had paid or appealed punitive damages awards totalling over \$23 million, and still faced over 5,000 claims for compensatory and punitive damages). Current litigation challenging the constitutionality of the imposition of multiple punitive damages awards for the same course of conduct is not within the purview of this article. See generally *Browning-Ferris v. Kelco Disposal*, 492 U.S. 257 (1989); *Pacific Mutual Life Ins. Co. v. Haslip*, 111 S. Ct. 1032 (1991); *Supreme Court Urged To Place Limits on Setting of Punitive Damages Awards*, 59 Antitrust & Trade Reg. Rep. (BNA) 529-30 (Oct. 11, 1990); *Olson & Bonrons v. Corboy*, *At Issue: Punitive Damages*, 77 A.B.A. J. 40-41 (Jan. 1991); *Bruce Fein & William Bradford Reynolds, High Court May End Judicial Sweepstakes*, MANHATTAN LAW 26 (June 1990); *John Calvin Jefferies, A Comment on the Constitutionality of Punitive Damages*, 72 VA. L. REV. 139 (1986); *Jeffrey W. Grass, The Penal Dimensions of Punitive Damages*, 12 HASTINGS CONST. L.Q. 241 (1985).

less of their level of awareness, because they manufactured or supplied asbestos-containing products in a condition not reasonably contemplated by the ultimate consumers and unreasonably dangerous for their intended use.

Naturally, defendants in asbestos litigation, when not reaching settlement agreements with plaintiffs, have set forth various defenses for use at trial. For example, a defendant may rely upon the so-called "state of the art" defense, claiming that, at the time it marketed its asbestos-containing products that caused the particular injury complained of, scientific and medical knowledge regarding the hazards of exposure to asbestos had not yet been developed and disseminated.¹⁹⁹

Alternatively, a defendant may rely upon a product nexus or proximate causation defense. If so, the defendant may grant that the plaintiff's injury was caused by exposure to another company's asbestos-containing products, but the defendant will deny that the plaintiff was exposed to its own products.²⁰⁰ A related defense may concede that the plaintiff was certainly injured, but deny that such injury resulted from any exposure to asbestos.²⁰¹

When seeking to develop a product nexus or proximate causation defense, an asbestos defendant will usually claim that the plaintiff has failed to meet his burden of establishing the requisite element of causation. In order to succeed on his claim, plaintiff has the burden of proving as a factual matter that he was exposed to the defendant's specific merchandise and that it is more likely than not that this exposure was a substantial factor in his injury.²⁰² "Plaintiff [has] to establish

199. Evidence such as the Roemer affidavit, *supra* note 198, however, has tended to vitiate and delegitimize such a state of the art defense.

200. See, e.g., *Thompson v. Johns-Manville Sales Corp.*, 714 F.2d 581 (5th Cir. 1983); *cert. denied*, 465 U.S. 1102 (1984) (interpreting Louisiana law); see also *Blackston v. Shook & Fletcher Insulation Co.*, 764 F.2d 1480 (11th Cir. 1985) (interpreting Georgia law).

201. Resorting to such a defense, for example, a defendant may argue that plaintiff's lung disease resulted from heavy cigarette smoking, and not exposure to asbestos. Of course, this defense will have virtually no chance of succeeding if the plaintiff had been diagnosed as having asbestosis or mesothelioma, the cause of which is almost always viewed exclusively as exposure to asbestos.

202. See, e.g., *Thompson*, 714 F.2d 581 (5th Cir. 1983), *cert. denied*, 465 U.S.

that his injury was proximately caused by the [defendant's] asbestos and produce evidence identifying [the particular defendant's] product as being a factor in his injury."²⁰³

On the other hand, the asbestos supplier may also come forward with a statistical analysis in order to establish the unlikelihood that its own asbestos-containing merchandise could have caused a particular plaintiff's injuries. Such an analysis attempts to demonstrate that the defendant's market share of the asbestos products at the particular site where the plaintiff was exposed was minuscule.

By means of such a market share approach, a defendant will try indirectly to transfer liability to his co-defendants in the litigation. This attempt to minimize responsibility becomes crucial in a jurisdiction such as New York, where, under the General Obligations Law, the jury will ultimately be asked to apportion fault among the numerous settling and non-settling co-defendants.²⁰⁴ Such apportionment is also required by Article 16 of New York's Civil Practice Law and Rules, which prescribes that, in an action for personal injury, any one defendant found to be fifty percent liable or less shall, under most circumstances, be liable to the claimant, for non-economic loss, for no more than "that defendant's equitable share determined in accordance with the relative culpability of each person causing or contributing to the total liability

1102 (1984); *Blackston*, 764 F.2d 1480 (11th Cir. 1985).

203. *Johnson v. Celotex Corp.*, 899 F.2d 1281, 1286 (2d Cir. 1989); cf. *Hymowitz v. Eli Lilly & Co.*, 539 N.E.2d 1069, cert. denied, 493 U.S. 944 (1989).

204. N.Y. GEN. OBLIG. LAW § 15-108 (McKinney 1976). The legislative history of General Obligations Law section 15-108 indicates that:

[t]he rule enunciated in section 15-108(b) of the General Obligations Law appears to be the most reasonable solution to the settlement problem by relieving a tortfeasor obtaining a good faith release from any further contribution, while at the same time allowing the other tortfeasors to prove the releasee's equitable share of the damages was greater than the value of the release, thus reducing plaintiff's claim against the other tortfeasors by that larger amount. Under such a scheme, plaintiffs will have to guard against defendants doing their utmost to shift the major portion of the blame onto the settling tortfeasor, thus reducing plaintiff's total claim.

Memorandum From Douglas R. McCuen, New York State Assembly, Standing Committee Central Staff, to Assemblymen DiCarlo, Fink, Murphy, Suchin (Mar. 25, 1974).

for non-economic loss"²⁰⁵

Consequently, a company that succeeds in convincing the jury that its products were only minimally present at the place of plaintiff's exposure will, naturally, be assigned only a very small percentage of the fault. When the damages award for non-economic loss is apportioned accordingly pursuant to Article 16, the defendant will probably be responsible for only a small percentage of the verdict.²⁰⁶

This article next examines the attempt of one former manufacturer of asbestos-containing products, the Owens-Illinois Company ("Owens-Illinois" or "O-I"), now an asbestos defendant in numerous lawsuits, to shift liability to its co-defendants by presenting such a market share analysis in various trials nationwide. In particular, the article analyzes the proffered expert testimony of an economist, Lewis C. Solmon, most recently offered on behalf of Owens-Illinois, albeit unsuccessfully, in the joint trial before Judge Jack B. Weinstein in the United States District Court for the Eastern District of New York,²⁰⁷ which trial consolidated several hundred cases

205. The doctrine of joint and several liability, as applied in New York state law, controls the apportionment of liability in the federal Brooklyn Navy Yard litigation. *See, e.g., Erie R.R. v. Tompkins*, 304 U.S. 64 (1938); *Huddleston v. Dwyer*, 322 U.S. 232, 236 (1944); *Roginsky v. Richardson-Merrell, Inc.*, 378 F.2d 832, 851 (2d Cir. 1967); *cf. McKenna v. Ortho Pharmaceutical Corp.*, 622 F.2d 657 (3d Cir. 1980). The New York state legislature, however, in Article 16 of the Civil Procedure Law and Rules, abrogated the doctrine of joint and several liability in certain situations. Thus, New York Civil Practice Law section 1601 provides in relevant part, that in an action for personal injury:

when the liability of a defendant is found to be fifty percent or less of the total liability assigned to all persons liable, the liability of such defendant to the claimant for non-economic loss shall not exceed that defendant's equitable share determined in accordance with the relative culpability of each person causing or contributing to the total liability for non-economic loss

N.Y. CIV. PRAC. L. & R. § 1601(1) (McKinney 1976 & Supp. 1992).

206. Section 1602 of New York's Civil Practice Law and Rules provides for certain exceptions to the limitations on liability set forth in Article 16. Most notably, for purposes of asbestos litigation, the limitations set forth in Article 16 do "not apply to any person held liable for causing claimant's injury by having acted with reckless disregard for the safety of others," and similarly do "not apply to any parties found to have acted knowingly or intentionally, and in concert, to cause the acts or failures upon which liability is based" N.Y. CIV. PRAC. L. & R. § 1602(7), (11) (McKinney 1976 & Supp. 1992).

207. *In re New York Asbestos Litig.* (Brooklyn Navy Yard), CV 90-9999

arising from asbestos-related injuries sustained by former workers in the Brooklyn Naval Shipyard (hereinafter "Brooklyn Navy Yard" or "Navy Yard").²⁰⁸

It will be demonstrated that, as Judge Weinstein ultimately ruled, such proffered testimony of Professor Solmon is based on misleading and speculative assumptions. The question remains, however, whether such problematic testimony should be admitted (which would allow the jury to consider what weight to assign the testimony in light of vigorous cross-examination) or precluded (which would represent a judicial determination that Professor Solmon should be prevented from using his complex econometric model to confuse the issues and mislead the jury).

As related, the Brooklyn Navy Yard consolidated trial represented for the asbestos defendants a crossroad at which an opportunity to avoid punishing verdicts hinged on the approach adopted by the court in assessing their proposed market share evidence. Although aware that Judge Weinstein had adopted a restrictive interpretation of Rule 703 in the context of medical causation testimony in the *Agent Orange* litigation, the parties were not certain that he would favor such heightened scrutiny and rigorous examination of an expert's methodology in other settings.

B. Critique of Professor Solmon's Market Share Formula

This article next briefly sets forth the essential features of Professor Solmon's market share formula, as well as certain key assumptions within the formula that may be described as misleading, and that skew the ultimate calculations at which the formula arrives. Such analysis should: (1) provide some

(E.D.N.Y. Jan. 24, 1991). This trial consolidates cases filed in the United States District Courts for both the Eastern and Southern Districts of New York.

208. By order dated January 22, 1990, United States District Judge Eugene H. Nickerson, endeavoring to manage a docket of several thousand personal injury and wrongful death asbestos cases, assigned several hundred of such asbestos cases to District Judge Jack B. Weinstein for consolidated trial, provided that these assigned cases had a "substantial nexus to the Brooklyn Navy Yard." Order of United States District Judge Eugene H. Nickerson, *In re Joint Eastern and Southern Districts Asbestos Litigation* (Jan. 22, 1990).

insight into the unique nature of the prosecution of asbestos-related claims; (2) demonstrate the manner by which statistical outcomes may be manipulated in the courtroom; and (3) convey a sense of the task of a jury or court in evaluating market share theory, or, more generally, complex expert opinion testimony. The latter two goals pertain to problems universally present in environmental litigation.

The ultimate goal of Professor Solmon's market share analysis is to arrive at a formula that is designed to establish that O-I's "Kaylo" was rarely used at the Navy Yard. Professor Solmon has created a ratio to accomplish his goal, using as the numerator his figure for the amount of Kaylo shipped to the Navy Yard over the years, and as the denominator his estimated amount of all asbestos-containing products shipped to the Navy Yard for each corresponding year.²⁰⁹

In proffering the testimony of Professor Solmon, Owens-Illinois necessarily sought to place before the jury the complex econometric formula from which Solmon has derived such a ratio. It is reasonable that most jurors, likely unfamiliar with the lingo of econometrics, would naturally not be apt to follow in an analytically critical way Solmon's step-by-step calculation process. Their evaluation of the credibility of such process, and of the soundness of Solmon's resulting conclusions, therefore becomes problematic. This problem is necessarily a key factor that directly informs the determination by courts regarding the extent of their own initial scrutiny of the expert's methodology.

In the Brooklyn Navy Yard litigation, the plaintiffs asked the court, by detailed *in limine* motion, to evaluate and preclude Professor Solmon's proposed testimony.²¹⁰ Notwith-

209. Because only minimal documentation has survived, however, it is improbable that there could be a reasonable basis for establishing such a ratio. Owens-Illinois has produced only fragmentary paperwork and statistically insignificant records, which reflect an indeterminable percentage of its Kaylo sales; the United States Government, as far as anyone can determine, has not retained purchase records with respect to insulation products shipped to the Navy Yard beginning during the World War II years.

210. It has been noted that "*in limine* ruling on evidence issues is a procedure which should, in a trial court's discretion, be used in appropriate cases." *In re Japanese Elect. Prod. Antitrust Litig.*, 723 F.2d 238, 260 (3d Cir. 1983); see also 21

standing testimonial evidence of the widespread use at the Brooklyn Navy Yard of Owens-Illinois' asbestos-containing "Kaylo"²¹¹ products from the early 1940's to 1958, Owens-Illinois offered its economic witness in an attempt to establish that O-I's market share of such products was indeed minuscule. In their motion papers, plaintiffs asserted that Professor Solmon's notions thus run directly counter to the personal recollections of numerous witnesses that O-I was a major player in the Navy Yard and that its Kaylo products were present there in abundance.²¹²

CHARLES ALAN WRIGHT & KENNETH W. GRAHAM, *FEDERAL PRACTICE AND PROCEDURE* § 5037, at 193-95 (1977); *MANUAL FOR COMPLEX LITIGATION* § 4.22 (1981) (supplement to 1 JAMES W. MOORE, *MOORE'S FEDERAL PRACTICE* (2d ed. 1982)); Brennan, *supra* note 30, at 5; Henry B. Rothblatt & David H. Leroy, *The Motion in Limine in Criminal Trials: A Technique for the Pretrial Exclusion of Prejudicial Evidence*, 60 KY. L.J. 611, 614 (1972). The *in limine* procedure is touted not only because it is "far more efficient than if the rulings [are] deferred until the trial, with consequent interruptions, but also because [it permits] more thorough briefing and argument than would [be] likely [were] the rulings deferred." *Japanese Antitrust*, 723 F.2d at 260.

211. "The Owens-Illinois Glass Company, of Toledo, Ohio, had developed Kaylo during the late 1930s, and had begun manufacturing it in the early 1940s. The trade name was derived from the so-called K factor — an engineering term for the rate at which heat passes through an inch of insulation. The better the insulation, the lower the heat loss, or K factor; hence the name 'Kaylo.'" PAUL BRODEUR, *OUTRAGEOUS MISCONDUCT: THE ASBESTOS INDUSTRY ON TRIAL* 148 (1985).

212. See, e.g., Deposition Testimony of Harry Winston Brayne, as read into Trial Transcript, at 18, *O'Brien v. Celotex Corp.*, No. CV-87-5151 (E.D.N.Y. Feb. 10, 1989), *reprinted in* Joint Appendix, at A337, *O'Brien v. Celotex Corp.*, No. 89-9111/9117 (2d Cir. 1990); Trial Testimony of Benjamin Kierman, at 62, 71, *O'Brien v. Celotex Corp.*, No. CV-87-5151 (E.D.N.Y. Feb. 10, 1989), *reprinted in* Joint Appendix, at A381, A390, *O'Brien v. Celotex Corp.*, No. 89-9111/9117 (2d Cir. 1990); Deposition Testimony of Moe Rapchick, at A107, as read onto Trial Transcript, *O'Brien v. Celotex Corp.*, No. CV-87-5151 (E.D.N.Y. Feb. 14, 1989), *reprinted in* Joint Appendix, at A463, *O'Brien v. Celotex Corp.*, No. 89-9111/9117 (2d Cir. 1990); Videotape Deposition Testimony of Remo Paternoster, at 27, *Paternoster v. Raymark Indus.*, No. 85-1778 (S.D. Ohio, Western Div. Nov. 27, 1985), *reprinted in* Joint Appendix, at A923, *O'Brien v. Celotex Corp.*, No. 89-9111/9117 (2d Cir. 1990); Deposition Testimony of Murray Zwilling, at 11, 20-25, *Scottino v. Celotex Corp.*, No. C-1-83-1973 (S.D. Ohio Mar. 11, 1987), *reprinted in* Joint Appendix, at A936, A943-945, *O'Brien v. Celotex Corp.*, No. 89-9111/9117 (2d Cir. 1990); Deposition Testimony of Harry Winston Brayne, at 30, *Brandfon v. Johns-Manville Sales Corp.*, No. CV-80-207948 (Superior Ct., Judicial District of Fairfield at Bridgeport May 16, 1985), *reprinted in* Joint Appendix, at A979, *O'Brien v. Celotex Corp.*, No. 89-9111/9117 (2d Cir. 1990); Deposition Testimony of James Harold Shannon, at 77, 81-94, *Shannon v. Fibreboard Corp.*, No. L-053346-85 (N.J. Super. Ct. Middlesex Cty.), *reprinted in* Joint Appendix, at A1070, A1074-77, *O'Brien v. Celotex Corp.*, No. 89-9111/9117 (2d Cir. 1990).

Summarizing and simplifying Professor Solmon's methodology, it can fairly be stated that, in his formula, Professor Solmon first selected the years during which O-I marketed its Kaylo products, as 1943 through 1958, and then, for each such year, attempted to determine the Brooklyn Navy Yard's national share of shipbuilding and repair activity. The formula then sought to indicate the amount of asbestos-containing insulation used in shipbuilding nationwide. Finally, Solmon attempted to calculate the amount of asbestos insulation at the Brooklyn Navy Yard, and O-I's market share at the Navy Yard of such asbestos insulation.

1. Determining the Brooklyn Navy Yard's National Share of Shipbuilding Activity

In first seeking to arrive at the national share of shipbuilding activity occurring at the Brooklyn Navy Yard, Professor Solmon set forth the actual number of civilians working in government naval yards each year nationwide, the number of civilian employees at the Brooklyn Navy Yard over the years, the number of persons employed in private shipyards for each year, and the number of naval vessels, by steel tonnage, that were built in and delivered from private shipyards in the years indicated.²¹³ Of course, the Brooklyn Navy Yard was a government owned and operated shipyard, not a private shipyard.

A significant problem inhering in Professor Solmon's figures detailing the naval vessels, by steel tonnage, built in private shipyards, is that Solmon here assumed only the new construction of naval vessels at private shipyards, and did not account for any overhaul, rip-out or repair activity that might have occurred.²¹⁴ Professor Solmon acknowledged that, to the extent that such activity occurred in the private yards, "[i]t is possible there could be some understating" in his model of the

213. Deposition of Lewis C. Solmon, at 102-06, *In re* Joint Eastern District and Southern District Asbestos Litigation (E.D.N.Y. and S.D.N.Y. Nov. 9, 1989) [hereinafter First Solmon Deposition].

214. *Id.* at 106.

private yard figures.²¹⁵ Indeed, Everett C. Hunt, a Professor of Marine Engineering, stated, upon reviewing Professor Solmon's formula, that "Dr. Solmon assumes for purposes of his analysis that none of the Navy-related activity in private shipyards involved the overhaul or repair of existing naval vessels. This is not correct. During the period 1943 to 1958, the Navy made extensive use of private yards for repairs to naval vessels."²¹⁶

As will be explained, any understating of the private yard figures would ultimately lead, in Professor Solmon's model, to a false decrease in the figure representing O-I's market share at the Brooklyn Navy Yard. It should first be noted, however, that a court's determination that Professor Hunt's statement is more credible than Professor Solmon's assumption would not necessarily represent its mere preference in the "battle of experts." Unlike the affidavit testimony of the defense expert in *Christophersen II*, Dr. Sherwood Gorbach, who merely stated that the accuracy of Dr. Miller's presumption has not been established in medical science, here Professor Hunt is claiming that, as a factual matter, Professor Solmon is wrong. Indeed, Professor Solmon concedes that this may be the case.

215. *Id.* By way of explanation of the methodology of the market share analyst, Solmon stated that "you know, we work with the best data we have available and that was the best data." *Id.* at 114. Professor Solmon further explained that, if the private yard figures "were a little higher or a little lower, it would not change the ultimate result by that much." *Id.* Proceeding through the formula, it will be shown that such understatement leads ultimately to a corresponding understatement of O-I's market share at the Navy Yard.

216. Affidavit of Everett C. Hunt, Professor of Marine Engineering, Webb Institute of Naval Architecture, Glen Cove, New York, sworn to August 16, 1990, at ¶ 2(a), *In re Joint Eastern and Southern District Asbestos Litigation* (E.D.N.Y. and S.D.N.Y.) [hereinafter Hunt Affidavit]. Professor Hunt continued:

An example of this can be found in the July 1951 issue of the industry publication 'Marine Engineering and Shipping Review,' which contained an article announcing that Vice Admiral Oscar C. Badger, Commander of the Eastern Sea Frontier, had given authorization for private yards to overhaul 186 naval vessels. Furthermore, in early 1953, I was an engineering officer aboard the U.S.S. Corregidor (CVE-58) during an extensive overhaul of main and auxiliary machinery at Maryland Shipbuilding and Dry Dock Company, Baltimore, Maryland. Typically, this overhaul included extensive removal and replacement of heat insulating materials.

Id.

Nevertheless, such a factually incorrect assumption may not be deemed fatal for purposes of a Rule 703 inquiry. As stated in the concurring opinion of Chief Judge Clark in the en banc decision in *Christophersen II*, Rule 703 is not concerned with whether experts in the field would have reasonably relied on the "particular" underlying facts or data, but on the "types" of underlying facts or data.²¹⁷

Professor Solmon arrived at a figure for the percentage of naval tonnage constructed at the private shipyards by dividing the naval tonnage in private yards by the total tonnage of nonmilitary and military vessels constructed in such private yards. Thus:

$$(\% \text{ nav. ton. prvt. yds.}) = \frac{(\text{nav. ton. prvt. yds.})}{(\text{nav. ton. prvt. yds.}) + (\text{non-nav. ton. prvt. yds.})}$$

He then set forth the number of persons in private yards working on naval shipbuilding projects by multiplying the percentage of naval tonnage in private yards by the number of private yard employees:

$$(\# \text{ prvt. pers. wkg. on nav.}) = (\% \text{ nav. ton. prvt. yds.}) \times (\# \text{ prvt. pers.})$$

By adding this figure, the number of persons in private yards working on naval shipbuilding projects, to the total number of persons working in naval yards, Professor Solmon calculated the total number of persons throughout the United States working on naval activity each year.²¹⁸ Thus:

$$(\# \text{ pers. nav. projects}) = (\% \text{ nav. ton. prvt. yds.}) \times (\# \text{ prvt. pers.})$$

Finally, Solmon calculated the national share of shipbuilding activity occurring at the Brooklyn Navy Yard. Here, Professor Solmon divided the total number of Navy Yard employees by the total number of persons working on naval projects. Thus:

217. *Christophersen II*, *supra* note 89, at 1106, 1119.

218. First Solmon Deposition, *supra* note 213, at 108-09; Deposition of Lewis C. Solmon, at 16, In re Joint Eastern District and Southern District Asbestos Litigation (E.D.N.Y. and S.D.N.Y. Dec. 21, 1989) [hereinafter Second Solmon Deposition].

$$(\% \text{ nav. act BNY}) = \frac{(\# \text{ BNY pers.})}{(\# \text{ pers. nav. projects})}$$

For this equation, any artificial diminution of the denominator (# pers. nav. projects) will, of course, cause an increase in the quotient (% nav. act. BNY). In other words, the lower the value of the denominator in the above fraction, the greater the value of the quotient. Omission of significant private yard activity in respect to naval contracts will result in such a diminution of denominator and increase in the quotient, representing the percentage of naval activity occurring at the Brooklyn Navy Yard.

As will be shown in the discussion of the remaining variables in Professor Solmon's formula, an assessment of O-I's market share at the Brooklyn Navy Yard will be distorted under the Solmon formula if the figures for the above quotient are distorted. In fact, the Solmon model significantly *undervaluates* O-I's market share at the Navy Yard to the extent that it overcalculates that quotient.

2. Determining the Amount of Asbestos-Containing Insulation Used in Shipbuilding

Having arrived at a calculation for the national share of shipbuilding activity occurring at the Brooklyn Navy Yard, Professor Solmon next sought to determine the amount of asbestos-containing insulation used in shipbuilding. He began by summarizing yearly expenditures for the construction and repair of naval vessels.²¹⁹ In developing such a summary, Solmon relied upon naval budgets prepared by the Department of Defense ("DOD"), which indicated expenditures on "all ships that the Navy bought" during the years in question, as well as various manufacturers' surveys, which provided data on expenditures for the repair of naval vessels.²²⁰

Thus, in respect to the DOD budgets, Solmon assumed, but could not confirm, that any expenditure credited to the purchase of a ship was an expenditure for new shipbuilding

219. Second Solmon Deposition, *supra* note 218, at 16.

220. *Id.* at 18-19.

and construction. It is further unclear how the DOD budgets and the manufacturers' surveys treated expenditures for ship conversions. If conversion costs were treated both as ship purchases, in the DOD data, and as repair costs, in the surveys, then there would be an inflationary distortion of the expenditure amounts used by Solmon. Any such augmentation would translate into a further artificial decrease in O-I's Navy Yard market share under Solmon's formula. This is because the asbestos component of such construction and repair of naval vessels would be estimated at an artificially high level, which would ultimately decrease the significance of fixed O-I sales amounts.

i. Solmon's Reliance on Oral Statements of a Phantom Naval Architect

In deriving figures for the dollar amount of asbestos-containing insulation used in shipbuilding, Professor Solmon made a number of assumptions that were of moment to the *in limine* court in striking Solmon's testimony. In the first instance, Professor Solmon conceded that he was "not an expert in shipbuilding,"²²¹ and "[could not] read ships' specifications."²²² Nonetheless, in lieu of a well-documented association with a known expert on shipbuilding (which expert might have provided trustworthy and verifiable data on the use of asbestos in shipbuilding), Solmon relied upon his recollection of the oral estimations of a "naval architect"²²³ with whom he had spoken no more than twice, both times over the phone.²²⁴

In any event, that architect told Solmon in one phone conversation that, for all ships, insulation products averaged 1% of the ship *by weight*. For destroyers, however, 2.6% of the weight of the ship constituted insulation products.²²⁵

The architect concluded that, of those percentage figures, "high temperature" Kaylo-type insulation would comprise

221. First Solmon Deposition, *supra* note 213, at 115.

222. Second Solmon Deposition, *supra* note 218, at 23.

223. First Solmon Deposition, *supra* note 213, at 115-16.

224. Second Solmon Deposition, *supra* note 218, at 23.

225. *Id.* at 24.

32% of the 1% figure, and 29% of the 2.6% figure. Stated Solmon, "[w]hen you take those, you get 32/100ths of 1% for all ships and 47/100ths [sic] of 1% for destroyers. [The architect] estimated that approximately one-third of the ships were destroyers and two-thirds were others. When you factor those in, you get .0047."²²⁶

On its face, Professor Solmon's rendition of the architect's computation is spurious. For if insulation products averaged 1% of "all ships" by weight, then the class of destroyers has already been included within the category of all ships. By nevertheless separating destroyers from the larger group, Solmon inflated the 0.32% figure to 0.47%.²²⁷

In this way Solmon concluded that, for *any* ship, 0.47% of the ship's weight is formed of asbestos-containing insulation. Such an inflated percentage, of course, further benefits Professor Solmon's client, Owens-Illinois, because the higher the percentage attributed to a ship's asbestos component, the lower will be the valuation of O-I's market share at the Brooklyn Navy Yard.

This is so because, under the Solmon model, as the average asbestos component of ships generally is calculated at increased levels, so will the amount of asbestos insulation used in shipbuilding be calculated at increased levels. Consequently, the amount of asbestos insulation attributed to the Navy Yard will be seen as proportionately higher, with a resulting decrease in that proportion of the asbestos used at the Navy Yard attributable to Owens-Illinois.

ii. Solmon's equivalence of Weight and Dollars

Further, Professor Solmon's calculations were not by weight, as were the architect's, but by dollar amounts. Thus, in assuming that the weight values of ship materials are strictly proportionate to their dollar values, Solmon extrapolated that 0.47% of the cost of a ship's materials represents

226. First Solmon Deposition, *supra* note 213, at 122.

227. It is also curious that Solmon, by way of the phantom architect, singled out destroyers, as opposed to aircraft carriers or battleships, for examples.

the cost of its asbestos insulation component.²²⁸

Assuming that the architect was correct in assessing the weight of asbestos insulation on a ship as roughly one-half of 1% of the total weight of the ship, there is nonetheless no clear basis for Solmon's leap to the conclusion that roughly one-half of 1% of a ship's cost is the dollar value of its asbestos insulation. Professor Hunt, the naval engineer who directly reviewed Professor's Solmon's formula, has noted that "[a]ssuming that all materials have the same dollar value per pound is a distortion which weakens [Solmon's] analysis."²²⁹ That engineer explains that "[a] precision machine such as a turbine, compressor or pump will have a cost many times greater than the structural steel used for the hull or any type of heat insulation on a dollars-per-pound basis."²³⁰

Moreover, regarding the 0.47% figure, Professor Solmon conceded that "one of the assumptions is that we have taken that same fraction for shipbuilding, conversion and repair dollars. One might argue that, in repair, given they were not doing the hull again, a higher proportion would be asbestos-containing block and pipe insulation."²³¹ If it is true that this assumption thus understated this asbestos-related factor, Solmon's formula, in this instance, would tend to overstate O-I's market share, because the fixed O-I sales values would occupy a greater proportion of the recognized whole asbestos component.

228. Second Solmon Deposition, *supra* note 218, at 25.

229. Hunt Affidavit, *supra* note 216, at ¶ 2(d).

230. *Id.* Professor Hunt further explains that the assumption of: an equivalence between weight values and dollar values for ship materials . . . is inappropriate since a World War II warship in light draft condition consists of a complex of hull structure, machinery, fittings, electrical apparatus and insulating and finishing materials. A precision machine such as a turbine, compressor or pump will have a cost many times greater than the structural steel used for the hull or any type of heat insulation on a dollars-per-pound basis. Assuming that all materials have the same dollar value per pound is a distortion which . . . is apparent in our everyday lives where we find we can purchase potatoes by the pound but electronic components, such as a T.V., are valued by their function not by weight.

Id.

231. First Solmon Deposition, *supra* note 213, at 117.

iii. Solmon's Reliance on a Chart Regarding Construction of 1930's Nonmilitary Vessels

In support of his leap from weight to monetary figures, Professor Solmon stated that the architect referred him to a "chart from the shipbuilding business in the United States of America," entitled "Materials Used in Shipbuilding."²³²

However, the chart describes itself as "show[ing] the values and distribution of materials required in a \$75,000,000 annual shipbuilding program of the usual types of vessels built in the United States, consisting of passenger and combination vessels, tankers, cargo vessels, yachts and small crafts."²³³

The chart continues that "[t]his program corresponds closely to what is expected to be the average annual construction for a five-year period from January 1, 1930."²³⁴ Using this chart, Solmon discounts the fact that the ships built at the Brooklyn Navy Yard were aircraft carriers and battleships, not yachts and passenger crafts.

The chart depicts expenditures for "insulation, deck covering and tiling" as \$1,084,000, or 1.4% of the total \$75,000,000 budget. Solmon then assumes, based on his recollection of the architect's analysis, that one-third of the "insulation, deck covering and tiling" figure will represent the expenditure for asbestos-containing insulation.²³⁵ Accepting the one-third estimate, Solmon concludes that 0.48% of the materials comprising a ship would be asbestos-containing insulation.²³⁶

However, it would appear self-evident that the material composition of battleships and destroyers is far more dense than that of the passenger vessels, cargo vessels and yachts dealt with by the chart. Moreover, the magnitude of the steel component of the warships constructed in the Navy Yard was

232. Second Solmon Deposition, *supra* note 218, at 25.

233. Chart entitled, *Materials Used In Shipbuilding*, attached as Plaintiffs' Exhibit 11 to Second Solmon Deposition, *supra* note 218 (emphasis added).

234. *Id.* (emphasis added).

235. Second Solmon Deposition, *supra* note 218, at 26.

236. *Id.* At some point, and without explanation, Professor Solmon replaces the 0.47% figure with the figure 0.48%.

not comparable to that aspect of the significantly lighter non-military crafts.²³⁷ To the extent that the imputation of a light craft asbestos component to the Navy warships results in an overestimation of such asbestos component within the warships, the O-I percentage at the Navy Yard is underestimated. Consequently, Solmon's reliance on the nonmilitary 1930's chart is highly problematic. Notwithstanding such problems, Professor Solmon, based on the chart, concludes that 0.48% of shipbuilding and repair expenditures in respect to World War II warships were devoted to the asbestos insulation component.

Solmon thus calculates the dollar amount of asbestos-containing insulation used in shipbuilding as the product of total naval shipbuilding expenditures times 0.0048. Thus:

$$(\text{asb. ins. used in shipbuilding}) = 0.0048 \times (\text{ttl. shipbuilding exp.})$$

3. Determining O-I's Market Share at Brooklyn Navy Yard

Professor Solmon thus laid the foundation for his ultimate determination of O-I's market share at the Brooklyn Navy Yard. He next sought to calculate the dollar amount of the asbestos insulation used at the Brooklyn Navy Yard over the years. In arriving at such amounts, Professor Solmon multiplied the percentage of naval activity occurring at the Navy Yard, based on numbers of employees, by the amount of asbestos insulation used in shipbuilding. Thus:

$$(\text{asb. ins. at BNY}) = (\% \text{ nav. act. at BNY}) \times (\text{asb. ins. used in shipbuilding})$$

Accordingly, the erroneous assumptions upon which Solmon based his figures for the above multiplier and multiplicand, which have been detailed, derivatively impair the calculation of the product — the amount of asbestos insulation used at the Navy Yard — rendering such product similarly suspect and arguably lacking in reliability.

The end of Professor Solmon's formula is the derivation

237. Hunt Affidavit, *supra* note 216, at ¶ 2(b) ("There is no rational basis for comparison among typical cargo ships and warships. . .").

of the following ratio:

$$(\text{O-I mkt. share at BNY}) = \frac{(\text{O-I at BNY})}{(\text{asb. ins. at BNY})}$$

The denominator having been resolved, as shown, Solmon then calculated the numerator — the amount of O-I's asbestos-containing products that reached the Brooklyn Navy Yard — based on various sales records or summaries of sales records that had been maintained by Owens-Illinois.²³⁸ However, these sales records and summaries were never established as complete or accurate. Indeed, it is improbable that records purporting to document corporate sales activities during prior decades could, under normal circumstances, be proven accurate or complete, even where authentic documentation is extant and not reduced to summary form.

As a further matter, Professor Solmon limited his inquiry to those records indicating direct sales to the Navy Yard.²³⁹ In so doing, Solmon did not include or make any provision for sales of Kaylo to dealers or distributors, who may, in turn, have shipped to the Brooklyn Navy Yard.²⁴⁰ Because the asbestos industry was, in fact, filled with middlemen and distributors as an ordinary part of the asbestos marketing scene,²⁴¹ Solmon's assumption of only direct sales represents an unwarranted leap of faith. It is therefore more likely than not that substantial amounts of Kaylo were sold to private distributors, which in turn supplied the O-I asbestos products to government yards.

The significance of Professor Solmon's assumption of direct sales only is that, to the extent that indirect sales were in fact made, the amount of Kaylo reaching the Brooklyn Navy

238. Second Solmon Deposition, *supra* note 218, at 7.

239. *Id.* at 8.

240. *Id.* at 58.

241. See, e.g., *Irving v. Owens-Corning Fiberglass Corp.*, 864 F.2d 383, 386 (5th Cir. 1989), *cert. denied*, 493 U.S. 823 (1989). See generally *In re School Asbestos Litig.* 789 F.2d 996 (1986); *Celotex Corp. v. Kelly*, 921 F.2d 1338 (3d Cir. 1990), *cert. denied*, 111 S. Ct. 1623 (1991); *White v. Celotex Corp.*, 907 F.2d 104 (9th Cir. 1989); *Simon v. Celotex Corp.*, 851 F.2d 361 (9th Cir. 1988); *Menna v. Johns-Manville Corp.*, 585 F. Supp. 1178 (D.N.J. 1984), *aff'd*, 772 F.2d 895 (1985).

Yard would be undervalued. Any undervaluation of O-I sales to the Brooklyn Navy Yard, of course, will function as a further device for devaluing O-I's market share at the Navy Yard.

As a quantitative matter, the numerous assumptions that have been discussed result in the final assessments made by Professor Solmon's econometric model, that O-I's market share at the Brooklyn Navy Yard for all but three years between 1943 and 1958 was less than 1% and in no year was greater than 3.06%. These figures therefore contradict the substantial anecdotal recollection on the part of numerous former Brooklyn Navy Yard workers that O-I's Kaylo constituted a significant portion of all insulation products seen at the Navy Yard.²⁴²

C. The *In Limine* Ruling Excluding Professor Solmon's Testimony

At the *in limine* hearing held on December 4, 1990, in the Brooklyn Navy Yard litigation, Judge Weinstein ruled that, for a number of reasons, the testimony of Professor Solmon would be excluded.²⁴³ In respect to this determination pursuant to Rule 703 of the Federal Rules of Evidence, Judge Weinstein stated that "the testimony would be given in contradiction to Rule 703[, which] requires that the facts . . . and data in a particular case upon which an expert bases an opinion or inference must be of a type reasonably relied upon by experts in the particular field in forming opinions or inferences."²⁴⁴

Judge Weinstein further found that an economist undertaking a study similar to that attempted by Professor Solmon would not reasonably "rely upon a telephone call without written report of an architect whose background he has not

242. See *supra* note 212 and accompanying text.

243. Transcript of Hearing on Motions Before the Honorable Jack B. Weinstein, *In re New York Asbestos Litigation* (Brooklyn Navy Yard), CV 90-9999, at 7876 (E.D. & S.D.N.Y. Dec. 4, 1990) [hereinafter Transcript of Hearing].

244. *Id.* at 7876-77.

checked upon.”²⁴⁶ The court also emphasized that, “for an expert to extrapolate from a chart such as was provided here . . . based upon civilian ships of the period 1930 as compared to the ships that were being worked on in the Navy Yard, namely, heavy battle ships and heavy cruisers and large aircraft carriers, represents such a departure from what would be expected from an expert working in this field that it is unacceptable. In fact, I find it shocking.”²⁴⁶

Finally, Judge Weinstein acknowledged, “I have a good deal of respect for this witness’ background, he has a fine curriculum vitae[,] but I believe that by testifying as he has with respect to this matter he has seriously compromised his professional standing in this court, whatever any other court may find.”²⁴⁷ At the conclusion of the *in limine* hearing, Judge Weinstein directed that a transcript of the examination of Professor Solmon be forwarded to the American Economic Association “for analysis by that association, if it sees fit to do so, to determine whether this level of expert testimony is appropriate in a federal court of law.”²⁴⁸

IV. Toward an Intermediate Approach to Proposed Expert Testimony

The ruling by Judge Weinstein excluding the proposed market share testimony of Professor Solmon represents an extension of the restrictive approach to contexts not involving medical causation. While comporting with the letter of Rule 703 in determining that the data underlying Professor

245. *Id.* at 7877.

246. *Id.* Judge Weinstein also based his ruling excluding Professor Solmon’s proposed testimony upon Rules 702 and 403 of the Federal Rules of Evidence. In respect to Rule 702, the court stated that, “while this witness has specialized [and] technical knowledge none of it offered here will assist this trier of fact to understand the evidence or to determine a fact in issue.” *Id.* Addressing Rule 403 considerations, the court noted that the proffered expert testimony “provides such limited probative value and such a high probability of prejudice as to warrant exclusion under 403 grounds as well.” *Id.*

247. *Id.* at 7878.

248. See Transcript of Hearing, *supra* note 243. The court later withdrew this directive, and such a determination was not made by the American Economic Association.

Solmon's model is not the type of information upon which a market share economist would reasonably rely, the court did not inquire whether, as a factual matter, this was so. Indeed, it was only as an afterthought that the court directed submissions to the American Economic Association for just such a Rule 703 recommendation from an association of Professor Solmon's peers.

Nor did the court credit Professor Solmon's attestations that he had used "generally accepted principal[s] of economics," and had relied "upon information that economists normally rely upon to make this kind of evaluation."²⁴⁹ Similarly to no avail was Solmon's suggestion that, because his underlying data was, in this particular case, the best available evidence for apprising market conduct undertaken several decades ago, the economist would normally use, rather than ignore, such data.²⁵⁰ Instead, Judge Weinstein relied upon his own rigorous examination of the proffered testimony, as presented through the plaintiffs' *in limine* motion, and found that such testimony did not meet his own standard of reasonable reliability.

In contrast to Judge Weinstein's approach, it is likely that a court adopting the pure liberal approach to the admissibility of proposed expert testimony would have concluded that Professor Solmon's testimony was admissible. There is at least some basis for Solmon's expert conclusions, and Solmon's attestations, that in the practice of his profession he would rely on the data underlying his model, which provides a sufficient basis for satisfying the threshold criteria of Rule 703.²⁵¹ It is not clear, however, whether such a court adopting

249. Testimony of Lewis C. Solmon, *In re New York Asbestos Litigation* (Brooklyn Navy Yard), CV 90-9999, Transcript at 7819-20 (E.D. & S.D.N.Y. Dec. 4, 1990). Professor Solmon further stated of his methodology that "[t]his is a set of economic techniques that are standard and very familiar to me and I have, as I said, won awards because I do it well." *Id.* at 7869.

250. *See id.*, at 7837 ("as a quantitative economic historian[, w]hat we do is just look at . . . any possible source of information that we can get. We evaluate — then we evaluate the quality of whatever the data is and weigh it"); First Solmon Deposition, *supra* note 213, at 114.

251. In his deposition testimony, Professor Solmon revealed that he had first given market share testimony on behalf of Owens-Illinois in 1981, and had similarly

the liberal approach and finding the market share evidence admissible under Rule 703, would then, nevertheless, find the same evidence problematic under another provision of the Federal Rules of Evidence, such as Rule 403.

In other words, the question arises whether the court adopting the liberal approach should, in appropriate circumstances, exclude under Rule 403 that which it includes under Rule 703. The immediate dilemma inherent in the suggestion of such a bifurcated approach to the scrutiny of expert testimony is that the creature of individualized judicial analysis sought to be avoided under the liberal approach could nevertheless rear its disheveled head under Rule 403 analysis. Yet Rule 703 certainly does not preempt or negate any other Federal Rule of Evidence. Logically, therefore, each Rule continues to play a role in the determination of admissibility, even where expert testimony is at issue.

One argument in support of the restrictive interpretation of Rule 703 is that, if rigorous judicial examination of proffered expert opinion testimony must be undertaken pursuant to Rule 403 in any event, then there is no reason to preclude such examination under Rule 703. Comparison of the case law representing the liberal and restrictive approaches, however, suggests that the former approach more clearly comports with the spirit of the Federal Rules of Evidence and ensures greater consistency and clarity of judicial analysis on the issue of admissibility.

Yet satisfaction of the liberal standard should result only in a rebuttable presumption, and not a guarantee, of admissibility of the challenged evidence. This presumption may be overcome upon demonstrating, under Rule 403 of the Federal Rules of Evidence, that the probative value of the proposed testimony is "substantially outweighed" by the danger of con-

testified on numerous occasions during the subsequent decade. First Deposition, *supra* note 213, at 45-46. In his trial testimony, Solmon further explained that he has "testified in other courts throughout the United States as an expert in the field of economics," and, in particular, has testified "with regard to the market share of Kaylo in the Brooklyn Navy Yard." Testimony of Lewis C. Solmon, *In re New York Asbestos Litigation (Brooklyn Navy Yard)*, CV 90-9999, Transcript at 7867, 7872 (E.D. & S.D.N.Y. Dec. 4, 1990).

fusion of the issues or misleading the jury. Isolated instances, even if numerous, of potentially misleading or incorrect assumptions should not by themselves warrant exclusion of the evidence. Instead, this danger, of misleading the jury or confusing the issues, must *permeate* the proffered evidence and inhere in *systematically* misleading or flawed assumptions that are substantially likely to thwart the jury's understanding or determination of the facts in issue.

Consequently, the standard proposed here is, in effect, an intermediate standard because it does entail a second level of scrutiny of proffered expert testimony. However, the ability ultimately to exclude such evidence is limited. Unlike the restrictive approach, this independent judicial examination occurs in the context of the Rule 403 standard, and not to gauge reliability under Rule 703. The Rule 403 analysis is different from a rigorous Rule 703 examination. Accordingly, under this intermediate standard, expert testimony that satisfies the liberal standard, and is not, when viewed as an organic whole, substantially likely to confuse the issues or mislead the jury, will be admitted, even if such testimony does not fulfill the court's particular standard of reliability.

A. The Correctness of the Liberal Approach

As an initial matter, the conflict between the liberal and restrictive interpretations of Rule 703 should be resolved in favor of the liberal approach. Rule 703 must be construed against the backdrop of Rule 702, which prescribes generally that expert testimony is admissible if the witness is qualified and if the testimony "will assist the trier of fact to understand the evidence or to determine a fact in issue"²⁵² Thus, whether the situation is a proper one for the use of expert testimony is a function of whether such testimony will assist the trier. It follows that expert opinions are broadly admissible for purposes of Rule 702 unless they "are unhelpful and therefore superfluous and a waste of time."²⁵³

252. FED. R. EVID. 702.

253. FED. R. EVID. 702 advisory committee's note, 56 F.R.D. 183, 282 (quoting JOHN H. WIGMORE, 7 WIGMORE ON EVIDENCE § 1918).

Judge Higginbotham has addressed certain concerns that arise from the openness to expert testimony apparently embodied in Rule 702 and the Rules of Evidence, generally, in respect to expert opinion testimony. He notes that, although the Rules may be open to the criticism that they invite so-called "hired gun" testimony, fears about the dangers of such testimony originated well before 1975, when the Rules became effective, and indeed well before 1965, when then Chief Justice Earl Warren appointed an advisory committee to draft such rules of evidence for the federal courts.²⁵⁴ Consequently, it is reasonable to conclude that the advisory committee, and then Congress, chose to tolerate the increased risks presented by a liberalized approach to expert opinion testimony.

One response to such increased risks, however, is Rule 706 of the Federal Rules of Evidence, which allows the court to appoint its own expert witnesses on its own motion or on the motion of any party.²⁵⁵ Though the argument has been made that a court appointed expert may acquire an unwarranted aura of infallibility,²⁵⁶ such an appointment is, in actual experience, a relatively infrequent occurrence. Thus, it has been noted that "the assumption may be made that the availability of the procedure in itself decreases the need for resorting to it. The ever-present possibility that the judge *may* appoint an expert in a given case must inevitably exert a sobering effect on the expert witness of a party and upon the person utilizing his services."²⁵⁷

Although the liberal approach makes more probable the occasional admission into evidence of expert testimony having questionable or negligible value, a corresponding risk associated with the restrictive approach is that valuable and fundamentally sound evidence will be excluded because the court agrees with opposing expert testimony. One axiom rooted in

254. See *Brock v. Merrell Dow Pharmaceuticals, Inc.*, 884 F.2d 167, 168-69 (5th Cir. 1989) (dissent from denial of rehearing *en banc*), *cert. denied*, 494 U.S. 1046 (1990).

255. FED. R. EVID. 706(a).

256. Elwood S. Levy, *Impartial Medical Testimony — Revisited*, 34 TEMP. L.Q. 416 (1961).

257. FED. R. EVID. 706 advisory committee's note, 56 F.R.D. 183, 287.

the liberal approach is that courts should not exclude expert testimony on the basis of having chosen sides in the battle of experts. The restrictive approach has been criticized because, on occasion, it has resulted in such judicial alignment as a basis for decision making. For example, in *Christophersen*, the district court had relied upon the affidavits of physicians who disagreed with the analysis of the proffered expert, Dr. Miller, who had concluded, "based upon reasonable medical probability," that the decedent's illness and death had been caused by exposure to fumes containing particles of nickel and cadmium.²⁵⁸ In its first opinion, the Court of Appeals for the Fifth Circuit in *Christophersen I* overturned the district court's determination, holding that the court "simply chose sides in this battle of the experts and thereby usurped the role of the jury in evaluating the evidence and the credibility of expert witnesses."²⁵⁹

Certain decisions in cases involving the drug Bendectin further illustrate use of a restrictive approach under which admissibility becomes a function of the court's assessment of the weight of competing expert views. In *Richardson v. Richardson-Merrell, Inc.*,²⁶⁰ the court, citing *In re "Agent Orange" Product Liability Litigation*,²⁶¹ concluded that the large number of epidemiological studies that failed to show a "statistically significant" association between Bendectin and birth defects overwhelmingly outweighed contrary information presented by the plaintiffs' expert, and therefore that the proffered testimony lacked an adequate foundation.²⁶² In the

258. *Christophersen v. Allied-Signal Corp.*, 902 F.2d 362, 365 (5th Cir. 1990) ("*Christophersen I*"). See generally *supra*, notes 42-114 and accompanying text.

259. *Christophersen I*, *supra* note 13, at 366.

260. *Richardson v. Richardson-Merrell, Inc.*, 857 F.2d 823 (D.C. Cir. 1988), *cert. denied*, 493 U.S. 882 (1989).

261. See *supra* note 14.

262. 857 F.2d at 830, 831 n.59, 832; see *supra* note 118. Nevertheless, the *Richardson* Court recognized the rule in *Ferebee* that "courts should be very reluctant to alter a jury's verdict [finding causation] when the causation issue is novel and 'stand[s] at the frontier of current medical and epidemiological inquiry.' If experts are willing to testify to causation in such situations and their methodology is sound, the jury's verdict should not be disturbed." 857 F.2d at 832 (emphasis in original)(quoting *Ferebee*, 736 F.2d at 1534). The *Richardson* Court distinguished *Ferebee*

subsequent case of *Ealy v. Richardson-Merrell, Inc.*,²⁶³ the Court of Appeals for the District of Columbia Circuit explained that "[t]he *Richardson* court concluded, as a matter of law, that the 'wealth of published epidemiological data . . . none of which has concluded that the drug is teratogenic . . . must be given their just due' Therefore, under Rule 703, an opinion refuting this scientific consensus is inadmissible for lack of an adequate foundation, in the absence of other substantial probative evidence on which to base this opinion."²⁶⁴

Moreover, as related, in *Agent Orange*, Judge Weinstein determined the reliability of various epidemiological studies regarding the effects of the chemical, and found that those he considered reliable and useful did not support the plaintiffs' allegations of causation. Judge Weinstein found the studies that did support a link between Agent Orange and plaintiffs' illnesses to rest "on surmise and inapposite extrapolation from animal studies and industrial accidents."²⁶⁵ Although the *Agent Orange* court apparently weighed competing methodologies as well as expert conclusions, the court took "judicial notice" that the studies indicating or inferring causation derived from unreliable underlying data and methodologies.²⁶⁶ To the extent that Judge Weinstein did weigh competing expert conclusions, he noted that Congress had linked only two diseases to exposure to Agent Orange, but that neither of these diseases afflicted the plaintiffs.²⁶⁷

from the case before it by noting that, in the Bendectin context, we are at the other end of the spectrum, a great distance from the "frontier of current medical and epidemiological inquiry." And far from a paucity of scientific information on the oft-asserted claim of causal relationship of Bendectin and birth defects, the drug has been extensively studied and a wealth of published epidemiological data has been amassed, none of which has concluded that the drug is teratogenic.

Id.

263. *Ealy v. Richardson-Merrell, Inc.*, 897 F.2d 1159 (D.C. Cir. 1990), *cert. denied*, 111 S. Ct. 370 (1990).

264. *Id.* at 1162 (quoting *Richardson*, 857 F.2d at 832).

265. *Agent Orange III*, 611 F. Supp. at 1231; *see supra* notes 120-124 and accompanying text.

266. *Agent Orange III*, 611 F. Supp. at 1246; *see supra* notes 120-24 and accompanying text.

267. *See Agent Orange III*, 611 F. Supp. at 1237; *cf. Helping Courts With Toxic*

However, it seems reasonable that, in terms of the ultimate integrity of the fact-finding process, it is better to risk admitting bad evidence under the liberal approach than to risk the exclusion of good evidence under the restrictive interpretation of Rule 703. This is because the exclusion of good evidence permanently deprives the proponent of the opportunity to make its case. The jury will not be presented with the data, expert opinions or conclusions supporting the proponent's position in the litigation. In contradistinction, however, the admission of bad evidence will not prevent the opposing party from thoroughly discrediting such evidence during cross-examination. The jury, under such circumstances, is thus presented with both sides of the issue and, as arbiter of credibility, is left to credit or reject the expert testimony.

Establishing the reliability of expert conclusions should not be a requisite to the admissibility of those conclusions, but rather should be a concern inherent in presenting the evidence to the jury. As stressed in *Ferebee*, the test for determining whether evidence reaches the jury "is not scientific certainty but legal sufficiency."²⁶⁸ Accordingly, "the fact that another jury might reach the opposite conclusion or that science would require more evidence before conclusively considering the . . . question resolved is irrelevant."²⁶⁹ Once the prospective witness is qualified as an expert in the field, then his own assessment of reliability must be factored into the admissibility determination, and may even be dispositive. If there is some factual basis for the testimony, and if the methodology and underlying data are of a type reasonably relied upon by experts in the particular field, the court, in excluding the evidence under the restrictive approach, often necessarily substitutes its own scientific or technical assessment for that of the expert, and its own determination of the credibility of competing views for that of the jury.

The analysis of the Third Circuit in *In Re Japanese*

Torts, *supra* note 30, at 56 (discussing the incorrectness of Judge Weinstein's approach and conclusions).

268. *Ferebee*, 736 F.2d at 1536; *see supra* note 30 and accompanying text.

269. *Id.*; *see supra* note 31 and accompanying text.

Electronic Products Antitrust Litigation captures the essence and intended meaning of Rule 703. As related, the Third Circuit emphasized that "[t]he proper inquiry is not what the court deems reliable, but what experts in the relevant discipline deem it to be."²⁷⁰ The court further noted that the language and intent of Rule 703 require only "a factual inquiry and finding as to what data experts in the field find reliable."²⁷¹

Although courts and scholars recognizing such a limited judicial role under Rule 703 have stressed that the prospective witness himself should be deemed competent to judge the reliability of his data and methodology, it is not clear that Rule 703 would preclude a collateral hearing on the issue of reasonable reliance by experts in the field. Such a collateral proceeding, however, could easily result in the kind of judicial weighing of competing views that the liberal approach seeks to avoid. In any event, it is likely that the Rule contemplates that validation of the underlying data by the proposed witness, who himself relies and thus stakes his professional credibility upon such data, "ought to suffice for judicial purposes."²⁷² Thus, it has been stated that, if the proffered statements "are attested by the expert as the basis for a judgment upon which he would act in the practice of his profession, it seems that they should ordinarily be a sufficient basis even standing alone for his direct expression of professional opinion on the stand" ²⁷³

B. Rebutting the Presumption of Admissibility

Yet satisfaction of the liberal standard should result only in a rebuttable presumption, and not a guarantee, of admissibility of the challenged evidence. Rules of evidence exist

270. *Japanese Antitrust*, 723 F.2d at 276 (citing *Wilder Enter. v. Allied Artists Pictures*, 632 F.2d 1135, 1143-44 (4th Cir. 1980); *Bauman v. Centex Corp.*, 611 F.2d 1115, 1120 (5th Cir. 1980); *United States v. Genser*, 582 F.2d 292, 298 (3d Cir. 1978), cert. denied, 444 U.S. 928 (1979)).

271. *Japanese Antitrust*, 723 F.2d at 277.

272. FED. R. EVID. 703 advisory committee's note, 56 F.R.D. 183, 283.

273. *Japanese Antitrust*, 723 F.2d at 277 (quoting CHARLES TILFORD MCCORMICK, MCCORMICK ON EVIDENCE § 15, at 35-36 (2d ed. 1972)); see *supra* note 183.

outside of Article VII of the Federal Rules, which deals exclusively with expert testimony, that may independently counsel exclusion even where Article VII standards have been met. Thus, the presumption of admissibility may be overcome upon demonstrating, for instance, under Rule 403 of the Federal Rules of Evidence, that the probative value of the proposed testimony is "substantially outweighed" by the danger of confusion of the issues or misleading the jury. To reconcile Rule 403 with Rule 703, as construed under the liberal approach, however, this danger must permeate the proffered evidence and inhere in systematically misleading or flawed assumptions that are substantially likely to thwart the jury's understanding or determination of a fact in issue.

Consequently, the standard at which we ultimately arrive is, in effect, an intermediate standard because it allows a second level of scrutiny of proffered expert testimony. However, under this standard, the court has only limited ability to exclude such evidence. Unlike the restrictive approach, this independent judicial examination occurs in the context of the Rule 403 standard, and not to gauge reliability under Rule 703. Accordingly, expert testimony that satisfies the liberal interpretation of Rule 703 and is not substantially likely to confuse the issues or mislead the jury, will be admitted, even if such testimony does not fulfill the court's particular standard of reliability.

Rule 403 states that, "[a]lthough relevant, evidence may be excluded if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury, or by considerations of undue delay, waste of time, or needless presentation of cumulative evidence."²⁷⁴ Circumstances are foreseeable in which proposed expert evidence will be deemed admissible under the liberal interpretation of Rule 703, yet problematic under Rule 403 because the evidence may potentially mislead the jury or confuse the issues.

The proffered testimony of Professor Solmon in the

274. FED. R. EVID. 403.

Brooklyn Navy Yard asbestos litigation arguably exemplifies expert evidence that should fulfill the liberal standard, yet be excluded under the second, intermediate level of scrutiny pursuant to Rule 403. Misleading assumptions within Solmon's market share model, fully explicated above, threaten to confuse the issues or mislead the jury.²⁷⁵

Nevertheless, even numerous misleading assumptions should not be sufficient to exclude expert testimony under Rule 403 that has been admitted under Rule 703. Such assumptions, it is submitted, once shown to be specious, must be *both pervasive and systematic*. Logically, to be systematic, the network of assumptions must form or constitute a system. The principal test of whether a chain of specious assumptions forms a system is whether, taken as a whole, it is clearly apparent that such a chain fosters a particular outcome. Whether that outcome is consciously or merely inadvertently fostered is irrelevant. The important consideration is that the vast majority of the assumptions are conducive of one result.

Thus, under the intermediate standard, were the defects in Professor Solmon's assumptions to operate in favor of each party at apparent random, then exclusion of the expert testimony under Rule 403 would not be appropriate. Thus, the intermediate standard permits the generally qualified expert whose proposed testimony has some factual basis to offer such testimony, even if his present analysis is demonstrably half-baked or ultimately of negligible value, so long as the defects are not result-oriented. If such evidence is determined to be admissible under Rule 703, and under Article VII of the Rules of Evidence generally, then it has already been determined that the evidence is not "so 'fundamentally unsupported' that [it] would be of no assistance to the jury in reaching a verdict. The questions [the opposing parties] raise concerning the bases for the conclusions are issues properly presented to and considered by the jury, but they do not render the opinion unreliable and therefore inadmissible."²⁷⁶

If the specious nature of the assumptions operate to pro-

275. See *supra* notes 165-193 and accompanying text.

276. Christophersen I, *supra* note 13, at 367.

duce or to discourage a particular result that is material to the litigation, however, then the danger that the expert evidence may mislead the jury or confuse the issues is intensified, and the proffered testimony should be excluded. When assumptions in an expert's methodology or analysis are both flawed and systematically produce a skewing effect in favor of one party, then the result, however unintentional, is analogous to the commission of a fraud upon the court. As stated by the dissent in the opinion in *Christophersen II*, the unfair prejudice to which Rule 403 refers is "an undue tendency to suggest decision on an improper basis."²⁷⁷ When such a skewing effect is demonstrated, the heightened protection offered by Rule 403 becomes applicable, and the Rule thus acquires a sort of policing function.

Of course, the fact that the expert's ultimate conclusion favors the party proffering the evidence would not by itself render such evidence sufficiently misleading under Rule 403 as to warrant exclusion. Because, as a practical matter, the expert's conclusions will always favor the proponent of the testimony, such a condition would render meaningless the requirement of systematic speciousness. Here, the underlying assumptions must be misleading, and must individually and systematically mislead in such a way as to the tilt the expert conclusions (and, by extension, the attentive jury) in one party's favor.

It is arguable that the flawed assumptions made by Professor Solmon constitute a system favoring Owens-Illinois, the former manufacturer of asbestos-containing products and the proponent of Solmon's testimony.²⁷⁸ The flaws permeating the formula appear to work in a consistent way to devalue the market share of Owens-Illinois at the Brooklyn Navy Yard. Each assumption that devalues O-I's market share thereby

277. *Christophersen II*, *supra* note 89, at 1106, 1135 (quoting FED. R. EVID. 403 advisory committee's note 56 F.R.D. 183, 218).

278. Nevertheless, Professor Solmon has stated that, in making certain of his market share assumptions, he "tr[ies] to bias the estimate, the calculation, against Owens-Illinois." Testimony of Lewis C. Solmon, *In re New York Asbestos Litigation* (Brooklyn Naval Shipyard Consolidated Cases), CV 90 9999, Transcript at 7823 (E.D. & S.D.N.Y. Dec. 4, 1990). See, e.g., *Supra* note 231 and accompanying text.

operates to assist that defendant in minimizing its own responsibility for the plaintiffs' injuries caused by exposure to asbestos products in the Navy Yard. Whether intentional or not, the defective assumptions are both pervasive and systematic.

Consequently, it is possible, as the *in limine* movants argued, that the problematic nature of Professor Solmon's model rises to the level at which his proffered testimony is properly excludable under Rule 403, even though such testimony may be admissible under the liberal interpretation of Rule 703. Although it may, therefore, be the case that even a court adopting the liberal approach to proposed expert testimony might have excluded Professor Solmon's testimony under Rule 703, exclusion on this basis would not have frustrated the asbestos defendants' efforts at market share strategy. For an economic analysis may be remedied of such systematic defects.

However, the reliability of any market share model set forth in defense of an asbestos manufacturer will always be problematic under the restrictive view of Rule 703. The need to reconstruct marketing behavior and distribution patterns occurring several decades in the past, for which there is minimal authentic documentation, makes it highly unlikely that a court adopting the restrictive approach would find such an economic model to be sufficiently reliable to be presented to the jury. Thus, Judge Weinstein's rigorous scrutiny of Professor Solmon's proffered testimony signified a momentous obstacle and possibly an end to the market share defense strategy in the asbestos litigation, as well as an overall extension of the restrictive view of Rule 703 to economic areas of environmental tort litigation.

V. Conclusion

Judge Weinstein's ruling excluding the testimony of Professor Solmon in the Brooklyn Navy Yard asbestos litigation suggests the broadened applicability of the restrictive judicial approach to Rule 703 evaluation of proposed expert testimony. In his *Agent Orange* opinions, Judge Weinstein com-

prehensively set forth principles upon which he based his own rigorous scrutiny of proffered expert evidence in the context of medical causation. As courts have been guided by these leading opinions, it is foreseeable that Judge Weinstein's use of the restrictive approach in respect to proposed economic evidence will now foster heightened judicial scrutiny of expert testimony apart from the localized context of causation in the toxic tort setting.

The ruling will further reinforce the already widespread disinclination to allow market share evidence in asbestos-related litigation. This disinclination exists because market share theories generally fail to account for the fact that the toxicity of asbestos-containing products varies depending on the specific nature of the asbestos component. Unlike DES, for example, which was produced according to one formula and for which market share theory may therefore be more appropriate, asbestos products may contain one or more types of asbestos silicates, as well as varying proportions of asbestos fibers. Given this possible effect of the exclusion of Professor Solmon's testimony, it is ironic that Judge Weinstein himself is becoming a leading proponent of the use of the market share allocation of responsibility in asbestos cases to relieve the massive asbestos docket and streamline the litigation.

For asbestos defendants, the exclusion of the market share testimony potentially negates one major defense that might otherwise have been increasingly developed by the individual companies. Because of the difficulty of constructing a market share model of conduct that occurred several decades in the past, and of which authentic documentation is truly scarce, it is unlikely that any court using the restrictive approach will deem such evidence reliable enough to be presented to a jury. Accordingly, it is probable that defendants will continue to coalesce around defenses involving issues such as state of the art and medical causation, rather than splinter in the attempt to blame one another through market share formulae.

It has been demonstrated, in any event, that these analytic and strategic concerns are informed by the larger doctrinal split, currently splintering courts involved in environmen-

tal tort litigation, regarding the level of judicial scrutiny that is appropriate under Rule 703 of the Federal Rules of Evidence. This article has argued for a liberal interpretation of Rule 703, yet one tempered by a certain degree of heightened scrutiny outside the confines of Article VII of the Rules of Evidence. The resulting intermediate standard would counsel exclusion of testimony such as that proffered by Professor Solmon, but, unlike the restrictive approach, would disallow exclusion of proposed testimony merely because such evidence does not fulfill the court's individual standard of reliability. Instead, once expert testimony is deemed admissible under the liberal approach, it would be excludable under Rule 403 only if the defects in the proffered evidence are both pervasive and systematic, and for these reasons substantially likely to mislead the jury or confuse the issues.